Granite Seed & Erosion Control

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Granite Seed Company - your one stop source for all land reclamation, restoration, and revegetation projects.

GRANITESEED.COM

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COLORADO'S SANGRE DE CRISTO NATIONAL HERITAGE AREA AND THE GREAT SAND DUNES NATIONAL PARK AND PRESERVE.

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FRONT COVER: MALE GREATER SAGE-GROUSE ON A BLACK SAGEBRUSH (*ARTEMISIA NOVA*) MATING LEK DURING SPRING IN UTAH. BACK COVER: FEMALE GREATER SAGE-GROUSE. ©MIA MCPHERSON

granite SEED
and erosion control

As we approach our 30th year in business, Granite Seed is pleased to present the newest edition of our well-known seed catalog. Considered the industry-standard manual by many land managers and practitioners, this new catalog is an expression of our continued commitment to exceptional customer service.

Inside you will find information for approximately 800 species, varieties and source identified native collections. There is also information about quality control, terminology of the seed trade, changes in botanical taxonomy, erosion control products, planting aids and much more.

New for this edition...

- Descriptions of nearly 200 new species, varieties and source identified selections.
- Revised and expanded plant summaries from the most current scientific information available.
- Recent developments in cover crops for restoring soil health and function.
- Product descriptions for the latest erosion control and planting aid technologies.

This catalog is intended as a technical reference guide for numerous types of seeding projects and will be useful for many years to come. Granite Seed's highly trained staff of seed and erosion experts is available to address any questions and assist with your revegetation and erosion control needs.

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NATIVE SHRUB COMMUNITY AT SAN FRANCISCO PEAKS NEAR FLAGSTAFF, ARIZONA.

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About
Granite Seed & Erosion Control

Granite Seed & Erosion Control, along with our affiliate companies, specialize in supplying seed and erosion control products for native restoration, reclamation, turf, landscape, agricultural, pasture and range projects. We are dedicated to providing:

- **Exceptional quality**
- **Extensive seed selection**
- **Full line of erosion control products**
- **Competitive and fair pricing**
- **Fast and accurate service**
- **Professional technical support**

QUALITY
Granite Seed realizes that our reputation is only as good as our quality. Our wildland collection specialists and affiliate seed production farms at L&H Seeds (WA) and Bruce Seed Farm (MT) all approach seed quality with the same attitude and we maintain a very strict seed testing and storage program. In order to offer our customers the best quality, we start with only the best produced seeds before thorough cleaning and testing to ensure a high germination rate and purity.

COMMITMENT TO PERFORMANCE
Granite Seed is committed to a best-in-class approach to quality, price, product selection, performance and customer service. We value the loyalty of satisfied customers and you can count on us to make customer satisfaction our highest priority. We have the most reliable processing equipment available in the industry, with custom designed computer software to keep track of testing and inventory to ensure that your seed orders are accurately prepared and blended. Our high quality and timely service is a result of our well trained people, computer system, internal logistics, mixing equipment and prime shipping locations.

GUARANTEE
Granite Seed Company guarantees its seed to be of the promised quality when it is shipped and true to name as specified. Should seed prove to be other than labeled, liability shall be limited to replacement or refund of the purchase price. Fulfillment of all orders is contingent upon availability and/or conditions beyond our control. Seed may be reserved in advance to help guarantee availability. Seeds are carefully handled and bagged to preserve the quality of the material. Our liability ceases once seed is on board the public carrier or your vehicle.

SERVICE & TECHNICAL SUPPORT
Granite Seed's educated, experienced and dedicated seed and erosion control specialists are all focused on bringing you the service and products you need to be effective in your work. When you have questions, expect prompt and accurate answers, and when you need seed we move quickly to assemble your custom mixes and get the product on the road.

SELECTION & DIVERSITY
Granite Seed maintains the most extensive inventory of seed products available from any one source. Our seed inventory is comprised of a diverse assortment of adapted local ecotypes and named varieties, including hundreds of hand collected native grasses, forbs and shrubs. Our unique vertically-integrated business model combines our own extensive production farms and native seed collection efforts with procurement from third-party vendors, ultimately ensuring availability of seed that is appropriate for your location and project. When your project site includes steep slopes, unstable soils or channels, we complement our seed offering with a complete selection of erosion control materials, from temporary biodegradable products to long-term or permanent stabilizers.

GRANITESEED.COM
The Granite Seed website is designed to help you plan all your seeding and erosion control projects. There you will find additional in-depth information for every species, erosion control product and planting aid. Our website has other useful tools to assist you, such as:

- Additional species photos
- Plant varietal release notices
- Planting guides for wildflowers, new turf installations and turfgrass revitalization
- Guidelines on seed testing, labeling, site-adapted seed, Pure Live Seed (PLS) and seed certification
- Product information sheets, photos, installation guides and certificates of compliance

You can also use our online Project Planner form to describe the objectives and site characteristics of your next project. Our seed and erosion control professionals will analyze the information and recommend the best seed and materials for the project. Or if you prefer, call us to discuss the specifics of your seeding and erosion control project.

SHIPPING LOCATIONS & LOCAL PICKUP
Granite Seed's numerous distribution locations—including our seed production farms and warehouse facilities at Bruce Seed Farm (MT) and L&H Seeds (WA)—place us at major crossroads for rapid shipping throughout the western and central U.S. Shipments from our facilities reach most destinations within one

WASHINGTON **L&H Seeds**
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to two days, and our in-house freight specialists are always working to find you the best freight carrier transit times and rates. Shipping to North American locations beyond the western U.S. is also prompt. You are also welcome to schedule your order for local pickup.

CUSTOM MIXING

Custom seed blending is Granite Seed's specialty. Whether your project requires one or multiple custom blends, we will gladly custom mix seed to your project's specifications.

TERMS

Net-30 day payment terms are available upon approved credit, unless other arrangements have been made in advance. Granite Seed accepts all major credit cards. Custom seed mixes cannot be cancelled after the seed is mixed and custom mixes are not returnable. Granite Seed may accept seed for refund (less a restocking fee) at its discretion. Complete ***Terms and Conditions of Sale*** are printed on our credit application form and on every invoice.

HOURS

Normal business hours are 8 AM to 5 PM, Monday through Friday. Granite Seed is closed for major U.S. holidays.

GRANITE SEED'S UTAH OFFICE AND WAREHOUSE.

©RYAN TIMONEY/GRANITE SEED

Quality, Guidelines & Services

At Granite Seed & Erosion Control our reputation is only as good as the quality of our product. Understanding how seed quality is determined will help you with the seed specifications for your next revegetation project and result in greater confidence in your purchase.

SEED TESTING & LABELING

Granite Seed's internal quality control program ensures that seed is accurately labeled and properly stored. All of our seed is tested for purity and germination by independent state-certified seed labs using the procedures sanctioned by the Association of Official Seed Analysts (AOSA). The date and results of the test are reported on your seed tag, showing the purity (percentage of the labeled species by weight), other crop, weed, inert material, dormant or hard seed, as well as the percentage of viable or germinable seed.

Never purchase seed that has not been tested for purity, weed and crop content and germination percentage.

All of our hand collected and harvested seeds undergo a complex process of drying, cleaning and laboratory testing in order to ensure a high quality product. The pure grass seed in the bag is the desired end product. The material in the bucket is the unwanted seed and chaff which was separated and removed during the cleaning process. ©Don Bermant/Granite Seed

CERTIFIED SEED

The seed certification system promotes the production and purchase of seed of known genetic purity and varietal identity. Only farm produced, named varieties such as 'Rosana' Western wheatgrass (*Pascopyrum smithii*) and 'Lodorm' Green needlegrass (*Nassella viridula*) can be certified.

In each state the authorized certification agency inspects the field and regulates the planting, production, harvesting and cleaning of each lot of certified seed. Only after the lot passes each phase of inspection, including high laboratory quality standards which meet state and federal seed law requirements, does a bag of seed receive an official state-certified blue tag.

Certification guarantees that the seed has the same genetic potential to perform as did the original breeder seed. For instance, when purchasing certified 'Schwendimar' Thickspike wheatgrass (*Elymus lanceolatus ssp. lanceolatus*) you are sure to have plants that have the same genetic composition as the breeder seed that was originally released. However, if you buy uncertified 'Schwendimar' the degree to which you can expect plants that resemble actual 'Schwendimar' depends upon the trustworthiness of the seed dealer and the grower.

SOURCE IDENTIFIED SEED

Recent interest in site-specific seed harvests prompted the seed industry to request assistance from the Association of Official Seed Certifying Agencies (AOSCA) in developing a reasonable and reliable method for verifying native seed harvest locations. AOSCA developed an approved seed certification class for wildland seed collections called Source Identified, which enables certifying agencies to verify the origin and ecotype of a given wildland seed harvest.

Seed production field of Firecracker penstemon *(Penstemon eatonii)* at L&H Seeds in southeastern Washington. ©L&H Seeds

Seed that is harvested following the approved guidelines and procedures for the Source Identified class can ultimately receive a certified seed yellow tag which indicates that the location of the seed harvest was verified by the certification agency.

SITE ADAPTED SEED

To increase the chances for successful revegetation it is important to plant seed adapted to the conditions of the project site. At Granite Seed, we make it our goal to match the ecological conditions of your site with seed that is properly adapted to it. If you are not certain which species and varieties to use, our seed experts can assist you in making appropriate seed selections.

CHANGES TO BOTANICAL NAMES

Since the common names of plant species often vary from region to region, it is always advisable to order seed using the botanical or scientific names. However, as advances in plant genetics reveal relationships between species that were previously unknown, some historically accepted scientific names have changed. This catalog provides species name indexing and cross-referencing to help you find the familiar names for the species you are looking for. Former names are cross-referenced in the text as well as in the *Old Botanical Names Index* near the back of the catalog.

PURE LIVE SEED

Pure Live Seed (PLS) is a measurement most often used by the seed industry to describe the percentage of live, viable seed in a particular lot of seed. Specifically, PLS indicates the total amount of seed capable of germination. PLS is calculated once a seed lot has been tested for purity and viability by an independent state-certified seed lab. Purity represents the percentage of seed weight that is the labeled species, excluding the inert, chaff, weed seed and other crop seed. Viable seed is the total percentage of germinable seed (germination + dormant + hard). PLS is obtained by multiplying the purity by the total viable seed:

$$\% \text{ PLS} = \frac{\% \text{ purity} \times \% \text{ total germination}}{100}$$

PLS gives buyers a way to compare the quality and value of different seed lots of the same species. Sometimes inexpensive bulk seed has a low PLS percentage, but in fact costs more on the basis of pure viable seed than a higher priced bulk seed lot with a higher PLS percentage. Consider the following example where the bulk, or scale weight, cost of two lots of the same species is significantly different:

	LOT A	LOT B
Bulk cost per pound	$1.00	$1.50
% Purity	75	95
% Germination	60	80
% PLS	45	76

At first glance, Lot A appears to be a better buy because it only costs $1.00 per bulk pound, whereas Lot B costs $1.50 per bulk pound. However, as indicated by the lower % PLS, the quality of Lot A is poorer than Lot B. In order to compare the value, calculate the cost per PLS pound by dividing the bulk cost by the % PLS:

$$\text{PLS Cost} = \frac{\text{Bulk Cost} \times 100}{\% \text{ PLS}}$$

Using this formula, Lot A costs $2.22 per PLS pound, while Lot B costs only $1.97 per PLS pound. Therefore, Lot B is a better value. Furthermore, since Lot B has a higher PLS percentage, it is not necessary to plant as much bulk material as would be required by using Lot A. Knowing the price per PLS pound is the only way to determine the best value in comparing two different lots of seed. To get the best value for money spent on seed, we recommend ordering seed in PLS pounds.

APPLICATION RATES

Pure Live Seed (PLS) percentage is used to calculate how much seed to apply within an area and makes seed ordering more precise. The typical PLS pounds per acre seeding rate for all grass, forb, legume and cover crop species is given in the *Characteristic & Adaptation Tables* at the back of this catalog. Your sales representative at Granite Seed can help you calculate the exact number of pounds needed based on PLS percentage, taking into consideration the method of planting (i.e. more seed is required for broadcast application than for seed drill application), appropriate rates at which to include any shrub species, and the appropriate coverage of seeds per square foot.

CUSTOM HARVEST & PRODUCTION

When project specifications require site-specific native seed or call for species which are not ordinarily available, a custom wildland collection may be the solution. Granite Seed frequently organizes on-site hand collections and custom seed grow-outs. Seed may be collected for immediate use or increased by one of our seed production farms at Bruce Seed Farm (MT) or L&H Seeds (WA).

Mountain brome *(Bromus marginatus)* being swathed for seed harvest at L&H Seeds in southeastern Washington. ©L&H Seeds

Bear in mind that relying on a site-specific collection for enough seed to fulfill a project is often risky because of the unpredictability of native seed production from year to year. Many factors affect wildland seed collection: Is the stand of the desired species large enough? Is the stand free from noxious weeds? Is there a good seed crop in the year of harvest? When a custom collection is required allow ample time to address such concerns, as well as for site scouting, organization and implementation. Additionally, both custom collections and subsequent farm production may require multiple growing seasons to successfully

Swathed windrows of native grass await seed combining at Bruce Seed Farm in Townsend, Montana. ©Gord Pearse/Bruce Seed Farm

produce a large enough quantity of seed for use on a future project.

If you do not have enough lead-time to implement a native collection, selecting seed adapted to your project site is the best solution. Granite Seed stocks the most diverse inventory of seed accessions from every corner of the West. We are extremely likely to have seed adapted for your project and we believe you will be satisfied with the results. Our seed experts can assist you with making seed selection decisions throughout the planning and duration of your project.

SEED AVAILABILITY

Granite Seed makes a concerted effort to stock every species listed in this catalog. We determine our inventories based on typical usages. However, situations sometimes occur—a devastating fire year increasing demand, or poor crop production due to uncharacteristic weather—which may cause us to run out of some seeds before their new harvest becomes available. To ensure the seed your project requires is available, call us as soon as you know your needs. In the case that the seed required is not available at the start time of your project, our seed experts can help you select an appropriate substitute.

CONSULTING SERVICES

As part of Granite Seed's commitment to customer support, our seed and erosion control experts are available to consult with you on your revegetation projects. When you purchase from Granite Seed, our experts are also available to you for complimentary guidance with designing seed mixtures and erosion control product specifications. Call, email or use our online Project Planner form at graniteseed.com to get started.

Erosion Control
& Planting Aids

New innovations in soil stabilization and vegetation establishment technologies are giving land managers and restoration specialists improved tools to increase the success of new seedings. These products are designed to prevent soil loss, sedimentation and water quality issues on disturbed soils; others are intended to increase vegetation establishment across difficult landscapes.

Granite Seed represents the leading manufacturers in the erosion control and planting aid industry. This section is intended to provide a brief overview of the types of products available for your next seeding and erosion control project.

For more specific information and specifications for any of these products, including installation guidelines, visit our website or contact our expert sales staff.

HYDRAULIC MULCH

Mulches designed for hydraulic or aerial application are made from wood fiber, recycled paper or straw. Basic hydraulic mulches are intended for short-term soil protection on moderate slopes (≤ 3:1) and are blended with seed, fertilizer or other planting aides in a one-step application, or applied over the top of seed and/or fertilizer in a two-step application.

In hydraulic applications the hydromulch slurry may contain a variety of planting aids along with the seed, including fertilizer, mycorrhizal inoculant or tackifier. ©Ryan Timoney/Granite Seed Company

In addition to their usefulness as soil stabilizers for erosion control, hydraulic mulches hold seed in place while simultaneously capturing and retaining critical moisture during germination and establishment, thus increasing seedling survival. Additionally, they provide a visual marker to the hydraulic tank operator to ensure that seed is thoroughly and evenly distributed. Tackifier may be added to a hydraulic mulch to help “glue” it to the site while also reducing or eliminating clogs in tank hoses during application.

Wood Fiber Mulch

High quality virgin wood fiber mulch products are made from processed wood, often as a byproduct of manufacturing. Long wood fibers intertwine to form a rigid bond. When used in conjunction with a high quality tackifier, these wood fibers offer excellent protection from wind and water erosion.

Recycled Paper Mulch

Hydraulic paper mulch products have the advantage of being easy to apply and quick to decompose. When used with a high quality tackifier they offer good short-term soil protection on relatively flat areas with quickly emerging vegetation, particularly in hydraulically applied lawn and turfgrass applications.

Straw Mulch

Straw mulch fibers are easy to apply, provide good coverage and soil protection on moderate to relatively flat slopes with quickly emerging vegetation, and they decompose quickly. Available with or without included tackifiers for high performance applications.

BONDED FIBER MATRIX

Bonded Fiber Matrix (BFM) is a broad term for high-performance hydraulic or aerial applied mulches more specifically classified as Engineered Fiber Matrix (EFM) and Flexible Growth Medium (FGM). These products are for use on steep slopes (≥ 3:1), slopes particularly vulnerable to surface erosion, and on irregular surfaces unsuited for erosion control blankets. EFM/FGM may be blended with seed, fertilizer or other planting aides in a one-step application, or applied over the top of seed and/or fertilizer in a two-step application.

Bonded Fiber Matrix (BFM) is applied as a liquid slurry, forming a strong and durable mat of interlocking fibers to prevent soil erosion while still allowing plants to germinate and establish. ©Granite Seed Company courtesy of Profile Products

QuickGuard® Sterile Triticale establishing through the interlocking fibers of a hydraulically applied Bonded Fiber Matrix (BFM). Additional Quick-Guard information on page 13. ©Don Bermant/Granite Seed

EFM/FGM are designed to mix and apply easily when wet, remain strong and insoluble once dry and reduce soil erosion by deflecting the velocity of raindrops while still allowing water to filter through. When properly applied with continuous surface contact, EFM/FGM protect soil surfaces from overland water flow and rill erosion from repeated rain events. EFM/FGM can be applied prior to the rainy season or late in the year and are formulated to endure the harsh conditions of heavy rains and snow.

EFM/FGM products are made up of strong and durable interlocking fibers held together by water resistant bonding agents that withstand repeated exposure to moisture without dissolving or losing their adhesive quality. Upon drying, a porous and breathable water-absorbent protective mat is formed, securing soils and seed until vegetation has established.

FGM is differentiated from EFM technology by the inclusion of crimped interlocking man-made fibers to enhance the overall erosion control performance, strength and longevity. Both EFM and FGM biodegrade completely into natural organic compounds, which are beneficial to plant life. They are safe for use in riparian zones and watersheds.

TACKIFIER

Organic and inorganic tackifiers are adhesives for “gluing” hydraulic mulch, blown straw or dust to the soil surface. Tackifiers also functionally improve the uniformity and suspension of the mulch and seed slurry, acting as a lubricant to provide a smooth flow during hydraulic application, potentially reducing or eliminating clogs in tank hoses during application and ensuring seed is thoroughly and evenly distributed.

Organic Tackifier

Natural plant-based tackifiers are typically derived from guar (cluster beans), plantago (psyllium) or miscellaneous plant starches (polysaccharide-based). They are water soluble and thus shorter-lived than inorganic tackifiers and are typically more widely used than inorganic tackifiers.

Inorganic Tackifier
Nontoxic and biodegradable polyacrylamides (PAM) and acrylic copolymer tackifiers last longer than organic tackifiers, especially when exposed to wet conditions. PAM-based tackifiers have the added benefit of reducing soil hydrophobicity (water repellency) following an intensely hot wildfire.

Pipeline reclamation along a steep hillside using both erosion control blankets and a hydraulically applied Bonded Fiber Matrix (BFM). ©Ryan Timoney/Granite Seed

EROSION CONTROL BLANKETS

Erosion control blankets stabilize soils while seedlings take root. Applications for erosion control blankets and mats range from gradual to steep slopes, and low to high velocity water flow channels. Erosion control blankets are available for both short-term biodegradable applications and long-term soil stabilization.

Installation of erosion control blankets is most effective where the soil surface has been properly prepared to provide a smooth surface. Blankets are available with single or double netting for increased durability. Netting comes in natural biodegradable fibers or synthetic photodegradable materials.

Natural netting offers complete biodegradability and independently woven strands to reduce the risk of tenting and wildlife endangerment. Synthetic netting is made with a photodegradable UV stabilized polypropylene that has a longer functional lifespan than natural biodegradable netting.

Straw Blankets
Straw blankets are made with certified weed-free straw (rice or wheat) and are recommended for mild to moderate slopes and areas requiring short-term protection.

Excelsior Blankets
Curled aspen wood fiber blankets are used for short to long-term stabilizations and in some channel applications. These blankets are available in several styles and densities.

Coir Blankets
Coconut husk fiber blankets are the most durable and long-lived. Use on steep slopes and in moderate velocity channels. Functional for 24 months or more.

Straw blanket with photodegradable netting. Also available with natural biodegradable netting. ©American Excelsior Company

Excelsior blanket (aspen fibers) with photodegradable netting. Also available with natural biodegradable netting. ©American Excelsior Company

Coir blanket (coconut husk fibers) with photodegradable netting. Also available with natural biodegradable netting. ©American Excelsior Company

Straw/Coir Blankets
Blended straw and coir blankets provide effective erosion control on steeper slopes and low velocity channels. Functional for approximately 18 months.

TURF REINFORCEMENT MATS

Turf Reinforcement Mats (TRM) may be used instead of rock or concrete linings in high velocity water channels where a long-term to permanent erosion solution with a vegetated end result is desired. TRM is available in synthetic, excelsior (aspen wood fiber) or coconut materials.

Synthetic TRM
These products are made of recycled synthetic fibers and installed under a layer of backfilled soil to provide permanent stability in channels and high runoff areas. Synthetic TRM does not interfere with soil percolation and water absorption, while providing high tensile strength against the action of fast moving water and a firm anchor for plant roots. These products provide twice the erosion protection of unreinforced vegetation.

Coir Netting & Mats
Woven coir fiber (coconut husk) netting and mats are made in various densities for control of steep slopes and high velocity flow channels. High tensile strength and naturally resistant to mold and rot for 4 to 8 years. Subtle appearance and complete biodegradability make these desirable wherever natural aesthetics are important.

Grass seedlings growing up through synthetic Turf Reinforcement Mat (TRM) made of 100% recycled post-consumer fibers. Use to provide permanent structural root system support on vegetated slopes and in water flow channels. ©American Excelsior Company

WATTLES (Fiber/Sediment Logs)

Flexible straw, excelsior, coir or compost tubes which are used to reduce the length of a slope, slow water velocity, capture sediments and promote vegetation establishment. On shorelines, channel shoulders, streams and riverbanks, wattles dissipate the impact of flowing water and wave action and can serve as a planting medium for shoreline rehabilitation and reclamation. In construction sites, wattles are also used as a silt fence replacement along sidewalks and construction perimeters to prevent sediment from washing into gutters. In low flow channels, wattles are used as a straw bale replacement to reduce water velocity and trap sediment. Unlike silt fence that must be removed following vegetation establishment, wattles can be left onsite to slowly biodegrade. Wattles will vegetate in permanent applications.

Wattle casing is typically made from photodegradable UV stabilized polypropylene netting, biodegradable burlap, or occasionally non-degradable and reusable tubular mesh.

Straw Wattles
Certified weed free straw (rice or wheat) will biodegrade and vegetate faster than wattles made of other materials. Standard diameter is 9 inches, but also comes in 12 or 20 inch diameters.

Excelsior Wattles
These wattles are filled with curled aspen wood fibers for use on high velocity flow slopes and have a functional lifespan of up to two years. Standard diameter is 9 inches, but also comes in 12 or 20 inch diameters.

Permeable wattles installed over erosion control blankets in order to slow surface runoff. May also be installed on bare soil.

Coir Wattles
Extremely durable coconut husk fibers are long-lived and reusable. Standard diameter is 9 inches, but can be custom produced in 12 or 20 inch diameters.

Compost Wattles
Compost filled reusable tubular mesh wattles biofilter water runoff from pollutants such as hydrocarbons, heavy metals, bacteria and nutrients. Standard diameter is 8 inches; also comes in 12, 18, 24 and 32 inch diameters.

Also available are reusable and movable sediment logs containing recycled rubber material or rock (filled onsite), intended for long-term and permanent sediment control solutions.

Excelsior fiber erosion control blocks used in a shoreline application with live willow stakes, pictured on the day of installation and three months later. Exterior casing is light in color compared to darker coir logs that can warm water temperatures, which can be detrimental to fish and other aquatic organisms. Functional for 3+ years, but designed to begin biodegrading during the first year as sediment and seed settle into the interior matrix. Also use in other applications such as a replacement for silt fence or for channel filter stations. ©American Excelsior Company

EROSION CONTROL BLOCKS
US-made excelsior fiber blocks (aspen wood) are a cost effective alternative to logs made from imported coir fiber (coconut husk). Use for shoreline and streambank stabilization and other applications with low water velocity and wave action, including sediment control and filtration in channels, around inlets and outlets, or in applications needing a damming effect; also as a silt fence replacement around job site perimeters and along slopes in place of wattles. Flat, rectangular base provides good soil contact and may also be installed over erosion control blankets and Turf Reinforcement Mats (TRM).

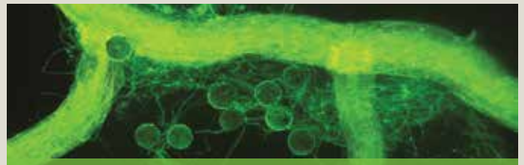
SILT FENCE
Geotextile filter fabric supported by wooden posts is installed as a temporary sediment barrier to slow and divert water, allowing it to pond such that soil particles may settle.

STAKES & STAPLES
Steel staples, biodegradable staples and wooden stakes are used for anchoring erosion control blankets, Turf Reinforcement Mats (TRM), erosion control blocks and wattles of all diameters.

GABION BASKETS
Gabion baskets are engineered steel cages that are assembled and filled with stones directly on a project site. Used for hardscaped retaining walls, channel liners, hydraulic control structures, slope erosion protection and various architectural applications. Sand, soil and seed may be added to the rock matrix in order to vegetate gabion structures.

BIOTIC SOIL AMENDMENTS
Topsoil alternatives are designed to quickly improve soils lacking in organic matter, nutrients and biological activity. Includes an abundant source of naturally derived and renewable organic matter, along with other soil building components such as biochar, humic substances and soil mycorrhizae, to help establish and sustain new vegetation. Hydraulically apply to sites and slopes where topsoil placement is impractical.

MYCORRHIZAL INOCULUM
Mycorrhizal fungi are necessary soil components of a natural functioning ecosystem, forming symbiotic



Microscopic view of arbuscular mycorrhizae on the root of a plant. The round bodies are spores. Threadlike filaments called hyphae grow outward extracting soil moisture and nutrients for the plant and excreting glomalin or “soil glue”, improving soil structure. ©Granite Seed Company and the USDA Agricultural Research Service

relationships with over 85% of terrestrial plants worldwide. Attaching themselves to plant roots, mycorrhizae provide a significant benefit to plant establishment and persistence, increasing its vigor, nutrient uptake, disease resistance and overall performance. Construction activities which remove natural vegetation and/or dig up inorganic mineral subsoils, often deplete or eliminate the mycorrhizal fungi population of a site.

Mycorrhizal inoculum is a soil amendment which facilitates the return of native mycorrhizal fungi to depleted sites and is particularly effective on shallow or nutrient poor soils. Inoculum includes spores, mycelium and mycorrhizal root fragments of one or more species of mycorrhiza (genus *Glomus*) and is available in a variety of regional suites (Desert, Basin and High Plains) for site-specific applications.

Mycorrhizal inoculum is housed in a dry granular carrier and is able to be applied hydraulically within a wet hydromulch slurry, or broadcast dry with seed spreading equipment. Inoculum should be applied just prior to, or in the same application as seeding.

See the *Characteristic & Adaptation Tables* on page 107 for the mycorrhizal dependency of every plant species described within this catalog.

ORGANIC FERTILIZER
Slow-release, 100% organic N-P-K fertilizers are designed to build the organic matter (humus) of a soil and reestablish the conditions for a healthy balance of beneficial soil microorganisms. In contrast to mineral or synthetic fertilizers which only supply plants with nutrients for growth, an organic composted fertilizer has the ability to reduce thatch buildup, prevent soil compaction and restore the biological processes which are essential for long-term soil development and optimum plant growth.

Additionally, the nitrogen release of traditional mineral fertilizers is very rapid and puts new seedlings and existing vegetation at risk of nitrogen-burn. Quick spikes in nitrogen availability also attract flushes of weeds, rather than supporting the slower-establishing perennial vegetation. Traditional mineral fertilizers are also unsuited for use in watersheds and other sites with potential to contaminate water sources. In contrast, slow-release 100% organic fertilizers release nutrients evenly and continuously throughout the growing season and are safe for use in watersheds and near waterways.

HUMATES
Naturally occurring humic substances play a crucial role in soil fertility and plant nutrition. Plants grown on soils containing sufficient humates are less subject to environmental stresses, are healthier, produce higher yields and have greater nutritional quality. Humic soil amendments bind to soil nutrients, creating humate-nutrient compounds which are available for plant roots to absorb. Humates also improve soil structure and water holding capacity by breaking down clays, while also reducing sodium and buffering pH extremes. Humates also provide a valuable carbon-rich food source for beneficial soil organisms, including mycorrhizal fungi.

BIOCHAR
Naturally occurring soil charcoal from historic wildfires is an important component of productive and resilient soils. Wildland soils where fire has been excluded or where deficient subsoils have been exhumed during construction activities, likely contain low to non-existent amounts of natural biochar. Man-made biochar is a highly porous, highly stable soil amendment made from plant matter that has been burned with a restricted flow of oxygen until the material reaches the charcoal stage. Soils amended with biochar have increased nutrient and water retention, leaving more nutrients available for plant uptake, while also absorbing contaminants and buffering pH extremes. Biochar is also a valuable carbon-rich food source for beneficial soil organisms, including mycorrhizal fungi.

COVER CROPS

Seeding with fast germinating vegetation is often the best tool to stabilize soils. Cover crops have the advantage of establishing quickly, thereby reducing wind and water erosion while also protecting young seedlings from drying winds and temperature extremes. Additionally, they restore soil health and function, protect perennial seedlings during establishment and provide valuable forage for livestock, wildlife and pollinators.

Native restoration and reclamation projects warranting the use of a cover crop often require different characteristics than typical cover crops provide. Sterile cover crops have been developed as a more appropriate tool for wildland situations where fast germination and non-reseeding traits are highly valued, preventing the cover crop species from persisting beyond the establishment year and competing with native species.

Quick germination, strong upright growth and sterility make QuickGuard ideal when timing is critical for erosion control. Also pictured on page 8. ©Granite Seed Company

QUICKGUARD STERILE TRITICALE

QuickGuard® Sterile Triticale is one of the best reclamation and native restoration cover crops available: a non-reseeding annual which is hardy and durable, but not persistent or invasive. QuickGuard® develops a dense fibrous root system and upright growth habit to stabilize soils while allowing desirable perennial species to establish. Adaptable to either spring or fall planting, it is cold tolerant with good winter survival, as well as drought tolerant. Studies conducted by the National Research Council of the National Academy of Sciences show QuickGuard® performs better than dryland Wheat *(Triticum aestivum)* on a wide range of soil conditions, including dry and sandy soils, infertile soils, acid and alkaline soils, cold soils and mineral deficient or high boron soils. Find more information on QuickGuard® Sterile Triticale on page 86.

For a complete list of other available cover crops see the *Cover Crops & Annual Forages* section beginning on page 81.

Corn grit or rice hulls are often added to seed blends being applied with a seed drill, helping to ensure continuous seed flow as well as uniform mixing and distribution. ©Damon Winter/L&H Seeds

RICE HULLS & CORN GRIT

Applying seed with a seed drill is a common method of planting. When drilling seed mixtures that include numerous species, differences in the seed sizes and weights can cause the mix to separate, leading to uneven distribution on the landscape. Lightweight and fluffy seeds may also bridge within the mechanics of the seed drill.

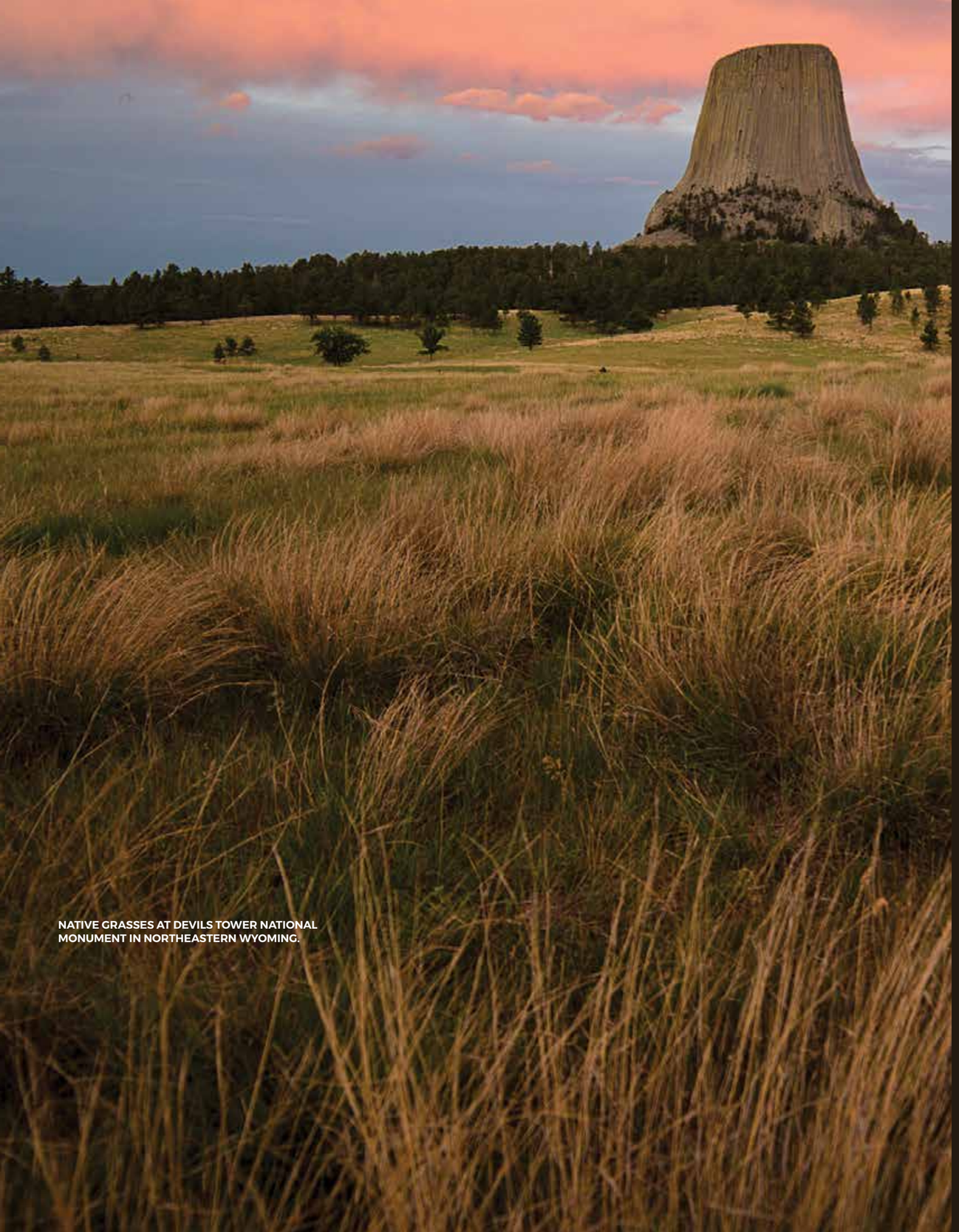
Adding rice hulls or corn cob grit to a diverse seed mixture provides an inexpensive and biodegradable inert carrier to improve seed flow, preventing the light and fluffy seeds from bridging within the mechanics of the drill and ensuring uniform distribution of the different seeds across the landscape.

Contact your sales representative for guidance in calculating the amount of rice hulls or corn grit to add to your particular mix.

BROADCAST SPREADERS

Various types of broadcast seed spreaders are available for hilly, uneven or wet terrain, or ground that may be too small, remote or otherwise unsuited for drilled or hydraulic seed application.

DESERT FLOWERS BLOOMING AT BARTLETT LAKE IN THE TONTO NATIONAL FOREST, ARIZONA.



NATIVE GRASSES AT DEVILS TOWER NATIONAL MONUMENT IN NORTHEASTERN WYOMING.

Grasses & Grasslikes

grass / gras / noun:
1. vegetation consisting of typically short plants with long narrow leaves, growing wild or cultivated on lawns and pasture, and as a fodder crop.
2. the mainly herbaceous plant that constitutes grass, which has jointed stems and spikes of small, wind-pollinated flowers.

grasslike / gras-lahyk / noun:
1. vegetation consisting of a wide variety of plants with long, narrow leaves which may resemble grasses, including sedges, rushes, bulrushes, cattails and other narrow-leaved species.

Grasses are the primary vegetation of many western landscapes, anchoring soils, housing forbs and shrubs, and sustaining herbivores and wildlife with both food and cover. Granite Seed offers the largest selection of both field-produced and wildland-harvested native and naturalized grasses in the Western U.S. We take special care to stock numerous varieties and site-adapted seeds. Whether for native restoration, reclamation, pasture or landscaping, we can supply any size project and location. We frequently carry new species, local collections and varieties. If you don't find what you need listed here, please contact us.

Mature Indian ricegrass *(Achnatherum hymenoides)* during seed shatter in New Mexico.

'Garrison' Creeping meadow foxtail [*Alopecurus arundinaceus*]. ©Gord Pearse/Bruce Seed Farm

Big bluestem *(Andropogon gerardii)* during pollination. ©David Schwaegler

Achnatherum hymenoides, Indian ricegrass

Formerly *Oryzopsis hymenoides.* Densely tufted, cool season, perennial bunchgrass, adapted to deep, well-drained soils. Tolerant of weakly saline and sodic soils. Very drought tolerant and winter hardy. Valuable for stabilizing sandy soils susceptible to wind erosion. Excellent for native restoration, rangeland improvement and disturbance reclamation. Often slow to germinate but good seedling vigor. Sometimes occurs as a dominant species. Forage is highly palatable and nutritious to livestock and wildlife. Seeds are sought by birds and small mammals. *Pictured on page 17.* Varieties:

Nezpar
Consistently good establishment. Survives in areas with as low as 6 in. annual precipitation. Outperforms Paloma in the northern U.S. in yield and stand survival. [Released 1978, origin: Idaho County, ID]

Paloma
Used in the southern half of the species range. Long lived, good regrowth and spring recovery. Some resistance to root rot damage. [Released 1974, origin: Pueblo County, CO]

Rimrock
Cold hardy and better adapted to northern latitudes than Nezpar. Prodigious seed producer. Similar in establishment and vegetation characteristics to Nezpar and Paloma. [Released 1996, origin: Yellowstone County]

Star Lake
Small-seeded variety intended for use on wildlands and mined lands in the Colorado Plateau and Arizona-New Mexico Plateau ecoregions. Excellent germination. [Released 2004, origin: McKinley County, NM]

White River
High germination rates and seed yield. Intended for wildland restoration, mineland rehabilitation, and mountain rangelands in Colorado, Utah and Wyoming. [Released 2006, origin: Rio Blanco County, CO]

Achnatherum lettermanii, Letterman's needlegrass

Formerly *Stipa lettermanii.* Cool season, perennial bunchgrass that occurs across a wide range of elevations from 5,000-11,700 ft. One of the most cold hardy of the needlegrasses. Excellent for revegetation of upper elevation sites. Remains green throughout most of the growing season. Has been used in mine reclamation.

Achnatherum speciosum, Desert needlegrass

Formerly *Stipa speciosa.* Tall, cool season, perennial bunchgrass found commonly in dry, rocky or sandy areas of the sagebrush deserts, canyons, or pinyon-juniper woodlands. Very drought hardy with an attractive, plumy appearance. Recommended for revegetation or landscaping.

Achnatherum thurberianum, Thurber's needlegrass

Cool season, perennial bunchgrass common in semiarid regions from southern Idaho to the Columbia Basin. Can be a dominant species, though slow to establish. Good for use in disturbed mine reclamation. Excellent spring forage prior to awn development; moderate quality later in the season following seed shatter. Inherently low seed yielding species. May hybridize with Indian ricegrass [*A. hymenoides*] to form *Achnatherum x bloomeri.* Varieties:

Princeton
Higher seed yield potential than other accessions. [Released 2016, origin: Harney County, OR]

*Agropyron cristatum,** Crested wheatgrass

Cool season, long-lived, perennial bunchgrass that can be weakly rhizomatous. Extremely drought and cold tolerant. Adapted to a wide range of sites but is most productive on well-drained, medium textured soils. Good palatability to livestock when green. Introduced extensively throughout the West. Varieties:

Ephraim
Rhizomatous growth habit. Well suited for soil stabilization. [Released 1983, origin: Ankara, Turkey]

Fairway
Shorter and finer-stemmed than other types; capable of forming sod in dryland areas. [Released 1927, origin: Siberia]

Kirk
Tall, coarse growth habit with regrowth better than all other varieties (except Nordan). Excellent seedling vigor. Top yielding variety in the northern latitudes. [Released 1987, origin: Europe, including Finland]

Roadcrest
Lower growth, finer leaf texture and increased sod formation. Developed for roadside use and low maintenance turf areas. [Released 1998, origin: Iran & Turkey]

*Introduced to North America.

*Agropyron desertorum,** Standard crested wheatgrass

Comparable to Crested wheatgrass [*A. cristatum*] but is slightly more cold, shade and moisture tolerant. Also plants are later maturing and slightly more productive. Varieties:

Hycrest
Hybrid cross between *A. cristatum* and *A. desertorum.* Taller, more robust than parental species. High forage yield, quick to develop. [Released 1974, source of ecotype: Central Asia, former USSR]

Hycrest II
Improved seedling establishment and stand persistence under dryland conditions. Increased drought tolerance. [Released 2008, origin: Hycrest variety]

Nordan
Good seedling vigor and forage producing abilities. Seed heads narrow and dense with short awns. [Released 1953, origin: Central Asia, former USSR]

*Agropyron fragile,** Siberian wheatgrass

Formerly *A. sibericum.* Cool season, perennial bunchgrass similar to Standard crested wheatgrass [*A. desertorum*] but is more drought tolerant, better adapted to saline soils, later maturing, more palatable and performs better on lighter textured soils. Extremely cold tolerant. Seedling vigor can be lower than other crested cultivars. Varieties:

Stabilizer
Excellent seedling establishment, persistence, seed production and pubescence. Low growing and reduced leaf matter or forage yield. Recommended for roadsides, low maintenance cover, and as a grass component in green strips and firebreaks. [Released 2011, origin: Kazakhstan]

Vavilov
Good seedling vigor and seed yield. Once established, tolerates longer drought periods than many other crested types. [Released 1994, origin: former USSR & Turkey]

Vavilov II
Greater seedling establishment and stand persistence during drought, especially on sandy soils. [Released 2008, origin: Vavilov variety]

*Agrostis capillaris,** Colonial bentgrass

Formerly *A. tenuis.* Cool season, tufted, perennial bunchgrass with a vigorous root system, sometimes with stolons or short rhizomes. Adapted to moist or moderately wet sites. Tolerates acidic and nutritionally poor soils. Nutritious and highly palatable. Commonly used as turfgrass. [See *Turfgrass & Turf Blends.*]

*Agrostis gigantea,** Redtop

Formerly *A. alba.* Cool season, rhizomatous, sod-forming perennial with a vigorous fibrous root system. Adapted to moist or moderately wet sites. Tolerates acidic and nutritionally poor soils, as well as periodic flooding. Palatable and nutritious to livestock and wildlife. Used as pasture and hay. Varieties:

Streaker
Fine-leaved, cold-hardy variety. Primarily used for hay and pasture in mountain meadows. Establishes easily from seed. [Released 1982, origin: Europe]

Agrostis scabra, Rough bentgrass (Ticklegrass)

Cool season, short-lived, perennial bunchgrass with a fibrous root system, occasionally with stolons. Adapted to a wide variety of habitats from streambanks to sagebrush communities. Tolerates low pH and acidic soils and periodic flooding. Palatable in the spring prior to flowering. Easily established and highly successful pioneer species.

*Agrostis stolonifera,** Creeping bentgrass

Formerly *A. palustris.* Cool season, stoloniferous, perennial sometimes with short rhizomes. Grows well in moist sites and tolerates acidic conditions well. Widely adapted. Most often used for lawns, putting greens and erosion control. [See *Turfgrass & Turf Blends.*]

*Alopecurus arundinaceus,** Creeping meadow foxtail

Cool season, long-lived, perennial sod-former adapted to wet or periodically wet soils such as meadows, waterways and ranges in the subalpine zone. Strongly rhizomatous. Withstands periodic flooding for up to 45 days. High forage producer compared to other grasses adapted to wet soils. More productive than Meadow foxtail [*A. pratensis*]. Tolerates acidic and saline soils and is palatable and nutritious. Frequently used as pasture grass on wet meadows. Varieties:

Garrison
Establishes and persists on soils from sands to poorly drained clays. High moisture tolerance and dense, vigorous rhizomes make it excellent for streambank and shoreline erosion. Tolerant of moderate salinity and some alkalinity. Withstands heavy grazing pressure and is extremely winter-hardy, even at high elevations. Excellent forage quality throughout its growing season. Grazing animals prefer it to Reed canarygrass [*Phalaris arundinacea*]. [Released 1963, origin: McLean County, ND, from former USSR]. *Pictured on page 17.*

*Alopecurus pratensis,** Meadow foxtail

Cool season, perennial bunchgrass sometimes producing short rhizomes. Adapted to wet, poorly drained sites and is tolerant of acidic and salty soils. Nutritious and palatable. Useful for irrigated pastures and range at higher elevations or wet sites. Less productive than Creeping meadow foxtail [*Alopecurus arundinaceus*].

Andropogon gerardii, Big bluestem

Warm season, long-lived, perennial, bunchy sod-former occurs on a wide range of sites but thrives on well-drained soils. Rhizomes spread slowly. Tall, averaging 5-8 ft. in height, occasionally reaching 12 ft. Tolerates slightly acidic and saline soils. Withstands periodic flooding and high water tables. Co-dominant species with Indiangrass [*Sorghastrum nutans*] in the tallgrass prairie ecosystem; minor component of some mixed-grass prairie sites. Excellent palatability and highly productive. *Pictured on page 17.* Varieties:

*Introduced to North America.

Bison
Northern variety, flowers much earlier than other cultivars. Good leafiness, high plant vigor, high seed yields and good winter hardiness. Shorter than other varieties. (Released 1989, origin: Oliver County, ND)

Bonilla
Demonstrates outstanding winter hardiness, persistence and seed yield. Forage production exceeds Bison and is comparable to Champ and Kaw. (Released 2010, origin: ND, SD & MN)

Champ
Hybrid cross with Sand bluestem (*A. hallii*). Moderately late-maturing, leafy, highly productive, with light green to glaucous gray foliage. Performs well on both sandy and fine textured soils. Early maturing. (Released 1963, origin: NE & IA)

Kaw
High yielding, medium-late maturing. Strong seed producer with some resistance to rust. (Released 1950, origin: Flint Hills, KS)

Pawnee
Tall variety producing long dark green leaves. Typical of the central prairie types. (Released 1963, origin: Pawnee County, NE)

Rountree
High yielding, late-maturing, resists lodging and rust. (Released 1983, origin: Monona County, IA)

Andropogon hallii, Sand bluestem

Similar to Big bluestem (*A. gerardii*) but is more strongly rhizomatous and drought tolerant; occurs on sandier sites. Tall, averaging 3-6 ft. in height. Grows in colonies. Excellent palatability and productive warm season perennial grass. Useful for controlling erosion of sand dunes and other blowout areas. Varieties:

Chet
Crossed with Big bluestem (*A. gerardii*). Medium statured variety recommended for reclamation, soil stabilization, pasture, hayland and forage production systems. (Released 2004, origin: OK)

Garden
Vigorous tall leafy type with good seed yields. Adapted to sandy sites, particularly in Nebraska and South Dakota. Better stand longevity than Goldstrike. (Released 1960, origin: Garden County, NE)

Goldstrike
Plants are variable in height. Characterized by its unique gold colored inflorescence at maturity. (Released 1973, origin: northern Sandhills of NE & western OK)

Woodward
Leafy variety with good forage production; medium-tall. (Released 1955, origin: Woodward County, KS & Curry County, NM)

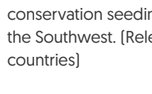
Aristida purpurea var. purpurea, Purple threeawn

Warm season, drought tolerant, perennial bunchgrass occurring on well-drained soils along roadsides, flats, benches and mesas. Provides good forage before going to seed. Starts growth in early spring and again in late summer. Establishes easily and rapidly; invades disturbed sites. Useful perennial grass for the the hot deserts of the southwest. Problematic seed for drill application; broadcast or hydroseeding application is strongly recommended. *Pictured on page 20.*

Beckmannia syzigachne, American sloughgrass

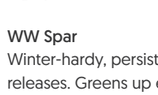
Cool season, robust annual or short-lived perennial that may develop short rhizomes. Commonly occurs on wet sites such as ponds, swamps, ditch banks, shallow marshes and sloughs. Prefers clay soils; tolerant of saline soils. Shallow-rooted and able to colonize denuded wetland soils, making it excellent for riparian reclamation. Seeds are eaten by migratory birds. Palatable and frequently used for hay or grazing. *Pictured on page 20.*

Bolboschoenus maritimus, Alkali bulrush



Formerly *Scirpus maritimus.* Cool season, rhizomatous, perennial grasslike occurring in wet alkaline or saline soils in meadows, marshes or near waterways. Valuable for providing cover for waterfowl and shore birds. Recommended for reclamation of mud flats, bogs or other areas adjacent to shallow or stagnant water.

Bothriochloa barbinodis, Cane beardgrass



Formerly *Andropogon barbinodis.* Warm season, drought tolerant, native perennial bunchgrass found on open rangelands and rocky slopes. Prefers coarse, well-drained soils but grows on finer soils below 4,000 ft. elevation. Provides good forage when green but tends to become unpalatable when mature. Good for roadside plantings. Varieties:

Saltillo
Vigorous and hardy type with good drought and cold tolerance. Valuable for forage and erosion control on rangelands, abandoned croplands and road cuts. (Released 2001, origin: Coahuila, MEX)

*Bothriochloa ischaemum,** Old-world bluestem (Yellow bluestem)

Warm season, long-lived, perennial bunchgrass that occurs on a wide variety of sites but prefers medium to fine textured soils. Highly productive and nutritious, often planted in pure stands for hay production. Also used in pasture and range blends. Varieties:

Plains
Productive, persistent and highly palatable. Use in pasture or conservation seedings throughout the short grass plains and into the Southwest. (Released 1970, origin: numerous Middle Eastern countries)

WW Iron Master
Later maturing and darker green leaf color than WW Spar. Less indeterminate flowering habit than other cultivars. Valuable for forage and soil stabilization on iron-deficient, calcareous soils with high pH. (Released 1987, origin: Afghanistan)

WW Spar
Winter-hardy, persistent and more drought tolerant than earlier releases. Greens up early and produces abundant forage even under low moisture conditions. (Released 1982, origin: Pakistan)

**Introduced to North America.*

Purple threeawn (*Aristida purpurea var. purpurea*). Credit: Patrick J. Alexander, hosted by the USDA-NRCS PLANTS Database

American sloughgrass (*Beckmannia syzigachne*). Credit: Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Sideoats grama (*Bouteloua curtipendula*).

Bouteloua aristidoides, Needle grama

Warm season, annual grass often abundant following summer rains. Common in the higher deserts of Arizona, southern California and northern Mexico from 3,000-5,500 ft. elevation. Prefers dry, open mesas or hillsides and is recommended for site stabilization or erosion control.

Bouteloua barbata, Sixweeks grama

Warm season, drought tolerant, annual bunchgrass. Found predominantly on dry sites including, mesas, rocky and sandy hillsides, steep slopes, gravelly and sandy washes, and disturbed ground in desert communities. Following sufficient summer rain it grows rapidly, sets seed and dies within 6-8 weeks of germination. Also found on some plains grasslands in Oklahoma and Montana. Often mistaken for Rothrock's grama (*B. rothrockii*).

Bouteloua curtipendula, Sideoats grama

Warm season, moderately drought tolerant, perennial grass. Weakly rhizomatous bunchy sod-former adapted to many sites but performing best on calcareous, moderately alkaline, medium and fine-textured, well-drained soils. Germinates and establishes quickly compared to other warm season grasses. High palatability during spring and summer, less so after maturity. *Pictured on page 20.* Varieties:

Butte
Winter hardy, long-lived, late-maturing. Excellent seedling vigor. Adapted to areas with short growing seasons. (Released 1958, origin: Holt & Platte Counties, NE)

El Reno
Excellent forage production and vigor. Good disease resistance, fair winter hardiness. (Released 1944, origin: Canadian County, OK)

Haskell
Exceptional rhizome production and adaptability to southern plains areas with greater than 18 in. of precipitation. (Released 1983, origin: Haskell County, TX)

Killdeer
Fair seed production and disease resistance. Adapted to cold, semi-arid environments. Outstanding vigor and leafiness. (Released in 1960's, origin: Bowman & Dunn Counties, ND)

Niner
Without rhizomes (*ssp. caespitosa*). Selected for drought tolerance, seedling vigor and herbage production. Adapted to the southwest. Darker color than Vaughn. (Released 1984, origin: Socorro County, NM)

Pierre
Outstanding vigor, leafiness and disease resistance. Persistent in semiarid areas. Excellent winter hardiness. (Released 1961, origin: Stanley County, SD)

Trailway
Winter hardy, long-lived, late-maturing. Indeterminate; considerable variability in maturity. (Released 1958, origin: Holt County, NE)

Vaughn
Drought tolerant with excellent seedling vigor. Frequently used in Arizona, New Mexico and southern Colorado. (Released 1940, origin: Guadalupe County, NM)

Bouteloua dactyloides, Buffalograss

Formerly *Buchloe dactyloides.* Short, warm season, perennial sod-former with vigorous stolons. Long-lived and widely adapted. Extremely palatable to livestock and wildlife and tolerates grazing well. Slow to establish unless seed is treated with potassium nitrate. Used for reclamation, soil stabilization and turfgrass. (See *Turfgrass & Turf Blends.*) Varieties:

Bison
Similar to Texoka in appearance, adaptation, forage yield and quality. Intended for pasture and range, but can also be used to establish low maintenance turf. (Released 1990 origin: Texoka and Mesa varieties)

Bowie
Improved color, texture, density and growth habit. (Released 2001, origin: NE)

Cody
Original low maintenance turf type. Rapid establishment, winter hardy and low water requirement. Successfully establishes and thrives across the western U.S. (Released 1995, origin: NE)

Plains
Taller, denser and darker color than Texoka; superior forage producer. Fast establishing. Intended for pasture and range plantings, but can also be used to establish a low maintenance turf. (Released 1992, origin: Texoka variety and selections in Baca County, CO & Clay County, NE)

Texoka
Good forage producer and often used to establish low-maintenance turf. Excellent seed producer. (Released 1974, origin: Ellis & Osborne Counties, KS & Dickens County, TX)

**Introduced to North America.*

Blue grama *(Bouteloua gracilis).*

Native Mountain brome (*Bromus marginatus*) left, versus forage-type Meadow brome (*B. biebersteinii*) right. ©Damon Winter/L&H Seeds

Bluejoint reedgrass (*Calamagrostis canadensis*). Credit: Robert H. Mohlenbrock, hosted by the USDA-NRCS PLANTS Database

Bouteloua eriopoda, Black grama

Warm season, drought tolerant, stoloniferous perennial adapted to well-drained sandy and gravelly soils. Long-lived and considered the climax type of Southwest desert rangelands. Important forage grass over much of its range. Highly palatable but will not tolerate heavy grazing pressure. Varieties:

Nogal
Intermediate between upright and decumbent types. High forage producer with good seedling vigor and disease resistance. Low seed yields. (Released 1971, origin: Socorro County, NM)

Bouteloua gracilis, Blue grama

Warm season, drought tolerant, perennial sod-former. Adapted to a broad spectrum of soils, but thrives on medium textured, well-drained sites. Highest drought tolerance of the major Great Plains grasses. Grows in bunches in the southern U.S., but is a sod-former in the mixed-grass and shortgrass plains, at higher elevations or when frequently watered or closely grazed. Highly palatable and nutritious year round. Also used as a low maintenance turfgrass. (See *Turfgrass & Turf Blends.*) *Pictured on page 21.* Varieties:

Alma
Large seed size and high seedling vigor. Can be seeded deeper than other varieties. (Released 1991, origin: Hachita & Lovington varieties)

Bad River
Drought and cold tolerant type adapted to northern latitudes. Establishes easily and provides excellent quality forage for summer grazing. Sod-former with excellent seedling vigor and leafiness. (Released 1997, origin: Haakon County, SD)

Bird's Eye
Source Identified selection originating from Fremont County, WY, averaging 5-7 in. annual precipitation.

Hachita
Palatable with good forage value into fall and winter. Excellent drought tolerance and ability to withstand grazing. Also use for low maintenance turf. (Released 1980, origin: Hidalgo County, NM)

Lovington
Widely adapted to eastern New Mexico, southeastern Colorado, Texas, Oklahoma and areas where annual precipitation is 12 in. or more. Excellent seedling vigor. (Released 1963, origin: Lea County, NM)

Bouteloua rothrockii, Rothrock's grama

Warm season, drought tolerant, perennial bunchgrass occurring on dry rocky hillsides and medium to coarse soils throughout the southwest deserts. Short-lived and useful for reclamation in the hot deserts of the southwest. Moderately palatable but less nutritious than other gramas.

Bromopsis biebersteinii, see *Bromus biebersteinii* (Meadow brome)

Bromus anomalus, Nodding brome

Cool season, short-lived, native perennial bunchgrass. Drought tolerant, adapted to coarse textured soils. Medium to high palatability to livestock and wildlife. Competitive in disturbed areas due to its high seedling vigor.

*Bromus biebersteinii,** Meadow brome

Formerly *Bromopsis biebersteinii.* Cool season, perennial open sod-former with short rhizomes. Adapted to most sites where water is adequate but performs best on moderately deep, well-drained moist soils. Long-lived and very winter hardy. Primarily used as a pasture component in grass and grass-legume mixtures. Spring green-up is 2-3 weeks earlier than other common pasture grasses. Excellent year-round forage. Use in dryland pastures in areas receiving greater than 14 in. of annual precipitation. *Pictured on page 21.* Varieties:

Cache
Enhanced seedling establishment and increased yields on both irrigated and semi-irrigated pastures in the western U.S. Improved forage production under drought. (Released 2004, origin: Regar, Fleet and Paddock varieties)

Fleet
Similar characteristics and pasture yields to Regar but slightly more resistant to silver top; also higher seed yields. (Released 1987, origin: Regar variety & Eurasian sources)

High West
Developed from populations with increased crude protein content and forage yield. Use on both irrigated and semi-irrigated hayfields and pastures in the western U.S. (Released 2017)

MacBeth
Similar in forage production to Fleet, Paddock and Regar, but with significantly higher seed yields. (Released 2001, origin: MT)

*Introduced to North America.

Paddock
Slightly more resistant to silver top than Regar. Similar pasture and hay yields to Fleet and Regar; seed yields are slightly lower than Fleet. Good vigor and winter hardiness. (Released 1987, origin: Krasnador, former USSR)

Regar
Seeds germinate and establish quickly. Very winter hardy and produces abundant forage. (Released 1966, origin: Turkey)

Bromus carinatus, California brome

Cool season, perennial bunchgrass sometimes acting as an annual or biennial. Occurs below 11,000 ft. elevation in open areas and woods in a wide variety of climates. Common in the Pacific Coast region, often occurring with Mountain brome (*B. marginatus*) and reportedly hybridizing with it.

Bromus ciliatus, Fringed brome

Cool season, perennial bunchgrass found on a wide variety of habitats and sites. Widely distributed through much of the U.S. Adapted to riparian habitats and moist areas that may become seasonally dry, and tolerant of poorly drained soils. Highly palatable summer forage for livestock and wildlife with good potential as a revegetation species. Useful in mine reclamation; observed to have naturally established on coal mine tailings.

*Bromus inermis,** Smooth brome

Cool season, moderately drought tolerant, long-lived sod-former. Vigorous rhizomes adapted to deep soils. Productive, starting growth in early spring, ripening by early summer and producing abundant late summer and fall regrowth. Highly palatable to livestock when green, fair palatability to wildlife. Varieties:

Carlton
Leafy, high yielding forage variety used for hay and pasture. Candidate for mine reclamation having demonstrated a tolerance to industrial soils. Considered to be best suited to the northern U.S. and Canada. High seed yields. (Released 1961, origin: Saskatchewan, CAN)

Lincoln
Aggressive, develops strong rhizomes and forms sod. Easy establishing with good seedling vigor. Considered to be best suited to the central and southern half of the U.S. (Released 1942, origin: CA, originally from Hungary)

Manchar
Mild sod-former, does not become sod-bound as quickly as Lincoln. Maintains good balance with legumes. Used throughout the West and central and northern latitudes of the U.S. (Released 1943, origin: Manchuria, China)

Bromus marginatus, Mountain brome

Cool season, short-lived, perennial bunchgrass adapted to a wide spectrum of relatively moist soils including thin, infertile sites. Intolerant of high water tables. Establishes quickly and easily on disturbed sites. Common on foothills and mountain valleys and has good shade tolerance. Performs well at elevations up to 10,500 ft. Good palatability to livestock and excellent wildlife forage. *Pictured on pages 6 & 21.* Varieties:

Bromar
Tall, leafy and late-maturing. Yields abundant forage and heavy seed. Used in mixtures throughout the western U.S. on upland or montane sites. (Released 1946, origin: Whitman County, WA)

Garnet
Good longevity, ease of establishment and productivity of both forage and seed. Exhibits better overall vigor and longevity than Bromar. Very winter hardy. Resistant to head smut. (Released 2000, origin: Powell County, MT)

UP Cold Springs
Source Identified selection originating on the Uncompahgre Plateau in western Colorado, averaging 16-18 in. annual precipitation.

Calamagrostis canadensis, Bluejoint reedgrass

Cool season, sod-forming, native perennial found on wetland and riparian sites. Performs well at low to high elevations. May become dominant in the northern extent of its range, including mainland Alaska. Good forage producer and highly palatable when young, but poor palatability when mature. Excellent for rehabilitating wet mineral or decomposed organic soils in cold environments. *Pictured on page 21.*

Calamovilfa longifolia, Prairie sandreed

Tall, warm season, rhizomatous, sod-forming perennial occurring on well-drained sites, especially deep sands. Drought tolerant once established; intolerant of high water tables. Moderately palatable to livestock and wildlife, though somewhat coarse and woody. Due to its abundance and forage yield it is considered to be vital to many grazing programs within its native range. Useful in stabilizing sandy soils, dunes and other blowout areas. Varieties:

Goshen
Drought hardy and mildly rhizomatous. Leafy type and excellent seed producer. Late maturing. Use for stabilization and revegetation of sandy sites. Good forage value for livestock and big game in early spring, late fall and winter. (Released 1976, origin: Goshen County, WY)

Carex aquatilis, Water sedge

Cool season, strongly rhizomatous, native grasslike perennial. Occurs in shallow water, wet or swampy soils from mid to high elevations. Excellent for wetland habitat restoration. Excellent palatability to both livestock and wildlife. Good forage producer; often a significant component of meadow hay. Important species in riparian restoration.

Carex athrostachya, Slenderbeak sedge

Cool season, densely bunched, native perennial grasslike. Common on disturbed sites and often abundant in wetlands and seasonally wet areas such as meadows, marshes, pond and lake margins, usually colonizing below the high water line. Occurs from lowlands to moderate mountain elevations. Useful for wetland and riparian restoration.

*Introduced to North America.

Carex bebbii, Bebb's sedge

Cool season, tufted, native perennial grasslike. Occurs in wet meadows, streambanks, ditchways and saturated soils from low to mid elevations. May mimic an annual by maturing and flowering in its first growing season. Increases with disturbance. Good palatability to livestock and wildlife. Useful for wetland and riparian restoration.

Carex microptera, Smallwing sedge

Cool season, bunched, native perennial grasslike. Occurs in wet meadows, saturated soils and streambanks from 5,000-10,000 ft. in elevation. Slow to establish. Low forage value and intolerant of shade. Accumulates lead in its foliage when seeded in soils with high heavy-metal concentrations, such as mine tailings. Use for riparian restoration and reclamation. ditchways and saturated soils from low to mid elevations. May mimic an annual by maturing and flowering in its first growing season. Increases with disturbance. Good palatability to livestock and wildlife. Useful for wetland and riparian restoration.

Carex nebrascensis, Nebraska sedge

Cool season, rhizomatous, sod-forming perennial grasslike. Occurs in wet and often alkaline soils. Widespread and important riparian and wetland species, more xeric than other sedges, able to thrive in dry sites as long as its roots remain wet; up to 9,500 ft. elevation. Good palatability to livestock and extremely valuable for providing forage and cover for waterfowl. Excellent for riparian reclamation. *Pictured on page 24.*

Carex obnupta, Slough sedge

Cool season, sod-forming, native perennial grasslike common to the Pacific Coast region. Deep rhizomes and tough leaves with sharp edges. Often a dominant species in marshes, wet meadows, riverbanks, coastal dunes and salt marshes. Confined to lower elevations. Useful for wetland and riparian restoration. Provides valuable feed and nesting for waterfowl.

Carex pellita, Woolly sedge

Formerly *C. lanuginosa.* Cool season, rhizomatous, native perennial grasslike. Occurs in marshy wetland areas, moist prairies and sites that can dry during the summer. Presence may indicate historical disturbance. Moderate to high palatability to livestock and wildlife and seeds are consumed by numerous birds. Useful for riparian and wetland reclamation.

Carex praegracilis, Clustered field sedge (Blackcreeper sedge)

Cool season, native perennial grasslike with aggressive black rhizomes. Occurs in seasonally moist wetland areas and prairies, from low elevations up to 10,000 ft. Adapted to fine, medium and coarse alkaline and serpentine soils. Highly palatable to livestock and wildlife and tolerant of grazing and trampling. Useful for riparian and wetland reclamation. Occasionally used as a low maintenance lawn, requiring little mowing and irrigation and able to withstand foot traffic.

Carex simulata, Analogue sedge

Cool season, rhizomatous, native perennial grasslike common in many western states. Occurs in saturated soils of wet meadows and springs, from foothills to moderate elevations up to 9,000 ft. Often found on gentle slopes below seeps and on flat areas next to streams, sometimes in dense stands. Tolerates partial shade. Well-adapted to soils rich in organic matter but also to fine-textured saturated mineral soils. Useful for wetland and riparian restoration.

Carex stipata, Awlfruit sedge

Cool season, tall, native perennial grasslike. Grows in dense clumps. Widely distributed across the northern latitudes of the U.S. Adapted to seasonally flooded wetlands, marsh edges and sites with still or slow moving water, usually in full sun. Excellent seed producer; floating seeds are a visible food source for waterfowl. Useful in habitat restoration, wetland projects and detention basins. *Pictured on page 24.*

Carex utriculata, Beaked sedge

Formerly *C. rostrata.* Cool season, strongly rhizomatous, native perennial grasslike. Forms large, dense stands in shallow water or wet soils around waterways and sometimes in wet meadows, from low to moderately high elevations. Common throughout its range. Moderately palatable but provides good wildlife habitat. Useful for wetland and riparian restoration.

Carex vulpinoidea, Fox sedge

Cool season, tall, native perennial grasslike. Grows in clumps in moist to wet meadows and marshes, and along edges of standing water in swamps, swales, lowland forests and wet ditches. Widely distributed and common species across much of the U.S. Pioneer species following land disturbance. May be aggressive in some wetland habitats.

*Cynodon dactylon,** Bermudagrass

Warm season, long-lived, perennial that spreads from rhizomes and stolons forming dense patches. Adapted to a wide variety of sites, including saline soils. Widely used for erosion control and as highly palatable forage for livestock, but may be an aggressive invader. Listed as noxious in some states. Used also as a turfgrass in the south. (See *Turfgrass & Turf Blends.*)

*Dactylis glomerata,** Orchardgrass

Cool season, long-lived, perennial sod-former found on a wide variety of sites, including acidic soils but not adapted to saline soils. Highly productive and palatable to livestock and wildlife. Predominantly used as a forage grass for pasture and hay production, though at times is used for erosion control on disturbed sites. Compatible in mixes with legumes and other forage grasses. Varieties:

Crown Royale
High yielding, high quality, long-lived variety with excellent seedling vigor. Tillers better than other varieties so there is less clumping. Rust resistant. Quick to recover after grazing or mowing. Shade and drought tolerant. Late-maturing.

**Introduced to North America.*

Nebraska sedge (*Carex nebrascensis*). Credit: Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Awlfruit sedge (*Carex stipata*). ©Damon Winter/L&H Seeds

Inland saltgrass (*Distichlis spicata*). Credit: Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Latar
Leafy, late-maturing variety which produces quality forage high in digestibility due to its low lignin content. Grows best on well-drained, medium textured soils. (Released 1957, origin: former USSR)

Paiute
Dryland type often used as a forage crop for arid rangelands. Persists on sites with only 12 in. of annual precipitation, producing highly palatable feed. Begins growing early and remains green longer than many other varieties. (Released 1983, origin: Ankara, Turkey)

Pennlate
High yielding with excellent disease resistance and great forage quality. Quick recovery after cutting and some drought tolerance. Somewhat winter hardy. Late maturing. (Released 1957, origin: Europe)

Persist
Higher yields than most other varieties. Establishes easily and has excellent seedling vigor. Long-lived and persistent, withstanding years of grazing or haying and requiring less reseeding. Heat and drought tolerant; cold hardy.

Potomac
Vigorous growth, rust resistance, leafiness and superior persistence. Cold tolerant. Commonly seeded into irrigated pastures throughout the U.S. and Canada. Medium maturing. (Released 1954, origin: Europe)

Profile
High yielding irrigated or dryland type. Selected for vigor, heat and drought tolerance, leafiness, winter hardiness and disease resistance. Deep rooted. Highly palatable. Early maturing.

Tekapo
Uniquely low set crown and dense prostrate growth habit allow it to be grazed to near ground level; well-suited for sheep and horse grazing. Produces dense stands which persist even under hard, continuous grazing. Winter hardy. Medium maturing.

Danthonia californica, California oatgrass

Cool season, perennial bunchgrass found on a variety of soil types. Slow to establish; long-lived. Broadly adapted through the Pacific Coast; up to 7,200 ft. elevation. May be dominant in shrublands, grasslands and seasonally flooded wetlands. Moderate drought tolerance. Good for revegetation and wildlife habitat. Good forage.

Deschampsia cespitosa, Tufted hairgrass

Cool season, densely tufted, perennial bunchgrass. One of the most widely distributed grasses on earth and a larval food plant for several butterflies and host for numerous insects. Adapted to soil textures from fine to coarse and soil pH as low as 3.5. Useful for acidic soil reclamation where precipitation is adequate. Low salinity tolerance. Most common on moist sites from sea level up to 14,000 ft. elevation, but may occur on drier sites at its upper limit. Palatable to both livestock and wildlife. Use in woodlands, seasonally wet meadows and for stabilizing disturbed riparian sites. Varieties:

Nortran
Cold tolerant and well adapted to northern latitudes, including Alaska and Canada. Also used in lower latitudes of the species range. Excellent for low maintenance groundcover. (Released 1986, origin: Iceland & various sites in AK)

Deschampsia elongata, Slender hairgrass

Cool season, fine-textured, fast-growing, native bunchgrass. Acts as a biennial or short-lived perennial. Useful nurse crop for slower establishing species along waterways, coastal prairies and moist forests, but also occurs in drier habitats from sea level to alpine zones. Fair to good palatability for livestock and wildlife.

Digitaria californica, Arizona cottontop

Formerly *Trichachne californica.* Warm season, very drought tolerant, perennial bunchgrass adapted to deep well-drained soils. Rarely found in pure stands. Will repeatedly go to seed throughout the growing season when moisture remains available. Attractive white cotton-like seed heads make it useful as an ornamental. Extremely palatable to livestock and useful for improving rangelands.

Loetta
Selected for overall vigorous growth, seed production, forage production and ability to reseed itself. Establishes easily. Adapted to a wide range of soils, from clay to sandy loams. (Released 1999, origin: Santa Rita Experimental Range, AZ)

Distichlis spicata, Inland saltgrass

Formerly *D. stricta.* Warm season, strongly rhizomatous, sod-forming monoecious perennial. Found on wet sites but is also common in the flats and basins of the arid West up to elevations of 6,000 ft., where it is one of the most drought tolerant grasses. Also survives coastal areas periodically

**Introduced to North America.*

Canada wildrye *(Elymus canadensis)* at Lake in the Hills Fen State Nature Preserve, Illinois. ©David Schwaegler

Bottlebrush squirreltail (*Elymus elymoides*). ©L&H Seeds

Blue wildrye (*Elymus glaucus*) in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

flooded by sea water; intolerant of prolonged inundation. Moderately palatable but remains green when other grasses are dry during drought. Useful for revegetating unusually alkaline and saline soils. *Pictured on page 24.*

Eleocharis palustris, Creeping spikerush

Cool season, strongly rhizomatous, native perennial occurring in wet meadows, marshes and waterways, from sea level up to more than 10,000 ft. elevation. Pioneer species spreads rapidly in neutral, alkaline or saline soils. Tolerant of inundated or seasonal flooding, but also periods of drought. Able to fix nitrogen. Use for quick stabilization in riparian and wetlands, native forage and wildlife food and nesting cover.

Elymus canadensis, Canada wildrye

Cool season, short-lived, tall perennial bunchgrass adapted to moist or periodically moist, well-drained sites, including sandy drainages or banks. Good spring palatability, but poor tolerance to grazing. Fast establishing, vigorous seedlings provide quick initial cover for erosion control applications. Good for stabilizing sandy, blown-out soils. Also use for native range improvement or shaded riparian areas. *Pictured on page 25.* Varieties:

Helena Valley
Source Identified selection from Lewis and Clark County, MT averaging 12-13 in. annual precipitation.

Mandan
Shorter, finer, softer leaved and leafier variety than common types. Also more tolerant of grazing. (Released 1946, origin: Morton County, ND)

*Elymus dahuricus,** Dahurian wildrye

Cool season, short-lived, perennial bunchgrass. Excellent forage, with nutritional quality and palatability for livestock similar to Altai wildrye (*Leymus angustus*). Establishes rapidly and has quick recovery after cutting or grazing. Used in grass mixtures to increase production in young, slow to establish grass stands. Varieties:

James
Recommended for increasing initial forage yields in long term pastures or as short rotation pasture or hay. (Released 1989, origin: Saskatchewan, CAN, originally from China)

Elymus elymoides, Bottlebrush squirreltail

Formerly *Sitanion hystrix.* Cool season, short-lived, perennial native bunchgrass found on both deep and shallow soils. Very drought tolerant. Easy to establish and often behaves as a pioneer species on disturbed sites. Extremely fire tolerant. Grows in a wide range of habitats from shadscale communities to alpine tundra. Provides good winter and spring forage to grazing animals. Especially useful for revegetation of drastically disturbed sites. *Pictured on page 25.* Varieties:

Antelope Creek
Adapted specifically for the western Blue Mountains and slopes and foothills of the eastern Cascades of central Oregon. High seed yield relative to other accessions collected in central Oregon. (Released 2009, origin: Wasco County, OR)

CRNG
Source Identified selection from Crooked River National Grasslands in Jefferson County, OR averaging 10-14 in. annual precipitation.

Fish Creek
Originated in the Snake River Plain. Rapid seedling emergence and the latest heading-out date compared to other populations. Primarily used in restoration mixes. (Released 2003, origin: Blaine County, ID)

Pleasant Valley
High seed yields and adapted to the eastern Blue Mountains of Oregon, Washington and Idaho. (Released 2010, origin: Baker County, OR)

Pueblo
Collected at an elevation of 7,200 ft. in shallow, gravelly soils. Intended for erosion control, native forage and various conservation applications. (Released 2005, origin: Pueblo County, CO)

Rattlesnake
Originates in the Snake River Plain, selected for biomass, number of seedheads and height. (Released 2007, origin: Elmore County, ID)

Toe Jam Creek
Greater seed mass and seedling vigor than earlier releases. Less robust awn making the seed more amenable to de-bearding, resulting in less damage from conditioning compared to earlier releases. (Released 2003, origin: Elko County, NV)

Turkey Lake
Released to make available material originating from the greater Twin Falls, ID area. (Released 2015, origin: Gooding County, ID)

Wapiti
Collected at an elevation of 7,800 ft. Intended for erosion control, native forage and various conservation applications. (Released 2005, origin: Rio Blanco County, CO)

Elymus glaucus, Blue wildrye

Cool season, tufted, perennial bunchgrass which is highly desirable for use in erosion control seedings. Commonly found thriving in moist meadows, woodlands or forests at mid elevations throughout its range. Shade tolerant. Attractive, blue green foliage adds value to commercial landscaping projects where slope or site stabilization is needed. Short-lived but readily reseeds itself. *Pictured on page 25.* Varieties:

Arlington
Excellent seed vigor and seed yield with higher disease tolerance. Use for quick establishing, long-term cover. (Released 1995, origin: Snohomish County, WA)

Elkton
Slightly taller in stem height and more persistent than Arlington; initiates spring regrowth and seed maturity earlier. Excellent forage biomass producer. Use for quick establishing, long-term cover. (Released 1997, origin: Douglas County, OR)

Union Flat
Collected from the Palouse Hills region at an elevation 1,800 ft. Rapid emergence and growth rate. Better seed producer than other cultivars. (Released 2008, origin: Whitman County, WA)

White Pass
Collected in the Cascade Mountains at an elevation of 4,440 ft. Intended for critical area stabilization and upland wildlife habitat plantings. Rapid emergence, large basal size and high biomass production. (Released 2010, origin: Yakima County, WA)

*Elymus hoffmannii,** RS Hybrid wheatgrass

Cool season, long-lived, weakly rhizomatous, sod-forming perennial. Very drought tolerant. Hybrid cross combining the palatability of Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*) with the productive and vigorous growth of Quackgrasss (*Elytrigia repens*), but without aggressive spreading. Adapted to most soils including moderately saline sites. Highly productive, nutritious and palatable. Recovers quickly from grazing, haying. Useful on both irrigated and non-irrigated pasture and range sites. Varieties:

AC Saltlander
Salt tolerance equal to Tall wheatgrass (*Thinopyrum ponticum*). Adapted to and remains highly palatable when occurring in saline soils. (Released 2006, origin: NewHy variety)

NewHy
Similar salinity tolerance to Tall wheatgrass (*Thinopyrum ponticum*), but better palatability and nutritional value. Persistent. (Released 1989)

*Introduced to North America.

Elymus lanceolatus ssp. lanceolatus, Thickspike wheatgrass

Formerly *Agropyron dasystachyum.* Cool season, strongly rhizomatous, sod-forming drought tolerant perennial. Long-lived and similar appearance to Western wheatgrass (*Pascopyrum smithii*) but ripens three weeks earlier. Adapted to a wide range of sites but prefers well-drained medium to sandy textured soils. Palatability generally good year-round for livestock and wildlife. Varieties:

Bannock
Composite from accessions in several western states. Long-lived, leafy variety with moderate sod-producing qualities. Able to grow in some clayey soils. Rapid establishment and high forage production. (Released 1995, origin: OR, WA & ID)

Bannock II
Greater seedling establishment than previous releases, including Sodar (Streambank wheatgrass, *E. lanceolatus ssp. psammophilus*). Better seed producer than Bannock, Critana and Sodar. (Released 2015, origin: Bannock & Schwendimar varieties)

Critana
Developed for strong sodding ability on dry sites. Strong seedling vigor; great for site stabilization including sand dunes. (Released 1971, origin: Hill County, MT)

Schwendimar
Adapted west of the Rocky Mountains on sites receiving as low as 8 in. annual precipitation; especially on coarse soils. (Released 1994, origin: Wasco County, OR)

Elymus lanceolatus ssp. psammophilus, Streambank wheatgrass

Formerly *Agropyron riparium.* Cool season, drought tolerant, strongly rhizomatous sod-forming perennial, similar and closely related to Thickspike wheatgrass (*E. lanceolatus ssp. lanceolatus*), but occupies slightly wetter sites and is more productive in slightly heavier soils; less palatable. Varieties:

Sodar
Excellent drought tolerance, strongly rhizomatous grass with excellent seedling vigor. Competitive with weeds in dryland conditions. Used for revegetation, erosion control and for low maintenance turf. (Released 1954, origin: Grant County, OR)

Elymus multisetus, Big squirreltail

Formerly *Sitanion jubatum.* Perennial, cool season, native bunchgrass often found on rocky or brushy hillsides and open dry woods and plains. Similar to Bottlebrush squirreltail (*E. elymoides*) but grows in slightly more mesic areas. Prefers well-drained soils. Provides fair forage in the spring. Useful for quick stabilization.

Elymus trachycaulus ssp. trachycaulus, Slender wheatgrass

Formerly *Agropyron trachycaulum.* Cool season, short-lived, perennial bunchgrass with short rhizomes. Adapted to a wide range of sites and is moderately drought tolerant; saline tolerant. Establishes easily and quickly on sites up to 12,000 ft. elevation. Good palatability to both livestock and wildlife. Useful where quick, native perennial cover is desired. Varieties:

*Introduced to North America.

Copperhead
Superior emergence, survival and biomass production on acid and heavy-metal impacted soils. Excellent for mine reclamation or other contaminated areas such as sediment ponds. (Released 2007, origin: Beaverhead County, MT)

FirstStrike
Good persistence and seedling vigor in response to drought during the establishment year. Taller than San Luis, shorter than Pryor. Germinates earlier than Pryor. (Released 2006, origin: CO & WY)

Pryor
Consistently rates superior to other varieties in seedling vigor, salt and drought tolerance, forage and seed production and stand longevity. Tolerates periodic flooding and extended drought. Matures 2-3 weeks earlier than other types. (Released 1988, origin: Carbon County, MT)

Revenue
Good for saline soils and short rotations. Establishes easily; saline tolerant. Good forage quality and forage and seed yields. (Released 1970, origin: Saskatchewan, CAN)

San Luis
Rapid establishment, good emergence, and spreading by seed and tillers. Excellent for soil stabilization. Longer-lived; persists 5-10 years. (Released 1984, origin: Rio Grande County, CO)

Elymus virginicus, Virginia wildrye

Cool season, tall, perennial bunchgrass adapted to moist, fertile, heavier soils along stream banks or in open habitats. Establishes well from seed. Good forage producer, palatable in the fall and spring. Useful in native restoration and as a pasture grass. Good seed producer.

Elymus wawawaiensis, Snake River wheatgrass

Cool season, long-lived, perennial bunchgrass formerly thought to be a regional type of Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*). Similar to Bluebunch wheatgrass in appearance, growth characteristics and adaptation, but more drought tolerant, resulting in it often being used in place of Bluebunch throughout the western U.S., though its natural distribution is limited to Idaho, Washington and Oregon. Palatable to livestock and wildlife, especially in the spring. Heavy spring grazing is detrimental to vigor and longevity. Varieties:

Discovery
Enhanced stand establishment of rangeland seedings. Seedlings are more persistent during summer drought than those of Secar. Higher dry-matter and seed yields than Secar. (Released 2008, origin: Asotin & Whitman Counties, WA & Idaho County, ID) *Pictured on page 28.*

Secar
Originally considered to be a Bluebunch wheatgrass. Low-elevation dryland ecotype with excellent drought tolerance and longevity. Matures early and produces numerous fine stems and leaves. (Released 1980, origin: Nez Perce County, ID)

*Eragrostis curvula,** Weeping lovegrass

Warm season, perennial bunchgrass with an extensive fibrous root system. Occurs on a wide range of soils with adequate moisture. May be aggressive without proper management. Produces abundant forage with good palatability to livestock. Varieties:

Ermelo
Leafier and more palatable than naturalized types. Remains green under moisture and temperature stress. Regrows quickly after grazing. (Released after 1944, origin: South Africa)

Eragrostis intermedia, Plains lovegrass

Warm season, drought tolerant, tufted perennial bunchgrass with a deep root system. Adapted to a wide range of sites but performs best on deep, well-drained sandy soils. Occurs throughout the southwest on upland sites where moisture is adequate. Highly palatable to both livestock and wildlife.

*Eragrostis lehmanniana,** Lehmann lovegrass

Warm season, drought tolerant, rhizomatous bunchy sod-former with an extensive fibrous root system. Prodigious seed producer occurring on a wide variety of sites. Provides good palatability to livestock and wildlife. May be aggressive and difficult to control.

*Eragrostis lehmanniana x E. trichophora,** Cochise lovegrass

Warm season, drought tolerant perennial bunchgrass up to 4 ft. tall. Adapted to well-drained soils. More productive at higher elevations. Establishes more easily, yields more forage and persists better than Lehmann lovegrass (*E. lehmanniana*) on identical sites.

Eragrostis trichodes, Sand lovegrass

Warm season, tall perennial bunchgrass with a dense, deep fibrous root system. Adapted to deep sandy sites but may occur on heavier soils. Extremely palatable to livestock but unable to withstand continuous close grazing. Useful for stabilizing sandy areas or improving rangelands. Varieties:

Bend
Easily established, uniform in maturity, relatively disease free, produces good seed crops. Suited to sandy sites throughout its adapted range. (Released 1971, origin: Arkansas River Basin of KS & OK)

Nebraska 27
Relatively long-lived, palatable, winter-hardy. Adapted to a wide variety of soils. Highly nutritious for livestock. (Released 1949, origin: Holt County, NE)

Festuca arizonica, Arizona fescue

Cool season, drought tolerant perennial bunchgrass with a coarse, dense fibrous root system. Most commonly found on thin, heavy soils but also occurs on deeper, coarser sites, often in association with Ponderosa pine communities. Provides good palatability to livestock and wildlife. Useful for controlling soil erosion and improving rangelands. Varieties:

**Introduced to North America.*

'Discovery' Snake River wheatgrass *(Elymus wawawaiensis).* ©Damon Winter/L&H Seeds

'Redondo' Arizona fescue (*Festuca arizonica*) ©Gord Pearse/Bruce Seed Farm

Idaho fescue *(Festuca idahoensis)* in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

Redondo
Exceptional seedling vigor and extensive fibrous root system. Good establisher. Useful for reclamation throughout its adapted range. (Released 1973, origin: Los Alamos County, NM) *Pictured on page 28.*

*Festuca arundinacea,** Tall fescue

Cool season, densely tufted, perennial bunchgrass with a deep fibrous root system. Occurs in all soil textures on deep soils. Tolerates wet, poorly drained, saline sites. Moderately drought-tolerant. Good palatability to livestock and big game. Extremely important to use endophyte-free strains when intended as forage. Used for pasture, hay, silage, soil erosion and as a turfgrass. (See *Turfgrass & Turf Blends*) Varieties:

Fawn
High crude protein content, high seed yield and low self-fertility. Matures early, good spring vigor and consistently produces high seed yields. (Released 1964, origin: Europe)

Kentucky 31 (K-31)
Deep rooted, tolerant of alkaline and acidic soils and drought tolerant. Once heavily used as a forage or hay crop, it is now less preferred due to newer endophyte-free varieties. (Released after 1931, origin: Menifee County, KY, originally from Europe)

Rustler
Large soft leaves are extremely palatable. High forage yields with improved resistance to common grass diseases. Tolerant of cold, drought and heat, as well as poor draining soils and a wide range of pH levels.

*Festuca arvernensis,** Blue fescue

Formerly *F. ovina glauca.* Cool season, short to medium height, perennial bunchgrass adapted to a wide range of soils. Attractive light-blue color, often used as a landscape ornamental. Tolerant of drought, poor soils and road salt. Used in wildland situations, in wildflower plantings and as a turfgrass. (See *Turfgrass & Turf Blends*)

*Festuca brevipila,** Hard fescue

Formerly *F. longifolia.* Densely tufted, cool season, long-lived perennial bunchgrass with a massive fibrous, shallow root system. Adapted to a wide range of soil conditions except for standing wet or strongly alkaline sites. Establishment is slow but persistent with mature stands being competitive. Good palatability to livestock and excellent for wildlife. Different varieties for either erosion control or turfgrass. (See *Turfgrass & Turf Blends*) Varieties:

Durar
Tall, densely tufted with a tremendous root system, drought resistant and good seed yields. Performs well in rainfall zones of 14-30 in. More drought resistant than Chewings fescue (*F. rubra fallax*); less than Sheep fescue (*F. ovina*) and Idaho fescue (*F. idahoensis*). Primarily used to stabilize roadsides, ditch banks, recreation areas and as a cover crop in orchards and vineyards. (Released 1949, origin: Europe)

Festuca campestris, Rough fescue

Formerly *F. scabrella.* Cool season, native bunchgrass that produces thick mats of sheaths and culm bases. Occurs in prairies and open woods up to 6,500 ft. elevation. Prefers dry, deep sandy loam soils but can establish on a wide variety of soil types. Excellent forage for livestock and wildlife.

Festuca idahoensis, Idaho fescue

Cool season, drought-tolerant, perennial bunchgrass. Adapted to deep, fertile, heavy soils but will occur on thin well-drained coarse sites. Seedlings are weakly competitive but once established mature stands are strongly competitive. Good palatability to livestock and wildlife. *Pictured on page 28.* Varieties:

CTUIR
Source Identified selection from the Confederated Tribes of the Umatilla Indian Reservation in Umatilla County, OR averaging 12-17 in. annual precipitation.

Joseph
Developed from 13 clones. Taller, more uniform and achieves greater basal density than Nezpurs. (Released 1983, origin: northwestern states of U.S. & CAN)

Nezpurs
Developed from 90 clones. High seed producer with good seedling vigor and germination. More plant variability than Joseph. (Released 1983, origin: northwestern states of U.S. & CAN)

Winchester
Source Identified selection from Lewis County, ID averaging 18 in. annual precipitation.

Festuca occidentalis, Western fescue

Cool season, short-lived, perennial bunchgrass closely related to Idaho fescue (*F. idahoensis*). Drought tolerant, shallow rooted species that often occurs on dry to moist well-drained woodlands, rocky slopes and along stream banks. Quick and reliable germinator with excellent erosion control potential. Good palatability but low productivity; fair seed producer.

**Introduced to North America.*

*Festuca ovina,** Sheep fescue

Cool season, long-lived, perennial bunchgrass similar to Hard fescue (*F. brevipila*) but more drought tolerant and with a more extensive root system. Adapted to various soil types; tolerant of weakly saline to alkaline and acidic sites. Sometimes misclassified as a native due to its widespread and longstanding naturalization. Primarily used as groundcover and soil stabilizer on erosion control projects such as roadsides and recreation areas. Tolerance to moderate equipment traffic makes it useful in vineyards, orchards and equipment yards. Often included in wildflower seedings and sometimes as a low maintenance turfgrass or ornamental. Attractive blue-green color. The most drought tolerant and water efficient of all the cool season turfgrasses. (See *Turfgrass & Turf Blends*) Varieties:

Azay
Leaf blades are very fine, low growth habit and moderately dark-blue green color which it maintains during periods of drought stress and cold weather. Thrives in acidic, infertile and droughty soils. Shade tolerant. Use as a low maintenance turfgrass, ground cover, erosion control and wildflower mixes.

Azure
Leaf blades are very fine, low growth habit and deep blue-teal color which intensifies under heat and drought stress. Tolerant of infertile soils and shade. Very slow growing, reducing landscape maintenance. Primarily used for turf areas or in wildflower mixtures.

Covar
Short aggressive competitor that forms attractive drought tolerant cover. Blue-green color. Survives with as little as 10 in. of annual precipitation; winter hardy. Slow to establish but extremely persistent once it becomes rooted. More drought tolerant than all other fescues. Used for erosion control, reclamation, low maintenance turf or as an ornamental. (Released 1977, origin: Konya, Turkey)

Festuca ovina glauca, see *Festuca arvernensis* (Blue fescue)

*Festuca pratensis,** Meadow fescue

Cool season, loosely tufted, short-lived perennial bunchgrass adapted to cool moist or humid regions. Extremely palatable and productive, but may be slow to establish. Useful in pasture blends, riparian areas and for erosion control.

Festuca roemeri, Roemer's fescue

Native, cool season, long-lived perennial bunchgrass. Occurs in full sun to partial shade on moderately dry to moist meadows and grassy openings in the Pacific Coastal states. Excellent for habitat improvement and restoration within its native range. Slow to establish. May be confused with non-native Creeping red fescue (*F. rubra*). Varieties:

Puget
Genetically diverse selection from seven naturally occurring populations. Moderate visible variation among plants, comprising pale blue, green or purple tinged foliage. Ideal for native habitat restoration of upland prairies, grassy meadows and oak savannas. (Released 2012, origin: South Puget Sound, WA)

*Festuca rubra,** Creeping red fescue

Introduced, cool season, long-lived, perennial sod-former adapted to cool, shady areas. Adapted to a wide range of sites and soils, including low fertility soils. Somewhat alkaline and saline tolerant. Moderate palatability. Used for stabilizing waterways, slopes and banks. Also for turfgrass or a low statured, shade tolerant cover crop in orchards. (See *Turfgrass & Turf Blends*)

Festuca rubra, Native red fescue

Cool season, perennial sod-former found in dry to wet habitats in various soil types from sea level up to 11,000 ft. elevation. Native type primarily suited to the Pacific Coastal states. Higher drought tolerance than non-native Creeping red fescue (*F. rubra*). Appearance varies with habitat. Use for habitat restoration or as a rugged, native lawn.

*Festuca rubra ssp. fallax,** Chewings fescue

Formerly *F. rubra commutata.* Cool season, long-lived, perennial bunchgrass adapted to cool shady areas. Not alkaline tolerant. Moderate palatability. Similar to non-native Red fescue (*F. rubra*) but more erect growth habit, may segregate into patches over time and has better heat tolerance. Used for erosion control and turfgrass. (See *Turfgrass & Turf Blends*)

Festuca saximontana, Rocky Mountain fescue

Cool season, long-lived, perennial bunchgrass similar in appearance to Arizona fescue (*F. arizonica*), though somewhat smaller and less densely tufted. Found on mesic to dry meadows and forest openings. Excellent palatability to livestock and big game, but low productivity. Establishes easily in tough conditions. Use for revegetating sandy or gravelly soils at mid to high elevations.

*Festuca spp. x Lolium spp.,** Festulolium

Perennial, cool season, hybrid cross between ryegrass (Annual or Perennial) and fescue (typically Meadow or Tall). Combines the fast establishment, extended productivity and high palatability of ryegrass with the disease resistance, persistence and summer stress tolerance of fescue. Result is a high-quality, hardy grass able to extend the summer growing season of irrigated hay fields and pastures. Best used in blends with other grasses and legumes. Varieties:

Duo
High yield and high quality tetraploid forage used for hay, grazing, silage or green chop. Persists longer than most ryegrasses without quality loss.

Johnstone
Often misclassified as a Tall fescue (*F. arundinacea*) although it was derived from a cross between tall fescue and annual and perennial ryegrasses before the name Festulolium was termed. Low alkaloid and endophyte content. (Released: 1983, origin: Europe)

*Introduced to North America.

Fowl mannagrass *(Glyceria striata).* ©David Schwaegler

Needle and thread (*Hesperostipa comata ssp. comata*). ©Damon Winter/L&H Seeds

Common rush (*Juncus effusus*). Credit: The Wild Garden, nwplants.com

Glyceria grandis, American mannagrass

Cool season, rhizomatous, native perennial that occurs in wetlands, streambanks, marshes and ditches. Requires wet to moist soils; withstands periods of submersion. Grows rapidly. Important wetland food and habitat source for waterfowl, muskrats and deer throughout its range.

Glyceria occidentalis, Western mannagrass

Cool season, tall, native perennial sod-former occurring in shallow water or wet soils. Found in freshwater marshes and wet prairies. Grows rapidly. Use in habitat restoration, streambank erosion control and detention ponds that are wet year round. Valuable cover and food waterfowl, muskrats and small mammals.

Glyceria striata, Fowl mannagrass

Cool season, rhizomatous perennial occurs along slow streams; spreads rapidly. Often associated with aspen or coniferous woods and willow thickets up to 11,500 ft. elevation. Prefers areas where seasonal flooding occurs. Excellent for streambank stabilization, habitat and food for waterfowl and small mammals. Found in every state except Hawaii. *Pictured on page 30.*

Hesperostipa comata ssp. comata, Needle and thread

Formerly *Stipa comata.* Cool season, short-lived, perennial bunchgrass adapted to coarse, well-drained soils. Very drought tolerant, typically occurring on sites receiving less than 16 in. annual precipitation. Widely distributed throughout numerous ecotypes and plant communities. Provides good spring forage, but after maturity the sharp needle-like awn may injure grazing animals. Extensively used for revegetating drastically disturbed sites and sandy blowout areas. *Pictured on page 30.*

Hesperostipa neomexicana, New Mexico feathergrass

Formerly *Stipa neomexicana.* Cool season, very drought tolerant, short-lived, perennial bunchgrass adapted to deep, well-drained soils in dry upland desert shrub and pinyon-juniper communities. Similar to Needle and thread (*H. comata ssp. comata*) but with much longer, hairy awns; may occur on slightly heavier soils.

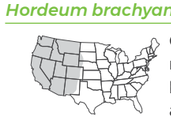
Heteropogon contortus, Tanglehead

Warm season, drought tolerant, native perennial bunchgrass occurring on rocky slopes and sandy plains from 1,000-5,000 ft. elevation in the semiarid desert grasslands of the Southwest. Vegetative growth begins in late spring; flowers August to October. Short lived but reseeds itself easily.

Hilaria belangeri, Curly mesquite

Highly drought tolerant, warm season, stoloniferous perennial bunchgrass. Prefers medium to fine textured soils, but will establish on a wide range of soil textures. Able to form dense sod, creating large patches within semiarid desert shrublands. Resembles Buffalograss (*Bouteloua dactyloides*) but found in hotter, more arid environments. Flowers August to November. Does not tolerate shade.

Hordeum brachyantherum, Meadow barley



Cool season, tufted, perennial bunchgrass is moderately alkaline and saline tolerant, and broadly adapted to various soils types. Best adapted to moist sites and tolerant of periods of shallow standing water, but is also summer-drought tolerant. Typically medium-lived but short-lived on drier sites. Excellent seedling vigor and quick growth. Important species to riparian areas, wetlands, meadows, forest openings, salt marshes and ocean beaches from sea level up to 11,000 ft. elevation. Rarely dominates, eventually yielding to longer-lived, more persistent species. Useful as a quick cover and nurse crop in habitat restoration mixes. Palatable to herbivores in the spring and can be used in dryland pasture at high elevations. Varieties:

Jackson-Frazier
Source Identified selection from the Jackson-Frazier Wetland nature preserve in Benton County, OR which receives an average of 43 in. annual precipitation. Taller (24-54 in.) than typical descriptions of the species (15-40 in.). Good seedling vigor and genetic diversity. May exhibit disease resistance to head smut and ergot. (Released 2008)

Juncus balticus, Baltic rush

Cool season, sod-forming, riparian native perennial grasslike. Occurs from deserts to subalpine zones, on saline or alkaline soils. Widely distributed, often found as a community dominant. Excellent for rehabilitating wetland and riparian ecosystems as well as some seasonally dry sites. Able to fix nitrogen. Used by a wide range of mammals and birds for food and habitat.

*Introduced to North America.

Prairie junegrass *(Koeleria macrantha)* in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

Green sprangletop (*Leptochloa dubia*). Credit: Patrick J. Alexander, hosted by the USDANRCS PLANTS Database

Great basin wildrye (*Leymus cinereus*) during flowering and pollination. ©Damon Winter/L&H Seeds

Juncus effusus, Common rush (Soft rush)

Cool season, tall, rhizomatous, native perennial grasslike. Provides shoreline protection with its dense fibrous root system. Generally occurs in fresh water to brackish marshes, swamps, ditches and moist seasonal wetlands. Tolerance to low pH and heavy metals allow it to survive in polluted conditions. Depended upon by a wide range of mammals and birds for food and habitat. *Pictured on page 30.*

Juncus ensifolius, Swordleaf rush (Daggerleaf rush)

Cool season, short, native perennial grasslike growing in rhizomatous clumps. Found in riparian areas, wetlands, wet meadows and streambanks; rarely in standing water. Depended upon by numerous small mammals and birds for food and habitat.

Juncus tenuis, Poverty rush (Path rush)

Cool season, rhizomatous, perennial native grasslike occurring in moist soils following disturbance or compaction. Adapted to soils from heavy clays to well-drained gravels. Widely distributed from low to mid elevations, on soils with winter saturation and dry summer conditions. Excellent for reclamation of riparian communities. Nest material and food for upland birds; cover for some mammals.

Juncus torreyi, Torrey's rush

Cool season, saline and alkaline tolerant, rhizomatous grasslike perennial; up to 3 ft. tall. Prefers saturated soils, but will also stand periods of drought. Tolerant of slightly acid to alkaline soils. Widespread, occurring up to 9,000 ft. in elevation. Useful for restoring wetland and riparian areas. Provides cover and food for wildlife.

Koeleria macrantha, Prairie junegrass

Formerly *K. cristata.* Cool season, drought tolerant, medium-lived perennial bunchgrass adapted to moderately or well-drained soils. Cold and heat tolerant. Widely distributed; occurs in numerous native plant communities on rangelands, meadows, plains and open forestlands; up to 11,500 ft. elevation. Starts growth very early in spring and provides excellent early season forage for livestock and wildlife. Establishes easily and is a good choice for revegetating severely disturbed areas. Often used in native restoration as well as revegetating mined lands, heavy use areas and other disturbed soil surfaces. *Pictured on page 31.* Varieties:

Umatilla
Source Identified selection from the Umatilla County, OR which receives an average of 12-17 in. annual precipitation.

UP Sims Mesa
Source Identified selection from the Uncompahgre Plateau in western Colorado averaging 16-18 in. annual precipitation.

Leptochloa dubia, Green sprangletop

Warm season, short-lived, native perennial bunchgrass. Drought tolerant, adapted to a wide variety of arid southwestern sites. Intolerant of poorly drained soils or high water tables. Establishes quickly and easily, behaving as a pioneer species. Provides good palatability and early spring forage to livestock and wildlife on open rangelands; occasionally cut for hay. *Pictured on page 31.*

*Leymus angustus,** Altai wildrye

Formerly *Elymus angustus.* Robust, cool season, long-lived, perennial bunchgrass with short creeping rhizomes. Well adapted to loam and clay soils, drought tolerant and extremely salt and alkaline resistant. Excellent winter hardiness. Root system may extend to 14 ft. below the surface, making it useful for soil stabilization. Excellent forage, especially in winter when plants stand above the snow surface available for grazing. Nearly as productive as Tall wheatgrass (*Thinopyrum ponticum*) on saline soils. Varieties:

Mustang
Produces significantly more forage than previous releases and as well as Magnar and Trailhead varieties of Great Basin wildrye (*L. cinereus*). Greater persistence than earlier releases. (Released 2005, origin: China)

Leymus cinereus, Great Basin wildrye

Formerly *Elymus cinereus.* Robust and very tall (4-8 ft.), cool season, perennial bunchgrass. Very drought tolerant but also withstands periodic flooding. Occurs from dry sage communities to wet meadows, up to 9,800 ft. elevation. Deep fibrous root system helps it thrive on sub-irrigated sites. Alkaline and saline tolerant. Excellent soil binder. Provides outstanding wind cover, nesting habitat and winter feed for herbivores and wildlife above snow level. *Pictured on page 31.* Varieties:

Continental
Rapid stand establishment is similar or superior to Trailhead and Magnar. Excellent seed yield. (Released 2009, origin: Magnar & Trailhead varieties)

Crooked River
Source Identified selection from the Crooked River National Grassland in Jefferson County, OR averaging 10-14 in. annual precipitation.

CTUIR
Source Identified selection from the Confederated Tribes of the Umatilla Indian Reservation in Umatilla County, OR averaging 12-17 in. annual precipitation.

Magnar
Robust and productive, often reaching heights over 8 ft. Cold hardy, long-lived and drought tolerant. Survives on alkaline sites and with moderately high water tables. (Released 1979, origin: Saskatchewan, CAN)

NBR
Source Identified selection from the Northern Basin and Range ecoregion in Malheur County, OR averaging 8-11 in. annual precipitation.

Trailhead
Drought tolerant strain superior to earlier cultivars in productivity and stand longevity under dry, hot conditions. Survives in areas receiving as little as 6 in. of annual precipitation. (Released 1991, origin: Musselshell County, MT)

Trailhead II
Increased total seedling establishment over Trailhead, Continental and Magnar. Seedling emergence rate also faster than Trailhead; occasionally taller at maturity. (Released 2016, origin: Trailhead variety)

*Leymus multicaulis,** Manystem wildrye

Introduced, cool season, sod-forming perennial grass. Spreads by underground stems and by seed, often forming distinct clumps. Primarily used for soil stabilization and reclamation of wet, saline soils. Moderately palatable to wildlife and livestock, especially in the early spring before it becomes coarse. Varieties:

Shoshone
Originally thought to be a variety of native Beardless wildrye (*L. triticoides*). Released without selection because of its ability to produce good forage on wet, saline-alkaline soils. Used for pastures or stabilization throughout the West. (Released 1980, origin: Eurasia)

*Leymus racemosus ssp. racemosus,** Mammoth wildrye

Formerly *Elymus giganteus.* Tall cool season, rhizomatous perennial sod-former occurring on coarse textured, well-drained sites. Poor forage value but outstanding for erosion control on dunes and other blowout areas. Varieties:

Volga
Tall creeping variety, which is coarse and essentially non-palatable to livestock. Provides a vigorous, permanent cover for sand dunes. (Released 1949, origin: Volga region, former USSR)

Leymus salinus, Salina wildrye

Tall cool season, densely tufted, native bunchgrass occasionally with short rhizomes. Adapted to upland rangelands and some semi-desert and mountain sites, sometimes as a dominant species. Moderately tolerant of alkaline environments. High forage producer, but unpalatable after early spring. Good soil stabilizer.

Leymus triticoides, Beardless wildrye (Creeping wildrye)

Formerly *Elymus triticoides.* Cool season, long-lived, loose sod-forming perennial with an extensive root system. Adapted to a wide variety of soils as long as they are subirrigated, wet or occur in precipitation zones receiving more than 7 in. annually. Extremely saline tolerant, useful for improving saline rangelands and waterfowl areas. Good palatability.

*Lolium perenne,** Perennial ryegrass

Cool season, short-lived, perennial bunchgrass adapted to a wide variety of sites where moisture is adequate. Establishes quickly and easily. Excellent palatability for use in pasture and range improvement blends; also extensively bred as a turf. Tetraploid types are more vigorous, digestible, less stemmy, have excellent regrowth and should be used for pasture and hay. Diploid types have finer leaf blades, tiller more aggressively and are developed as turf. Popular choice for winter over-seeding of dormant warm season Bermudagrass (*Cynodon dactylon*) lawns in the south and southwest. (See *Turfgrass & Turf Blends*) Varieties:

Albion
Superior for pasture, hay and silage. Excellent performance in areas that experience drought or high humidity. Notable drought tolerance for a ryegrass.

Linn
Commonly used for erosion control, naturalized areas and basic pasture; unsatisfactory turf. Productive early in the growing season. (Released 1961, origin: New Zealand, originally from Europe)

Oro Verde
Superior pasture, hay and silage. Tolerant of cold climates and drought conditions. Establishes easily; improved persistence.

*Lolium perenne ssp. multiflorum,** Annual ryegrass

Formerly *L. multiflorum.* Cool season, annual bunchgrass adapted to many sites where adequate water is available. Establishes quickly and easily. Highly palatable to livestock and wildlife. Excellent for temporary pasture or for early spring growth in a perennial pasture mix. Use in erosion control blends for quick, temporary cover. Also used for winter over-seeding of dormant warm season Bermudagrass (*Cynodon dactylon*) lawns in the south and southwest. Varieties:

Ed
High forage yields, even after extended periods below freezing. Improved crown rust resistance.

Gulf
Developed as winter forage for livestock. High forage production and seed yield. Resistant to rust. Susceptible to winter kill. (Released 1958, origin: Uruguay)

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'Lodorm' Green needlegrass (*Nassella viridula*). ©Gord Pearse/Bruce Seed Farm

Western wheatgrass *(Pascopyrum smithii)* during pollination. ©Damon Winter/L&H Seeds

Timothy (*Phleum pratense*).

Muhlenbergia asperifolia, Scratchgrass

Warm season, rhizomatous perennial occurring in dense spreading patches. Favors riparian or moist areas but also found on arid sites; fine to medium textured soils. Adapted to alkaline meadows, low flats, sandy washes, grassy slopes and salted roadsides up to 9,800 ft. Low palatability to livestock.

Muhlenbergia montana, Mountain muhly

Warm season, perennial bunchgrass with a fibrous root system. Found on many sites but generally in ponderosa pine and grassland habitats from 2,600-11,200 ft. elevation. Adapted to both dry and moist conditions but requires excellent drainage. Good palatability for livestock and wildlife while actively growing; palatability declines with maturity. Excellent seed producer.

Muhlenbergia porteri, Bush muhly

Warm season, perennial bunchgrass forms a mass of growth resembling a shrub. Distinct purplish heads mature to a white, fluffy appearance. Occurs on sandy to coarse textured soils of desert grass and shrublands, open hillsides and along drainages, up to 6,000 ft. elevation. Once occurred in extensive stands but now generally only found in shrub canopies; some shade tolerance. Good palatability and stays green throughout the year.

Muhlenbergia wrightii, Spike muhly

Warm season, long-lived, perennial bunchgrass found in many sites but generally in the pinyon-juniper or pine-grassland types at 3,600-9,800 ft. elevation. Occurs on a variety of soils but often found in gravelly prairies and on rocky slopes. Slow to establish but persistent. Good palatability to livestock and excellent for wildlife. Varieties:

El Vado
Good seedling vigor and forage production. Palatable throughout the year and an excellent soil binder. (Released 1973, origin: Rio Arriba County, NM)

Nassella viridula, Green needlegrass

Formerly *Stipa viridula.* Cool season, long-lived, drought tolerant perennial bunchgrass with an extensive fibrous and deep root system. Important native species from the Northern Great Plains to Arizona. Performs well on a wide variety of sites, thriving on medium and fine textured bottomland soils but also tolerant of coarser sites. Moderately palatable to livestock and wildlife year-round. Use for native pasture, rangeland or for prairie habitat restoration. Occasionally slow to germinate and establish. Seedlings are slow to develop, but mature plants are vigorous. Varieties:

Cucharas
Higher plant productivity, germinability and seed yields than Lodorm. Tolerant of grazing. (Released 2003, origin: Huerfano County, CO)

Fowler
Northern type intended for restoration and wildlife habitat enhancement. Shorter than Cucharas. (Released 2006, origin: southern Alberta, CAN)

Lodorm
Widely utilized. Low seed dormancy. (Released 1970, origin: Burleigh County, ND) *Pictured on page 33.*

*Panicum antidotale,** Blue panicgrass

Robust, warm season, perennial bunchgrass which spreads by rhizomes and has an extensive fibrous root system. Prefers heavy, fertile, well-drained soils. Highly palatable to livestock. Useful for irrigated pastures and improving rangelands.

*Panicum coloratum,** Kleingrass

Warm season, moderately drought and heat tolerant, perennial rhizomatous bunchgrass adapted to a wide range of sites; sometimes with stolons. Highly palatable and nutritious to livestock. Frequently used as irrigated pasture and hay in the southwest.

Panicum obtusum, Vine mesquite

Warm season, spreading perennial. Occurs abundantly in heavy soils or low-lying areas from 1,000-6,000 ft. elevation. Good soil binder due to strong stoloniferous growth habit. Often found in dense stands along waterways, floodplains or depressions where water accumulates. Palatable to all livestock but utilized best when grazed early or when more palatable grasses are not present.

Panicum virgatum, Switchgrass

Warm season, strongly rhizomatous, open sod-former found on a wide variety of sites where moisture is adequate; 3-5 ft. tall. Found on prairies, open oak and pine woodlands, shores, riverbanks and brackish marshes. Abundant forage producer in warm-season pastures and as high quality hay. Highly palatable and nutritious to both livestock and wildlife. Seed is sought by birds and small mammals. Also useful for controlling soil erosion, land reclamation and range improvement. Some use in bioenergy production due to its ability to yield high amounts of biomass on marginal quality ground. Varieties:

Alamo
Adapted to the southern half of Texas. Produces superior forage and flowers 1-2 months after Blackwell. (Released 1978, origin: Live Oak County, TX)

Blackwell
Upland type, leafy and medium in height. Good resistance to disease. Widely adapted in north Texas, Oklahoma, Nebraska and Kansas. (Released 1944, origin: Kay County, OK)

Dacotah
Cold hardy northern variety selected for high vigor, seed yield, leafiness and drought tolerance. Shorter and much faster maturing than other varieties. (Released 1989, origin: Morton County, ND)

Forestburg
Superior winter hardiness, persistence and seed production. Earlier maturity than other varieties, except Dacotah. One of the best forage producers in northern latitudes. (Released 1987, origin: Sanborn County, SD)

Kanlow
Especially adapted to low wetland areas, tolerating submerged conditions for weeks. Also performs well on thin upland, droughty soils. (Released 1963, origin: Hughes County, OK)

Nebraska 28
Early-maturing strain representative of Nebraska Sandhill types. Leafy, achieves moderate heights and is non-uniform. Susceptible to rust in areas with longer growing seasons. (Released 1949, origin: Holt County, NE)

Pathfinder
Winter-hardy, leafy, late maturing. Produces good stands and forage yields. Rust resistant. (Released 1967, origin: NE & KS)

Sunburst
Superior seedling vigor and stand establishment; early maturing. Seed is approximately twice the size of other varieties. High forage yields and performs well in northern Great Plains. (Released 1983, origin: Yankton County, SD)

Trailblazer
Similar to Pathfinder but with superior forage digestibility. Recommended for the Central Great Plains and adjacent states. (Released 1984, origin: NE & KS)

Pascopyrum smithii, Western wheatgrass

Formerly *Agropyron smithii.* Cool season, strongly rhizomatous, long-lived perennial. Widely adapted; saline-tolerant and moderately drought tolerant. Tolerant of some flooding, heavy soils and cold. One of the best known and most common native grasses in North America, occurring in numerous types of native plant communities. May be replaced by Thickspike wheatgrass (*Elymus lanceolatus ssp. lanceolatus*) on coarser soils. Moderately palatable to livestock and wildlife. *Pictured on page 33.* Varieties:

Arriba
Rapid seedling establishment with aggressive rhizomes. Produces dense medium height forage. Superior seed yielder. (Released 1973, origin: Kit Carson County, CO)

Barton
Native collection from a clayey site. Strongly rhizomatous and leafy intermediate growth type, occurring between the northern and southern varieties. Superior forage and seed yields. (Released 1970, origin: Barton County, KS)

Recovery
Establishes quicker and has greater seedling vigor than previous releases. Stands remain vigorous even 4-6 years after establishment. Especially useful on military land and arid rangelands having repeat disturbance or wildfire. Forage yields similar to other varieties. (Released 2009, origin: Rosana variety and collections from central CO)

Rodan
Moderately rhizomatous, thin-leaved plant producing good forage yields. Well suited for pasture or revegetation. Good disease resistance. Seed yield is comparable to Rosana except with a short awn. (Released 1983, origin: Morton County, ND)

Rosana
Strongly rhizomatous native collection with excellent seedling vigor. Equal in forage yields to other varieties. Low seed dormancy aids in ease of establishment. (Released 1972, origin: Rosebud County, MT)

*Paspalum vaginatum,** Seashore paspalum

Warm season, prostrate perennial sod-former comparable to Bermudagrass (*Cynodon dactylon*). Deeply rooted, dense and rapid-growing from stolons and rhizomes. Adapted to a wide variety of soils and sites, including coastal marshes. Tolerant of extreme salinity, allowing for irrigation with poor quality water. Also grows in fresh water. Survives both standing water and dry periods. Used as livestock forage, erosion control, wetland restoration, coastal sites and as high quality turfgrass in landscapes and golf courses. (See *Turfgrass and Turf Blends*)

Phalaris arundinacea, Reed canarygrass

Large and robust, cool season, perennial rhizomatous sod-former. Adapted to poorly drained wetland areas; long-lived. Prodigious forage producer, medium palatability when actively growing, otherwise only poor to fair. Provides cover for wetland wildlife species. Competitive and aggressive on adapted sites. Useful for revegetating riparian areas. Though native, it should be planted with some caution in pastures and wet sites due to its extreme aggressiveness.

Phleum alpinum, Alpine timothy

Short, cool season, perennial native bunchgrass sometimes forming a sod. Occurs at high elevations in northern latitudes from 4,000-12,500 ft. Prefers mountain meadows, bogs and streambanks in well-drained to poorly drained soils. Provides good forage that stays green throughout the summer and late season. Used to revegetate roadsides, ski slopes and mines.

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Muttongrass (*Poa fedleriana*) in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

'Sherman' Big bluegrass (*Poa secunda ssp. ampla*). ©Damon Winter/L&H Seeds

Russian wildrye (*Psathyrostachys juncea*). ©Brody Maughan/Bruce Seed Farm

*Phleum pratense,** Timothy

Cool season, short-lived, perennial bunchgrass adapted to deep, moderately moist sites. Shallow, fibrous root system prefers fine textured soils. Very winter hardy; not tolerant of alkaline conditions. Commonly used as irrigated pasture, silage or hay. Palatable and nutritious to wildlife and livestock; hay is considered to be premium horse feed. Excellent companion grass for planting with forage legumes as it is one of the grasses least competitive with legumes, especially Alfalfa (*Medicago sativa*), Birdsfoot trefoil (*Lotus corniculatus*) or clovers. *Pictured on page 33.* Varieties:

Climax
Tall, fine-stemmed leafy variety. Rust resistant. Matures 7-10 days later than common timothy. Excellent fall regrowth. (Released 1947)

Tuukka
Leafier and better seedling vigor when compared to other varieties. Quick regrowth after cutting or grazing, even after a second cutting.

Pleuraphis jamesii, Galleta grass

Formerly *Hilaria jamesii.* Warm season, rhizomatous, bunchy sod-former found on a wide variety of well-drained soils, preferring neutral to moderately alkaline soils. Drought tolerant and slow to establish. Begins growth early, maturing in early summer. Widespread, occurring in various types of plant communities with annual precipitation sometimes as low as 5 in. Often a dominant or co-dominant throughout its range; 3,500-7,500 ft. elevation. Moderate palatability. Excellent for semi-desert rehabilitation, erosion control, mine reclamation and groundcover in heavy traffic areas. Desirable forage for livestock and also grazed by deer, antelope and desert bighorn sheep. Varieties:

Viva
Spreads by tough woody rhizomes but establishes easily from seed. Performs well with only 8 in. annual precipitation. Excellent cold tolerance at northern latitudes in spite of its southern origin. (Released 1979, origin: Guadalupe County, NM)

Pleuraphis rigida, Big galleta

Formerly *Hilaria rigida.* Warm season, strongly rhizomatous, perennial grows in large shrub-like clumps. Best on sandy or gravelly soils; poor on clays. More drought tolerant than other *Pleuraphis* species. Greens-up quickly after spring rains and again in the fall when moisture is available. Found across large expanses of dunes in the Sonoran and Mojave Desert communities. Good reclamation species.

Poa alpina, Alpine bluegrass

Short, densely tufted, cool season perennial bunchgrass adapted to subalpine and alpine slopes and meadows. Wide variety of soils from clay to gravel. Leaves form a dense mat providing good soil cover. Good palatability for wildlife but does not produce a lot of forage. Useful for revegetating high elevation rangelands. Varieties:

AEC Glacier
For reclaiming disturbed mountainous, high elevation sites. Rapid growth and high seed yield. (Released 2002, origin: Alberta, CAN)

*Poa compressa,** Canada bluegrass

Short, cool season, bunchy sod forming, long-lived perennial. Able to grow in harsh sites including shallow infertile soils. Good palatability to livestock and wildlife. Useful for land reclamation and improvement of poor sites where more palatable and productive species are unable to establish. Varieties:

Reubens
Early maturity and excellent adaptation to low moisture and low fertility conditions. (Released 1976, origin: Lewis County, ID)

Talon
Tall erect growth habit, dark color and thick stems. Use as a low maintenance turf or reclamation grass on poor quality soils. (Released 1995, origin: WA, OR & MI)

Poa fendleriana, Muttongrass

Cool season, deep-rooted, native perennial bunchgrass. Occasionally with short rhizomes. Grows on a wide range of soils ranging from 3,000-12,000 ft. elevation. One of the most drought tolerant of the native bluegrasses. Starts growth in early spring and matures in June or July. Common on mesas, mountains, dry open woods, cold deserts and rocky hills. Excellent forage for livestock and wildlife. *Pictured on page 35.* Varieties:

UP Ruin Canyon
Source Identified selection from the Uncompahgre Plateau in western Colorado averaging 16-18 in. annual precipitation.

Poa nervosa, Wheeler bluegrass

Cool season, loosely tufted, perennial sod-former with short rhizomes. Adapted to moist meadows and open forests in the montane to subalpine zones. Easy to establish in post-fire revegetation. Moderately palatable to wildlife and livestock.

*Introduced to North America.

Poa nevadensis, Nevada bluegrass

Cool season, perennial bunchgrass matures early in the growing season. Very robust native bluegrass, second only to Big bluegrass (*Poa secunda ssp. ampla*). Develops extensive deep penetrating, coarse, fibrous roots that make it drought tolerant and resistant to grazing and trampling. Grows in relatively moist areas in sagebrush communities including mountain foothills and meadows. Varieties:

Opportunity
Tall, robust and late maturing. Suited for elevations from 2,000-6,000 ft. within the 10-18 in. precipitation zone. Establishes well on contaminated mineland soils, characterized by high soil acidity and moderate to high levels of heavy metals. (Released 2007, origin: near Anaconda, MT)

Poa palustris, Fowl bluegrass

Cool season, weak sod-forming, perennial bunchgrass. Occurs in meadows and moist open marshes from low to medium elevations, mostly through northern latitudes or at higher elevations. Palatable where moisture is adequate. Excellent seedling vigor; use for quick cover in habitat restoration and detention basins.

*Poa pratensis,** Kentucky bluegrass

Cool season, long-lived, dense sod-forming perennial with shallow fibrous root system and vigorous rhizomes. Adapted to most well-drained soils where moisture is adequate. Resumes growth in early spring, matures in late summer with vigorous regrowth in fall. Highly palatable and nutritious to livestock and wildlife. Useful for pasture, land reclamation and extensively as turf. (See *Turfgrass and Turf Blends*) Varieties:

Ginger
Forage type with early spring green-up. Excellent yields and nutrition, especially for horses. Tolerant of close grazing. Competitive with pasture weeds. Very cold hardy with good disease resistance. (Released 1988, origin: Europe)

Poa secunda ssp. ampla, Big bluegrass

Formerly *P. ampla.* Robust, cool season, perennial bunchgrass with a shallow fibrous root system, sometimes spreading by short rhizomes. Occurs on a variety of sites but is intolerant of poorly drained soils or high water tables; drought tolerant. The most robust of the native bluegrasses. Early spring green-up and excellent forage production. Found in sagebrush communities, meadows and openings in aspen stands. Excellent palatability to livestock and wildlife year-round. Seeds valued by birds and small mammals. Varieties:

Sherman
Large statured, at times growing over 3 ft. tall. Useful for revegetation of low to mid-elevation grass, shrub and forest communities. Extremely drought tolerant. (Released 1945, origin: Sherman County, OR) *Pictured on page 35.*

Poa secunda ssp. canbyi, Canby's bluegrass

Formerly *P. canbyi.* Short, cool season, perennial bunchgrass with extensive shallow fibrous root system. Adapted to both shallow and deep soils and all soil textures; drought tolerant. Highly palatable to livestock and wildlife. Early spring green-up, but later maturing than Sandberg bluegrass (*P. secunda ssp. sandbergii*). Useful as early season forage. Varieties:

Canbar
Excellent vigor, late spring growth and numerous basal leaves. Competitive with annual spring weeds. Use in revegetation mixes as an understory for larger bunchgrasses. (Released 1979, origin: Columbia County, WA)

Poa secunda ssp. sandbergii, Sandberg bluegrass

Formerly *P. sandbergii.* Short, cool season, drought tolerant perennial bunchgrass similar to Canby's bluegrass (*P. secunda ssp. canbyi*) but more drought tolerant. The most common native bluegrass in the arid Western U.S. Occurs in dry sagebrush and mountain shrub communities, and occasionally on alpine sites. Early spring green-up. Important early spring forage species for animals. Varieties:

Hanford
Source Identified selection from Benton County, WA averaging 6-7 in. annual precipitation.

High Plains
From locations across the high plains of Wyoming. Good establishment, vigor and uniform seed maturation dates. Wide genetic base broadens its adaptation into neighboring states and the Pacific Northwest. (Released 2000, origin: Campbell, Natrona & Uinta Counties, WY)

Mountain Home
Drought tolerant, competitive and easy establishing. Useful for fire rehabilitation and habitat enhancement. Used in restoration of sagebrush-wheatgrass communities, especially in the Snake River Plain and the Northern Basin and Range. (Released 2011, origin: Owyhee County, ID)

Reliable
High genetic diversity, drought tolerance and excellent persistence, especially on frequently disturbed sites such as military training sites and areas prone to wildfire. (Released 2004, origin: U.S. Army Yakima Training Center, Yakima County, WA)

UP Colorado (Sims Mesa)
Source Identified selection from the Uncompahgre Plateau in western Colorado averaging 10-12 in. annual precipitation.

Vale
Source Identified selection from Malheur County, OR averaging 8-11 in. annual precipitation.

*Poa trivialis,** Rough bluegrass

Short, cool season, perennial stoloniferous sod-former. Primarily used as a turfgrass for winter overseeding on putting greens and dormant Bermudagrass (*Cynodon dactylon*) lawns in the south. Tolerates wet, cool soils and shady areas. Can be cut closely soon after germination so golf courses are minimally interrupted. (See *Turfgrass and Turf Blends*)

*Psathyrostachys juncea,** Russian wildrye

Formerly *Elymus junceus.* Cool season, perennial bunchgrass with an extensive horizontal root system. Adapted a wide range of soil textures and infertile soils; moderately

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saline and alkaline tolerant. Very drought tolerant, surviving with as little as 8 in. annual precipitation. Cold hardy. May be difficult to establish, but extremely competitive and long-lived thereafter. Starts growth in early spring, produces abundant green basal leave forage. Excellent palatability and can be grazed from late summer through winter, retaining its protein content even when cured. Tolerant of heavy grazing and regrows quickly. Most of the forage sits low in the basal leaves; unsuited for hay production. Use also for arid rangelands, dryland pasture, green strips and fuel breaks. *Pictured on page 35.* Varieties:

Bozoisky-Select
Good seedling vigor, stand establishment and forage yield. (Released 1984, origin: former USSR)

Bozoisky II
Selected for seedling vigor, seed mass, seed yield, vegetative vigor, forage production and response to drought. Equal to or greater seedling establishment than earlier varieties. Better seedling establishment than Bozoisky-Select. (Released 2006, origin: former USSR)

Swift
Good seedling emergence from deeper plantings. Resistance to leaf spot. (Released 1978, origin: former USSR)

Tom
Heavy seed weight, herbage yield and improved seedling emergence from deep planting. (Released 2002, origin: former USSR)

Pseudoroegneria spicata ssp. inermis, Beardless bluebunch wheatgrass

Formerly *Agropyron inerme.* Cool season, long-lived, drought tolerant, perennial bunchgrass adapted to a wide variety of sites but intolerant of poor drainage, high water tables and spring flooding. An awnless-type Bluebunch wheatgrass (see also: Bluebunch wheatgrass, *P. spicata ssp. spicata*) which starts growth in early spring, has a relatively short life cycle but renews growth in early fall. Good palatability to livestock and wildlife. *Pictured on page 38.* Varieties:

Whitmar
Good seedling vigor, forage quality and seed production. Long-lived. (Released 1946, origin: Whitman County, WA)

Pseudoroegneria spicata ssp. spicata, Bluebunch wheatgrass

Formerly *Agropyron spicatum.* Cool season, drought tolerant, long-lived perennial bunchgrass widely distributed and adapted to most sites including thin, non-productive soils. Extensive root system. Establishes quickly on a wide variety of soil textures, from rocky sites to clays. Intolerant of poor drainage and high water tables. Some tolerance to salinity. Cold hardy. Often a major component of native plant communities within its range. Generally good palatability to livestock and wildlife late into summer and fall. Stressed by overgrazing and repeated early season grazing. Preferred feed for elk, deer and antelope at peak times. Use for arid rangelands, erosion control and native habitat restoration. *Pictured on page 38.* Varieties:

Anatone
Rapid establishment, high forage production and the ability to survive and thrive in areas with at least 10 in. annual precipitation. (Released 2003, origin: Asotin County, WA)

Boardman
Source Identified selection from Morrow County, OR averaging 9 in. annual precipitation.

Columbia
Collected from a historical population adapted to the 6-8 in. annual precipitation of Washington's Columbia Basin. Originates from a drier climate zone than all former releases. (Released 2015, origin: Adams County, WA)

Goldar
Quick establishment, high forage production and good survivability in areas with at least 12 in. annual precipitation. (Released 1989, origin: Umatilla National Forest, Asotin County, WA)

P-7
Genetically diverse and widely adapted release for semiarid to mesic sites. Long-lived, drought tolerant and highly palatable. (Released 2001, origin: ID, NV, OR, UT, WA and British Columbia)

*Puccinellia distans,** Alkaligrass

Cool season, perennial sod-former with a vigorous and shallow fibrous root system. Adapted to moist or periodically moist, saline soils. Able to withstand intermittent flooding and shallow water tables. Moderately palatable. Excellent for establishing cover on saline soils. Also used as a turfgrass. (See *Turfgrass and Turf Blends*) Varieties:

Fults II
One of the most salt tolerant turfgrasses available. Germinates quickly and produces dark green sod. Also used for roadsides or groundcover where high salt content exists. May become dominant in high salt areas. (Released 1979, origin: Boulder, CO)

Puccinellia nuttalliana, Nuttall's alkaligrass

Formerly *P. airoides.* Cool season, perennial sod-former found growing on moist alkaline sites and occasionally surviving in standing water. Valuable species to include in mixtures for reseeding marshes, shorelines, alkali basins or other waterways. Population decreases with soil drying, soil compaction and heavy grazing.

*Schismus barbatus,** Mediterranean grass

Small, cool season, desert annual that inhabits deep well-drained soils. Starts growth in winter months, often covering the desert with a carpet of green. May inhibit growth of other species by dominating available soil moisture. Useful for establishing cover and controlling erosion.

Schizachyrium scoparium, Little bluestem

Formerly *Andropogon scoparius.* Warm season, moderately drought tolerant, long-lived perennial bunchgrass with a deep fibrous root system. Adapted to a wide range of soils. Exceptionally drought tolerant; persistent. Generally found on dry uplands but occasionally some wetter sites; intolerant of wetlands. Provides good palatability to livestock and wildlife. Use for

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Beardless bluebunch wheatgrass (*Pseudoroegneria spicata ssp. inermis*) without the long awn typical of Bluebunch wheatgrass (*P. spicata ssp. spicata*). ©Damon Winter/L&H Seeds

Hardstem bulrush *(Schoenoplectus acutus var. acutus)* during flowering. ©David Schwaegler

Indiangrass *(Sorghastrum nutans)* during flowering. ©David Schwaegler

pasture, range improvement, as a dominant component in tallgrass prairie restoration and for stabilizing a variety of soils, including sands. Varieties:

Aldous
Medium-late maturing, tall, leafy, vigorous type. More uniform than other varieties. Hardy and productive northern type. Rust resistant. (Released 1966, origin: Flint Hills Prairie, KS)

Badlands
From collections across ten different sites, including the Badlands of the Dakotas. Broad genetic base, early-maturing, good seed production and disease resistance. Variation in size, color and leaf width. (Released 1997, origin: ND & SD)

Blaze
Late-maturing, leafy, compact medium-tall plant. Named for its vivid red foliage after fall frost. (Released 1967, origin: NE & KS)

Camper
Moderately late-maturing, long-lived variety with broad genetic adaptation. Spreads by short rhizomes. (Released 1973, origin: NE & KS)

Cimarron
Good forage production and disease resistance. Produces forage and seed with as little as 12 in. annual precipitation. Good performer, except in high saline and alkaline soils. (Released 1979, origin: southwest KS & panhandle of OK)

Itasca
From numerous collections across native grasslands. Cold hardy and good seed production in northern latitudes. Early-maturing with outstanding vigor and abundant foliage; relatively short-statured. (Released 2001, origin: ND, SD & MN)

Pastura
Adapted to temperature and precipitation extremes. Uniform growth, good forage production and excellent seedling vigor. Adapted to the foothills and plains of central and eastern New Mexico and eastern Colorado. (Released 1963, origin: San Miguel County, NM)

Schoenoplectus acutus var. acutus, Hardstem bulrush

Formerly *Scripus acutus.* Cool season, rhizomatous, sod-forming, native grasslike perennial. Occurs at lower elevations within its range in standing water or wet muddy soils surrounding waterways; alkaline tolerant. May become dominant in marshes and meadows, forming monocultures. Good for wetland and riparian restoration and for numerous bird and mammal species. *Pictured on page 38.*

Schoenoplectus americanus, Olney threesquare

Formerly *Scirpus americanus.* Cool season, rhizomatous, native grasslike perennial occurring in wet meadows, marshes and other low-lying sites. Tolerant of alkalinity but does not require it. Found at low to moderate elevations. May become dominant or co-dominant in slightly or moderately saline marshes bordering lakes or springs. Good for riparian reclamation. Roots and rhizomes are an important food source for geese and muskrats; nesting for numerous other species.

Schoenoplectus pungens, Common threesquare

Formerly *Scirpus pungens.* Cool season, rhizomatous, native grasslike perennial occurring on muddy shores and standing water of marshes, playas, ponds, streams and lakes below 6,500 ft. elevation. Tolerates alkaline, saline and freshwater conditions. May survive seasonal drought. Good for wetland projects. Roots and rhizomes are an important food source for geese and muskrats; nesting for numerous other species.

Schoenoplectus tabernaemontani, Softstem bulrush

Formerly *Scirpus validus.* Cool season, rhizomatous, native grasslike perennial that prefers marshes and muddy shores of lakes and streams, wet prairies and marshes. Tolerant of alkaline soil conditions, although does not require it. Thrives in disturbed wetlands; may spread aggressively. Also found in more stable wetlands. Important source of food to many wetland birds and muskrats.

Scirpus microcarpus, Smallfruit bulrush

Cool season, strongly rhizomatous, native perennial. Common in year-round wet, sloughs, streambanks, marshes, ditches and wet clearings, from low to moderate elevations. Tolerant of fluctuating water levels and saturated soils, but not of long periods of flooding. Valuable food and nesting material for wildlife.

Setaria vulpiseta, Plains bristlegrass

Formerly *S. macrostachya.* Warm season, short-lived, perennial bunchgrass adapted to coarse, well-drained sites. Very drought tolerant. Highly palatable to livestock and wildlife. Useful for erosion control on shallow to deep soils and for improving wildlife habitat. Seeds provide valuable food for birds and small mammals.

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Prairie cordgrass *(Spartina pectinata)* during flowering. ©David Schwaegler

Sand dropseed *(Sporobolus cryptandrus)*.

Prairie dropseed *(Sporobolus heterolepis)* at Lake in the Hills Fen State Nature Preserve, Illinois. ©David Schwaegler

Sorghastrum nutans, Indiangrass

Warm season, perennial, bunching sod-former, adapted to most soil textures where moisture is adequate. Tall, 3-6 ft. on average, occasionally reaching 8 ft. Slow to spread. Tolerant of imperfectly drained soils and acid to alkaline conditions. Provides excellent forage for livestock and wildlife and good cover for birds and small mammals. Often used to improve native pasture and hay ground. Co-dominant species with Big bluestem (*Andropogon gerardii*) in the tallgrass prairie ecosystem. *Pictured on page 38.* Varieties:

Cheyenne
Good forage and seed producer adapted for range and pasture in Oklahoma and Texas. Widely used in New Mexico, western Kansas and eastern Colorado. (Released 1945, origin: Woodward County, OK)

Chief
Used for pasture and hayland production in northern latitudes of the U.S. and Canadian prairie. Productive under heavy grazing for up to five years; longer under light to moderate grazing. (Released 2008, origin: Holt and Oto varieties)

Holt
Moderately early-maturing, superior in leafiness and yield to other early-maturing strains. Finer leaves and stems than later-maturing, southern varieties. (Released 1960, origin: Holt County, NE)

Nebraska 54
Late-maturing, tall, leafy variety with high seed yields. Vigorous and productive. (Released 1957, origin: Jefferson County, NE)

Osage
Good leafiness, vigor, and rust resistance. Good seed producer. (Released 1966, origin: KS & OK)

Scout
Similar adaptation to Nebraska 54. Highest forage yields and digestibility of the varieties. (Released 2008, origin: Nebraska 54 variety)

Tomahawk
Early maturity and superior winter hardiness and persistence. One of the best forage producers at northern latitudes. High seed yield. (Released 1988, origin: Dickey & Marshall Counties, ND & Brown County, SD)

Spartina pectinata, Prairie cordgrass

Warm season, native, strongly rhizomatous, perennial with the ability to spread 5-10 ft. per year. Typically found on low, poorly drained soils along roadsides, ditches, streams and marshes. Stiff stems and vigorous rhizomes provide good shoreline cover; excellent erosion control species. Provides good cover for wildlife. *Pictured on page 39.*

Red River
Germplasm with a broad genetic base and good rhizome production. (Released 1998, origin: MN, ND & SD)

Sporobolus airoides, Alkali sacaton

Warm season, perennial bunchgrass with an extensive fibrous root system. Performs best on deep, moist, fine textured soils but will persist on coarser soils on dry sites. Tolerant of a wide range of soil pH. Capable of thriving on both saline and non-saline sites, sometimes becoming abundant. Versatile, tolerant of both drought and water inundation once established. Recommended for seeding disturbed saline soils and as a soil binder. Palatable to livestock and wildlife and provides valuable cover and food for birds, jackrabbits and other small mammals. Tolerant of moderate grazing. Varieties:

Salado
Collected on an upland site with shallow soils. Adapted to moderately alkaline, light to heavy textured soils. Use for range improvement, mined land reclamations, highway revegetation and forage production on most arid lands in the West. (Released 1983, origin: Socorro County, NM)

Vegas
Naturally selected from nine distinct collections to develop a broad genetic base and adaptation to a wide range of conditions. Intended for restoration and rehabilitation of riparian areas, wildlife habitat improvement, disturbance restoration and increased diversity along the Virgin River and other locations in southern Nevada. (Released 2006, origin: southern NV)

Sporobolus compositus, Tall dropseed

Perennial, warm season, bunchgrass that establishes quickly on open and disturbed sites. Useful for prairie restoration and preventing erosion. Drought tolerant and long-lived once established. Generally associated with sites that have low organic matter.

*Introduced to North America.

Sporobolus contractus, Spike dropseed

Tall, warm season, drought tolerant, perennial bunchgrass adapted to dry sandy or rocky soils. Provides fair palatability to livestock and wildlife. Reseeds itself readily following overgrazing or drought. Excellent species for stabilizing sandy soils with high erosion potential. Varieties:

Cochise
Naturally selected from 44 collections and has undergone minimal purposeful selection. Does not differ significantly in rate of spread, seed production or vigor from naturally occurring populations. Use for revegetation of denuded range sites, abandoned cropland and other critical areas. (Released 2005, origin: AZ, NV & NM)

Sporobolus cryptandrus, Sand dropseed

Warm season, extremely drought tolerant, long-lived, perennial bunchgrass adapted to most soil textures but thrives on sandy sites. Fine, fibrous root system. Adapted to slightly acidic to slightly basic soils. Found on upland prairies and semi-desert sites from low elevations up to 8,000 ft. Palatable summer forage to livestock and wildlife, but may increase excessively when animals prefer it less than other species. Pioneers disturbed and water-stressed sites. Establishes easily and is widely used for native restoration, controlling erosion and to stabilize sandy soils and dunes. *Pictured on page 39.* Varieties:

Asotin
Source Identified selection from Asotin County, WA averaging 13-22 in. annual precipitation.

UP Dolores
Source Identified selection from the Uncompahgre Plateau in western Colorado, averaging 16-18 in. annual precipitation.

Western
Source Identified selection from Wheeler County, OR averaging 11-15 in. annual precipitation.

Sporobolus giganteus, Giant dropseed

Tall, warm season, drought tolerant, perennial bunchgrass adapted to deep sands and sandy soils. Poor to moderately palatable. Especially useful for stabilizing sand dunes and other blowout areas.

Sporobolus heterolepis, Prairie dropseed

Short to tall, warm season, drought tolerant, perennial bunchgrass with short rhizomes, adapted to well-drained fine to coarse textured soils. Important prairie restoration species; slow to establish but long-lived. Palatable to wildlife and livestock. Seeds eaten by songbirds. Also grown as an ornamental. *Pictured on page 39.*

Sporobolus wrightii, Big sacaton

Warm season, drought tolerant, perennial bunchgrass adapted to various soil textures. Tolerant of alkaline and saline soils; also seasonal flooding. Found in semidesert grasslands, shrublands and wetland communities on rocky slopes, plateaus, mesas and floodplains at 2000-7000 ft. elevation. Often in pure stands of 3-8 ft. in height; excellent for trapping wind erosion. Valuable forage and cover for wildlife.

*Thinopyrum intermedium,** Intermediate wheatgrass

Formerly *Agropyron intermedium.* Cool season, perennial, robust, moderately drought tolerant sod-former, 2-4 ft. tall. Adapted to a wide variety of sites but does best on medium to fine textured soils. Excellent soil builder due to high levels of root production. Good palatability to livestock and wildlife, as well as nesting cover for birds and waterfowl. Use for conservation, pasture and hay. Grows well with Alfalfa (*Medicago sativa*). Varieties:

Chief
Short term pasture and hayfields remain productive under heavy pressure for up to five years; longer under moderate to light pressure. (Released 1961, origin: former USSR and Oahe variety)

Clarke
Pasture and hay production. Drought tolerant, excellent seed producer. Higher yielding and winter-hardy than Chief; comparable to Greenleaf (Pubescent wheatgrass, *T. intermedium ssp. barbulatum*). (Released 1980, origin: former USSR)

Manifest
Improved tillering compared to Oahe, making it better for grazing. Superior longevity to other varieties. High forage yield and increased persistence under grazed conditions. Recommended for hayland and pastures in grass or grass-legume mixtures. (Released 2007, origin: Russia)

Oahe
High seed and forage producer and good resistance to rust. Blue-green type with vigorous sod-forming capability. (Released 1945, origin: former USSR)

Reliant
Vigorous and winter hardy. Matures relatively late, weakly rhizomatous and is strongly resistant to leaf spot. Distinguished from other types by its upright growth habit. (Released 1991)

Rush
Good seedling emergence and vigor. Achieves greater stand density and height quicker than previous releases. Equal or higher forage production to Oahe. (Released 1994)

*Thinopyrum intermedium ssp. barbulatum,** Pubescent wheatgrass

Formerly *Agropyron trichophorum.* Cool season, robust, drought tolerant, strongly rhizomatous, long-lived, sod-forming perennial grass. Similar to Intermediate wheatgrass (*T. intermedium*) but slightly more drought tolerant and winter hardy; also, tolerates lower soil fertility, higher alkalinity and higher elevations. Excellent soil builder due to high levels of root production. Good palatability to livestock and wildlife, as well as nesting cover for birds and waterfowl. Use for revegetation, pasture and hay. Grows well with Alfalfa (*Medicago sativa*). Varieties:

Greenleaf
Bright green foliage. Winter hardy with excellent seedling vigor. Some tolerance to saline soils. (Released 1966)

Luna
Dark green foliage. Adapted to warmer, lower elevation sites. Excellent seedling vigor. The most broadly adapted variety available. (Released 1963, origin: former USSR and Turkey)

*Introduced to North America.

Tall wheatgrass (*Thinopyrum ponticum*). ©Damon Winter/L&H Seeds

Arrowgrass *(Triglochin maritima)* at Lake in the Hills Fen State Nature Preserve, Illinois. ©David Schwaegler

Sixweeks fescue (*Vulpia octoflora*) Credit: Sheri Hagwood, hosted by the USDA-NRCS PLANTS Database

Manska
Improved vigor, resistance to leaf spot, high forage production and nutritional quality. Forage yield similar to Oahe (Intermediate wheatgrass, *T. intermedium*), but higher nutritive value. (Released 1992, origin: Mandan variety)

*Thinopyrum ponticum,** Tall wheatgrass

Formerly *Agropyron elongatum* and *Elytrigia elongata*. Cool season, late maturing, coarse, productive perennial bunchgrass growing to 5 ft. or more. Extremely saline and alkaline tolerant, able to establish on soils with pH of 10. Adapted to deep or shallow, well-drained and imperfectly drained soils; able to tolerate flooding and shallow water tables. Some drought tolerance. Generally good palatability year-round. *Pictured on page 41.* Varieties:

Alkar
Tall, high yielding forage producer adapted to wet, alkaline sites. Blue-green leaves. Very late maturing. Use for revegetation or pasture on saline and alkaline sites. (Released 1951, origin: former USSR)

Alkar XL
Significantly larger and more robust than any previous release. Increased biomass and improved nutritional quality, including increased crude protein and digestibility. Extra-large size and nutritional characteristics make it a potential candidate for bioenergy production. (Released: 2017)

Jose
Medium tall, high yielding forage producer adapted to warmer climates of the Southwest. Use for revegetation or pasture on saline and alkaline sites. (Released 1965, origin: Australia, originally from Eurasia)

Triglochin maritima, Arrowgrass

Cool season, perennial grasslike species that occurs in saline and alkaline marshes, peat lands, plains and basins at low to middle elevations. Frequently grows with sedges and grasses but is often overlooked because of its slight stature. Poisonous to livestock. *Pictured on page 41.*

Tripsacum dactyloides, Eastern gamagrass

Robust, warm season, rhizomatous, perennial bunchgrass distantly related to field corn and reaching as high as 8 ft. tall. Widely adapted but prefers moist, fertile, non-saline soils. Deep rooted soil stabilizer. Tolerates periodic flooding or drought. Abundant producer of highly palatable, nutritious forage during summer months. Use for native prairie or hay, grazing and silage; vigorous regrowth. Valuable wildlife food and cover, especially for ground-dwelling birds. Varieties:

Pete
Widely adapted, leafy type. (Released 1988, origin: KS & OK)

Trisetum spicatum, Spike trisetum

Cool season, long-lived, perennial bunchgrass found in meadows, streambanks, forest openings, subalpine meadows and alpine tundra. Prefers dry, well-drained, rocky areas; occasionally moist sites. Extremely cold and fire tolerant. Low nutrient requirements; moderately tolerant of acidic and alkaline soils. Good soil builder and erosion control species. Important forage during the growing season and into late fall.

Typha latifolia, Cattails

Cool season, tall, strongly rhizomatous, native perennial occurring in dense clusters in and around aquatic areas throughout North America. Widely adapted and may become aggressive. Provides excellent cover for wildlife.

Vulpia microstachys, Small fescue

Native, cool season, annual found in open grassland and prairie habitats, sometimes as a dominant species. Prefers thin, low-nutrient, serpentine, sandy soils; occasionally clays. Fast-growing and opportunistic, commonly increases after fire and other disturbances. Recommended for reclamation and emergency short-term erosion control while perennial plants establish.

Vulpia octoflora, Sixweeks fescue

Cool season, small, loosely tufted, native annual commonly found in open disturbed areas throughout the U.S. Drought tolerant and well-adapted to sand and loam soils. Useful as a reclamation species in early seral stages. Poor palatability to livestock and wildlife. *Pictured on page 41.*

*Introduced to North America.

WILDFIRE IN NORTHCENTRAL OREGON CONSUMES A CHEATGRASS INFESTED STAND OF BASIN BIG SAGEBRUSH (*ARTEMISIA TRIDENTATA SSP. TRIDENTATA*) AND WESTERN JUNIPER (*JUNIPERUS OCCIDENTALIS*).

Broken Cycle: Weeds and Wildfire

Sagebrush (*Artemisia spp.*) ecosystems are adapted to the natural cycles of wildfire necessary to reset and revitalize native plant communities. However, invasions of annual grass weeds have dramatically shortened historic average fire return intervals within some sagebrush systems from 60-110 years, down to 3-5 years at present.[1]

Cheatgrass is the primary weed culprit, spreading aggressively and producing substantial amounts of thick and continuous fine fuels which encourage frequent, high-intensity wildfires. With shorter amounts of time to recover between fires, slow-growing sagebrush is unable to reestablish and cheatgrass dominates indefinitely, setting the stage for a future of chronic, catastrophic wildfire. Large expanses of native western landscapes have already converted from healthy functioning sagebrush ecosystems—sustaining both people and hundreds of species of wildlife—to monocultures of relentless cheatgrass. Without intervening management in these areas, sagebrush and other native vegetation may never recover, putting the livelihoods of people and the habitat of critical wildlife populations at risk. (See also: *Icons of the West: Sagebrush and Sage-grouse.*, page 80.)

At Granite Seed we offer numerous native and naturalized grass species to quickly stabilize and begin to restore grassland and shrubland habitats after disturbances such as wildfire. The species in this catalog are those we stock regularly. If you require something not found here, just ask. Our team is happy to assist in your wildfire restoration and weed management projects.

[1] Whisenant, S.G. 1990. Changing fire frequencies on Idaho's Snake River Plains: ecological and management implications. In: Proceedings of the Symposium on Cheatgrass Invasion, Shrub Die-Off, and Other Aspects of Shrub Biology and Management. Forest Service General Technical Report INT-276, pages 4–10. Intermountain Research Station, Las Vegas, NV.

Wildflowers & Forbs

wildflower / wyld-flaur / noun:
1. a flower or the plant bearing it which grows freely without human intervention.
2. flowering plant that generally grows in fields, deserts and forests without deliberate cultivation.

forb / fawrb / noun:
1. a herbaceous flowering plant other than a grass.

Broadleaf plants greatly increase the species biodiversity of wild landscapes, providing essential food and habitat for beneficial insects, vital pollinators and all types of wildlife. Granite Seed provides a large and diverse selection of wildflower and forb species for native habitat restoration, reclamation, landscaping and beautification. We farm-produce and wildland-harvest many of the seeds offered here, ensuring reliable supplies of the highest quality wildflower seed for any project or location. We frequently carry new species, local collections and varieties. If you don't find what you need listed here, please contact us.

NUMEROUS SPRING WILDFLOWERS AMONG MOUNTAIN BIG SAGEBRUSH (*ARTEMISIA TRIDENTATA SSP. VASEYANA*) IN THE MOUNTAINS OF COLORADO.

Western yarrow *(Achillea millefolium var. occidentalis)* in a seed production field at L&H Seeds in southeastern Washington. ©Damon Winter/L&H Seeds

Butterfly milkweed *(Asclepias tuberosa)* is a host plant for Monarch caterpillars.

Basalt milkvetch *(Astragalus filipes)* in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

Abronia villosa, Desert sand verbena

Drought tolerant native annual with fragrant purple-pinkish flower clusters, blooming January to June. Creeps to form low dense patches trailing up to 3 ft. long, sometimes intermingled with other species. Found in open sandy desert and coastal locations and roadsides; up to 5,000 ft. elevation.

*Achillea millefolium,** White yarrow (Common yarrow)

Introduced, drought tolerant rhizomatous perennial with flat clusters of small white flowers, blooming April to October. Feathery fernlike leaves are distinctly pungent. Widely used for erosion control or landscaping. Much taller, aggressive and weedy than native Western yarrow (*A. millefolium var. occidentalis*).

Achillea millefolium var. occidentalis, Western yarrow

Formerly *A. lanulosa.* Rhizomatous native perennial forb with small flat flower clusters and fernlike leaves, blooming April to October. Extremely drought tolerant, though very common throughout the U.S. on wet or dry sites. Especially important in western sagebrush-Bluebunch wheatgrass (*Pseudoroegneria spicata ssp. spicata*) communities. Used on shrublands, prairies, mine reclamation and roadsides at all elevations; also as an ornamental and for pollinator habitat for native bees. Competitive with weeds. Smaller and much less aggressive than the introduced White yarrow (*A. millefolium*). *Pictured on pages 45 and 61.* Varieties:

Columbia
Source Identified selection from Sherman County and Gillman County, OR averaging 11-13 in. annual precipitation.

Eagle
Adapted to low elevation, semiarid sites with long, hot growing seasons. Easily established. Competitive with introduced grasses and annual weeds such as cheatgrass. May establish better on arid sites than other releases. (Released 2011, origin: Ada County, ID)

Yakima
Source Identified selection from Yakima County, WA averaging 6-11 in. annual precipitation. Good establishment and persistence on semiarid lands, especially locations prone to repeat disturbance such as wildfire. (Released 2004, origin: U.S. Army Yakima Training Center, Yakima County, WA)

Aquilegia canadensis, Eastern red columbine

Native perennial forb with nodding red and yellow flowers, blooming April to July. Very adaptable, found in dry to mesic woodland sites or open gravelly shorelines and roadsides; up to 5,000 ft. elevation. Nectar is vital for migrating hummingbirds when few other plants are flowering. Resembles Western red columbine (*A. formosa*).

Aquilegia coerulea, Colorado blue columbine

Native perennial forb with large blue and white nodding flowers, blooming June to September. Occurs on xeric to moist subalpine meadows, open woodlands and near mountain streams; 7,000 to 13,000 ft. elevation. Also use as a landscape ornamental for pollinator habitat. State flower of Colorado.

Aquilegia formosa, Western red columbine

Native perennial forb with nodding red and yellow flowers, blooming April to September. Occurs in moist open woods and meadows from the coast to the subalpine; up to 11,000 ft. elevation. Nectar is used by hummingbirds and other pollinators. Resembles Eastern red columbine (*A. canadensis*).

Argemone polyanthemos, Crested pricklypoppy

Formerly *A. platyceras.* Drought tolerant native annual, biennial or perennial with bright white or occasionally lavender flowers, blooming April to October. Covered in slender yellow prickles. Occurs in coarse to medium textured soils of prairies, foothills, roadsides and disturbed areas; up to 8,000 ft. elevation. Poisonous to livestock.

Asclepias incarnata, Swamp milkweed

Native rhizomatous perennial with bright pink to reddish-violet flowers, blooming June to October. Occurs in moist habitats and wet soils in low fields, prairies, wet meadows, forest openings, swamps, marshes and along shorelines; up to 6,500 ft. elevation. Tolerant of occasional flooding but also able to grow in drier areas. Highly variable in height, ranging from 2-6 ft. tall. Establishes easily and is excellent for wetland and riparian restoration or as an ornamental, especially in wet, heavy clay soils. Excellent nectar for pollinators, attracting hummingbirds, butterflies, honeybees, native bees and various beneficial insects. Larval host of the Monarch butterfly.

*Introduced to North America.

Asclepias speciosa, Showy milkweed

Drought tolerant native rhizomatous perennial with rose-purple flowers, blooming May to September. Occurs in well-drained soils of open meadows, roadsides and ditchbanks; up to 10,000 ft. elevation. Usually 2-4 ft. tall. Robust species, tolerant of a variety of environments. Forms vigorous colonies, making it useful for stabilizing degraded or disturbed soils. May become weedy, displacing other vegetation. The most abundant milkweed species in the Great Plains and western U.S. Hybridizes with Common milkweed (*A. syriaca*). Excellent nectar for pollinators, attracting hummingbirds, butterflies, honeybees, native bees and various beneficial insects. Larval host of the Monarch butterfly. *Pictured on page 64.*

Asclepias syriaca, Common milkweed

Drought tolerant native rhizomatous perennial with rose or occasionally white flowers, blooming May to October. Occurs in rich loamy soil to high clays and sands within prairies, forest margins, dunes, roadsides and ditchbanks; up to 5,500 ft. elevation. Highly variable height, from 2-6 ft. tall. Robust, tolerant of a variety of habitats. Vigorous colonizer useful for stabilizing degraded or disturbed soils. Hybridizes with Showy milkweed (*A. speciosa*). May become weedy, displacing other vegetation. Excellent nectar for pollinators, attracting hummingbirds, butterflies, honeybees, native bees and various beneficial insects. Larval host of the Monarch butterfly.

Asclepias tuberosa, Butterfly milkweed

Moderately drought tolerant native rhizomatous perennial with showy brilliant orange-red flowers, blooming May to September. Adaptable to loam and clay soils but prefers mesic to dry, sandy or rocky soils within dry prairies and woodlands, colonizing open disturbed areas such as roadsides; up to 7,500 ft. elevation. Usually 12-30 in. tall. Perhaps the most showy of the milkweeds, and is an excellent ornamental for landscaping. Widely distributed, attracting butterflies, honeybees, native bees and pollinating insects throughout its range. Larval host of the Monarch butterfly. *Pictured on page 45.*

Aster chilensis, see *Symphyotrichum chilense* (Pacific aster)

Aster glaucodes, see *Herrickia glauca* (Blueleaf aster)

Aster laevis, see *Symphyotrichum laeve* (Smooth blue aster)

Aster novae-angliae, see *Symphyotrichum novae-angliae* (New England aster)

Astragalus canadensis, Canadian milkvetch

Medium to tall, rhizomatous short-lived perennial native legume with creamy greenish-white flowers, blooming June to September. Adapted to a wide range of well-drained soils, preferring wet meadows, forests, riverbanks and marshy sites; up to 9,000 ft. elevation. Useful for riparian restoration and erosion control; slow establishing. Pollinated by native bees and butterflies. Not tolerant of extreme cold.

Astragalus filipes, Basalt milkvetch

Drought tolerant, long-lived perennial native legume with showy pale-yellow to creamy white flowers, blooming April to July. Widely distributed and abundant on western arid and semiarid sagebrush steppe and open woodland ecosystems, from northern Mexico to southern Canada, often occurring in large colonies; up to 9,000 ft. elevation. Prefers coarse to semi-coarse soils, commonly basalt derived. Some ability to develop new shoots from lateral roots. Good colonizer after fire and competes well with cheatgrass. Use for revegetation, reclamation and habitat restoration on sites with increased fire frequency. Nontoxic to livestock and wildlife. Provides food for sage-grouse during the brood-rearing stage. Excellent pollen and nectar source for pollinators, including numerous species of native bees. *Pictured on page 45.* Varieties:

Dry River
Source Identified selection from Deschutes County, OR averaging 9-12 in. annual precipitation.

NBR-1
Use for fire rehabilitation, restoration and wildlife and pollinator habitat enhancement. (Released 2008, origin: UT, ID, OR & CA,)

*Aurinia saxatilis,** Basket of gold

Formerly *Alyssum saxatile.* Introduced mat-forming perennial with golden yellow flowers blooming spring and early summer. Low to moderate water use. Use as a groundcover in borders, rock gardens and wildflower mixtures. Attractive to bees, butterflies and birds.

Bahiopsis parishii, Parish goldeneye (Desert sunflower)

Formerly *Viguiera deltoidea.* Drought tolerant, native perennial subshrub with yellow daisy-like flowers blooming February to June. Occurs on dry sandy desert subshrub communities in the Mojave and Sonoran Deserts; up to 5,000 ft. elevation. Use in desert restoration and xeric landscapes.

Baileya multiradiata, Desert marigold

Drought tolerant, short-lived perennial native with daisy-like brilliant yellow flowers, blooming intermittently from March to November. Common in well-drained gravelly roadsides, plains, low washes, mesas and slopes of desert scrub and pinyon-juniper communities, sometimes in large patches; up to 7,000 ft. elevation. Attractive to bees, butterflies and other nectar-seeking insects. *Pictured on page 48.*

Balsamorhiza macrophylla, Cutleaf balsamroot

Short to tall native perennial forb with large yellow sunflower-like blooms and an unpleasant turpentine odor, blooming May to August. Occurs on well-drained clay to gravel soils as a minor component of upper grassland and sagebrush steppe communities; 4,000 to 9,500 ft. elevation. Minimal tolerance to drought or flooded soils. Grazed lightly by ungulates in spring. Attracts a large number of native pollinators.

*Introduced to North America.

Balsamorhiza sagittata, Arrowleaf balsamroot

Drought tolerant, long-lived perennial native with yellow sunflower-like flowers, blooming April to July. Deep, thick taproot is tolerant of fire, grazing, trampling and drought; seedlings slow to establish. Prefers deep, fine to medium textured well-drained soils. Often found in large patches. Common in sagebrush communities as well as mountain shrub communities, woodlands and open forests; up to 10,000 ft. elevation. Thought to have potential for use in oil shale and mining reclamation. Valuable spring and summer forage for mule deer, elk, bighorn sheep and pronghorn. Attractive to native pollinators. Sage-grouse eat the young shoots and flower buds. *Pictured on page 48.*

*Bellis perennis,** English lawn daisy

Introduced spreading biennial with white to pink flowers blooming spring to fall; only 3-6 in. tall. Once considered a weed in traditional lawns, now often included in flowering "ecolawns" or rugged naturalized lawns. Prefers moist, well-drained soils in full sun or part shade. Overseed existing lawns or apply when seeding a new lawn. Will not flower the first year. Also used as a groundcover or bedding plant.

Camassia quamash, Camas

Native bulbous perennial with light to deep blue flowers, blooming April to July. Grows in full sun to part shade in moist meadows, depressions, seasonal floodplains and prairies that dry by early summer; up to 11,000 ft. elevation. Tolerant of heavy clay soils. Up to three years before first blooming season. Grazed by ungulates in spring. Attracts beneficial insects.

Campanula rotundifolia, Harebell

Native perennial with bell shaped blue flowers, blooming June to September. Occurs on dry shallow soils of sunny meadows, hillsides, valleys and rocky slopes of the temperate and arctic zones across the northern hemisphere; up to 12,500 ft. elevation. Numerous small to mid-sized bee species feed on the nectar and pollen.

Castilleja applegatei ssp. martinii, Wavyleaf Indian paintbrush

Highly variable, drought tolerant native perennial with scarlet red or yellow bract flowers, blooming April to September. Occurs from valleys to foothills in dry open greasewood, sagebrush, pine and oak woodlands; up to 12,000 ft. elevation. Root-parasitic on other plants. Attracts hummingbirds.

Castilleja exserta ssp. exserta, Purple owl's clover (Exserted Indian paintbrush)

Formerly *Orthocarpus purpurascens.* Drought tolerant, native annual root-parasite with bright rose-purple bract flowers, blooming March to June. Occurs on many soil types in large masses along hillsides and in pastures; up to 5,000 ft. elevation. May form a stunning carpet across the desert floor in wet years. Attracts hummingbirds.

Castilleja linariifolia, Wyoming Indian paintbrush

Drought tolerant, native perennial root-parasite with showy bright red flower bracts, blooming June to October. Found on arid rocky grasslands, meadows, sagebrush scrub and open woodland communities; 3,000 to 11,000 ft. elevation. Attracts hummingbirds. State flower of Wyoming.

Castilleja minor, Lesser Indian paintbrush

Formerly *C. exilis.* Native annual root-parasite with long red bract flowers, blooming April to October. Occurs in heavy soils of sunny wetlands, saline or alkaline meadows, wet shores and seasonally moist sites with high water tables; up to 8,500 ft. elevation.

Castilleja rhexiifolia, Splitleaf Indian paintbrush

Native perennial root-parasite with deep rose-pink to magenta floral bracts, blooming June to September. Found on mesic to moist woodlands, meadows, streambanks and open rocky slopes up to alpine mountain regions; 4,500 to 14,000 ft. elevation.

Castilleja sulphurea, Sulphur Indian paintbrush

Native perennial root-parasite with pale yellow floral bracts which is an uncommon color within the genus, blooming June to September. Commonly found in moist open mountain meadows; up to 13,000 ft. elevation.

*Centaurea cyanus,** Bachelor button (Cornflower)

Introduced annual with blue flowers, blooming May to August. Easily established in full sun to part shade as part of wildflower mixes and flower gardens; well-drained sandy to clay soils. Pollinated by flies, bees, butterflies and moths. *Pictured on page 101.*

Chamaecrista fasciculata, Partridge pea

Fairly drought tolerant, native annual legume with showy yellow flowers, blooming July to September. Common in poor soils of prairies, roadsides, waterways and disturbed areas; thrives after wildfire. Establishes rapidly and volunteers easily. Often in dense stands, decreasing as other species establish. Palatable in wildlife food plots but poisonous to livestock when over-consumed. Valuable pollinator species for native bees and honeybees. *Pictured on page 48.*

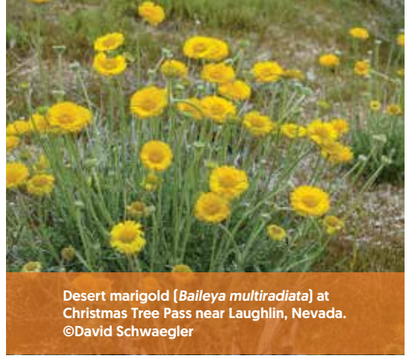
Chamerion angustifolium, Fireweed

Formerly *Epilobium angustifolium.* Rhizomatous native perennial with deep rose-pink flowers on tall ascending green and reddish stems, blooming June to September. Widespread in burned or logged forests, meadows, road cuts and waterways; up to 12,500 ft. elevation. Colonizer following wildfire or disturbance. Moderate moisture requirement; long-lived with full sunlight. Pollinated by native bees, moths and hummingbirds.

*Cheiranthus allionii,** Wallflower

Introduced annual with orange flowers, blooming spring to summer. Found along roadsides and meadows. Recommended for full sun landscaping blends in wildflower meadows and gardens; low to moderate water requirement.

*Introduced to North America.



Desert marigold (*Baileya multiradiata*) at Christmas Tree Pass near Laughlin, Nevada. ©David Schwaegler

Arrowleaf balsamroot (*Balsamorhiza sagittata*) in the Columbia River Gorge, Oregon.

Partridge pea (*Chamaecrista fasciculata*) at Ayers Sand Prairie State Nature Preserve, Illinois. ©David Schwaegler

Chrysanthemum maximum, see *Leucanthemum maximum* (Shasta daisy)

Clarkia amoena, Farewell-to-spring

Common native annual with pale pink to deep red petals, often with a dark red spot in the center, blooming May to August. Occurs in well-drained to dry soils of meadows, roadsides and woodland openings. Tolerant of alkaline soils, clays and seaside conditions. Use in wildflower meadows and gardens. Attracts bees and hummingbirds.

Cleome lutea, see *Peritoma lutea* (Yellow beeplant)

Cleome serrulata, see *Peritoma serrulata* (Rocky Mountain beeplant)

Collinsia heterophylla, Chinese houses

Distinct native annual with bicolored purple and speckled white petals, blooming February to June. Prefers fertile, well-drained, moist soils. Endemic to California. Occurs in forest understories, meadows and wet areas; below 5,000 ft. elevation. Pioneer species after disturbances and wildfire. Use in habitat restoration and in shady gardens beyond its native range. Reseeds easily. The most favorite early-season pollen and nectar source of Blue orchard bees, an important native pollinator of almond orchards. Also a larval host plant for the Checkerspot butterfly and a pollen source for a variety of native bees.

*Consolida ajacis,** Rocket larkspur

Formerly *Delphinium ajacis.* Introduced annual with blue, pink or white flowers, blooming spring to fall. Adaptable to a wide range of conditions and soils; low to moderate water use. Use in full to part sun wildflower gardens. Primarily pollinated by long-tongue bees.

Coreopsis lanceolata, Lanceleaf coreopsis (Lanceleaf tickseed)

Native rhizomatous perennial with solitary yellow daisy-like flowers on long stalks, blooming April to August. Occurs on sandy or rocky well-drained soils in prairies, meadows and disturbed sites with poor soil. Tolerant of heat, humidity and drought. Able to form large colonies; establishes easily. Pollen and nectar source for honeybees, native bees and butterflies. Use for prairie restoration, roadsides, waste areas and wildflower gardens and borders.

Coreopsis tinctoria, Plains coreopsis (Golden tickseed)

Native annual with numerous yellow flowers with maroon centers, blooming May to October. Prefers moist, sandy or clay soils with poor drainage along roadsides, low fields, meadows and disturbed sites. Readily reseeds itself. Pollinated by bees, butterflies and birds. Use for roadsides, prairie restoration, wildflower mixtures and gardens. State flower of Florida.

*Cosmos bipinnatus,** Cosmos

Introduced annual with showy red, pink and white flowers on tall stalks; bloom summer to fall. Establishes easily and quickly on infertile sandy soils; low water use. Use for landscaping and wildflower meadows. Attracts butterflies and honeybees.

*Cosmos sulphureus,** Sulphur cosmos (Yellow cosmos)

Introduced annual with bright sulphur orange flowers on tall stems; bloom summer to fall. Easily established, preferring coarse soils. Low water user. Use in beautification, wildflower meadows and gardens. Attracts butterflies and honeybees.

Crepis acuminata, Tapertip hawksbeard

Drought tolerant native perennial with yellow flowers, blooming May to September. Occurs on dry well-drained soils in sagebrush and conifer communities up to 10,500 ft. elevations. Good spring and summer forage for elk, deer and antelope. Sage-grouse chicks feed on the leaves and associated insects.

Dalea candida, White prairie clover

Formerly *Petalostemon candidus.* Native perennial non-toxic legume with white flowers, blooming June to October. Branched taproot. Found on well-drained coarse textured soils of prairies, roadsides and wooded openings; up to 8,000 ft. elevation. Provides nutritious browse for antelope, deer, elk and sharp-tail grouse. Intolerant of overgrazing. Attracts numerous native bees and honeybees and is a food source for the larvae of the Reakirt's blue butterfly. Use for reclamation of disturbed soils, range renovation, prairie habitat restoration and roadside mixes. Varieties:

Antelope
Vigorous, high forage and seed producer. Plant for forage, range renovation and prairie restoration. [Released 2000, origin: Stark County, ND]

*Introduced to North America.

Dalea ornata, Western prairie clover (Blue Mountain prairie clover)

Native, non-toxic perennial legume with light pink to purple flowers, blooming May to July. Occurs on soft clay and sandy soils of sagebrush steppe communities; up to 8,000 ft. elevation. Taprooted. Highly palatable to herbivores and many types of wildlife. Intolerant of overgrazing. Primarily insect pollinated, attracts both native and managed bees. Use for habitat restoration, beautification and roadsides. Similar to Searles' prairie clover (*D. searlsiae*). Varieties:

Aridlands
Source Identified selection from Wheeler County, OR averaging 11-14 in. annual precipitation.

Majestic
Represents the genetic diversity from the western Columbia Plateau and western Blue Mountain ecoregions. (Released 2011)

Spectrum
Represents the genetic diversity from the central and eastern Columbia Plateau, central and eastern Blue Mountains, Northern Basin and Range, and Snake River Plain ecoregions. (Released 2011)

Dalea purpurea, Purple prairie clover

Formerly *Petalostemon purpureus.* Native, warm season non-toxic leguminous perennial with pink to purple flowers, blooming June to September. Deep woody, stout taproot. Adapted to well-drained soils of hillsides, prairies and plains; up to 8,000 ft. elevation. Highly palatable browse to ungulates and many types of wildlife. Intolerant of overgrazing. Attracts numerous bees and is the larval host plant of the Southern dogface butterfly. Use for restoration, beautification, roadsides and habitat improvement. *Pictured on page 50.* Varieties:

Bismark
Superior vigor, foliage abundance and above average seed yield. Northern adaptation. (Released 2000, origin: Lyman County, SD)

Kaneb
Good vigor, height and stand development. (Released 1975, origin: Manhattan, KS)

Dalea searlsiae, Searles' prairie clover

Native, non-toxic perennial legume with pink to purple flowers, blooming April to August. Occurs in sandy or gravelly soils of sagebrush, shrub steppe and woodland habitats; 3,000 to 8,000 ft. elevation. Primarily insect pollinated. Highly palatable browse to herbivores and many types of wildlife. Intolerant of overgrazing. Use for restoration, beautification, roadsides and habitat improvement. Similar to Western prairie clover (*D. ornata*). Varieties:

Bonneville
Represents the genetic diversity from northwestern Utah, taken from a considerably drier, lower elevation site than other releases; 7 in. annual precipitation. (Released 2015, origin: Tooele County, UT)

Carmel
Intended for the Colorado Plateau. Greater dry-matter yields, height, flowering and seed production than Bonneville. (Released 2015: Kane County, UT)

Fanny
Intended for Nevada and southwestern Utah. Greater dry-matter yields, height, flowering, seed production and seedling emergence than Bonneville. (Releases 2015, Lincoln County, NV)

Desmanthus illinoensis, Illinois bundleflower

Native, semi-woody perennial legume with white globelike flower heads, blooming June to October. Occurs in well-drained soils of prairies, thickets, rocky slopes and open sites throughout the plains and southeastern states. Good palatability to big game; seeds desirable for wild birds. Pollinated by native bees.

*Dianthus barbatus,** Sweet William

Introduced biennial or short-lived perennial with dense clusters of white, pink and red disc-like flowers, blooming April to September. Prefers moist, well-drained soils in full sun. Use for groundcover, borders and wildflower seedings. Pollinated by bees, butterflies and moths.

*Dianthus deltoides,** Maiden pinks

Introduced perennial with deep pink to red flowers and a dark red ring around their center, blooming May to September. Occurs along open fields and roadsides. Use for easy maintenance groundcover on poor soils. Butterfly pollinated.

Dieteria bigelovii var. bigelovii, Plains aster

Formerly *Machaeranthera bigelovii.* Native drought tolerant biennial with large showy purple flowers and yellow centers, blooming July to October. Found on dry open areas with shallow or gravelly soils in the upper elevations of its range; 4,000 to 12,000 ft. elevation. Often occurs in large masses. Browsed throughout the season by deer and livestock. Attracts a variety of generalist bees, including honey and leafcutter bees.

Dieteria canescens, Hoary tansyaster

Formerly *Machaeranthera canescens.* Native short-lived perennial with blue to purple flowers and yellow centers, blooming May to October. Early colonizer of degraded and disturbed sites in various types of arid communities, from low valley rangelands to higher mountain elevations; up to 10,500 ft. elevation. Common to the eastern Pacific Northwest. Competitive with cheatgrass and knapweeds. Habitat for many birds and mammals. Insect associations important for sage-grouse chicks. Varieties:

Amethyst
Superior establishment and vigor. Excellent for wildlife habitat and pollinator improvement. (Released 2014, origin: Fremont County, ID)

*Introduced to North America.

Purple prairie clover (*Dalea purpurea*).

Purple coneflower (*Echinacea purpurea*). ©David Schwaegler

'Meriwether' Blanketflower (*Gaillardia aristata*) in a seed production field at L&H Seeds in southeastern Washington. ©Damon Winter/L&H Seeds

*Digitalis purpurea,** Foxglove

Introduced biennial with tall spires of pink, purple and white tubular flowers heavily spotted on their inner surface, blooming May to August. Naturalized in open woodlands and disturbed sites. Use for wildflower gardens and tall borders. Flowers attract hummingbirds.

*Dimorphotheca sinuata,** African daisy

Introduced annual with showy yellow, orange and cream flowers, blooming early spring and summer. Recommended for beautiful groundcover, garden borders or areas where quick cover is needed. Drought and heat tolerant; full sun. Attracts pollinator species.

Dracopis amplexicaulis, Clasping coneflower

Formerly *Rudbeckia amplexicaulis.* Native annual with yellow flower petals and reddish maroon bases, blooming April to September. Naturally occurs in open bottomlands, roadsides, streambanks and prairies. Tolerant of heat, drought and various soils. Use in pollinator gardens and wildflower plantings. Attracts bees and butterflies.

Echinacea angustifolia, Blacksamson

Long-lived native perennial with rose-purple flowers, blooming June to September. Prefers dry open rocky, sandy prairies and plains; up to 7,000 ft. elevation. Deep, woody taproot and low water user. Slow growing, taking up to three years to flower. Attractive to native bees, butterflies and hummingbirds.

Echinacea pallida, Pale purple coneflower

Very tall native perennial with long lavender petals drooping from a dark orange center cone, blooming May to July. Found in well-drained soils of open prairies, grassy slopes, dry woodlands and roadsides. Tolerant of drought, heat, humidity and poor soils. Preferred nectar plant for numerous bees and butterflies.

Echinacea purpurea, Purple coneflower

Tall native rhizomatous perennial with purple cone-shaped flowers, blooming May to September. Fairly drought tolerant, preferring open rocky prairies or woodlands on a wide range of soils. Use in wildflower blends and roadside mixtures, providing both erosion control and beautification. Attracts numerous bees and butterflies. *Pictured on pages 50 & 99.*

Epilobium angustifolium, see *Chamerion angustifolium* (Fireweed)

Erigeron speciosus, Aspen fleabane (Aspen daisy)

Native perennial with lavender to blue flowers and yellow centers, blooming June to September. Occurs on well-drained to clay soils in moist meadows, streambanks and openings of aspen, spruce and fir; up to 12,000 ft. elevation. Pollinated by native bees.

Eriogonum heracleoides, Wyeth buckwheat (Parsnipflower buckwheat)

Native, drought tolerant perennial forb to subshrub with cream to yellow-pinkish umbel flower clusters, blooming May to August. Occurs on dry rocky soils of slopes and canyons in sagebrush and shrubland communities and mountain meadows; up to 10,000 ft. elevation. Flowers attract insects which are an important food source to sage-grouse.

Eriogonum racemosum, Redroot buckwheat

Native drought tolerant perennial with numerous tight clusters of long-lasting white to pink tubular flowers, blooming June to October. Vivid fall colors after senescence. Distinctly tall and slender for a buckwheat. Common, occurring in openings of foothills, dry meadows, gravelly flats, steppe and shrublands; 4,000 to 10,000 ft. elevation. Often forms large patches or colonies. Host for various species of butterflies; attracts large numbers of native bees.

Eriogonum umbellatum, Sulphur flower buckwheat

Native, drought tolerant, low-growing woody perennial forb to subshrub with tiny yellow flower clusters, blooming May to September. Tolerant of drought, salinity, carbonates and infertile soils; 6.5 to 9.0 pH range. Common on dry well-drained soils of rocky slopes, valley bottoms, sagebrush deserts or mountain meadows; up to 12,000 ft. elevation. Excellent species for native pollinators, including being a larval host and nectar source for the Lupine blue butterfly. Leaves and associated insects are an important food for sage-grouse chicks.

Eriophyllum lanatum, Oregon sunshine (Common woolly sunflower)

Highly variable native annual, biennial or short to long-lived perennial with golden yellow flowers, blooming April to August. Excellent drought tolerance. Common and quick to establish, occurring in dry, rocky or sandy well-drained soils on

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Gooding's verbena (*Glandularia goodingii*) in the Coconino National Forest near Sedona, Arizona. Credit: ©David Schwaegler

Utah sweetvetch (*Hedysarum boreale*) in a seed production field at L&H Seeds in southeastern Washington. ©Damon Winter/L&H Seeds

Maximilian sunflower (*Helianthus maximiliani*).

roadsides, bluffs, canyons, dry grasslands and forests. Attracts numerous pollinating flies, bees, moths and butterflies. Host plant for the Painted lady butterfly and nectar source for the Oregon-endangered Fender's blue butterfly. Use in native habitat restoration, roadsides and in landscaping borders.

Eschscholzia caespitosa, Tufted poppy

Drought tolerant native annual with bright yellow flowers, blooming March to June. Prefers medium to fine textured soils in the grasslands of California's Central Valley; up to 5,000 ft. elevation. Visited by native bumble bees.

Eschscholzia californica, California poppy

Drought tolerant native annual to perennial with cup-shaped orange flowers, blooming February to July. Occurs along foothills and open grassy slopes; up to 5,000 ft. Widely adapted species that establishes easily and readily reseeds. Use for habitat restoration, wildflower mixes, borders and roadsides. Important pollinator species for numerous bees and insects, especially bumble bees. State flower of California. *Pictured on page 101.*

Eschscholzia californica ssp. mexicana, Mexican gold poppy

Drought tolerant native perennial with bright yellow-orange flowers, blooming February to May. Endemic to the Sonoran Desert region. Easily recognized by carpeted patches on the coarse soils of desert hillsides following warm, wet winters; up to 4,000 ft. elevation. Close desert-relative of California poppy (*E. californica*), only smaller, more drought hardy and quicker to flower.

Gaillardia aristata, Blanketflower

Widely adapted, drought tolerant native perennial with yellow and red flowers, blooming April to September. Found in a variety of well-drained soils in grasslands, shrublands, open woodlands and mountain meadows; up to 10,000 ft. elevation. Tolerant of mild acidic to mild alkaline conditions. Establishes quickly and able to grow into large colonies, especially on disturbed sites. Fire resistant, increasing after wildfire. Competitive with weeds. Attracts numerous pollinating bees and butterflies; extensive bloom period. Foliage and associated insects are a food source for sage-grouse and sharp-tail grouse. Use in restoration, erosion control or beautification. Varieties:

Meriwether
First true North American native release. Ray petals are solid yellow without red interiors, differing from some commonly known types. Use in habitat restoration, site reclamation or as an ornamental in low maintenance landscaping. (Released 2011, origin: MT & WY). *Pictured on page 50.*

Gaillardia pulchella, Firewheel (Indian blanket)

Heat and drought tolerant native annual with vibrant red and yellow daisy-like flowers, blooming March to October. Found on open sandy plains and roadsides in desert areas. Widely adaptable and recommended for wildflower mixes or mass plantings. Good bee pollinator plant.

*Gazania rigens,** Gazania (Treasure flower)

Formerly *G. splendens.* Low growing, spreading introduced perennial with mixed flowers of red, yellow and orange, blooming spring to fall. Use as a groundcover for border areas, parking strips or to stabilize hillsides or roadsides. Low to moderate water requirement.

Geranium viscosissimum, Sticky purple geranium

Native perennial with pale lavender-pink to purple flowers, blooming May to August. Widely distributed in well-drained soils of forests and shrub steppe communities, occasionally moist meadows; 1,000 to 10,000 ft. elevation. Pollinated by flies, butterflies and native bees.

Gilia capitata, Globe gilia

Native drought tolerant annual with blue globe-shaped flowers atop tall stems, blooming March to July. Occurs in woodlands and prairies; up to 7,000 ft. elevation. Use for mass plantings, along borders and in full sun to full shade garden mixes. Attracts native bees, butterflies and hummingbirds.

Gilia tricolor, Birds eyes

Widely adaptable native annual with pale to deep blue-violet flowers with yellow throats and five pairs of purple spots at the base of each petal, blooming February to June. Endemic to California; up to 4,500 ft. elevation. Also use for beautification mixes beyond its native range; full sun to part shade. Attracts bees.

Glandularia gooddingii, Gooding's verbena (Southwestern mock vervain)

Formerly *Verbena gooddingii.* Native mounding perennial with clusters of pink or lavender flowers, blooming February to October in response to desert precipitation. Grows well on sandy or rocky sites, especially on limestone or granite soils in sandy washes, canyon floors, gravel bars and roadsides; up to 8,000 ft. elevation. Short-lived but easily reseeds itself. *Pictured on page 51.*

*Glandularia pulchella,** Moss verbena (South American mock vervain)

Formerly *Verbena tenuisecta.* Introduced mounding perennial with purple flowers, blooming spring to fall. Use for low water groundcover and landscape borders; full sun to part shade. Attracts numerous pollinating insects.

Hedysarum boreale, Utah sweetvetch (Northern sweetvetch)

Widely distributed native drought tolerant perennial legume with colorful pink-purple pea-like flowers, blooming May to August. Occasionally rhizomatous. Occurs in the openings of semi-deserts, shrublands and woodland openings; 2,000 to 10,000 ft. elevation. Prefers well-drained loamy sites, but tolerant of sandy or clay soils. Highly palatable to ungulates. Use for habitat restoration, reclamation and roadsides. Provides habitat for sage-grouse and pollinators. *Pictured on page 51.* Varieties:

CP-UP
Source Identified selection from the Colorado Plateau-Uncompahgre Plateau of San Miguel County, CO averaging 16-19 in. annual precipitation.

Timp
High seedling vigor, establishment, adaptability, persistence, seed production and nitrogen fixing ability. Competes well with broadleaf weeds. (Released 1994, origin: Utah County, UT)

Helianthella uniflora, Oneflowered helianthella

Native perennial with tall stems ending in solitary yellow flowers, blooming June to August. Adapted to coarse shallow soils in shrub and woodland communities; 2,000 to 10,500 ft. elevation. Food source for native bees, birds, small mammals and deer. Use for habitat restoration.

Helianthus annuus, Annual sunflower

Fast growing, drought tolerant native annual with yellow flowers and large dark centers, blooming March to October. Smaller flower heads than commercial types used in food and oil production (See: *Cover Crops & Annual Forages*). May reach up to 10 ft. in height. Prefers disturbed ground and waste areas such as abandoned fields, roadsides and gravel pits; up to 10,000 ft. elevation. Easily established, often forming large colonies; tolerant of clay soils. Seeds are winter food for many birds. Visited by butterflies and bees. State flower of Kansas.

Helianthus maximiliani, Maximilian sunflower

Aggressive, rhizomatous perennial native with showy yellow flowers, blooming from July to October. Forms dense colonies in moist heavy soils of mixed grass prairies and rocky upland sites; up to 5,000 ft. elevation. Food and habitat for numerous bees, insects, birds, small mammals and large game. Important late-season nectar source for migrating Monarch butterflies. *Pictured on page 51.* Varieties:

Medicine Creek
Large, late maturing ecotype intended for conservation, wildlife habitat, prairie restoration, landscaping hedges or in filter strips because of its ability to use excess water and nutrients. (Released 2000, origin: Hughes County, SD)

Helianthus nuttallii, Nuttal's sunflower (Marsh sunflower)

Tall, rhizomatous and tuberous native perennial with upright yellow flowers, blooming July to September. Common on moist to saturated soils of meadows and sloughs, forming large clumps; up to 9,000 ft. elevation. Occasionally on dry soils which experience seasonal flooding.

Heliomeris multiflora, Showy goldeneye

Formerly *Viguiera multiflora.* Tall native perennial forb to subshrub with golden yellow sunflower-like flowers, blooming May to October. Competitive; good seedling vigor. Prefers well-drained soils on dry to moderately moist slopes and roadsides in sagebrush and woodland communities; 3,500-12,000 ft. elevation. Browsed by ungulates; birds and rodents eat the seeds. Attracts numerous native bees, butterflies and hummingbirds.

Herrickia glauca, Blueleaf aster (Gray aster)

Formerly *Aster glaucodes.* Drought tolerant, rhizomatous native perennial forb to subshrub with numerous pale lavender flowers, blooming July to October. Colonizes openings of arid salt desert shrub, sagebrush and woodland communities; 2,000 to 11,000 ft. elevation.

Heterotheca villosa, Hairy goldenaster

Drought tolerant, native perennial forb to subshrub with yellow flowers, blooming May to October. Common, occurring in sandy and rocky or calcareous soils of dry grasslands, desert shrublands and open forests. Useful for erosion control and pollinator habitat.

Ipomopsis aggregata, Scarlet gilia (Skyrocket)

Formerly *Gilia aggregata.* Biennial or short-lived native perennial with showy brilliant red, or occasionally pink tubular flowers, blooming May to September. Occurs on well-drained sandy or rocky deserts and subalpine meadows; up to 11,500 ft. Browsed by deer and elk prior to flowering. Pollinated by native bees, flies, moths and hummingbirds.

Ipomopsis rubra, Standing cypress

Native biennial with showy red tubular flowers marked with interior yellowish spots, blooming May to September. Occurs along riverbanks and open sandy areas; moderate drought tolerance. Use in hummingbird gardens and wildflower mixtures.

Iris missouriensis, Rocky Mountain iris (Western blue flag)

Native perennial evergreen forb spreading by tuberous rhizomes with showy large pale blue to blue-violet flowers and dark violet veins, blooming May to September. Occurs in wetlands and riparian areas of streambanks, moist meadows and forest openings; up to 11,500 ft. elevation. Use for restoration or in wet to saturated landscaping. Attracts insects and hummingbirds.

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Kallstroemia grandiflora, Arizona poppy (Arizona caltrop)

Sprawling summer native annual with golden orange-yellow flowers, blooming July to October after desert monsoons. Quick germination when moisture is available. Found along roadsides, sandy washes, mesas, disturbed areas and low spots, often in mass communities; up to 6,500 ft. elevation. Use in desert restoration and native gardens. Prolific seed producer; seeds eaten by birds. Visited by numerous bees, wasps, flies and butterflies.

Layia platyglossa, Coastal tidytips

Drought tolerant native annual with circular yellow white tipped flowers, blooming February to June. Historically common on dry habitats from low coastal dunes to grassy meadows and the high desert; up to 7,000 ft. elevation. Widely adaptable, suited for mass plantings or full sun wildflower gardens; tolerates clay soils. Seeds are a favorite of many birds. Attractive to butterflies and native bees.

Leptosiphon grandiflorus, Mountain phlox (Large-flower linanthus)

Formerly *Linanthus grandifloras.* Low-growing annual native endemic to California with soft white and lilac flowers, blooming April to July. Widely adaptable, occurring in well-drained open prairies, shrub and woodland habitats, often in dense colonies when moisture is adequate; up to 4,000 ft. elevation. Use in restoration and wildflower blends.

Lesquerella gordonii, see *Physaria gordonii* (Gordon's bladderpod)

*Leucanthemum maximum,** Shasta daisy

Formerly C*hrysanthemum maximum.* Introduced, rhizomatous short-lived perennial with large white daisy-like flowers, blooming May to August. Found in clumps along disturbed sites and roadsides. Use for low to moderately watered gardens or landscapes; full sun to part shade.

Liatris punctata, Dotted blazingstar (Dotted gayfeather)

Very long-lived, drought tolerant native perennial with clusters of lavender-pink flowers along long stems, blooming July to October. Substantial taproot and rhizomatous lateral root system can reach 16 ft. deep and 5 ft. in spread. Occurs on well-drained sandy or rocky forest, sagebrush, grassland and prairie sites; up to 9,000 ft. elevation. Increases after disturbance. Use for restoration and as an ornamental. Fair to good browse for wild ungulates. Especially important late-season nectar source for native butterflies and moths.

Liatris pycnostachya, Thickspike blazingstar (Thickspike gayfeather)

Tall, long-lived native perennial with clusters of pink-purple flowers along stems sometimes reaching 5 ft. tall, blooming June to October. Substantial taproot system can reach 5-15 ft. deep; also rhizomatous. Occurs on moist tallgrass prairies, often in thick patches. Use for prairie restoration and as an ornamental. Nectar important to many native pollinators, especially native butterflies and moths.

Liatris spicata, Dense blazingstar (Marsh gayfeather)

Native rhizomatous perennial with clusters of rose-purple flowers on stems typically 2-4 ft. tall, blooming July to October. Occurs on low-lying moist prairie soils in meadows and fields and on the edges of marshes and bogs. Nectar important to many native bees, butterflies and moths. Similar appearance to Thickspike blazingstar (*L. pycnostachya*), but prefers wetter sites.

Linanthus grandiflorus, see *Leptosiphon grandiflorus* (Mountain phlox)

*Linaria maroccana,** Moroccan toadflax (Baby snapdragon)

Drought tolerant introduced annual with mixed colors of pink, red, orange, yellow, lavender and white, blooming prolifically from early spring to summer. Widely adaptable and easy to establish. Used for full to part sun ornamental borders and garden mixtures.

*Linum grandiflorum,** Scarlet flax

Introduced annual with brilliant scarlet flowers, replaced daily from early spring to fall. Widely adaptable, easily to establish and readily reseeds itself. Used for full to part sun ornamental borders and garden mixtures.

Linum lewisii, Lewis flax (Prairie flax)

Short-lived, drought tolerant native perennial with light blue flowers that are replaced daily from April to August. Widely adapted, occurring on well-drained, infertile and disturbed soils of mixed grass prairies, shrublands, woodlands and forest openings; up to 12,000 ft. elevation. Cold hardy. Intolerant of poor drainage, flooded soils or high water tables. Use for habitat restoration, reclamation, roadsides and beautification. Also use in green strips and fuel breaks; semi-evergreen and fire resistant. Eaten by livestock and wild ungulates, especially deer and antelope. Birds eat the seeds in fall and winter. *Pictured on page 54 & 126.* Varieties:

Columbia
Source Identified selection from Sherman & Gillman Counties, OR averaging 11-13 in. annual precipitation. *Pictured on page 54.*

Maple Grove
Outstanding vigor, beauty and overall competitiveness with grasses. (Released 2003, origin: Maple Grove, UT)

*Linum perenne,** Blue flax

Short-lived drought tolerant semi-evergreen perennial with deep blue flowers that are replaced daily from April to August. Widely adapted and naturalized throughout much of the U.S. on well-drained, infertile and disturbed soils. Intolerant of poor drainage, flooded soils or high water tables. Good seedling vigor. Use for reclamation, highways and beautification in xeriscaping and around cabins. Also use in green strips and fuel breaks; semi-evergreen and fire resistant. Eaten by livestock and wild ungulates. Birds eat the seeds in fall and winter. Varieties:

Appar
Outstanding vigor, beauty and overall competitiveness with grasses. Widely used for reclamation, highway roadsides and

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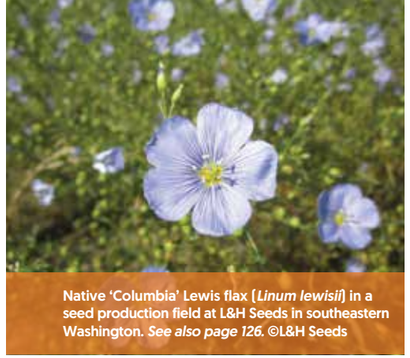

Native 'Columbia' Lewis flax (*Linum lewisii*) in a seed production field at L&H Seeds in southeastern Washington. *See also page 126.* ©L&H Seeds

Fernleaf biscuitroot (*Lomatium dissectum*) at Payette National Forest near Council, Idaho. ©David Schwaegler

Arizona lupine (Lupinus arizonicus). ©David Schwaegler

beautification. Originally released as native Lewis flax (*L. lewisii*), but later discovered to be an introduced, yet naturalized species. (Released 1980, origin: Black Hills, SD, originally Europe)

*Lobularia maritima,** Sweet alyssum

Formerly *Alyssum maritimum.* Annual or short-lived perennial with clusters of small white flowers, blooming most of the growing season. Use as a low-growing, low maintenance groundcover or in well-drained, partially shaded wildflower gardens.

Lomatium dissectum, Fernleaf biscuitroot

Very large, drought tolerant native perennial with inconspicuous yellow to brownish-purple flowers, blooming late March to August. Largest of the biscuitroots. Common on rocky semi-desert foothills, shrub-steppe and woodland openings; up to 11,000 ft. elevation. Early spring growth provides crucial forage and pollen for ungulates and pollinator species. Foliage and associated insects are vital spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly. *Pictured on page 54.*

Lomatium foeniculaceum, Desert biscuitroot

Low-growing, drought tolerant native perennial with inconspicuous yellow flowers, blooming late March to July. Common on rocky outcrops in foothills, grasslands, shrublands and woodland openings up to 11,000 ft. elevation. Crucial early spring pollen for pollinators. Foliage and associated insects are vital early spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly.

Lomatium grayi, Gray's biscuitroot

Medium-tall, somewhat drought tolerant native perennial with inconspicuous yellow flowers, blooming early March to July. Common on rocky outcrops in foothills, shrublands and woodland openings; up to 10,000 ft. elevation. Very early spring growth, similar to Bigseed biscuitroot (*L. macrocarpum*). Seedling growth and vigor may be greater than Fernleaf biscuitroot (*L. dissectum*) and Nineleaf biscuitroot (*L. triternatum*). Crucial early spring forage and pollen for ungulates and pollinators. Foliage and associated insects are vital early spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly.

Lomatium macrocarpum, Bigseed biscuitroot

Low-growing, drought tolerant native perennial with inconspicuous white flowers, blooming early March to July. Common on rocky outcrops in foothills, grasslands, shrublands and woodland openings up to 9,000 ft. elevation. Very early spring growth, similar to Gray's biscuitroot (*L. grayi*). Crucial early spring pollen for pollinators. Foliage and associated insects are vital early spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly.

Lomatium nudicaule, Barestem biscuitroot

Large, somewhat drought tolerant native perennial with leafless stalks topped with inconspicuous yellow flowers, blooming early April to August. Found on rocky and sandy soils in foothills, shrublands and woodland openings up to 8,500 ft. elevation. Crucial early spring forage and pollen for ungulates and pollinators. Foliage and associated insects are vital early spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly.

Lomatium triternatum, Nineleaf biscuitroot

Large, somewhat drought tolerant native perennial with long linear leaf segments and inconspicuous yellow flowers, blooming early April to August. Found on rocky and sandy soils in foothills, shrublands and woodland openings up to 12,000 ft. elevation. Crucial early spring forage and pollen for ungulates and pollinators. Foliage and associated insects are vital early spring food for sage-grouse hens and chicks. Biscuitroots are host plants for the Anise swallowtail butterfly and the rare Indra swallowtail butterfly.

Lupinus albicaulis, Sicklekeel lupine

Annual, biennial or short-lived perennial native legume with purple, yellow or white flowers, blooming April to August. Vigorous grower with a deep taproot, occurs on dry open slopes and recently disturbed sites, from lowlands to mountain habitats; up to 10,000 ft. elevation. Prefers well-drained sandy to coarse soils. Seeds are eaten by various birds. Important pollen source for bees and other pollinators. Poisonous to livestock.

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Silky lupine (*Lupinus sericeus*) at Shafer Butte Recreation Area near Boise, Idaho. ©David Schwaegler

Prairie aster (*Machaeranthera tanacetifolia*) in Capitol Reef National Park, Utah. ©David Schwaegler

Silver-spotted skipper butterfly on Wild bergamot (*Monarda fistulosa*) at Lyons Woods Forest Preserve, Illinois. ©David Schwaegler

Lupinus x alpestris, Mountain lupine (Great Basin lupine)

Moderately drought tolerant, leguminous native perennial with blue-lavender flowers, blooming June to October. Occurs from foothills to the subalpine, in clearings, under trees and on moist exposed ridges; up to 11,000 ft. elevation. Seeds are eaten by various birds. Important pollen source for bees and other pollinators. Poisonous to livestock.

Lupinus argenteus, Silvery lupine

Drought tolerant, bushy leguminous native perennial with violet or whitish-blue flowers, blooming May to September. Widespread in its natural range in shrublands, grasslands and woodlands at mid to high elevations; up to 12,500 ft. Prefers well-drained soils. Aggressive colonizer after disturbance. Seeds are eaten by various birds. Important pollen source for bees and other pollinators. Poisonous to livestock.

Lupinus arizonicus, Arizona lupine

Drought tolerant, leguminous native annual with deep blue or purplish flowers, blooming January to May. Occurs on disturbed sandy washes, roadsides or open desert; up to 4,000 ft. elevation. May "super bloom" following a wet desert winter. Seeds are eaten by various birds. Important pollen source for bees and other pollinators. *Pictured on page 54.*

Lupinus bicolor, Miniature lupine

Short, drought tolerant leguminous native annual with bicolored flowers of blue and white, blooming March to July. Occurs in open sandy soils and grassy areas; up to 5,500 ft. elevation. Common in large patches among California poppy (*Eschscholzia californica*); often after wildfire. Grows rapidly, useful for quick cover and beautification. Seeds are eaten by various birds. Important pollen source for bees and other pollinators.

Lupinus caudatus, Tailcup lupine

Drought tolerant, leguminous native perennial with deep violet-blue flowers, blooming May to September. Occurs in a variety of habitats including grasslands, sagebrush, shrublands and open forests; up to 11,500 ft. elevation. Prefers well-drained soils. Deep taproot allows it to survive and respond to wildfires. Seeds are eaten by various birds. Important pollen source for bees and other pollinators. One of the most poisonous lupine species to livestock.

Lupinus perennis, Wild lupine (Sundial lupine)

Native perennial legume with purplish-blue flowers, blooming March to July. Prefers well-drained sandy or gravelly soils along dry, open woods, fields and mixed grass prairies; tolerant of slightly acidic soils. Large deep taproot and rhizomatous. Thrives after disturbance such as wildfire. Used frequently in wildflower landscaping beyond its native range. Pollinated by numerous bees and flies. Visited by many species of butterfly, including being the sole larval host plant of the endangered Karner blue butterfly.

Lupinus polyphyllus, Bigleaf lupine

Native perennial legume with blue to purple flowers, blooming May to September. Highly variable characteristics; occasionally rhizomatous. Prefers moist sites such as wetlands, damp forests, wet meadows and streambanks but also tolerant of seasonally dry sites; up to 11,000 ft. elevation. Versatile and competitive, able to grow in acidic, nutrient-poor mineral soils. Nectar and pollen-rich flowers attract beneficial insects, hummingbirds and numerous bees.

Lupinus rivularis, Riverbank lupine

Native short-lived perennial or occasionally biennial legume with purple-blue to white flowers, blooming March to August. Prefers well-drained, sandy or gravelly soils on dunes and road cuts, as well as marshes, streams and wet meadows; up to 8,000 ft. elevation. Use for restoration and as a fast growing pioneer after disturbance on infertile soils. Provides pollen and nectar for native bees, butterflies and other beneficial insects. Varieties:

Herdema
Rapid establishment and growth; high seedling vigor and seed yields. Tolerant of disease and insect damage. Originally incorrectly released as a variety of Sicklekeel lupine (*L. albicaulis*). (Released 1981, origin: Polk & Marion Counties, OR)

Lupinus sericeus, Silky lupine

Drought tolerant, native perennial legume with vivid blue flowers, blooming May to August. Adapted to a broad range of soil textures but most common on coarse, well-drained sites. Performs well in soils with low fertility; poor in acidic or saline soils. Occurs on dry grasslands, sagebrush deserts, shrublands and open woodlands, often on repeatedly disturbed sites; up to 11,000 ft. elevation. Eaten by deer, bighorn sheep, birds and small mammals. Poisonous to livestock, especially sheep. Attracts hummingbirds and numerous native bees; nectar source for honeybees. *Pictured on page 55.*

*Introduced to North America.

Lupinus sparsiflorus, Coulter's lupine (Desert lupine)

Drought tolerant, native annual legume with pale blue to purple flowers and a yellow mark on the upper petal which turns red after pollination, blooming January to June. Prefers sandy soils of mesas, washes and roadsides, often carpeting the desert floor for miles; up to 6,000 ft. elevation. Occurs in the Mojave and Sonoran Deserts when rainfall is adequate; later in other regions. Absent in drought years. Used often in restoration and erosion control.

Lupinus succulentus, Arroyo lupine (Hollowleaf annual lupine)

Large native annual legume with deep violet-blue flowers and a white mark on the upper petal, blooming February to June. Tolerates heavier soils than most lupine species; more water tolerant. Occurs in many habitat types, often densely colonizing disturbed areas; up to 5,000 ft. elevation. Used often in restoration, erosion control and as an ornamental.

Lupinus texensis, Texas bluebonnet

Native, drought tolerant winter annual legume with dark blue white tipped flowers, blooming March to June where native. Widely adaptable but intolerant of poorly drained, clay soils. Occurs in meadows and fields. Used on roadsides and as an ornamental. State flower of Texas.

*Lychnis chalcedonica,** Maltese cross

Tall and hardy rhizomatous perennial with scarlet to orange-red flowers, blooming June to September. Popular ornamental in well-drained wildflower gardens; partial to full sun.

Machaeranthera bigelovii var. bigelovii, see *Dieteria bigelovii var. bigelovii* (Plains aster)

Machaeranthera canescens, see *Dieteria canescens* (Hoary tansyaster)

Machaeranthera tanacetifolia, Prairie aster

Formerly *Aster tanacetifolius.* Low spreading, drought tolerant native annual or biennial with bright violet daisy-like flowers, blooming May to October. Occurs on various habitats including, dry upland desert scrub, rocky hillsides and in open sandy prairies and woodlands; 1,000 to 8,000 ft. elevation. Use for restoration, revegetating disturbed areas, roadsides and in xeriscaping. *Pictured on page 55.*

Malacothrix glabrata, Smooth desertdandelion

Native annual forb with showy pale yellow flowers and occasionally a red center, blooming February to June. Occurs on coarse sandy soils in open washes and flats of shrublands and foothill woodlands; up to 6,500 ft. elevation. Occurs in large masses during wet years.

Mentzelia albicaulis, Whitestem blazingstar

Distinctly slender, drought tolerant native annual with small yellow flowers, blooming May to July. Occurs in well-drained, sandy to rocky soils of dry meadows, shrublands and woodlands, up to 7,000 ft. elevation. Sometimes prolific after wildfire.

Mentzelia laevicaulis, Smoothstem blazingstar

Drought tolerant native biennial or short-lived perennial with yellow star-like flowers, blooming June to September. Prefers sandy or gravelly soil on disturbed sites, road cuts and rocky slopes; up to 10,000 ft. elevation. Barbed hairs on leaves and seed capsules easily fasten to fur and clothing, likely as a mechanism of seed dispersal.

Mentzelia lindleyi, Lindley's blazingstar

Drought tolerant native annual with large bright yellow flowers and a red base, blooming May to June. Endemic to central California, from coastal scrub to foothill woodland habitats, up to 3,000 ft. elevation. Performs well in poor soils, especially on rocky or sandy open slopes of hillsides and road cuts. Used in restoration and as an ornamental.

Mimulus guttatus, Monkeyflower

Native showy yellow snapdragon-like flowers with red throat spots, blooming March to September. Considerable variability in form and lifespan throughout its range, occurring as both a fibrously rooted, small and spindly annual, or as a rhizomatous, robust and bushy perennial. Found on all types of riparian habitats including coastal meadows, intermittent desert streams and mountain seeps, sometimes aquatic; up to 13,000 ft. elevation. Occurs as scattered individual plants or in large patches. Pollinated by numerous types of insects, including various bumblebee species.

Mirabilis multiflora, Colorado four o'clock

Native drought tolerant shrub-like perennial with conspicuous purple-magenta bell-shaped flowers, blooming nocturnally April to October. Occurs on dry sandy and rocky areas of desert grasslands, shrublands and woodlands; up to 9,000 ft. elevation. Use in restoration and xeriscaping. Attracts night pollinators, including hawkmoths.

Monarda citriodora, Lemon beebalm (Lemon mint)

Tall native annual, biennial or perennial with fragrant foliage and white or pink-lavender flowers, often dotted purple, blooming May to September. Prefers alkaline soils and clay soil of prairies and roadsides with mesic to dry conditions; up to 10,000 ft. elevation. Use in prairie restoration or full sun landscaping. Important pollinator species for butterflies, bees and hummingbirds.

Monarda fistulosa, Wild bergamot (Beebalm)

Tall, rhizomatous native perennial with aromatic foliage and lilac to deep pink flowers, blooming June to September. Occurs on moist to dry roadsides, woods and meadows forming large colonies on a wide range of soil types; up to 9,000 ft. elevation. Use in prairie restoration or landscaping. Excellent for bumble bees, hummingbirds, butterflies, moths and various insects. *Pictured on pages 55 & 61.*

*Myosotis sylvatica,** Forget-me-not

Formerly *M. alpestris.* Small short-lived rhizomatous perennial with deep blue petals and yellow interior, blooming April to August. Prefers moist sites from the lowlands to the

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alpine; up to 10,500 ft. elevation. Use in wildflower garden mixes and landscaping borders.

Nemophila maculata, Five spot

Trailing annual native flower with five white petals and a blue-purple spot at the tip of each, blooming March to July. Low to moderate water requirement; full sun to part shade. Endemic to California, occurring in open meadows, woodlands and roadsides; up to 8,000 ft. elevation. Early spring blooms are significant pollen and nectar sources for Blue orchard bees, an important native pollinator for almond orchards. Also use for wildflower gardens beyond its native range.

Nemophila menziesii, Baby blue eyes

Short trailing annual native with pale blue flowers and white centers, blooming prolifically February to June. Low to moderate water requirement; full sun to shade. Occurs on meadows, woodlands and desert washes up to 6,500 ft. elevation. Early spring blooms are significant pollen and nectar sources for Blue orchard bees, an important native pollinator for almond orchards. Also use for wildflower plantings beyond its native range.

Oenothera biennis, Common evening primrose

Robust native biennial with bright yellow fragrant flowers, blooming nocturnally June to October. Occurs in open woods, fields, floodplains, shores and disturbed areas; up to 4,000 ft. elevation. Seeds provide winter food for many birds. Visited by native bees, butterflies, hummingbirds and pollinated by hawkmoths at night. Use in full sun wildflower gardens with low to moderate moisture requirements. May escape wildflower gardens.

Oenothera elata, Hooker's evening primrose

Formerly *O. hookeri.* Tall native biennial or short-lived perennial with fragrant yellow flowers, blooming nocturnally April to November. One of the largest and showiest of the evening primroses. Occurs on open slopes, roadsides, moist lowlands and streams; up to 10,000 ft. elevation. Attracts night pollinators, including hawkmoths.

Oenothera hookeri, see *Oenothera elata* (Hooker's evening primrose)

*Oenothera lamarckiana,** Evening primrose

Tall annual with large showy yellow flowers that open in early evening, blooming July to September. Naturalized throughout much of the U.S. Tolerates high pH soils. Used in low to moderate water landscaping mixes.

Oenothera macrocarpa, Missouri evening primrose (Bigfruit evening primrose)

Formerly *O. missouriensis.* Drought tolerant, trailing native perennial with large fragrant canary yellow flowers, blooming nocturnally April to July. Common on dry open prairies, rocky hillsides, roadsides and disturbed areas; below 6,000 ft. elevation. Useful for erosion control or beautification. Attracts night pollinators such as hawkmoths.

Oenothera missouriensis, see *Oenothera macrocarpa* (Missouri evening primrose)

Oenothera pallida, Pale evening primrose

Rhizomatous native perennial with showy white flowers and yellow centers, blooming April to September. Drought tolerant, occurring on dry, sandy or gravelly soils and dunes in desert shrub and open woodland habitats; up to 9,000 ft. elevation. Useful for restoration, erosion control and beautification. Pollinated by hawkmoths and bees.

Oenothera speciosa, Showy evening primrose

Drought resistant, rhizomatous native perennial with pink to rose flowers and yellow centers with pink or red veins, blooming April to August. Grows upright or sprawling, spreading to form large colonies. Some populations bloom nocturnally. Occurs on open plains, grasslands, roadsides and degraded sites; up to 8,000 ft. elevation. Use for restoration, erosion control or showy groundcover. Pollinated by hawkmoths and bees.

Oligoneuron rigidum, Stiff goldenrod

Formerly *Solidago rigida.* Tall native perennial with flat-topped golden yellow flower clusters, blooming July to October. Deep-rooted, often occurring in patches on rocky or sandy sites in dry grass prairies, open woods and roadsides where deeper soils are present; up to 7,000 ft. elevation. Moderate water needs. Attracts numerous bees and pollinators, especially Monarch butterflies.

Orthocarpus purpurascens, see Castilleja exserta ssp. exserta (Purple owl's clover)

Osmorhiza occidentalis, Sweet anise (Western sweetroot)

Native perennial with tiny yellow or whitish umbel flowers, blooming June to August. Strong licorice odor. Occurs singly in dry aspen stands and conifer forests, and in large patches on moist sites and streambanks, generally in partial shade; up to 11,000 ft. elevation. Use in woodland and meadow restoration.

Papaver nudicaule, Iceland poppy (Arctic poppy)

Short-lived perennial with bright yellow-orange to orange-red flowers, blooming in spring. Native to the alpine regions of North America, occurring on exposed high elevation summits throughout the Rocky Mountains. Primarily used in landscaping mixes and wildflower gardens beyond its native range. Moderate moisture requirement.

*Papaver rhoeas,** Flanders poppy (Corn poppy)

Fast-growing annual with red flowers or mixed colors of white, orange, pink and red, blooming April to July. Low to moderate water needs; full sun to part shade. Use for wildflower gardens and mass plantings; easily reseeds itself with soil disturbance.

Penstemon acuminatus, Sharpleaf penstemon

Very drought tolerant, short-lived native perennial with blue to lavender flowers, blossoming April to July. Occurs in well-drained sandy soils of dunes and dry steppe

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Sharpleaf penstemon (*Penstemon acuminatus*) in a seed production field at L&H Seeds in southeastern Washington. ©L&H Seeds

Palmer's penstemon (*Penstemon palmeri*).

Parry penstemon (*Penstemon parryi*) at Boyce Thompson Arboretum State Park in Superior, Arizona. ©David Schwaegler

habitats; up to 8,000 ft. elevation. Use for wildlife and bee pollinator habitat enhancement and restoration, roadside plantings and xeriscaping. *Pictured on page 58.*

Penstemon angustifolius, Narrowleaf penstemon (Broadbeard beardtongue)

Drought tolerant native perennial with pink or lavender to blue showy flowers, blooming May to July. Adapted to sandy and medium-textured soils on semi-desert grasslands, shrublands and dunes; 2,000-9,000 ft. elevation. Intolerant of clay soils. Use for habitat enhancement and restoration. Flowers visited by hummingbirds and numerous insects.

Penstemon barbatus, Beardlip penstemon

Tall native perennial with brilliant red tubular flowers, blooming June to October. Drought tolerant, preferring dry, rocky slopes, open woods, roadsides and disturbed areas; 2,000 to 11,000 ft. elevation. Use for restoration and erosion control mixes. Late-summer nectar is very attractive to migrating hummingbirds.

Penstemon cyananthus, Wasatch penstemon

Native perennial with deep blue to purple flowers blooming May to August. Low to moderate water requirement. Occurs on a wide range of habitats from midland sagebrush and grassland communities to alpine elevations; up to 12,000 ft. elevation. Common in its range, sometimes in large patches especially after disturbance.

Penstemon cyaneus, Blue penstemon

Native perennial subshrub with vivid blue flowers often saturated with pink, blooming May to August. Drought tolerant, occurring in well-drained coarse soils on open dry sagebrush steppe and high elevation meadows with a lingering winter snowpack; 2,000-10,000 ft. Use for habitat restoration, roadsides and xeriscaping. Fibrous root system is excellent for soil stabilization. Attracts numerous native bees and pollinators.

Penstemon deustus var. deustus, Hotrock penstemon (Scabland penstemon)

Short-lived native perennial with showy white tubular flowers, blooming May to August. Prefers well-drained dry rocky sites, including basalt flows, limestone outcrops and other volcanic soils; up to 9,500 ft. elevation. Very drought tolerant, occurring in open sagebrush, juniper and pinyon-juniper communities receiving as low as 8 in. annual precipitation. Attracts numerous native bees and other pollinator insects. Use for habitat restoration, roadsides and xeriscaping.

Penstemon eatonii, Firecracker penstemon

Short-lived native perennial with scarlet red tubular flowers, blooming March to July. Drought tolerant, occurring on dry sagebrush, desert scrub and woodland communities; up to 11,000 ft. elevation. Use for restoration, pollinator enhancement and xeriscaping. Fibrous root system is excellent for soil stabilization. Attracts hummingbirds and other pollinators. *Pictured on page 5.* Varieties:

Richfield
Chosen for its beauty, hardiness, seed production and natural range of adaptability. (Released 1994, origin: Sevier County, UT)

Penstemon eriantherus, Fuzzytounge penstemon

Short to tall native perennial with lavender to pale purple flowers, blooming May to July. Drought tolerant, occurring on dry, well-drained soils from the low shrub steppe to the mountains; up to 10,000 ft. elevation. Foliage and seeds are important food source for wildlife and birds. Use for restoration and xeriscaping. Attracts butterflies and bumble bees. Varieties:

Old Works
Found growing on a copper smelting mine site in soils with high levels of heavy metals and sulfur, including phytotoxic levels of arsenic and copper and a 5.8 pH. Thought to perform well in moderately acidic and heavy metal soils. Also suitable for use in habitat restoration projects not related to mining.

Penstemon grandiflorus, Large beardtongue

Formerly *P. bradburii.* Tall native perennial with showy pink to blue-lavender flowers, blooming May to June. Moderately drought tolerant, preferring dry, coarse well-drained soils in open prairies of the northern Great Plains, but is widely adaptable; up to 6,000 ft. elevation. Not fire resilient. Use in restoration and flower gardens. Visited by numerous bees and bumble bees.

Penstemon pachyphyllus, Thickleaf penstemon (Thickleaf beardtongue)

Native short-lived perennial with blue-violet or lavender flowers, blooming May to August. Drought tolerant, occurring on well-drained, infertile, disturbed soils of salt desert shrub, sagebrush, mountain brush and woodland communities; 3,000 to 11,000 ft. elevation. Large showy flowers attract large bumble bees.

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Penstemon palmeri, Palmer's penstemon

Tall native perennial with soft pink fragrant flowers, blooming April to August. Very drought tolerant, preferring open areas such as well-drained rocky hillsides, gravelly washes and roadsides in desert brush and woodland communities; up to 9,000 ft. elevation. Semi-evergreen leaves are somewhat fire resistant and palatable to wildlife and livestock during spring and winter. Recommended for revegetation and pollinator habitat; attracts various native bees. *Pictured on page 58.* Varieties:

Cedar
Widely adapted. Able to establish, persist and provide forage diversity for small birds, big game and livestock. Excellent root system for erosion control and revegetation. [Released 1985, origin: Iron County, UT]

Penstemon parryi, Parry's penstemon (Parry's beardtongue)

Potentially tall, drought tolerant native perennial with various shades of brilliant pink-magenta flowers, blooming February to June. Widely adaptable but prefers coarse soils of lowland desert mesas and canyons; up to 7,000 ft. elevation. Common in the southeastern portion of the Sonoran Desert, usually as scattered individuals rather than in dense colonies. Tubular flowers attract numerous hummingbirds. *Pictured on page 58.*

Penstemon procerus, Smallflower penstemon (Littleflower penstemon)

Mat-forming native perennial with woody rhizomes and small blue to purple flowers, blooming June to August. Common within its range. Occurs on a wide variety of soils in dry to moist meadows and woodland openings, as well as wetland and riparian sites; up to 12,500 ft. elevation. Use for revegetation and pollinator habitat; attracts hummingbirds, butterflies and small bees.

Penstemon pseudospectabilis, Desert penstemon

Large bushy native perennial subshrub with deep rose-pink flowers, blooming February to June. Drought tolerant, occurring on sandy or well-drained soils in washes, canyons and slopes of desert scrub and woodlands; up to 8,000 ft. elevation. Common in the Sonoran Desert region. Use in restoration or xeriscape gardens. Attracts hummingbirds and small bees.

Penstemon rydbergii, Rydberg's penstemon

Widespread native perennial with woody rhizomes and bright blue or purple flowers, blooming June to August. Moderately drought tolerant, occurring on dry to moist meadows, shrublands, open woodlands and streambanks; 2,000 to 13,000 ft. elevation. Foliage is more palatable to browsing herbivores than most other penstemon species. Attracts hummingbirds, butterflies and pollinating insects.

Penstemon strictus, Rocky Mountain penstemon

Semi-evergreen native perennial with deep blue-violet flowers, blooming May to June. Very common. Moderately drought tolerant, occurring in well-drained rocky to sandy loam soils on mid-elevation sagebrush, scrub and woodland openings; 5,000 to 11,000 ft. elevation. Widely adaptable and frequently used in soil stabilization, restoration and wildflower plantings. Visited by bumble bees and other native bees. *Pictured on page 60.* Varieties:

Bandera
Intended for erosion control, restoration diversity and beautification. Establishes easily from seed and has good seedling vigor. [Released 1973, origin: Torrance County, NM]

Penstemon subglaber, Smooth penstemon

Moderately drought tolerant native perennial with deep blue or occasionally white flowers, blooming June to August. Occurs on somewhat moist to dry well-drained soils of grassy lowlands and sagebrush flats to rocky ridges and open sage, oak or aspen slopes; 5,000 to 11,000 ft. elevation. Use for habitat restoration and landscape beautification. Good pollinator species.

Penstemon superbus, Superb beardtongue

Tall native perennial with pink-coral flowers, blooming April to June. Drought tolerant, occurring on well-drained, sandy or gravelly soil in rocky canyons, washes and shrublands in and around the Chihuahua Desert; 3,500 to 5,500 ft. elevation. Use in habitat restoration and xeriscaping beyond its native range. Tubular flowers attract hummingbirds.

Penstemon venustus, Venus penstemon (Alpine penstemon)

Tall, long-lived native perennial forb to subshrub with showy lavender-purple flowers, blooming May to September. Prefers shallow, coarse, well-drained soils; tolerant of mild acidity to mild alkalinity. Intolerant of poorly drained, clay soils. Occurs on sunny, disturbed valleys, foothills and slopes; up to 8,000 ft. elevation. Use in habitat restoration and beautification. Excellent pollinator species, attracting native bees and nonaggressive pollen wasps. Varieties:

Clearwater
Demonstrated the best establishment and longest survival of 119 different collections. Use for erosion control, restoration, biodiversity and beautification. [Released 1994, origin: Clearwater County, ID]

Peritoma lutea, Yellow beeplant (Yellow spiderflower)

Formerly *Cleome lutea.* Drought tolerant native annual with pincushion-like yellow flowers, blooming April to September. Colonizer, preferring open and disturbed sites on arid and semi-arid shrublands and woodlands, sometimes in large colonies; up to 9,000 ft. elevation. Valuable nectar and pollen for numerous native bee species. Use as a soil stabilizer and short-term emergency food source for native pollinators after disturbance, until perennial forbs bloom.

Peritoma serrulata, Rocky Mountain beeplant

Formerly *Cleome serrulata.* Tall moderately drought tolerant native annual with pincushion-like bright pink flowers, blooming June to September. Colonizer, preferring open and disturbed sites on roadsides, moist prairies, shrublands, mountain woodlands and in old pastures and rangelands, sometimes in large colonies; up to 10,000 ft. elevation. Valuable nectar and pollen for numerous native bees, honeybees and Monarch butterflies; seeds for upland game birds. Use as a soil stabilizer and emergency short-term food source for native pollinators after disturbance, until perennial forbs bloom. *Pictured on page 60.*

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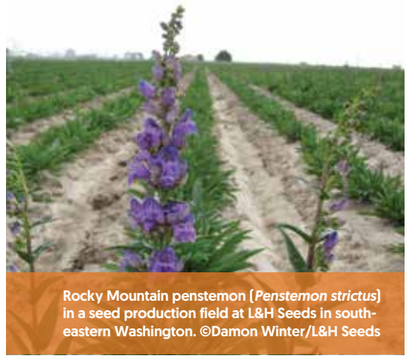

Rocky Mountain penstemon (*Penstemon strictus*) in a seed production field at L&H Seeds in southeastern Washington. ©Damon Winter/L&H Seeds

Hummingbird feeding on Rocky Mountain beeplant (*Peritoma serrulata*) nectar in Arizona.

Desert bluebells (*Phacelia crenulata)* in Kofa National Wildlife Refuge, Arizona. ©David Schwaegler

Perityle emoryi, Emory's rockdaisy (Desert daisy)

Sprawling native annual with white daisy-like flowers and yellow centers, blooming January to October or sporadically year-round at lower latitudes. Very common. Drought tolerant and highly adaptable to diverse habitats from low deserts to rocky cliffs and coastal areas; up to 4,000 ft. elevation. Wet habitats may extend the lifespan to biennial.

Petalostemon candidus, see *Dalea candida* (White prairie clover)

Petalostemon purpureus, see *Dalea purpurea* (Purple prairie clover)

Phacelia campanularia, California bluebells

Drought tolerant native annual with deep cobalt blue flowers, blooming February to May. Prefers dry gravelly or sandy soils in deserts, shrublands and woodland openings; up to 6,000 ft. elevation. May "super bloom" in large patches following a wet desert winter. Significant early-season pollen and nectar source for Blue orchard bees, an important native pollinator for almond orchards. Also use in revegetation, along roadsides and in xeriscaping.

Phacelia crenulata, Desert bluebells (Cleftleaf wildheliotrope)

Drought tolerant native annual with purple to violet-blue flowers in curling clusters, blooming January to June. Found in gravelly, well-drained soils on washes and hillsides throughout the desert southwest; up to 8,000 ft. elevation. Arizona's most abundant species. Use in habitat restoration, revegetation, roadsides and xeriscaping. *Pictured on page 60.*

Phacelia tanacetifolia, Lacy phacelia

Water efficient native annual forb with lavender-blue flowers in dense curling clusters, blooming May to September. Vigorous root system and top growth, occasionally reaching 4 ft. tall. Adapted to a wide range of soil pH and textures, including clays. Occurs on grasslands, shrublands and open woodlands; up to 6,000 ft. elevation. Attracts beneficial insects and native bees. Significant early-season pollen and nectar source for Blue orchard bees, an important native pollinator for almond orchards. Exceptionally valuable honeybee plant. Use in habitat restoration and erosion control. Also used as an annual cover crop and green manure in agricultural rotations. [See also in *Cover Crops & Annual Forages*] *Pictured on page 102.*

Phlox drummondii, Drummond phlox

Moderate water using showy annual with pink to bright rose flowers blooming, February to October. Occurs in fallow fields, open woods, roadsides and prairies. Originates in Texas but used widely in low-grow landscaping and roadsides beyond its native range. Prolific bloomer with sufficient water.

Physaria gordonii, Gordon's bladderpod

Formerly *Lesquerella gordonii.* Cool season, low-growing native annual, biennial or short-lived perennial with bright yellow flowers, blooming February to June. Occurs in sandy desert soils on open shrub, plains and mesas; up to 7,000 ft. elevation. May carpet the desert floor following a rainy spring season.

Plantago insularis, see *Plantago ovata* (Desert Indianwheat)

Plantago ovata, Desert Indianwheat

Formerly *P. insularis.* Short drought tolerant native annual with small white inconspicuous flowers, blooming January to May. Common to abundant within its range on dry desert plains, mesas and roadsides; up to 4,000 ft. elevation. Establishes easily, carpeting the desert floor after especially rainy winters. Seeds are coated with a sticky substance which glues-down topsoil, reducing erosion in years with ample seed production.

Ratibida columnifera, Yellow prairie coneflower

Formerly *R. columnaris.* Drought tolerant native perennial with showy drooping yellow ray petals, blooming June to September. Common on dry well-drained grasslands, mountain foothills, roadsides and disturbed soils; up to 9,000 ft. elevation. Similar form and adaptation to Mexican hat [*R. columnifera var pulcherrima*], but occurs more frequently in the Great Plains and Intermountain West. Use for revegetation, sagebrush and prairie restoration and flower gardens. Easily reseeds itself. Seeds are preferred by birds and small mammals. Various mid to late-season pollinating insects, including honeybees and butterflies, are attracted to the nectar and pollen. Varieties:

Stillwater
Consistent tall stature, uniform timing in seed maturation and excellent seed production. Use in revegetation and habitat restoration of rangelands, mine sites, roadsides, recreation areas and wildflower gardens. [Released 2004, origin: Carbon and Stillwater Counties, MT]

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Blackeyed susan (*Rudbeckia hirta*) among Western yarrow (*Achillea millefolium var. occidentalis*) and Wild bergamot (*Monarda fistulosa*). ©David Schwaegler

Chia (*Salvia columbariae*) in Anza-Borrego Desert State Park, California. ©David Schwaegler

Desert globemallow (*Sphaeralcea ambigua*).

Ratibida columnifera var. pulcherrima, Mexican hat (Upright prairie coneflower)

Drought tolerant native perennial with showy drooping maroon-red ray petals, blooming June to September. Common on dry well-drained grasslands, shrublands, roadsides and disturbed soils; up to 9,000 ft. elevation. Similar form and adaptation to Yellow prairie coneflower (*R. columnifera*), but occurs more commonly in the Southwest. Useful in revegetation, restoration and as an ornamental. Easily reseeds itself. Seed is utilized by birds and small mammals. Various mid to late-season pollinating insects, including honeybees and butterflies, are attracted to the nectar and pollen. *Pictured on page 101.*

Ratibida pinnata, Grayheaded coneflower

Tall native perennial with showy yellow flowers around a gray cylindrical cone, blooming June to September. Occurs in dry to wet grassland prairies, open woodlands, limestone outcrops and roadsides. Palatable to ungulates but diminishes with heavy grazing. Useful in revegetation, prairie restoration and in flower gardens. Attracts many pollinators including native bees and beneficial predator insects.

Rudbeckia amplexicaulis, see *Dracopis amplexicaulis* (Clasping coneflower)

Rudbeckia hirta, Blackeyed Susan

Large native annual, biennial or short-lived perennial with yellow sunflower-like flowers, blooming May to October. Versatile, resilient and common, occurring in fine to coarse textured, well-drained to poorly drained soils of prairies, disturbed fields, open woods and roadsides; adapted up to 10,000 ft. elevation. Pioneer species after disturbances such as wildfire. Used in revegetation, reseeding road cuts, prairie restoration and extensively as a landscaping ornamental. Easily reseeds itself. Provides cover and food for numerous song and game birds; also eaten by rabbits and deer. Attracts many pollinating insects, including bees and butterflies. State flower of Maryland. *Pictured on pages 61 & 99.*

Rudbeckia occidentalis, Western coneflower

Leafy, very tall native perennial with a distinctive dark purple-brown cylindrical cone and no flower petals, blooming June to September. Rhizomatous, preferring fine to medium textured soils in moist meadows, seeps, forest openings, waterways and pond edges; up to 10,500 ft. elevation. Use in meadow restoration or as a unique landscaping ornamental. Favored by bees.

Salvia coccinea, Scarlet sage (Blood sage)

Tall native perennial forb to subshrub with showy deep red flowers, blooming continuously from May until first frost. Prefers moist well-drained soils in natural areas and gardens. Acts as an annual in colder climates; heat tolerant. Use in revegetation or as an ornamental. Attracts butterflies and hummingbirds.

Salvia columbariae, Chia (Chia sage)

Drought tolerant native annual with whorls of small blue to deep blue-purple flowers, blooming February to June. Height varies widely from 1 to 24 in. relative to available moisture. Occurs on poor well-drained soils of sage scrub, open grassy woodlands and disturbed sites, sometimes in extensive stands; up to 6,500 ft. elevation. Increases after wildfire. Seeds are eaten by birds and small mammals. Important nectar source for native bees and butterflies. *Pictured on page 61.*

Sanguisorba minor,* Small burnet

Introduced, hardy, long-lived perennial evergreen forb with dense pink to red petal-less flowers, blooming May to July; weakly rhizomatous. Cold tolerant and widely adapted, persisting on infertile well-drained soils with at least 12 in. annual precipitation; up to 9,000 ft. elevation. Excellent browse for livestock and wild ungulates until snow cover; also grazed by sage-grouse. Commonly used for pasture, rangeland, food plots, weed control, fuel breaks and green strips. Pollinated by bees. Varieties:

Delar
Produces high amounts of forage and seed. Intolerant of poorly drained, flooded soils and high water tables. (Released 1981, origin: McCracken County, KY, originally Europe)

Senna covesii, Desert senna

Formerly *Cassia covesii.* Native leguminous perennial forb to subshrub with yellow flowers, blooming sporadically throughout the year in response to desert rain. Drought tolerant, occurring on dry sandy plains and washes in the Mojave and Sonoran Deserts and beyond; up to 4,500 ft. elevation. Easily established along roadsides and in xeriscapes. Visited by carpenter bees and bumble bees; larval host for Cloudless sulphur butterflies.

*Introduced to North America.

Silene armeria,* Sweet William catchfly

Introduced annual with clusters of long tubular pink flowers, blooming June to September. Though not carnivorous, stems exude a sticky substance which trap small insects. Naturalized throughout North America on a wide range of soils, preferring disturbed sites. Used as an ornamental in landscaping beautification requiring low to moderate water use.

Sisyrinchium bellum, Blue-eyed grass

Short native perennial with dark blue flowers and a yellow eye, blooming March to July. Rhizomatous, preferring sandy to clay soils in moist grassy meadows and open woodlands; up to 8,000 ft. elevation. Tolerant of salty conditions, seasonal flooding and foot traffic. Use in meadow restoration and to colonize open garden areas.

Solidago rigida, see *Oligoneuron rigidum* (Stiff goldenrod)

Sphaeralcea ambigua, Desert globemallow

Native shrubby perennial with brilliant orange-red flowers, blooming February to June. Common on rocky sands to alkaline clay soils in scrublands and grasslands across the deserts of the southwest to the Great Basin, often in large patches; up to 8,000 ft. elevation. Most drought tolerant of the globemallow species. Use in desert revegetation, roadsides and xeriscapes. *Pictured on page 61.*

Sphaeralcea coccinea, Scarlet globemallow

Short drought tolerant native perennial with red-orange flowers, blooming April to August. Rhizomatous, occurring in dry open desert shrublands, woodlands and grasslands, on a wide range of well-drained soil types and textures, often in large colonies; up to 9,000 ft. elevation. Use in revegetation, erosion control and roadsides. Deep roots allow it to survive grazing and increase after disturbances such as wildfire. Competitive with cheatgrass and other annual weeds. Palatable to ungulates; especially important to pronghorn antelope. Preferred nectar source for numerous native bees, butterflies and moths.

Sphaeralcea coulteri, Coulter's globemallow

Short native annual with pure orange flowers, blooming January to June. Drought tolerant, adapted to sandy soils at low elevations in southwestern deserts; up to 4,000 ft. elevation. Carpets large areas of the desert floor after ample winter rain. Use in restoration and revegetation. Palatable to ungulates. Pollinated by native bees and wasps.

Sphaeralcea grossulariifolia, Gooseberryleaf globemallow

Drought tolerant native perennial forb to subshrub with orange-red flowers, blooming May to August. Occurs in clay to gravel soils of dry open desert shrub and woodland habitats; up to 8,000 ft. elevation. Known to colonize roadsides and disturbance; increases after fire. Competitive with cheatgrass and other annual weeds. Use in restoration and revegetation. Palatable to ungulates. Pollinated by native bees and wasps.

Sphaeralcea munroana, Munro's globemallow

Drought tolerant native perennial forb to subshrub with bright red-orange flowers, blooming May to August. Occurs in sandy to clay soils along roadsides, washes and openings in arid sagebrush deserts and mountain slopes; up to 8,000 ft. elevation. Palatable to ungulates. Used for restoration and roadside revegetation. Attracts numerous native bees, including specialist ground-nesting bees. Similar to Nelson globemallow (*S. parvifolia*). *Pictured on page 63.*

Sphaeralcea parvifolia, Nelson globemallow (Smallflower globemallow)

Drought tolerant native perennial forb to subshrub with red-orange flowers, blooming April to October. Occurs in sandy or gravelly soils of dry open desert, foothill and woodland habitats; 2,000 to 7,500 ft. elevation. Palatable to ungulates. Used for restoration and roadsides. Attracts native bees. Similar to Munro's globemallow (*S. munroana*).

Symphyotrichum chilense, Pacific aster

Formerly *Aster chilensis.* Short to tall native rhizomatous perennial with pink to lavender flowers, blooming June to October. Drought tolerant, occurring from dry coastal dunes and salt marshes up to mountain meadows, preferring open or disturbed sites and tolerant of clay soils; up to 8,000 ft. elevation. Use for late-season native pollinator habitat and prairie restoration. Important for bumble bee queens, pre-hibernation. Host plant for Checkerspot and Crescent butterflies.

Symphyotrichum laeve, Smooth blue aster

Formerly *Aster laevis.* Native rhizomatous perennial with pale blue to purple flowers, blooming from July to October. Widely adapted, occurring on various soils in moist woods to dry open prairies and grasslands up to 9,500 ft. elevation. Often dominant under stands of quaking aspen. Use for mixedgrass and tallgrass prairie restoration and roadsides. Preferred by whitetail deer. Pollinated by late-season butterflies.

Symphyotrichum novae-angliae, New England aster

Formerly *Aster novae-angliae.* Tall, rhizomatous native perennial with bright lavender to purplish-blue flowers, blooming August to October. Showiest flowers of the asters. Primarily occurs in rich well-drained soils of all textures on moist prairies, meadows, streambanks and roadsides. Pollinated by numerous late-season native bees and honeybees. Larval host for Crescent butterflies.

Thermopsis montana, Mountain goldenbanner

Rhizomatous native perennial legume with lemon-yellow pea-like flowers, blooming May to August. Occurs in moist mountain meadows, woods and along streambanks; up to 11,500 ft. elevation. Persists on seasonally wet soils that dry out in summer heat. Use for restoration, roadsides and wildflower mixes. Toxic to browsing animals; increases on overgrazed sites. Attractive to bumble bees.

*Introduced to North America.

Munro's globemallow (*Sphaeralcea munroana*).

American vetch (*Vicia americana*) in Wadsworth Prairie Nature Preserve, Illinois. ©David Schwaegler

Desert zinnia (*Zinnia acerosa*).

Thymophylla pentachaeta, Fiveneedle pricklyleaf (Golden dyssodia)

Formerly *Dyssodia pentachaeta.* Prostrate to mounded native annual to perennial forb or subshrub less than 1 ft. tall with bright golden yellow daisy-like flowers, blooming March to November. Drought tolerant, adapted to sandy well-drained soils on dry slopes, rocky hillsides, mesas and roadsides in lower and upper deserts; up to 6,000 ft. elevation. Common throughout its range, especially on open or disturbed sites. Short-lived but reseeds readily. Use for disturbance restoration, erosion control or as xeriscape groundcover. Provides nectar for pollinators, attracting numerous bees, butterflies and birds and is a caterpillar host for the Dainty sulphur butterfly.

Verbena gooddingii, see *Glandularia gooddingii* (Gooding's verbena)

Verbena hastata, Blue verbena (Swamp vervain)

Tall rhizomatous native perennial with purple-blue to pink flowers, blooming June to October. Occurs in moist meadows, pastures, ditches and degraded wetlands and riparian areas; up to 7,000 ft. elevation. Seeds are eaten by numerous birds. Not palatable to ungulates. Pollinated by numerous native bees and wasps. Larval host plant for Buckeye butterflies.

Verbena stricta, Hoary verbena

Tall native short-lived perennial with blue-violet flowers, blooming June to October. Drought tolerant, preferring sandy well-drained soils of dry fields, meadows, pastures, roadsides and disturbed areas. Not competitive with vigorous grasses. Not palatable to ungulates, spreading in overgrazed pastures. Seeds eaten by birds and small mammals. Preferred nectar plant of bees and butterflies.

Verbena tenuisecta, see *Glandularia pulchella* (Moss verbena)

Vicia americana, American vetch

Native rhizomatous climbing perennial legume with purple flowers, blooming April to August. Very drought tolerant and widely adaptable, occurring in moist to dry soils of forest openings, meadows, shrublands and streambanks; up to 12,000 ft. elevation. Use for habitat restoration, mining reclamation, arid rangelands and roadsides. Increases following fire. Excellent palatability for all wildlife and ungulates. Important for native pollinators, including wild bees. Larval host of the Western blue tailed butterfly. *Pictured on page 63.*

Viguiera deltoidea see *Bahiopsis parishii* (Parish goldeneye)

Viguiera multiflora see *Heliomeris multiflora* (Showy goldeneye)

Wyethia amplexicaulis, Mule ears

Drought tolerant, long-lived perennial native with large yellow flowers, blooming May to July. Occurs on dry to moist rangelands, meadows, sagebrush scrub and woodland openings, sometimes in dense stands; 1,000 to 11,000 ft. elevation. Grows on all soil textures, but aggressive on heavy clays. Unpalatable leaves, though flowers are eaten by ungulates. Use for restoration and mine reclamation.

Wyethia mollis, Woolly mule ears

Long-lived perennial native with sunflower-like yellow flowers, blooming May to August. Occurs on well-drained soils of dry to wet meadows, rocky slopes, sagebrush scrub and forest openings, sometimes in large dense patches; 3,000 to 10,000 ft. elevation. Leaves are unpalatable to ungulates.

Zinnia acerosa, Desert zinnia

Small rounded native perennial forb to subshrub bearing numerous white to cream flowers, blooming March to November. Drought tolerant, common in arid desert mesas, rocky slopes and caliche or alkaline sites with high pH soils; 2,000 to 6,500 ft. elevation. Hardy, use in desert restoration and habitat improvement. Attracts pollinating insects, especially butterflies. *Pictured on page 63.*

**Introduced to North America.*

MONARCH BUTTERFLIES FEED ON SHOWY MILKWEED (*ASCLEPIAS SPECIOSA*) NECTAR. THOUGH ADULT MONARCHS FEED FROM NUMEROUS FLOWER SPECIES, MILKWEEDS (*ASCLEPIAS SPP.*) ARE THE ONLY FOOD SOURCE OF MONARCH CATERPILLARS.

Essential Creatures: Native Pollinators

Pollinators are responsible for the reproduction of over 85% of the world's flowering plants, including more than two-thirds of its agricultural crops. In the U.S. alone, pollinators provide an estimated economic value of $3 billion annually in crop pollination services.[1]

Pollinators are essential to the function of our natural ecosystems, pollinating the flowers of the native forbs and shrubs that produce the seeds and fruits which sustain countless insects, birds and mammals in wildland habitats.

Presently, native pollinators—not just honeybees—face many challenges to their survival, one of the most crucial being habitat loss. Monarch butterflies are especially struggling, with declines in overwintering populations since the late 1990's of an estimated 74% in California and 80-90% in Michoacán, Mexico.[2] Suitable habitat for insect pollinators includes nesting sites and flowers providing nectar and pollen. Native wildflowers and forbs, as well as many types of non-native garden and landscaping plants, often meet both of these habitat needs. Creating clusters of flowering plants is a fairly easy way to meet both the nesting and foraging needs of many of our essential pollinators, and including milkweed plants (*Asclepias spp.*) in these projects helps cultivate habitat for Monarchs as well as other insects.

At Granite Seed we offer numerous wildflower, legume and flowering shrub species to create diverse pollinator habitats within wildlands, roadsides, parks, golf courses, agricultural buffers, home gardens, city landscaping and other available greenspaces. The species and mixes found in this catalog are those that we regularly stock at the time of this printing. If you require a species not in this catalog, please ask. Our knowledgeable sales staff is happy to assist you meet the goals of your pollinator habitat project.

[1] The Xerces Society for Invertebrate Conservation, xerces.org

[2] ibid.

Shrubs & Trees

shrub / shruhb / noun:
1. a woody perennial plant smaller than most trees that has multiple permanent stems arising at or near the ground.

tree / tre / noun:
1. a woody perennial plant with a single main stem or trunk, typically growing to a significant height and bearing lateral branches at some distance from the ground.

Woody shrubs and trees are vital components of biologically diverse ecosystems, providing food, thermal cover, concealment, height diversity and nesting habitat for numerous types of insects, pollinators, birds and wildlife species of all sizes. Additionally, they form essential microclimates and serve as protective nurse plants for understory forbs and other woody species. Granite Seed hand-harvests a large and diverse selection of shrub and tree seeds from numerous ecotypes, ensuring reliable supplies of the highest quality seed for any project or location. We frequently carry new species and local collections. If you don't find what you need here, please contact us.

NATIVE SHRUB COMMUNITY BELOW SMITHSONIAN BUTTE NEAR ZION NATIONAL PARK, UTAH.

Male and female flowers of Cheesebush (*Ambrosia salsola*). ©David Schwaegler

Saskatoon serviceberry (*Amelanchier alnifolia*). Credit: The Wild Garden, nwplants.com

Silver sagebrush (*Artemisia cana*) at sunrise in Clark County, Idaho. ©Mia McPherson

Acacia constricta,
see *Vachellia constricta* (Whitethorn acacia)

Acacia farnesiana,
see *Vachellia farnesiana* (Sweet acacia)

Acacia greggii,
see *Senegalia greggii* (Catclaw acacia)

Acmispon rigidus, Shrubby deervetch (Desert rock pea)

Formerly *Lotus rigidus.* Wiry-stemmed leguminous drought-deciduous subshrub 1-3 ft. tall with bright yellow pea-like flowers tinged reddish-orange, blooming January to June. Occurs on well-drained dry rocky slopes, flats, washes and foothills throughout southwestern deserts in Joshua tree and pinyon-juniper woodland communities; up to 6,000 ft. elevation. Notable upright growth form and drought resistance considering its former genus. Use in restoration and xeriscape landscaping. Eaten by desert tortoises. Pollinators include hummingbirds and large numbers of native bees.

Allenrolfea occidentalis, Iodinebush (Pickleweed)

Native halophytic shrub under 3 ft. tall with knobby succulent stems becoming woody toward the base and small petal-less flowers, blooming mid-summer to late fall. The only species in the genus. Extremely salt tolerant, preferring alkaline soils of salt playas, mudflats and dry desert lakebeds; up to 8,000 ft. elevation. Large shallow root system extends up to 30 ft. from the plant, capturing surface water and spreading by runners. Often set atop hummocks formed by trapping windblown sand. Minimal forage value for livestock and browsing wildlife; seeds eaten by birds and rodents.

Ambrosia ambrosioides, Canyon ragweed

Drought tolerant sprawling shrub from 3-6 ft. tall with small inconspicuous yellowish-green flowers, blooming February to May. Prefers sandy soils in riparian areas, washes, canyons and disturbed sites in the deserts of northern Mexico, California and Arizona; up to 5,500 ft. elevation. Widespread throughout its range. Not palatable to livestock or wildlife, but useful for erosion control and ecosystem restoration. Host plant for numerous insects. Highly allergenic pollen.

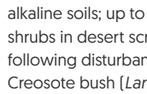
Ambrosia deltoidea, Triangleleaf bursage

Drought tolerant shrub up to 3 ft. tall with triangle shaped leaves and small inconspicuous yellowish-green flowers, blooming January to May. Occurs on well-drained sandy alluvial plains, mesas and rocky slopes; 1,000 to 4,000 ft. elevation. Common and abundant in the Sonoran Desert, occurring in pure stands or as a codominant in scrub communities with Creosote bush (*Larrea tridentata*), Palo verde (*Parkinsonia spp.*) and Mesquite (*Prosopis spp.*). Replaced by White bursage (*A. dumosa*) at hotter, lower elevations. Not palatable to livestock or wildlife, but useful for erosion control and ecosystem restoration. Often the primary nurse plant for young Saguaro cactus. Highly allergenic pollen.

Ambrosia dumosa, White bursage

Drought tolerant shrub up to 3 ft. tall with small inconspicuous yellowish-green flowers, blooming February to December. Occurs on dry, rocky and sandy washes and fine alluvial plains throughout the Sonoran and Mojave Deserts, thriving in alkaline soils; up to 5,000 ft. elevation. One of the most abundant shrubs in desert scrub communities and is often an early colonizer following disturbance, often serving as a vital nurse plant to Creosote bush (*Larrea tridentata*). Occupies an ecological niche similar to Triangleleaf bursage (*A. deltoidea*) but further west. Hybridizes with Cheesebush (*A. salsola*). Highly allergenic pollen.

Ambrosia salsola, Cheesebush (White burrobush)



Formerly *Hymenoclea salsola.* Rounded feathery-branched drought-deciduous shrub up to 10 ft. tall with clusters of white or yellow small flowers, blooming February to June. Adapted to well-drained, sandy, alkaline soils in sandy washes, alluvial fans and rocky slopes; up to 6,000 ft. elevation. Commonly occurs with Creosotebush (*Larrea tridentata*), Catclaw acacia (*Senegalia greggii*), saltbush (*Atriplex spp.*), palo verde (*Parkinsonia spp.*) and in Joshua tree and pinyon-juniper woodlands. Crushed foliage has a cheesy odor. Excellent pioneer after disturbance. Hybridizes with White bursage (*A. dumosa*). Moderately allergenic pollen. *Pictured on page 67.*

Amelanchier alnifolia, Saskatoon serviceberry

Deciduous low spreading shrub to small tree up to 23 ft. tall with white flower clusters, blooming April to August. Adapted to a wide range of soils, but preferring moist, well-drained and acidic soils; up to 10,000 ft. elevation. Similar to and hybridizes with Utah serviceberry (*A. utahensis).* Intolerant of saline soils and high water tables; able to establish on granitic mine spoils. Common throughout its range. Forms rhizomatous thickets in open woods, conifer forests, grasslands, along streambanks and other riparian zones. Good to excellent browse for large wildlife. Valuable berries and cover for birds and small mammals. Caterpillar host of the moth *Setagrotis pallidicollis. Pictured on page 67.*

**Introduced to North America.*

Amelanchier utahensis, Utah serviceberry

Deciduous low spreading shrub to small tree up to 13 ft. tall with white flower clusters, blooming April to August. Similar to and hybridizes with Saskatoon serviceberry (*A. alnifolia*), but adapted to drier sites and more southern ecotypes; up to 10,000 ft. elevation. Prefers coarse to medium textured well-drained soils and intolerant of saline soils and high water tables; establishes on mineland soils. Abundant in the southern Great Basin. Sprouts less vigorously than Saskatoon serviceberry. Occurs in sagebrush (*Artemisia spp.*), pinyon-juniper and aspen communities. Excellent browse for large wildlife. Valuable cover and food source for birds and small mammals; berries hang on longer into winter than on Saskatoon serviceberry.

Amorpha canescens, Leadplant

Rhizomatous, native perennial subshrub legume with distinctive purple and orange flowers, blooming June to September. Drought tolerant, preferring well-drained to dry soils of mildly acidic to alkaline soils in open woodlands, prairies, dry plains and sand dunes; up to 8,000 ft. elevation. Slow-growing; not competitive with grasses. Important species within Great Plains communities of Big bluestem (*Andropogon gerardii*), Sand bluestem (*Andropogon hallii*), Prairie sandreed (*Calamovilfa longifolia*), Switchgrass (*Panicum virgatum*), Little bluestem (*Schizachyrium scoparium*), Indiangrass (*Sorghastrum nutans*) and Prairie dropseed (*Sporobolus heterolepis*). Responds well after wildfire. Very palatable to ungulates but intolerant of repeated grazing. Attractive to bees and other pollinator species as a food source; especially nectar-feeding solitary bees.

Arctostaphylos uva-ursi, Kinnikinnick (Bearberry)

Mat-forming evergreen shrub growing up to 8 in. tall with clusters of pinkish-white bell shaped flowers, blooming March to October. Adapted to rocky, well-drained, low nitrogen soils; intolerant of moist, poorly drained soils; up to 12,000 ft. elevation. May form dense stands on coastal bluffs and prairies, forests, sand dunes, barren rocky outcrops, dry alpine meadows and coniferous forests; circumboreal. Foliage is lightly browsed by deer. Berries are eaten by birds, bears and small mammals, especially as emergency food during winter and early spring. Used extensively in landscaping as a low-growing, ornamental groundcover. Host plant of the Seaside hoary elfin butterfly.

Artemisia arbuscula, Low sagebrush

Low-growing mounded shrub up to 2 ft. tall with evergreen grayish-green leaves, flowering May to October though most often in spring, unlike other sagebrush species. Occurs on shallow clays and dry rocky soils; 2,000 to 12,000 ft. elevation. Adapted to a wide variety of habitats, from valleys and alkali basins to high mountain slopes. Often found in pure patches within larger stands of big sagebrush (*A. tridentata*) due to shallow clay or rocky soils. Occurs in arid salt desert scrub communities of Shadscale (*Atriplex confertifolia*) and Greasewood (*Sarcobatus vermiculatus*); also at higher elevations within pinyon-juniper and mountain shrub habitats. Occasionally root sprouts after disturbance. Highly palatable to deer, elk, sheep and pronghorn, especially in desert scrub communities during summer. Sage-grouse favor the patches of short, open habitat which occur within larger stands of taller and denser big sagebrush.

Artemisia cana, Silver sagebrush

Short to tall shrub from 1-5 ft. depending on the geographically distinct subspecies, with silver-gray or yellow-green to gray deciduous leaves, flowering June to October. Occurs on a wide range of soil textures, preferring moister, colder soils than other sagebrush species; 2,000 to 11,000 ft. elevation. Intolerant of strongly saline and calcareous soils. Found in riparian areas, bottomlands, mountain meadows, disturbed steppe and pine and aspen woodlands. Tolerant of high water tables and periodic flooding, often found in wet-to-upland transitional habitats. Less susceptible to fire mortality than other sagebrush species. Rhizomatous, readily sprouting after fire and other disturbances. Valuable forage for deer, bison, elk, pronghorn, bighorn sheep and sage-grouse. *Pictured on page 67.*

Artemisia filifolia, Sand sagebrush

Medium to tall rounded shrub from 2-5 ft. tall with distinctive silvery-green threadlike winter-deciduous leaves, flowering May to October. Grows in deep, well-drained infertile sands, rarely in clays; 2,000 to 7,500 ft. elevation. Commonly found with Indian ricegrass (*Achnatherum hymenoides*), Sand dropseed (*Sporobolus cryptandrus*) and other high-desert and semiarid grassland sandy species. Rhizomatous, readily sprouts after fire and disturbance. Used in restoration to prevent erosion of light, sandy soils in Blackbrush (*Coleogyne ramosissima*), big sagebrush (*A. tridentata*) and pinyon-juniper communities, as well as for dune stabilization. Utilized by big game in arid regions where other forage is inadequate. Provides cover for small mammals and birds. Important cover for the lesser prairie-chicken. Caterpillar host of the Hera buckmoth.

Artemisia frigida, Fringed sagebrush (Prairie sagewort)

Distinctive mat-forming subshrub from 4-16 in. tall with grey-green velvety evergreen leaves, flowering June to September. Prefers coarse, shallow, arid soils of regularly disturbed sites; 2,000 to 11,500 ft. elevation. Rhizomatous, readily sprouting after fire and disturbance. Most widely distributed of all the sagebrush species, occurring throughout the northern hemisphere from cold boreal regions to the central grasslands; also in sagebrush steppe and woodland communities. Thrives along ditches and streambanks. Moderately browsed by native ungulates in winter and spring. Important food source for small mammals and birds, including sage-grouse and greater prairie-chickens. Attractive and pleasantly aromatic, increasingly used in xeriscape landscaping.

Artemisia ludoviciana, White sagebrush (Prairie sagebrush)

Herbaceous forb or subshrub from 1-3 ft. tall with silver-woolly leaves and stems; flowering May to October. Adapted to a wide variety of rocky to silty soil textures; up to 12,000 ft. elevation. Occasionally dominant after wildfire, though generally more abundant on sites with infrequent disturbance. Often found in pure stands connected by underground rhizomes. Tolerant of some periodic flooding. Use for riparian sites in woodland, mountain brush, sagebrush and desert shrub communities, as well as more mesic sites in shortgrass and tallgrass prairies. Important summer forage for pronghorn and winter forage for elk. Used by sage-grouse for summer food and cover. Host plant for the cudweed grasshopper.

**Introduced to North America.*

Artemisia nova, Black sagebrush

Small flat-topped shrub up to 2 ft. tall with dark green evergreen leaves, flowering May to October. Most common on shallow, dry, infertile and coarse soils; 4,000 to 9,000 ft. elevation. Slightly salt tolerant; intolerant of moist sites. Often indicative of a root-restricting carbonate layer within 2 ft. of the soil surface. More drought tolerant than most other sagebrush species. Forms open, solid stands with very little other vegetation from valley bottoms to mountain slopes. Also occurs with Shadscale (*Atriplex confertifolia*), Winterfat (*Krascheninikovia lanata*) or as a minor component in big sagebrush (*A. tridentata*), pinyon-juniper and mountain brush communities. Resembles and often grows with Low sagebrush (*A. arbuscula*). Intolerant of fire and disturbance. Preferred year-round forage for deer and antelope. Favored by sage-grouse. *Pictured on the front and back covers.*

Artemisia tridentata ssp. tridentata, Basin big sagebrush

Evergreen shrub with gray-green leaves commonly 3-7 ft. tall, is the tallest of the big sagebrush subspecies and may reach up to13 ft. tall; flowering August to October. Prefers deep, fertile, well-drained soils from valley bottoms and plains, to the foothills and upper timberline; up to 7,000 ft. elevation. Occurs on slightly more mesic sites than the other subspecies, often indicating a high water table or deep soil moisture. Intolerant of wildfire; does not resprout. Least palatable browse of all the subspecies though heavily used during winter months by various types of ungulates and other wildlife. Eaten by sage-grouse when the other more preferred subspecies are absent. Provides valuable cover for wildlife, including sage-grouse and pygmy rabbits. Caterpillar host of the Hera buckmoth. *Pictured on pages 42, 70 & 80.*

Artemisia tridentata ssp. vaseyana, Mountain big sagebrush

Evergreen shrub with gray-green leaves typically 2-4 ft. tall though occasionally taller, flowering July to October. Prefers moderately deep, well-drained, slightly acidic to slightly alkaline soils on foothill benches, upper slopes and mountain meadows; 2,500 to 10,000 ft. elevation. Likely the most abundant of the big sagebrush subspecies. Occurs at higher elevations and in higher precipitation zones than the other subspecies. Also found on lower elevational sites having sufficient summer moisture, late-melting snow drifts, or on north facing slopes. Readily killed by wildfire; does not resprout. Extremely palatable subspecies for ungulate and sage-grouse forage; important wildlife habitat. Provides valuable cover for wildlife. *Pictured on page 43.*

Artemisia tridentata ssp. wyomingensis, Wyoming big sagebrush

Evergreen shrub with gray-green leaves typically 2-3 ft. tall, flowering July to November. Adapted to well-drained loamy or occasionally rocky soils, from harsh dry sites of low valleys and plains, to benches and mid-elevation mountain slopes; 2,500 to 7,500 ft. elevation. Most drought tolerant of the big sagebrush subspecies. Range overlaps with the other two subspecies, occupying sites with shallower, more arid soils. Will not resprout after wildfire. Used heavily by big game species during winter months. Not as palatable as Mountain big sagebrush (*ssp. vaseyana*), but more palatable than Basin big sagebrush (*ssp. tridentata*). Crucial food source for sage-grouse. Provides valuable cover for birds and small mammals.

Atriplex canescens, Fourwing saltbush

Greatly branched evergreen to deciduous shrub from 2-10 ft. tall with red to yellowish-brown or nondescript flowers, blooming April to October. Adapted to all soil textures, including clays but most common on well-drained, coarse soils and is saline and alkaline tolerant; up to 9,000 ft. elevation. Intolerant of high water tables and inundation. Important and often dominant in numerous types of desert shrub communities within the Great Basin, Great Plains, Mojave, Sonoran and Chihuahuan Deserts. Some populations are rhizomatous and may sprout after low-severity fire. Excellent palatability to browsing livestock and wildlife with protein, fat and carbohydrate content similar to Alfalfa (*Medicago sativa*). Especially valuable forage during fall, winter and drought. Excellent cover and seeds for birds and small mammals, providing water for black-tailed jackrabbits, which are a major food source of golden eagles. Foliage fed on by numerous insects and is a caterpillar host of the MacNeill's saltbush sootywing, Saltbush sootywing and San emigdio blue butterflies. *Pictured on page 70.* Varieties:

Wytana
Naturally occurring hybrid cross with Gardner's saltbush (*A. gardneri*) that grows up to 4 ft. tall. Less spiny than other saltbushes. Adapted to salty sites in Idaho, Montana and Wyoming. Developed for mine reclamation and range revegetation in arid and semi-arid northern latitudes. (Released 1976, origin: Musselshell County, MT)

Atriplex confertifolia, Shadscale saltbush

Spine-tipped evergreen to deciduous halophytic shrub up to 3 ft. tall with yellow or nondescript dioecious flowers, blooming March to October. Adapted to a wide variety of soil types, preferring well-drained soils and indicating subsoil salinity; 1,500 to 8,000 ft. elevation. Inhabits both warm and cold deserts, often found in large, pure stands within the lowest and most arid salt desert shrub communities within the Great Basin and Mojave Desert. Highly palatable to browsing livestock and wildlife, especially valuable during winter. Spiny branches limit utilization. Excellent cover and food for reptiles and small mammals including black-tailed jackrabbits, a major food source of golden eagles. Leaves feed numerous insects.

Atriplex corrugata, Mat saltbush

Mat-forming evergreen halophytic shrub under 6 in. tall with yellow to light brown flowers, blooming March to August. May become 5-20 times wider than tall. Adapted to very saline, moderately alkaline, poorly developed, sparsely vegetated and highly erodible silt and clay soils; 4,000 to 7,000 ft. elevation. Occurs on lower hillslopes, clay barrens, plateaus, benches and alkaline flats, sometimes with other saltbushes. More alkaline and salt tolerant than other saltbushes. Fair forage for livestock and wildlife in summer and fall when other forage options are unavailable.

Atriplex cuneata, Castle Valley saltbush

Prostrate to upright evergreen shrub under 1 ft. tall with yellow to brown flowers, blooming March to August. Occurs on heavy clay soils of alkaline flats, rocky slopes and ridges; 4,000 to 7,000 ft. elevation. Similar to Mat saltbush (*A. corrugata*) but occupies slightly wetter sites. More salt tolerant than Fourwing saltbush (*A. canescens*). Possible use in revegetating processed

*Introduced to North America.

Basin big sagebrush (*Artemisia tridentata ssp. tridentata*) near Billings, MT. Also pictured on pages 42 and 80.

Fourwing saltbush (*Atriplex canescens*) near the Rio Grande River in New Mexico.

Fairyduster (*Calliandra eriophylla*) in Arizona.

oil shale soils and other highly saline sites. Provides fair to good forage for browsing wildlife.

Atriplex gardneri, Gardner's saltbush

Prostrate to upright evergreen shrub under 2 ft. tall with yellow to brown flowers, blooming May to September. Extremely salt and alkaline tolerant, occurring on heavy to medium textured saline soils in valley bottoms, plains and slopes; 2,000 to 8,000 ft. elevation. Often occurs in pure stands in harsh, arid saltbush and desert shrub communities. Mineral properties make it difficult to carry wildfire when ignited and may be used in native fuelbreaks; vigorous root sprouter after fire. Establishes in processed oil shales and coal mine spoils on reclamation soils. Nutritious and palatable forage for livestock and wildlife and an important winter food source.

Atriplex lentiformis, Quailbush

Fast growing and tallest shrub of the *Atriplex* genera reaching up to 10 ft. tall with greenish-yellow flowers, blooming June to November. May be somewhat halophytic. Occurs on somewhat infertile heavy to medium, very alkaline soils in drainages, dry lakes, along rivers, canal banks and roadsides in warm desert shrub and riparian communities; up to 3,000 ft. elevation. Common through much of the Sonoran Desert in Arizona especially near areas that are occasionally flooded; will defoliate under extreme drought. Provides cover and food for reptiles, birds and small mammals. Caterpillar hostplant of the MacNeill's saltbush sootywing and Saltbush sootywing butterflies.

Atriplex obovata, New Mexico saltbush (Mound saltbush)

Drought resistant subshrub less than 2 ft. tall with silvery obovate deciduous leaves and yellow flowers, blooming June to October. Occurs in fine to sandy soils and alkaline conditions in saline flats of salt desert shrub and lower pinyon-juniper communities; 2,000 to 7,000 ft. elevation. Widespread in Arizona, New Mexico and Mexico. Browsed by wildlife and very succulent in the spring. Rapid regrowth when browsed. Useful for stabilizing disturbed sites.

Atriplex polycarpa, Desert saltbush (Cattle spinach)

Deciduous shrub 3-6 ft. tall with shredded bark and greenish-tan flowers, blooming May to October. Occurs on medium to well-drained soils of alkaline flats, drainages and rocky slopes; up to 5,000 ft. elevation. Flourishes in arid areas with highly saline soils unsuitable for most other species, often in dominant stands. Also in desert scrub and grassland communities with Creosote bush (*Larrea tridentata*), Shadscale (*A. confertifolia*) and sagebrush (*Artemisia spp.*). More drought tolerant but less cold tolerant than Fourwing saltbush (*A. canescens*). Excellent cover for small wildlife, especially Gambel's quail. Highly palatable for browsing animals, with crude protein, digestible nutrients and fats comparable to Alfalfa (*Medicago sativa*).

Atriplex tridentata, Trident saltbush (Basin saltbush)

Prostrate to upright evergreen shrub under 2 ft. tall with yellow to brown flowers, blooming May to September. Bottomland species adapted to heavy alkaline clay soils along flats, drainages, washes and roadsides of shrub steppe, grasslands and plains; 3,500 to 7,500 ft. elevation. May occur with and easily mistaken for Gardner's saltbush (*A. gardneri*), but often on slightly wetter areas. Vigorous root sprouter after disturbance such as fire. Nutritious and palatable forage for livestock and wildlife.

*Bassia prostrata,** Forage kochia (Prostrate summer cypress)

Formerly *Kochia prostrata.* Evergreen subshrub 1-3 ft. tall with small inconspicuous flower clusters, blooming July to September. Adapted to a wide range of soils from sands and gravels to clays and silts, including shallow infertile and highly saline or sodic sites; up to 7,500 ft. elevation. Not to be confused with its weedy distant relative Kochia (*B. scoparia*). Extremely drought tolerant, remaining green throughout the wildfire season. Exceptional fire resistance, able to suppress or stop approaching wildfires and is used for greenstrip firebreaks in cheatgrass infested ranges on arid sites of the Intermountain West. Competes well with cheatgrass and other aggressive weeds such as halogeton, Russian thistle and medusahead. Provides highly palatable and nutritious year-round forage and cover for livestock, wildlife and upland game birds. Varieties:

Immigrant
From 12-15 in. tall, released for forage and soil erosion control on rangelands in the Intermountain West due to its longevity, forage production, forage quality, palatability and competitiveness. Limited use for winter grazing during periods of deep snow cover due to short stature. (*ssp. virescens*, Released 1984, origin: former USSR)

Snowstorm
Up to 30 in. tall, released for its improved stature and ability to extend above snow level, allowing it to be browsed during fall and winter and improve winter range in the Intermountain West. Also higher forage production, leafiness, protein content and digestibility than Immigrant. (*ssp. grisea*, Released 2012, origin: Uzbekistan)

*Introduced to North America.

Desert willow (*Chilopsis linearis*).

Brittlebush (*Encelia farinosa*) in the Anza-Borrego Desert State Park, California. ©David Schwaeglerler

Queen butterfly feeding on Rubber rabbitbrush (*Ericameria nauseosa*) nectar in Golden, Colorado.

Calliandra eriophylla, Fairyduster (False mesquite)

Densely branched deciduous shrub up to 4 ft. tall with attractive pink, red or whitish fluffy ball-shaped flowers with long prominent stamens, blooming February to April and again September to October after ample rain. Native nitrogen-fixing legume prefers dry gravelly slopes, mesas and washes of desert grasslands; up to 7,000 ft. elevation. Used for restoration, erosion control and xeriscaping in the southwest. Provides valuable year-long forage to livestock and deer. Tolerant of grazing due to its rhizomatous growth. Seeds are sought after by upland game birds. Visited by numerous pollinators including, bees, flies, butterflies and hummingbirds. *Pictured on page 70.*

Ceanothus integerrimus, Deerbrush

Deciduous shrub reaching 3-18 ft. tall with white to blue or lilac fragrant flower clusters, blooming April to September. Occurs on well-drained soils of all textures on mountain slopes and ridges and in scattered patches within the understory of conifer and oak woodlands; up to 8,000 ft. elevation. Able to fix large amounts of nitrogen. Establishes primarily by seed but also by layering, when branches take root after soil contact, and by sprouting after stand-replacing events such as fire, landslide or logging. High quality palatable forage for ungulates, especially important deer summer browse in the ponderosa pine belt. Provides seeds and cover for many birds and mammals. Valuable honey plant for bees and a nectar source for Johnson's hairstreak butterfly.

Ceanothus sanguineus, Redstem ceanothus

Deciduous shrub reaching 3-10 ft. tall with white fragrant flower clusters, blooming April to September. Occurs on dry to relatively moist well-drained soils of forest openings, clear-cuts, rocky hillsides and slopes, preferring more moisture than most other Ceanothus species; up to 5,000 ft. elevation. Persists on soils with low organic content. Able to fix large amounts of nitrogen. Establishes primarily by seed but also by sprouting after disturbance events such as fire, landslide or logging. Seeds germinate best following fire. Important food and cover for wildlife, especially as winter browse for elk. Provides seeds and cover for numerous birds and small mammals. Larval host of the Pale swallowtail butterfly and a nectar source for Johnson's hairstreak butterfly.

Ceanothus velutinus, Snowbrush ceanothus

Evergreen shrub reaching 2-9 ft. tall with cream-white fragrant flower clusters, blooming May to September. Prefers well-drained soils on dry to moist mountain slopes, shrublands and open forests; up to 11,000 ft. elevation. Often common, occurring in ponderosa pine and mountain brush communities, regularly forming large colonies after disturbance such as wildfire or timber harvest. Vigorous sprouter, but also establishes by seed and layering, when branches take root after soil contact. Year-round browse in forested areas for deer, elk and moose. Provides nesting and cover for small birds and mammals. Nectar source for Johnson's hairstreak butterfly.

Celtis ehrenbergiana, Desert hackberry (Spiny hackberry)

Formerly *C. pallida.* Large sprawling evergreen shrub with spiny branches reaching up to 20 ft. tall with inconspicuous green flowers and small orange berry-like fruits, blooming February to May. Occurs on various well-drained soils of foothills, mesas, canyons and washes, especially in the Sonoran and Chihuahuan Deserts; up to 5,000 ft. elevation. Often forms dense thickets. Use for restoration, erosion control, xeriscaping and to create natural hedges. Excellent cover species for many types of wildlife. Lightly browsed by deer. Fruits attract small mammals, birds and insects. Flowers provide nectar for insects, bees, butterflies and moths. Valuable bird and honey species. Larval host of the Empress leilia and American snout butterflies.

Cercocarpus ledifolius, Curl-leaf mountain mahogany

Long-lived evergreen tree or shrub 3-35 ft. tall with whitish-yellow flower tubes and seeds with a long twisted hairy tail, blooming March to October. Adapted to a wide range of shallow to deep well-drained, nutrient-poor soils on dry rocky mountain slopes and ridges; 1,000 to 11,000 ft. elevation. Shallow but wide root system; able to fix nitrogen. Component of sagebrush, pinyon-juniper, mountain brush, quaking aspen and fir-spruce communities. Fire intolerant but may root sprout weakly after low-severity wildfire. Highly preferred forage for numerous large wild ungulates especially deer and elk; also used by moose, bighorn sheep and pronghorn. Numerous small mammals and birds use for nesting, cover and seeds. Caterpillar host of the native moth *Stamnodes animata.*

Cercocarpus montanus, True mountain mahogany (Birchleaf mountain mahogany)

Long-lived evergreen tree or shrub 3-20 ft. tall with whitish-yellow tubular flowers and seeds with a long spiraled hairy tail, blooming May to September. Adapted to neutral pH sites with coarsely drained, poorly developed, shallow to moderately deep soils on dry mountain slopes, ridges, mesas, desert foothills and rock outcrops; 4,000 to 10,000 ft. elevation. Extensive rhizomatous root system; able to fix nitrogen. May be dominant or codominant in pine-oak woodlands, mixed coniferous forests, alpine shrub, mountain brush, sagebrush, aspen and pinyon-juniper communities. Vigorous root sprouter after low-severity wildfire. Important year-round forage for deer and elk; bighorn sheep browse in summer. Numerous small mammals and birds use for nesting, cover and seeds. Caterpillar host plant for Behr's hairstreak butterfly, Mountain mahogany hairstreak butterfly and Western sheepmoth.

Chilopsis linearis, Desert willow

Long-lived deciduous shrub to tree up to 40 ft. tall with large showy white, pink or lavender trumped shaped flowers, blooming April to October. Not a true willow. Drought and heat tolerant, occurring on most well-drained soils, including acidic and alkaline sites. Dominant in dry desert washes, riverbanks, seasonally wet arroyos and other sites with available ground water; up to 6,000 ft. elevation. Remarkably cold hardy. Vigorous root sprouter after wildfire. Used for restoration, wildlife cover, wind breaks and as an ornamental in xeriscaping. Grows quickly with supplemental irrigation. Used by numerous birds for seeds and nest habitat. Nectar attracts native bees, pollinating insects and various hummingbirds, including the Broad-billed, Costa's and Lucifer hummingbirds. Caterpillar host of the Seraph moth and the moth *Eucaterva variaria. Pictured on page 71.*

Chrysothamnus viscidiflorus, Douglas rabbitbrush (Low rabbitbrush)

Bushy deciduous shrub under 4 ft. tall with yellow sticky compact flower clusters, blooming June to October. Adapted to medium to coarse well-drained soils and tolerant of somewhat salty sites in drainages, flats, dunes and slopes; 1,000 to 11,000 ft. elevation. Common in western deserts and semi-deserts such as pinyon-juniper woodlands and sagebrush habitats. Also occurs with Rubber rabbitbrush (*Ericameria nauseosa*), Shadscale (*Atriplex confertifolia*) and Winterfat (*Krascheninnikovia lanata*). Aggressive native is often subdominant in sagebrush communities and is a useful pioneer for revegetating after disturbance, decreasing as sagebrush increases. Roots sprout vigorously after wildfire. Wild ungulates browse in late fall and early winter after more palatable species have dwindled. Important cover for pronghorn fawns and nesting habitat for sage-grouse and other birds. Visited by numerous insect pollinators and is the caterpillar host for the Sagebrush checkerspot butterfly and the moth *Pelochrista crambitana.*

Cleome isomeris, see *Peritoma arborea* (Bladderpod)

Coleogyne ramosissima, Blackbrush

Compact symmetrically rounded evergreen to drought-deciduous shrub up to 6 ft. tall with yellow to brown petal-less flowers, blooming March to June. Adapted to shallow, poorly developed soils of well-drained rocky sands on valley bottoms, washes and flatlands; 1,000 to 7,000 ft. elevation. Occupies the transition between the Creosote bush (*Larrea tridentata*) and White bursage (*Ambrosia dumosa*) communities of the Mojave Desert and the sagebrush communities of the Great Basin. Occurs in pure stands or with Joshua tree, juniper, Winterfat (*Krascheninnikovia lanata*), Shadscale (*Atriplex confertifolia*) and Greasewood (*Sarcobatus vermiculatus*). Intolerant of fire. Winter browse for mule deer and bighorn sheep. Provides seeds and cover for small mammals and birds. Caterpillar host for Griffin's sheepmoth.

*Introduced to North America.

Cornus canadensis, Bunchberry

Low-growing herbaceous understory subshrub up to 10 in. tall with small white to pinkish modified leaves functioning as flower petals, blooming May to September. Forms a dense groundcover from extensive rhizomes on a wide range of mineral to highly organic soils in moist coniferous, deciduous and mixed forests and riparian areas, bogs, meadows and thickets; up to 11,000 ft. elevation. Partially circumboreal. Tolerant of full sun to near total shade. May sprout vigorously after wildfire or other disturbance. Important forage for caribou, moose, elk and deer. Fruits are eaten by bears, small mammals and numerous birds. Pollinated by native bees, flies and various insects.

Cornus sericea, Redosier dogwood

Formerly *C. alba* and *C. stolonifera.* Deciduous thicket-forming shrub 3-20 ft. tall with small white flower clusters and white berries, blooming May to September. Adapted to moist, poorly drained soils in forests, shrublands, floodplains, lake edges, ponds, wetland margins and streambanks of sites that may be entirely dry by late summer; up to 10,000 ft. elevation. Tolerant of partial sun to full shade in closed-canopy forests. Able to root sprout after wildfire. Important food, cover and nesting habitat for wildlife. Preferred browse for moose, elk, deer, bighorn sheep, mountain goats and beavers. Valuable fruits are eaten by bears, small mammals and numerous birds. Common landscaping ornamental.

Dasylirion wheeleri, Desert spoon (Sotol)

Drought tolerant succulent evergreen shrub with basally clumped leaves up to 3 ft. tall and producing yearly flower stalks up to 17 ft. tall with tiny greenish-white flowers in clusters, blooming March to September. Adapted to well-drained shallow, rocky, or gravelly soils on hillsides and slopes in chaparral, desert, semidesert grasslands and southwestern oak woodlands; 3,000 to 6,000 ft. elevation. Also commonly occurs with Turpentine bush (*Ericameria laricifolia*) and True mountain mahogany (*Cercocarpus montanus*). Somewhat sensitive to wildfire though able to resprout. Sugary trunks and leaf bases are browsed by bighorn sheep.

Encelia farinosa, Brittlebush

Rounded drought-deciduous shrub up to 4 ft. tall with bright yellow daisy-like flowers on tall stems above gray-green leaves, blooming November to June or throughout the entire year given adequate monsoon rainfall. Adapted to dry, rocky or gravelly soils on slopes and mesas and on desert pavement; up to 4,000 ft. elevation. One of the most common and conspicuous yellow flowered shrubs in the Sonoran and Mojave deserts. Often found with Creosote bush (*Larrea tridentata*). Weak ability to root sprout after wildfire, but good offsite colonizer via wind dispersed seeds. Establishes easily. Browsed by mule deer and bighorn sheep. Forage for desert tortoise. Attracts the caterpillars of the Painted lady butterfly. *Pictured on page 71.*

Encelia frutescens, Button brittlebush

Rounded drought-deciduous shrub up to 3 ft. tall with bright yellowish-orange flowers, blooming January to September with adequate monsoon rainfall. Adapted to slow-draining sand and gravel soils with high water tables and in drainage channels; up to 5,000 ft. elevation. Primarily occurs in the

*Introduced to North America.

Creosote bush (*Larrea tridentata*) in the Superstition Wilderness Area of the Tonto National Forest near Apache Junction, Arizona. ©David Schwaegler

Wolfberry (*Lycium andersonii*).

Creeping Oregon grape (*Mahonia repens*).

Mojave Desert but also found at higher elevations in the Sonoran Desert and beyond. Often in Shadscale (*Atriplex confertifolia*), Blackbrush (*Coleogyne ramosissima*), Creosote bush (*Larrea tridentata*) and Joshua tree communities. Aggressive offsite colonizer of wildfire disturbed areas via wind dispersed seeds. Seeds are eaten by birds and small mammals. Important succulent forage for desert tortoise in periods of drought.

Ephedra nevadensis, Nevada ephedra (Nevada Mormon tea)

Leafless jointed evergreen shrub up to 5 ft. tall with primitive cone flowers, blooming March to July. Adapted to shallow to medium depth dry rocky, and often limestone derived soils on the margins of salt deserts, desert grasslands and in floodplains; 1,000 to 7,000 ft. elevation. More tolerant of alkaline and saline soils than Green ephedra (*E. viridis*). Often occurs within White bursage (*Ambrosia dumosa*), Blackbrush (*Coleogyne ramosissima*), Creosote bush (*Larrea tridentata*) and Joshua tree communities. Able to root sprout after wildfire. Browsed by mule deer, bison, bighorn sheep and pronghorn; especially important deer winter forage. Seeds are favored by many small mammals and are also eaten by mountain quail. Provides cover for small animals and upland birds.

Ephedra viridis, Green ephedra (Green Mormon tea)

Leafless jointed evergreen shrub up to 5 ft. tall with primitive cone flowers, blooming March to August. Adapted to sandy, gravelly or rocky undeveloped soils in deserts, desert grasslands and woodlands; 2,000 to 10,000 ft. elevation. Less tolerant of alkaline and saline soils than Nevada ephedra (*E. nevadensis).* Often occurs within big sagebrush (*Artemisia tridentata spp.*), saltbush (*Atriplex spp.*), Creosote bush (*Larrea tridentata*), Utah serviceberry (*Amelanchier utahensis*) and pinyon-junipers communities. May sprout vigorously after wildfire. Important wild ungulate forage on winter ranges. Seeds are favored by many small mammals and are also eaten by mountain quail. Provides cover for small animals and upland birds.

Ericameria laricifolia, Turpentine bush

Formerly *Haplopappus laricifolius.* Compact broadly rounded evergreen shrub up to 3 ft. tall with small golden yellow flowers, blooming August to December. Resinous leaves have an odor similar to turpentine when crushed. Occurs on rocky well-drained soils of desert mountains, slopes, mesas and canyons; 2,000 to 7,000 ft. elevation. Found within Creosote bush *(Larrea tridentata*) desert scrub, semidesert grasslands and pinyon-juniper woodland communities throughout the desert southwest. Poor forage palatability but useful for reclamation. Popular in low-grow xeriscape landscapes for its fall season flowers. Attracts bees, numerous late season butterflies and other nectar-loving insects.

Ericameria nauseosa, Rubber rabbitbrush

Formerly *Chrysothamnus nauseosus.* Bushy deciduous shrub up to 8 ft. tall with yellow compact flower clusters, blooming May to November. Adapted to various soils from gravel to heavy clays on slightly acidic to strongly basic or saline sites. Found in dry, open plains, valley bottoms, drainages, foothills and mountains; up to 10,000 ft. elevation. Common component of numerous habitats including, ponderosa pine, sagebrush, desert and mountain shrub, pinyon-juniper, mountain plains and desert grasslands. Establishes easily and aggressively after disturbance, becoming a minor community component over time. Sprouts vigorously after wildfire. Important winter browse for deer, antelope and elk on poor or depleted rangelands. Provides cover for small mammals and birds including sage-grouse. Attracts numerous native insect pollinators. Flowers are foraged by yellow faced bees, which are thought to be endemic to Craters of the Moon National Monument, ID. Caterpillar host for the moth *Pelochrista crambitana. Pictured on page 71.*

Eriogonum fasciculatum, Flat-top buckwheat (California buckwheat)

Low spreading deciduous shrub up to 3 ft. tall with dense round clusters of whitish to pinkish flowers, blooming March to August. Occurs in moderately to well-drained sandy to clay loams and problem soils such as serpentine, decomposed granites and high pH soils, on dry slopes, washes and canyons in desert scrub and semidesert grasslands; up to 5,000 ft. elevation. Abundant after disturbance and excellent for use on critical erosion sites. Provides good forage to browsing animals and excellent cover for birds and small mammals. Important long-flowering wild nectar source for bees and other pollinator insects, especially Blue butterflies.

Fallugia paradoxa, Apache plume

Multi-branched deciduous to semi-evergreen shrub from 2-8 ft. tall with white showy flowers developing into feathery clusters of pinkish plumes, blooming April to December. Adapted to dry, sandy or gravelly soils of canyon bottoms, washes, ephemeral waterways and alluvial plains; 3,000 to 9,000 ft. elevation. Occurs in all the southwestern deserts and into the grassland and woodland habitats of surrounding regions. Extensively used as a xeriscape ornamental in landscaping. Often rhizomatous and colonial. Vigorous root-sprouter after wildfire. Protects dry washes during flash flooding. Browsed somewhat by mule deer, more so by pronghorn. Provides nesting cover for small mammals and numerous ground dwelling birds. Attracts native bees and butterflies and is a caterpillar host of Neumoegen's buckmoth.

*Introduced to North America.

Ferocactus wislizeni, Barrelcactus (Candy barrelcactus)

Columnar-shaped succulent cactus 2-10 ft. tall and 18-33 in. in diameter with showy orange, yellow or red flowers in a ring upon its top, blooming July to September. Occurs on deep sandy desert soils, often of igneous and limestone origin, on gravelly slopes, wash margins and alluvial fans in desert grassland, desert shrub habitats, oak woodlands and grasslands; up to 6,000 ft. elevation. Frost sensitive; fire resistant. Appearance varies through its broad geographical and elevational range. Extensively used as a xeriscape ornamental in landscaping. Cattle and other animals consume the flesh when the spines are removed by disturbances such as wildfire. Javelina, mule deer, numerous birds and small mammals browse the large yellow sour fruits. Caterpillar host of moth *Cactobrosis fernaldialis.*

Grayia spinosa, Spiny hopsage

Freely-branched semi-evergreen rounded shrub up to 5 ft. tall with dense green flower clusters, blooming March to July. Occurs on gravel and sands to heavy clays and highly calcareous alkaline soils free of salt and hardpans within sagebrush, saltbush desert shrub and pinyon-juniper communities; up to 9,000 ft. elevation. Branches are spine-like at the tips. Extremely drought tolerant, remaining dormant throughout hot, dry summer months. Somewhat wildfire tolerant; sprouts afterwards. Valuable winter to early spring browse for numerous wildlife, including bighorn sheep and black-tailed jackrabbits. Provides good cover for birds and small mammals.

Gutierrezia sarothrae, Broom snakeweed

Formerly *Xanthocephalum sarothrae.* Mounded woody evergreen subshrub up to 3 ft. tall with clusters of small golden yellow flowers, blooming June to November. Adapted to a wide range of soils within deserts, grasslands, shrublands and wooded areas; up to 10,000 ft. elevation. Native but aggressive, especially on overgrazed and disturbed sites. Toxic to sheep and cattle, particularly during pregnancy. Preferred browse of pronghorn antelope in spring and summer. Major summer and winter food source for black-tailed jackrabbits. Seeds are eaten by a wide variety of small birds and mammals. Pollinated by various insects and is the caterpillar host of Yellow sprague ia moth.

Hymenoclea salsola, see *Ambrosia salsola* (Cheesebush)

Isocoma tenuisecta, Burroweed

Formerly *Haplopappus tenuisectus.* Compact rounded herbaceous subshrub 1-3 ft. tall with dense clusters of small yellow flowers, blooming August to November. Found on arid desert plains, washes, mesas and roadsides; 1,500 to 6,500 ft. elevation. Useful for reclamation in desert regions. Intolerant of fire. Native but aggressive, especially on overgrazed and disturbed sites. Toxic to livestock, especially horses. Attracts insects and butterfly pollinators.

Juniperus scopulorum, Rocky Mountain juniper

Extremely long-lived shrubby evergreen tree reaching up to 30-65 ft. tall with cone flowers maturing into blue berry-like fruits, blooming April to August. Adapted to rocky, sandy or clay soils of dry mountain slopes, hillsides, outcrops, prairies and floodplains in open woodlands and shrublands, often with ponderosa pine, sagebrush species and various grasses. Intolerant of wildfire. Excellent winter cover for deer and elk. Fruits are valuable food for small mammals and birds, especially Cedar waxwings. Also provides bird nesting habitat and migration corridors. Larval host plant of the Siva juniper hairstreak butterfly.

Krascheninnikovia lanata, Winterfat

Formerly *Ceratoides lanata.* Long-lived spreading evergreen subshrub up to 2 ft. tall with silvery white foliage and inconspicuous petal-less flowers, blooming April to August. Adapted to a wide range of soil textures, tolerating moderate to highly saline conditions; intolerant of acidic soils, flooding and prolonged wet conditions. Often forms pure stands within arid salt desert shrub, pinyon-juniper, sagebrush and at the edges of some woodland communities; 1,000 to 9,000 ft. elevation. Some tolerance to wildfire, able to sprout after low-severity burns. Germinates easily. Excellent pioneer in mine reclamation and revegetation after disturbance. Extremely palatable to all classes of livestock and wildlife. Important forage for Rocky Mountain bighorn sheep. Also browsed by deer, elk, pronghorn and numerous small mammals; a core food for black-tailed jackrabbits.

Larrea tridentata, Creosote bush

Extremely long-lived evergreen shrub up to 13 ft. tall with bright yellow flowers, blooming January to June and year-round following rain. Occurs on well-drained, calcareous, sandy and alluvial soils, often over caliche hardpan, on dry plains, mesas, slopes and hillsides as a dominant or codominant in desert grassland, shrubland and woodland communities; up to 7,000 ft. elevation. The most common and widely distributed shrub in North American deserts, often forming pure stands by cloning. Some clones are thought to be several thousand years old and may be the earth's oldest living organisms. May resprout after low-severity wildfire. Frequently utilizes White bursage (*Ambrosia dumosa*) as a nurse plant to reestablish on a site after disturbance. Unpalatable to wildlife or livestock. Used for cover and nesting habitat by numerous mammals and birds. Desert tortoises commonly dig shelters beneath it, using the root system to stabilize the structure. Host plant to the Lac scale insect. *Pictured on page 73.*

Lotus rigidus, see *Acmispon rigidus* (Shrubby deervetch)

Lycium andersonii, Wolfberry

Dull spine-tipped drought-deciduous shrub up to 9 ft. tall with small tubular white to violet flowers and succulent orange-red fruits, blooming January to June. Adapted to sandy or gravelly washes, sandy flats, mesas and slopes, and tolerant of some poorly drained soils with high alkalinity, salinity and well-developed desert pavement; up to 6,000 ft. elevation. Occurs in hot, dry southwest deserts, often with Creosote bush (*Larrea tridentata*), Foothills palo verde (*Parkinsonia microphylla*), White bursage (*Ambrosia dumosa*), Nevada ephedra (*Ephedra nevadensis*), Spiny hopsage (*Grayia spinosa*) and Blackbrush (*Coleogyne ramosissima*). May root sprout after fire. Provides cover for birds and wildlife. Berries are foraged by chukars and Gambel's quail. Nectar attracts Black-chinned hummingbirds. *Pictured on page 73.*

*Introduced to North America.

Lycium exsertum, Thornbush (Arizona desert-thorn)

Slightly spine-tipped drought-deciduous shrub up to 12 ft. tall with small tubular pale lavender flowers and plump bright red fruits, blooming January to May. Adapted to well-drained soils in dry washes, plains and rocky hillsides in desert or semidesert habitats within its narrow range; 1,000 to 4,500 ft. elevation. Often occurs with other *Lycium* species. Provides cover for birds and wildlife. Berries are an important food source for desert birds. Nectar source for Costa's hummingbird.

Mahonia repens, Creeping Oregon grape

Formerly *Berberis repens.* Creeping evergreen subshrub up to 12 in. tall with deep blue berries from bright yellow flower clusters, blooming April to September. Occurs on well-drained, dry to moist soils in coniferous forests, woodlands, shrublands, plains, riparian and occasionally wetland habitats; up to 11,000 ft. elevation. Intolerant of poor drainage and high water tables; tolerant of strongly acid to mildly alkaline soils. Rhizomatous, sprouting with or without wildfire. Heat, sun and shade tolerant and makes excellent landscaping groundcover. Poor palatability to livestock but important food to some wildlife, especially as elk winter forage and summer berries for bears. Pollinated by bees and butterflies. Nectar source for Johnson's hairstreak butterfly. *Pictured on page 73.*

Olneya tesota, Ironwood (Desert ironwood)

Irregularly-spread leguminous tree up to 30 ft. tall with lavender to white pea-like flowers, blooming April to June. Occurs on gravelly to silty soils along desert washes, foothills and in sandy canyons of desert scrub and riparian habitats, endemic to the Sonoran Desert region; below 3,000 ft. elevation. Evergreen except in cold desert winters; used as a frost indicator when selecting locations for citrus orchards. One of the heaviest woods in the world. Spines and branching make it a valuable nurse plant. Use as a xeriscape ornamental in landscaping. Seeds are valued by various wildlife and the leaves are browsed by desert bighorn sheep and mule deer. Attracts insects and numerous bird species. Pollinated by native bees, flies, butterflies, honeybees and hummingbirds and is the caterpillar host of the Funereal duskywing butterfly.

Parkinsonia aculeata, Mexican palo verde (Jerusalem thorn)

Fast-growing leguminous deciduous tree with spines, up to 35 ft. tall with photosynthetic green bark and showy yellow flower clusters, tinged red-orange in the centers, blooming May and sporadically year-round. Adapted to a wide range of well-drained soils from sand dunes to clays in arid desert arroyos, disturbed grasslands, roadsides, riparian areas and low sites where water accumulates; up to 5,000 ft. elevation. Excellent pioneer on disturbed sites, poor soils, saline soils and sites with intermittent flooding. Less desirable landscaping plant than other palo verdes (*Parkinsonia spp.*); use in erosion control, reclamation or as a natural hedge. May form dense thickets. Possibly originated in Mexico, naturalizing in southwestern desert states. Foliage and pods can be used as emergency forage for desert livestock and are eaten by wildlife. Flowers attract birds and butterflies and are favored by honeybees. Caterpillar host of the Dot-lined angle moth and the Clench's greenstreak butterfly.

Parkinsonia florida, Blue palo verde

Formerly *Cercidium floridum.* Slow-growing leguminous drought-deciduous tree with spines, up to 40 ft. tall with photosynthetic green bark and brilliant yellow flower clusters, blooming March to May and again following monsoon rains. Occurs in well-drained, low-nutrient sandy soils of uplands, floodplains, dry washes, intermittent streambeds and desert riparian areas of desert scrub and semidesert grasslands; up to 5,000 ft. elevation. Often codominant in Creosote bush (*Larrea tridentata*) and White bursage (*Ambrosia dumosa*) habitats and acts as nurse plants to Saguaro cacti. Widely used for restoration and as a landscaping ornamental. Foliage and pods can be used as emergency forage for desert livestock and are sought after by wildlife. Nectar attracts birds and butterflies and is favored by bees. Susceptible to parasitic mistletoe which attracts birds to its berries and is a host for Great purple hairstreak butterflies. Co-state tree of Arizona, along with Yellow palo verde (*P. microphylla*).

Parkinsonia microphylla, Yellow palo verde (Foothill palo verde)

Formerly *Cercidium microphyllum.* Slow-growing leguminous drought-deciduous tree up to 26 ft. tall with weak spines, photosynthetic green bark and white and pale yellow flower clusters, blooming April to May, one to two weeks later than Blue palo verde (*P. florida*). Adapted to well-drained, coarse to medium textured soils of upland hillsides and mesas and sites drier than Blue palo verde; up to 4,000 ft. elevation. Occurs within desert scrub and semidesert grasslands and is one of the most common trees of the Sonoran Desert, often codominant within Creosote bush (*Larrea tridentata*), Triangle bursage (*Ambrosia deltoidea*) and Brittlebrush (*Encelia farinosa*) habitats. Primary nurse plant of Saguaro cacti. Widely used for restoration and as a xeriscape landscaping ornamental. Foliage and pods have been used as emergency forage for desert livestock and are sought after by bird and small mammals. Nectar attracts birds and butterflies and is favored by bees. Susceptible to parasitic desert mistletoe which attracts birds to its berries and is a host for Great purple hairstreak butterflies. Co-state tree of Arizona, along with Blue palo verde (*P. florida*).

Parthenium incanum, Mariola

Compact and strongly aromatic deciduous subshrub up to 2 ft. tall with intricate branching and clusters of pale creamy-white flowers, blossoming July to November. Extremely drought tolerant, preferring dry, gravelly slopes and plains, rocky outcrops and canyons, often on limestone soils in open desert scrub habitats; 2,000 to 6,000 ft. elevation. Common or often dominant within the Chihuahuan Desert, but also occurs within the Sonoran Desert and other regions. Often used in restoration, erosion control and as an accent in xeriscape landscaping.

Peritoma arborea, Bladderpod (Bladderpod spiderflower)

Formerly *Cleome isomeris* and *Isomeris arborea.* Rounded evergreen shrub to subshrub 4-6 ft. tall with attractive yellow flowers, blooming primarily January to June. Odd-smelling sulfurous leaves. Tolerant of alkalinity, occurring on dry, well-drained desert soils in disturbed areas, hillsides, grasslands, washes, roadsides, sand dunes and coastal bluffs; up to 4,500 ft. elevation. Very drought tolerant and adapted to temperatures from below freezing to hot desert summers.

**Introduced to North America.*

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Bladderpod (*Peritoma arboreа*).
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Seed pods of Screwbean mesquite (*Prosopis pubescens*).

Velvet mesquite (*Prosopis velutina*).

Provides food and cover for wildlife and birds, especially quail. Abundant nectar source for pollinators, including both native and introduced bees. Caterpillar host of Becker's white butterfly. *Pictured on page 76,*

Prosopis juliflora, see *Prosopis velutina* (Velvet mesquite)

Prosopis pubescens, Screwbean mesquite (Tornillo)

Deciduous leguminous shrub to tree with spines, 20-30 ft. tall with dense cluster-spikes of small yellow flowers, blooming April to October. Named for its coiled seed pods. Prefers well-drained soils but adapted to a wide range of sand to heavy clay textures in moderately saline to alkaline floodplains, creek bottoms and washes within desert riparian, woodland and scrub habitats; up to 5,500 ft. elevation. Drought tolerant yet also survives months of flooding. Sometimes a dominant species, but also often associated with Velvet mesquite (*P. velutina*) Creosote bush (*Larrea tridentata*), wolfberries (*Lycium spp.*), White bursage (*Ambrosia dumosa*), Fourwing saltbush (*Atriplex canescens*), Quailbush (*A. lentiformis*), Desert saltbush (*A. polycarpa*), Blue palo verde (*Parkinsonia florida*) and Skunkbrush sumac (*Rhus aromatica*). Good cover and nesting for birds and small mammals and leaves and sweet pods are browsed by livestock and numerous wildlife. Caterpillar host and nectar source for Palmer's metalmark butterfly. *Pictured on page 76.*

Prosopis velutina, Velvet mesquite

Formerly *P. juliflora.* Deciduous leguminous shrub-like tree with sturdy thorns, up to 30 ft. tall with dense spikes of small yellow-cream flowers, blooming spring and again in fall. Occurs on a wide range of soil textures in upland deserts, along major water courses, riparian areas and in washes of desert grasslands, oak woodlands and pinyon-juniper woodlands; up to 6,000 ft. elevation. Forms pure thickets, but also often associated with Whitethorn acacia (*Vachellia constricta*), Catclaw acacia (*Senegalia acacia*), Ironwood (*Olneya tesota*), Burroweed (*Isocoma tenuisecta*), hackberries (*Celtis spp.*), palo verdes (*Parkinsonia spp.*), wolfberries (*Lycium spp.*) and Fourwing saltbush (*Atriplex canescens*). Used in desert habitat restoration. Sugary sweet seed pods are abundant and nutritious food for livestock and various wildlife. Good cover for large ungulates. Important nectar and pollen source for native pollinators such as solitary bees and is preferred by honeybees. Shelters various caterpillars and beneficial insects. *Pictured on page 76.*

Prunus fasciculata var. facsiculata, Desert almond (Desert peach)

Somewhat thorny deciduous shrub 3-8 ft. tall with fuzzy almond-shaped fruits and tiny pale yellowish flowers, blooming March to June. Adapted to well-drained coarse soils in washes, dry streambeds, mesas and mountain slopes within the harsh and arid desert scrub and woodland habitats of the Great Basin, Mojave Desert and parts of the Sonoran Desert; 2,000 to 7,000 ft. elevation. Sprouts from the crown, forming thickets. Often associated with Douglas rabbitbrush (*Chrysothamnus viscidiflorus*) and Green ephedra (*Ephedra viridis*). Good palatability to grazing animals. Attracts bees and is a caterpillar host of the Burns' buckmoth and Neumoegen's buckmoth.

Prunus virginiana, Chokecherry

Deciduous shrub to tree up to 30 ft. tall with bright red to dark purple berries and cylindrical clusters of white flowers, blooming May to August. Adapted to a wide range of well-drained thin and infertile, to deep and nutrient-rich soils, and is also tolerant of moderately acidic to alkaline sites; intolerant of heavy clays. Found on moist or seasonally moist sites such as riparian areas, woodlands, drainages, foothills and mountain slopes; up to 10,000 ft. elevation. Widely distributed and abundant in numerous habitat types. Rhizomatous, forming loose to dense thickets that sprout readily after wildfire. Often planted as a landscaping ornamental. Fruits are important to many birds and mammals, including bears. Deer browse extensively in winter. Flowers are an important nectar source for ants and insect pollinators, including butterflies and honeybees. Caterpillar host of California hairstreak butterfly, Small-eyed sphinx and Chokecherry leafroller moth. *Pictured on page 77.*

Psilostrophe cooperi, Paperflower (Whitestem paperflower)

Round globe-like woody subshrub 1-2 ft. tall with brilliant yellow flowers becoming pale to translucent and papery with maturity, blooming February to September or year-round. Drought tolerant, adapted to well-drained sand and gravel soils on dry mesas, plains, slopes and arroyos in desert scrub, semidesert grasslands and pinyon-juniper woodlands, in both the Sonoran and Mojave Deserts; 1,000 to 6,000 ft. elevation. Often found in Creosote bush (*Larrea tridentata*) communities. Used in restoration, erosion control and as a copiously flowering accent in xeriscape landscaping. Highly aromatic, deterring some insect herbivory and toxic to livestock.

Purshia glandulosa, see *Purshia tridentata var. glandulosa* (Desert bitterbrush)

Purshia mexicana, Mexican cliffrose

Formerly *Cowania mexicana.* Moderate to deeply taprooted evergreen shrub less than 12 ft. tall, occasionally reaching 25 ft. with creamy white flowers, blooming April to October. Adapted to well-drained shallow, sandy to rocky soils on foothills, slopes, mesas and high plains of forest woodland, mountain

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Chokecherry (*Prunus virginiana*). Credit: The Wild Garden, nwplants.com

Smooth sumac (*Rhus glabra*). Credit: The Wild Garden, nwplants.com

Wax currant (*Ribes cereum*) at Shafer Butte Recreation Area near Boise, Idaho. ©David Schwaegler

brushland and desert shrubland habitats; 3,000 to 8,000 ft. elevation. Colonizer of open disturbed sites. Mostly killed by wildfire but may weakly sprout afterwards. Occasionally produces nitrogen-fixing root nodules. Excellent palatability to livestock and wildlife, especially important as winter browse

Purshia tridentata, Antelope bitterbrush

Moderate to deeply taprooted evergreen shrub 2-10 ft. tall with small yellowish flowers, blooming April to August. Adapted to a wide variety of well-drained soils, slightly acidic to basic, often deep, coarse profiles on dry slopes and hillsides within mixed shrub and woodland forest communities; up to 11,000 ft. elevation. Less drought tolerant than close relative Desert bitterbrush (*P. tridentata var. glandulosa*). Establishes by seed and layering, when branches take root after soil contact; some ecotypes may sprout. Mostly killed by wildfire. Occasionally able to produce nitrogen-fixing root nodules. Used for restoration, erosion control and mine reclamation. Moderately palatable to livestock and highly palatable to pronghorn, deer, elk and bighorn sheep. Caterpillar host plant for Behr's hairstreak butterfly and numerous moths, including Columbia silkmoth, Western sheepmoth, Walnut spanworm moth and Nuttall's sheepmoth.

Purshia tridentata var. glandulosa, Desert bitterbrush

Formerly *P. glandulosa.* Deeply taprooted evergreen shrub 1-15 ft. tall with small yellowish flowers, blooming March to July. Adapted to a wide variety of well-drained soils, both alkaline and acidic, and dominant on deep, coarse profiles of valleys, foothills and slopes within semi-arid shrub and woodland communities; 1,000 to 10,000 ft. elevation. Shares numerous characteristics with its better-understood relative, Antelope bitterbrush (*P. tridentata*), but is more drought tolerant and typically found on more arid sites. Establishes by seed, sprouting and layering, when branches take root after soil contact. Pioneer species, sprouting vigorously after wildfire. Rarely able to produce nitrogen-fixing root nodules. Important winter forage for livestock, deer and pronghorn, though less palatable to deer than Antelope bitterbrush.

Rhus aromatica, Skunkbush sumac (Aromatic sumac)

Formerly *R. trilobata.* Deciduous thicket-forming shrub up to 8 ft. tall with bright red berries and small yellow flower clusters, blooming March to October. Widely adapted, occurring on well-drained, rocky soils in woodlands, valley bottoms, mid to high deserts, low mountain habitats, roadsides and riparian communities; up to 9,000 ft. elevation. Deep roots and spreading rhizomes. Smaller and less aggressive than Smooth sumac (*R. glabra*). Used for restoration, landscaping hedges and rehabilitating disturbed sites such as cutbanks. Browsed by elk, deer, bighorn sheep and pronghorn; occasionally by livestock. Provides cover for many species of birds and small mammals. Berries are an emergency winter food source for various birds including, prairie chickens, wild turkeys, ring-necked pheasants, ruffed grouse, sharp-tailed grouse, sage-grouse and others. Attracts numerous small native bees, flies and butterflies. Caterpillar host of Neumoegen's buckmoth, Splendid royal moth and Phoenix emerald moth.

Rhus glabra, Smooth sumac

Deciduous thicket-forming shrub to small tree up to 20 ft. tall with deep red berry clusters and branched greenish flowers, blooming April to October. Common and widely distributed, adapted to shallow to moderately deep, dry to moist, coarse or variably textured soils of open woodlands, prairies, rocky hillsides, canyons, roadsides, waste places and old fields; up to 7,500 ft. elevation. Prairie invader and pioneer species after disturbance, vigorously resprouting from rhizomes after wildfire; excellent for erosion control. Also used in landscaping and for hedges for its brilliant red fall foliage. Provides valuable cover for wildlife and its fruits are food for hundreds of bird species. Retains its berries for much of the winter which are important for ruffed grouse and sharp-tailed grouse. Nectar and pollen source for numerous native bees, flies, wasps, and butterflies. *Pictured on page 77.*

Rhus ovata, Sugar sumac (Sugar bush)

Evergreen thicket-forming shrub to small tree up to 15 ft. tall with red berries and dense clusters of cream to pinkish flowers, blooming February to May as well as at other times of the year. Adapted to well-drained sandy loams and nutritionally poor soils and is also tolerant of some alkalinity. Common within its range, occurring in dry canyons, rocky hillsides, washes, south-facing slopes and mesas; up to 6,000 ft. elevation. Very drought tolerant, used in native restoration and as an ornamental in full sun desert xeriscapes. Provides cover for wildlife and its fruits are food for birds. Retains its berries through the winter. Fruit and flowers attract birds, bees and butterflies.

Rhus trilobata, see *Rhus aromatica* (Skunkbush sumac)

Ribes aureum, Golden currant (Buffalo currant)

Deciduous root-spreading shrub up to 10 ft. tall with globe-like berries and showy yellow trumpet shaped flowers with reddish-tinged centers, blooming February to August. Widely adapted, occurring on fine to sandy well-drained loam soils of cliffs, mountain slopes, ravines, floodplains, streamsides, washes and near springs in grasslands, coniferous forests, woodlands, mountain shrub and riparian communities, though drought tolerant; up to 9,000 ft. elevation. Broad distribution but rarely abundant. Often found with willows and Wood's rose (*Rosa woodsii*). Good for restoration of rangelands and able to grow on some mine tailings. Cultivated as a landscaping ornamental. Rhizomes sprout after disturbance and fire. Provides cover and forage is browsed by wildlife. Fruits are an important food for numerous birds and small mammals. Flowers attract hummingbirds, bumble bees, butterflies and the Clark's sphinx hawkmoth.

Ribes cereum, Wax currant

Deciduous non-rhizomatous shrub up to 6 ft. tall with globe-like berries and short tubular white to pink flowers, blooming April to September. Adapted to a variety of soils from sands to clays on dry, open slopes, ridges and rock outcrops in open, coniferous forests, woodland edges, shrub-steppe, sagebrush desert and mountain shrub to subalpine habitats; up to 12,500 ft. elevation. Frequently occupies drier sites than Golden currant (*R. aureum*). May be found within pine, Rocky Mountain maple (*Acer glabrum*), Skunkbush sumac (*Rhus aromatica*), snowberry (*Symphoricarpos spp.*), Wood's rose (*Rosa woodsii*) and Saskatoon serviceberry (*Amelanchier alnifolia*) communities. Provides cover as well as food for wild ungulates when little else is available. Berries are excellent food for birds and small mammals. Nectar is important to hummingbirds. Caterpillar host of the Rocky Mountain agapema moth. *Pictured on page 77.*

Rosa woodsii, Woods rose

Deciduous thorned subshrub to shrub up to 10 ft. tall with fleshy red fruit hips and pink to deep rose colored flowers, blooming May to October. Adapted to a wide range of well-drained soil textures and moisture conditions on slopes and meadows within shrub-steppe, pinyon-juniper woodlands, deciduous and conifer forests and also riparian and wetland communities; up to 11,500 ft. elevation. The most common native rose in western North America, but highly variable traits throughout its distribution. Aggressive pioneer strongly tolerant of disturbance and wildfire. Forms thickets by suckering and layering, when branches take root after soil contact. Provides nesting and escape cover for numerous birds and small mammals. Leaves are browsed by livestock and wild ungulates. Native hips are a premier natural source of vitamin C, feeding a diversity of birds and mammals, including deer, porcupine, beaver, coyote, bear and sharp-tailed grouse. Persistent hips are an especially important food source during snow cover. Pollinated by insects and native bees. *Pictured on page 79.*

Sambucus nigra ssp. cerulea, Blue elderberry

Formerly *S. caerulea.* Deciduous short-lived aromatic shrub or small tree up to 20 ft. tall or more with purple-black berries and white to cream flowers, blooming March to September. Adapted to a wide variety of well-drained soils along streambanks, riverbanks, riparian areas and moist sites within drier brush and forest communities; up to 10,000 ft. elevation. Often found with quaking aspen, alders, serviceberries (*Amelanchier spp.*), Chokecherry (*Prunus virginiana*), roses (*Rosa spp.*), gooseberries (*Ribes spp.*) and big sagebrush (*Artemisia tridentata*). Sprouts vigorously from the crown after wildfire. Good palatability to livestock and wildlife and is a more important deer browse than Red elderberry (*S. racemosa*). Persistent and may recover well from heavy browsing. Provides cover and nesting for wildlife, and berries feed numerous birds and small mammals. Native cavity nesting bees live inside the pithy stems of old dried growth. Hummingbirds visit flowers for nectar.

Sambucus racemosa, Red elderberry

Deciduous aromatic shrub or small tree up to 20 ft. tall with bright red berries and creamy white flowers, blooming April to September. Occurs on well-drained deep, loamy nutrient rich soils along streambanks, ravines, swamps, moist forest openings and upland sites near wetlands; up to 12,000 ft. elevation. Common throughout its range, often occurring within conifer and alder communities. Densely rhizomatous pioneer, good for erosion control on moist sites. Sprouts from crown and rhizomes after disturbance and wildfire; some populations lack rhizomes. May be tolerant of heavy metal contaminated soils on mining and smelting sites. Provides cover and nesting for wildlife and berries feed numerous birds and small mammals. Palatability to livestock and wildlife varies due to the natural cyanide content of individual plants. Intolerant of heavy browsing. Native cavity nesting bees live inside the pithy stems of old dried growth. Hummingbirds forage flower nectar.

Sarcobatus vermiculatus, Black greasewood

Deciduous to semi-evergreen long-lived spiny shrub 3-10 ft. tall with green female flowers and male pine cone-shaped flowers, blooming May to September. Adapted to a wide variety of soils from heavy clays to coarse loams and tolerant of strongly sodic and saline soils. Highly drought tolerant but also withstands high water tables and prolonged flooding within arid to semi-arid habitats and lowland western deserts; up to 8,500 ft. elevation. Often dominant on saline sites but also occurs with various saltbushes (*Atriplex spp.*), Iodinebush (*Allenrolfea occidentalis*), Rubber rabbitbrush (*Ericameria nauseosa*), Spiny hopsage (*Grayia spinosa*), Basin big sagebrush (*Artemisia tridentata ssp. tridentata*), Wyoming big sagebrush (*Artemisia tridentata ssp. wyomingensis*). Excellent soil stabilizer, especially on sites too saline for most other species; also processed oil shales. Able to crown sprout after damage and may do so vigorously after moderately severe wildfire. Substantial lateral root system as far as 12 ft. from the main plant with buds which sprout after disturbance. Palatable to livestock but toxic in large quantities without considerable other forage in the diet. Lightly browsed by mule deer and pronghorn during spring and summer. Important food source and cover for jackrabbits.

Senegalia greggii, Catclaw acacia

Formerly *Acacia greggii.* Long-lived deciduous legume shrub or small tree up to 20 ft. tall with sharp thorns like a cat's claw and intensely fragrant creamy-white flower spikes, blooming March to November. Common and abundant, adapted to dry gravelly, often shallow soils of mesas, canyons, rocky hillsides, flats, washes, floodplains and riparian areas within arid and semiarid grassland and scrub communities in southwestern deserts; up to 6,000 ft. elevation. Prolific resprouter after wildfire. Valuable reclamation species on mining soils and other disturbed sites. Foliage is browsed by livestock, deer and many small mammals and javelina forage its beans. Tolerates heavy grazing pressure. Provides extensive cover and nesting for desert mammals and numerous birds. Attracts butterflies and hordes of pollinator insects and native bees. Caterpillar host of the Hubbard's small silkmoth.

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Woods rose (*Rosa woodsii*) at the Snake River Birds of Prey National Conservation Area near Kuna, Idaho. ©David Schwaegler

Common snowberry (*Symphoricarpos albus*).

Whitethorn acacia (*Vachellia constricta*) at the Riparian Preserve at Water Ranch in Gilbert, Arizona.

Shepherdia argentea, Silver buffaloberry

Deciduous thorny thicket-forming shrub or small tree up to 20 ft. tall with brown hard fruit and yellow male and inconspicuous female flowers, blooming April to August. Adapted to well-drained moist soils with some tolerance to poor drainage, occurring on moist prairies, riparian areas, wet meadows, floodplains, shorelines and springs within woodlands, shrublands and short and mixed-grass prairies; 1,000 to 8,000 ft. elevation. Sprouts from the root crown and from rhizomes after disturbance and wildfire. Fixes nitrogen. Preferred cover and nesting habitat for numerous birds and small mammals. Poor palatability to livestock but valuable browse for mule deer and pronghorn; also utilized by elk. Fruit is eaten by bears, small mammals and birds, including sharp-tailed grouse. Pollinated by honeybees and numerous native bees. Caterpillar host of the Columbia silkmoth.

Shepherdia canadensis, Russett buffaloberry

Deciduous thicket-forming shrub up to 13 ft. tall with bright red fruit and yellow-brown inconspicuous flowers, blooming May to September. Cold hardy, adapted to dry to moist rocky, sandy or gravelly, nutrient-poor soils on dry slopes, valley bottoms, open rocky woodlands, forests, shorelines and riparian areas; up to 11,000 ft. elevation. Sprouts from the root crown after disturbance and wildfire and some populations may be rhizomatous. Fixes nitrogen. Provides cover for numerous birds and small mammals. High protein browse but low palatability to livestock and wildlife. Fruit is important for bears as well as small mammals and birds. Pollinated by honeybees and numerous native bees.

Simmondsia chinensis, Jojoba

Native densely-branched evergreen shrub 1-7 ft. tall with attractive acorn-like fruit capsules and green inconspicuous flowers, blooming December to July. Adapted to well-drained coarse desert soils and tolerant of highly saline sites on dry rocky slopes and along washes within desert shrub and southern coastal scrub habitats; up to 5,000 ft. elevation. Common to dominant throughout its range. Extremely drought tolerant. Desirable for xeriscape landscaping as well as restoration. Readily resprouts following damage or wildfire, forming thickets from deep roots several feet away from the crown. Highly palatable and important browse for livestock and wildlife, including deer, desert bighorn sheep and jackrabbits. Nuts are eaten by deer, javelina and numerous small mammals. Honeybees collect considerable amounts of pollen from the male plants but avoid the females.

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Symphoricarpos albus, Common snowberry

Deciduous shrub to small tree up to 6 ft. tall with round white berries from small clusters of white flowers, blooming April to October. Common, adapted to a wide variety of well-drained soil types and low nutrient conditions on dry to moist slopes in numerous types of forest, woodland, shrub and riparian communities; up to 9,000 ft. elevation. Rhizomatous, among the first recolonizers after wildfire. Browsed by livestock and wild ungulates, including deer, bighorn sheep, elk and moose. Important cover and food for small mammals and birds, including sharp-tailed, ruffed and blue grouse as well as wild turkeys. Floral visitors include numerous hummingbirds, native pollinator insects and honeybees. Caterpillar host of the Ashy pleromelloida and Vashti sphinx moths. *Pictured on page 79.*

Symphoricarpos oreophilus, Mountain snowberry

Deciduous montane shrub up to 5 ft. tall with round white berries from small clusters of pinkish flowers, blooming May to September. Common, adapted to well-drained soils on dry to moist ridges, rocky slopes, forest openings, woodland, shrubland and riparian communities; 3,000 to 11,000 ft. elevation. Less rhizomatous growth than Common snowberry (*S. albus*); sprouts weakly from the root crown after disturbance such as wildfire. Browsed by livestock and is important forage for deer and elk, especially in early spring. Important cover and food for small mammals and birds, including ruffed grouse. Pollinators include numerous hummingbirds, native insects and honeybees. Larval host for the Chalcedon checkerspot butterfly.

Vachellia constricta, Whitethorn acacia

Formerly *Acacia constricta*. Long-lived deciduous legume shrub or small tree rarely more than 12 ft. tall with long slender spines and slightly fragrant yellow flower globes, blooming May to September. Common and abundant, adapted to dry sandy to loamy soils, often in shallow caliche soils on slopes, washes, flats, mesas and riparian areas within arid and semiarid grassland and scrub communities in southwestern deserts; 1,000 to 6,000 ft. elevation. Slow to establish, but useful reclamation plant on mining soils and other disturbed sites. Vigorous resprouter after wildfire. Lightly browsed by livestock and wild ungulates. Provides cover and nesting for desert mammals and numerous birds and its beans are foraged by numerous types of wildlife. Attracts nectar-seeking pollinator insects such as butterflies and bees. *Pictured on page 79.*

Vachellia farnesiana, Sweet acacia

Formerly *Acacia smallii* and *A. farnesiana*. Long-lived deciduous legume shrub or tree up to 30 ft. tall with long spines in pairs and incredibly fragrant yellow to orange flower globes, blooming March to November. Evergreen in mild winters. Adapted to a wide variety of soils types, occurring on arroyos, plains and low slopes within arid scrub communities in southwestern deserts; up to 6,000 ft. elevation. Pantropical species, also native to northern Australia and southern Asia. Popular in xeriscape landscaping in the southwestern desert states and Mexico. Caterpillar host of the Dot-lined angle moth.

Yucca glauca, Soapweed yucca (Small soapweed)

Rosette shaped semi-woody evergreen shrub 3 ft. tall with stiff sharply pointed fleshy leaves and greenish to white flowers on a tall solitary stalk extending from the center of the plant, blooming May to August. Drought tolerant, adapted to dry sandy, rocky soils in short grass prairies, high plains, desert grasslands, woodlands and shrublands; up to 9,500 ft. elevation. Rhizomatous, forming small to moderate sized colonies. The most extensively distributed yucca in North America. Livestock and numerous wild ungulates browse flowers and seedlings. Provides food and cover for birds and small mammals and nesting habitat for native bees. Caterpillar host for Strecker's giant-skipper butterfly, as well as Yucca moths, which are thought to be its only successful pollinator, and its fruits serve as the moth's sole larval food source. State flower of New Mexico.

MALE AND FEMALE SAGE-GROUSE GATHER ON A COLORADO MATING LEK NEAR BASIN BIG SAGEBRUSH (*ARTEMISIA TRIDENTATA SSP. TRIDENTATA*).

Icons of the West: Sagebrush and Sage-grouse

The West's vast expanses of sagebrush (*Artemisia spp.*) may appear endlessly monotonous to many, but these areas are essential habitat for more than 350 wildlife species,[1] including the iconic bird featured on the cover of this publication: sage-grouse—named for its dependence on sagebrush plants for food and cover.

Sage-grouse inhabit 186 million acres of sagebrush ecosystem in Washington, Oregon, Idaho, California, Nevada, Utah, Wyoming, Colorado, Montana, South Dakota, North Dakota and the Canadian provinces of Alberta and Saskatchewan.[2] The birds utilize different sagebrush sites throughout the year for mating, nesting, raising chicks and winter habitat, and return to the same breeding location each spring. Immediate and substantial threats exist to sagebrush ecosystems largely due to annual exotic weed invasion (see also: *Broken Cycle: Weeds and Wildfire,* page 42), juniper encroachment and habitat fragmentation. Federal and state agencies continue to work together with and alongside private industry, ranchers and landowners to protect and restore sage-grouse habitat.

Granite Seed offers numerous sagebrush, forb and grass species to restore native sage-grouse habitat after wildfire, disturbance or degradation. The species found in this catalog are those we regularly stock. If your habitat restoration project requires something not found here, please ask.

[1] Sage Grouse Initiative, sagegrouseinitiative.com

[2] ibid.

Cover Crops
& Annual Forages

cover crop / kuhv-er krop / noun:
1. a crop grown for the protection and enrichment of the soil.

forage / for-ij / noun:
1. food for animals such as grass or hay, especially when eaten by browsing or grazing.

annual / an-yoo-uhl / adjective:
1. plant completing its life cycle in one growing season or year.

Cover crops and annual forages are valuable tools for reclamation, agricultural land improvement, pasture establishment and food plots. They germinate quickly to stabilize exposed soils, restore soil health and function, protect perennial seedlings during establishment, and provide valuable forage for livestock, pollinators and wildlife. Many of these species have been cultivated in distant regions of the world for thousands of years and numerous varieties are available. Ask us about which types are best suited to your location and project needs. For nitrogen fixing cover crops and forages, refer to the *Forage Legumes* section.

DAIKON RADISH (*RAPHANUS SATIVUS VAR. LONGIPINNATUS*) PLANTED TO PENETRATE COMPACTED SOILS, IMPROVE WATER INFILTRATION, SOIL AERATION AND THE ROOTING DEPTH OF SUCCESSIVE CROPS.

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Japanese millet (*Echinochloa esculenta*).


Buckwheat (*Fagopyrum esculentum*).


Pearl millet (*Pennisetum glaucum*).

*Avena sativa,** Oats

Cool season, moderately drought tolerant tufted annual cereal grain. Prefers cool, moist conditions and well-drained soils. Establishes quickly and early maturing. Extremely palatable and soft-leaved, use for grazing, hay, silage or for wildlife food plots. Spring plant with annual clovers, vetches, Field peas (*Pisum sativum ssp. arvense*), or other legumes for superior forage and soil improvement. Plant in early fall for high quality fall grazing, especially deer food plots. Not winter-hardy.

*Brassica juncea,** Brown mustard & Oriental mustard

Cool season, annual brassica traditionally grown for its spicy seeds. Germinates quickly on a wide variety of soils; not tolerant of wet soils. Tolerates some drought stress, but intense heat during flowering reduces seed-set. Sensitive to frost and winterkills easily. Use between commercial crops and in home gardens as a green manure to naturally fumigate soil nematodes and pathogens. Wait at least four weeks after plow-down before planting the next crop. Has been used in environmental phytoremediation to remove toxic heavy metals such as cadmium (Cd) from polluted soils. Varieties:

Cutlass
Oriental-type used as a natural biofumigant for suppressing nematodes and common root rot between rotational crops such as potatoes and sugar beets. Also reduces weeds in the subsequent crop year. Biofumigation is improved when fields are planted in a 1:1 mix with White mustard (*Sinapis alba*). (Released 1985). *Also see Mustard Biofumigant Blend on page 86.*

*Brassica napus,** Forage rapeseed

Cool season, annual brassica; biennial when planted late. Widely adapted to sites and soils with adequate moisture and fertility. Deep fibrous root system. Origin species of canola. Use in crop rotations, as a high quality forage or as a green manure and biofumigant for soil nematodes. Spring plant to supplement summer pastures, or summer plant to extend the grazing season into late fall. Plant in pastures with small grains, other brassicas or annual legumes such as clovers.

*Brassica rapa,** Forage turnip

Cool season, annual or biennial brassica that is somewhat frost tolerant. Prefers deep, fertile, sandy to heavy clay soils. Use as a high quality forage crop; excellent late fall and winter forage. Plant in the spring for summer grazing or in the summer to extend the grazing into late fall. Leafy tops can be lightly grazed before fall, and bulbs are dug for forage in the winter by grazing livestock and wildlife, even under snow.

*Carthamus tinctorius,** Safflower

Warm season, annual broadleaf often cultivated for vegetable oil and birdseed. Prefers deep, fertile soils. Substantial taproot (8-10 ft.) allows plants to thrive in arid to semiarid conditions, breaks up compacted soils and draws-up and accumulates nutrients from lower subsoils. Also works in irrigated systems and some areas receiving higher rainfall. Moderate quality forage for grazing or hay if used before it becomes too prickly. Good pollinator species, increasing the presence of beneficial insects and reducing pressure from pest insects.

*Cichorium intybus,** Chicory

Fast growing biennial or short-lived perennial forb, somewhat woody and with pale blue flowers when allowed to bolt. Widely adapted to fertile, well-drained sites; intolerant of wet soils. Use in pastures and wildlife food plots. Forage quality comparable to many legumes. Dries too brittle to be a suitable hay plant. Deep taproot provides drought tolerance, extending midsummer pastures when other forages slump. Accumulates trace minerals and nutrients from lower subsoils. Reduces gastrointestinal parasites in small livestock and deer. Certain growing conditions may increase toxic nitrate levels. Taproot can be damaged by overgrazing or excessive trampling. Graze before bolt.

*Echinochloa esculenta,** Japanese millet

Warm season, cold tolerant coarse annual grass. Adapted to all soils but thrives on wet and swampy soils, even standing water. Provides fast-growing, short-term cover while perennials establish. Often used around ponds and other waterways as a source of cover and preferred food for waterfowl, including ducks. Effective as a weed-suppressing smother crop. Greater protein content for grazing animals than Oat (*Avena sativa*) and Timothy (*Phleum pratense*) hay. *Pictured on page 83.*

*Eragrostis tef,** Teff

Warm season, fine-stemmed annual grass with quick germination. Adapted to various soil types in drought stressed to water logged soils; fairly salt tolerant. Primarily used for high-yield, low-input, summer hay under a short growing season. Excellent emergency forage when weather delays the timely planting of other crops or forages. Multi-cut in some regions. Highly nutritious and palatable; leafy and soft. Extends the summer growing season of hay fields and pastures. Also use for silage, green manure, erosion control or as a companion crop. Seed in late spring into warm soils; frost sensitive at all stages.

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*Fagopyrum esculentum,** Buckwheat

Warm season, annual broadleaf traditionally cultivated as a pseudo-cereal. Prefers light to medium textured, well-drained soils; tolerant of low-fertility. Intolerant of frost, flooding or severe drought. Establishes and matures quicker than all other cover crops, forming a dense canopy and suppressing weeds. Use in double cropping systems, to prevent erosion, improve soils, disrupt root pathogen cycles, conserve soil moisture or as green manure. Hay has low forage value. White flowers attract beneficial insects and are excellent for honeybees. *Pictured on page 83.*

Helianthus annuus, Common sunflower

Warm season, annual broadleaf plant with an extensive and deep root system. Adapted to well-drained, sandy to clayey soils. Establishes and matures quickly, forming a dense canopy and suppressing weeds. Developed from the naturally occurring native type (see section: *Wildflowers & Forbs*) for commercial seed and oil production. Now gaining popularity in double crop systems, as a green manure and as forage or silage. Attracts birds, butterflies, bees and other beneficial insects. Use thin shelled black oil varieties for bird habitat.

*Hordeum vulgare,** Barley

Cool season, moderately drought tolerant annual cereal grain adapted to a wide range of soils and sites, preferring cool, dry areas. More productive on alkaline and saline soils than other cover crops. Hardier than Oats (*Avena sativa*), but less so than winter Wheat (*Triticum aestivum*). Early maturing; produces more forage in a shorter time than all other cereal crops. Graze or cut for hay or silage. Use in short rotation windows or for exceptional erosion control. Winter and spring types available. Use hay-type (beardless) varieties for grazing.

*Lolium perenne ssp. multiflorum,** Annual ryegrass (See section: *Grasses & Grasslikes.*)

*Panicum miliaceum,** Proso millet

Warm season, drought tolerant annual grass preferring moist to dry conditions in a range of soil types, including poor, thin soils; shallow-rooted. Intolerant of high salinity. One of the lowest water requirements of any grain species. Fast to establish and grow, reaching maturity quickly. Plant for erosion control, in rotations with winter annuals, or into stubble fields in a double crop system. Leafiness, palatability and forage yields are lower than many other annual hays such as Foxtail millet (*Setaria italica*). Excellent in wildlife food plots for game birds.

*Pennisetum glaucum,** Pearl millet

Warm season, tall annual grass adapted to well-drained, low-fertility soils. Performs well in high salinity or low pH areas. One of the most drought resistant cereal grasses. Highly palatable and nutritious annual forage. Used for grazing, silage, hay, green chop, green manure and wild bird habitat. Most widely grown type of millet; often preferred forage over other millets such as Japanese millet (*Echinochloa esculenta*) and Proso millet (*Panicum miliaceum*). *Pictured on page 83.*

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Managing Cover Crops

Some cover crops have the potential to negatively impact cropping systems. Cover crops used in agricultural settings must be managed properly to prevent contaminating later crop rotations.

For example, Buckwheat (*Fagopyrum esculentum*) seed contains an allergen and flour millers now test for buckwheat contamination in wheat and other cereal grains. Grain producers must use appropriate management practices if and when they choose to use buckwheat as a cover crop in or near their grain production. Failure to do so can critically devalue harvests.

Similarly, some millets can become competitive weeds in cereal crop production, decreasing grain yields and contaminating harvests.

Correct management of cover crops in agricultural systems may include such practices as grazing, cutting, herbicide application, and/or tilling cover crops into the soil previous to seed development.

Foxtail millet (*Setaria italica*).

White mustard (*Sinapis alba*) previous to being tilled into the soil for green manure and natural biofumigation. ©L&H Seeds

Sorghum-Sudangrass (*Sorghum bicolor x Sorghum bicolor var. drummondii*).

Phacelia tanacetifolia, Lacy phacelia

Water efficient, native annual broadleaf with lavender-blue flowers in dense curling clusters, blooming March to June. Vigorous root system and top growth, occasionally reaching 4 ft. tall. Adapted to a wide range of soil pH and textures, including clays. Excellent cold tolerance, continuing growth into fall. Use as a cover crop and green manure for soil building and weed suppression in either cash crop rotations or vineyards and orchards. Significant early-season pollen and nectar source for Blue orchard bees, an important native pollinator for California's almond orchards. Also attracts beneficial insects which eat aphids and other agricultural pests. Exceptionally valuable honeybee plant. Long-day plant requiring a minimum of 13 daylight hours to initiate flowering. (See also in: *Wildflowers & Forbs*) *Pictured on page 102.*

*Raphanus sativus var. longipinnatus,** Forage radish (Daikon radish)

Cool season annual brassica with a single massive taproot (12-20+ in. long). Adapted to a wide range of soils; intolerant of waterlogged soils. Rapid germination and growth. Long taproot reaches deep into the soil profile to increase topsoil nitrogen and nutrient fertility the following spring. Use in crop rotations to penetrate compacted soils and improve water infiltration, soil aeration and the rooting depth of successive crops. Dense canopy suppresses weeds when planted in a monoculture. Also use in food plots. Grazing animals eat the leafy tops and the taproot. *Pictured on page 81.* Varieties:

GroundHog
Daikon-type with consistent performance. Use on its own or in mixes with Crimson clover (*Trifolium incarnatum*), Field peas (*Pisum sativum ssp. arvense*), Annual ryegrass (*Lolium perenne ssp. multiflorum*), Forage turnips (*Brassica rapa*) or other forage species.

*Secale cereale,** Cereal rye

Cool season, drought tolerant tall annual cereal grain adapted to a wide variety of conditions, including arid environments and clay soils. Establishes easy and likely to outperform all other cover crops on poor, infertile soils. Excellent at suppressing weeds when seeded heavy. Used as livestock forage between crop rotations; graze late fall or early spring. As a green manure or forage it performs best when planted with other species, such as Hairy vetch (*Vicia villosa*) or Triticale (*Triticum aestivum x Secale cereale*). Also use for quick soil cover, particularly in the late fall. May volunteer and become weedy.

*Setaria italica,** Foxtail millet

Warm season, annual grass adapted to well-drained soils in cool, semi-arid regions. Suitable for use at higher elevations. Shallow rooted and tolerant of highly saline soils. Primarily grown for single-cut hay and as a short-season emergency forage; palatable and nutritious. Excellent soil cover but may out-compete establishing perennials; can be used as a weed-suppressing smother crop. Seeds are a desired food for birds and small mammals. *Pictured on page 85.* Varieties:

Golden German
Late maturing; often seeded into wheat stubble for drought tolerant hay. Higher forage yields under irrigation than Siberian variety. Also use in warm season wildlife food plots for gamebirds, especially dove, quail and pheasant. (Released 1969)

Siberian
Short-statured and not a large forage yielder, but highly valued for its early maturity and hardiness. More drought tolerant than Golden German variety.

*Sinapis alba,** White mustard

Cool season, annual brassica traditionally grown for its spicy seeds. Establishes quickly on a wide variety of soil types; not suited to wet soils. Some drought tolerance, but extreme heat during pollination may reduce seed production. Frost sensitive and winterkills easily. Use in commercial crop rotations and in home gardens as a green manure with chemical properties that naturally fumigate soil pests such as nematodes and fungal pathogens. Wait at least four weeks after plow-down before planting the next crop. *Pictured on page 85.* Varieties:

Martigena
Developed as a natural biofumigant for suppressing nematodes and common root rot in rotational crops such as potatoes and sugar beets. Also shown to substantially reduce weeds in the subsequent crop year. Biofumigation effectiveness is improved when fields are planted in a 1:1 mix with Oriental mustard (*Brassica juncea*). *Also see Mustard Biofumigant Blend on page 86.*

*Sorghum bicolor,** Grain sorghum (Milo)

Warm season, quick growing annual primarily used for dryland feed grain. Coarse grass similar to corn in appearance. Adapted to a wide range of soils; moderate salt tolerance. Heat and drought tolerant plant ideal for arid areas unsuitable for corn production, yet also more tolerant of saturated and flooded soils than most grain crops. Grain is highly palatable to livestock and has more protein and fat than corn. Harvest grain for livestock feed, graze stubble after grain harvest or use entire plant for silage. As all sorghums, forage must be managed for prussic acid toxicity (see below: Sorghum-Sudangrass). Also use in warm season food plots for gamebirds and deer.

*Sorghum bicolor x Sorghum bicolor var. drummondii,** Sorghum-Sudangrass

Warm season, quick growing annual grass with an extensive root system. Hybrid cross between forage Sorghum and Sudangrass. Adapted to well-drained, fertile soils. Tropical plant intolerant of frost or prolonged saturation. Inhibits soil nematodes and suppresses weeds when in dense stands. Highly palatable; use for silage, hay, green chop and pasture. Brown midrib (BMR) varieties are more digestible than traditional white midrib (WMR) varieties, however, BMR-types have an increased potential for lodging. Extremely toxic (prussic acid) to livestock after frost, drought stress and mechanical damage. To avoid toxicity wait until plants are 18 in. tall before grazing; one week after frost; 6-8 weeks after ensiling; do not graze during or immediately after drought stress. Never feed to horses. *Pictured on page 85.*

*Triticum aestivum,** Wheat

Cool season, drought tolerant annual cereal grain typically grown as a grain. Widely adapted to most soils and sites. Tolerates wet soils better than Barley (*Hordeum vulgare*) and Oats (*Avena sativa*), but is less tolerant of poorly drained soils than Cereal rye (*Secale cereale*) and Triticale (*T. aestivum x Secale cereale*). Excellent winter hardiness and can be sown later in the fall than barley. Suited to irrigated or dryland production. Plants grazed in winter continue forage production in the spring. Forage yields lower than triticale under irrigation. Also cut for hay or silage. Plant alone or in blends with annual legumes or brassicas for increased yield and soil enhancement. Winter and spring varieties available; reduced awn varieties are preferred forage.

*Triticum aestivum x Elytrigia elongata,** Regreen

Sterile, cool season annual or short-lived perennial grass. Hybrid cross between annual Wheat (*T. aestivum*) and perennial Tall wheatgrass (*Thinopyrum ponticum*). Adapted to most sites. Developed as a soil stabilizer and cover crop.

*Triticum aestivum x Secale cereale,** QuickGuard® Sterile Triticale

Sterile, cool season drought tolerant annual cereal grain. Comprises all the attributes of common Triticale (see below), but is non-reseeding and does not persist in subsequent years. Will not produce seed unless it is exposed to pollen from Wheat (*T. aestivum*) or non-sterile varieties of triticale. Intended for short-term soil stabilization on non-agricultural erosion control projects in semi-arid regions of the western US. Use alone or as a nurse plant with slower establishing perennials in mining reclamation, road development, new construction and following soil disturbance. Germinates in cool environments. Suitable for use in fall or spring. (*See also Erosion Control & Planting Aids on page 7.*) *Pictured on pages 8 & 13.*

*Triticum aestivum x Secale cereale,** Triticale

Cool season, drought tolerant annual cereal grain. Hybrid cross between Wheat (*T. aestivum*) and Cereal rye (*S. cereale*) with the hardiness of rye and the yield potential of wheat. Larger root mass and more efficient user of soil nutrients than wheat; also more tolerant of disease, salt and drought. Widely adapted and excellent tolerance to drought, acidic and saline soils and many common cereal diseases. Extremely good forage yield and highly palatable; high crude protein. Germinates in cool environments. Establishes rapidly in the fall to produce high yields for winter grazing; continues production in the spring. Use alone or in blends with Field peas (*Pisum sativum ssp. arvense*) or other annual forages; also as a nurse crop with perennials. Use awnletted varieties for grazing. (For non-agricultural uses, see above: *QuickGuard Sterile Triticale.*)

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Mustard Biofumigant Blend

White mustard (*Sinapis alba*) and Oriental mustard (*Brassica juncea*) varieties blended for use in commercial crop rotations and home gardens as a natural soil biofumigant and green manure.

Mustards contain glucosinolate, which when incorporated into the soil produce a natural bioactive chemical similar to the active ingredient used in some commercial soil fumigants. These natural chemicals suppress soil nematodes and fungal pathogens such as common root rot, which damage subsequent crops. The chemical properties of the mustards along with their rapid fall growth and canopy closure, also help to substantially reduce spring weed emergence. When incorporated into the soil, the large amount of biomass also improves soil quality by increasing organic matter, water infiltration, water and nutrient holding capacity and overall productivity.

Optimal seeding dates vary by region, but typically range from July to mid-August. For best results fertilize with 150 lbs/acre of total nitrogen. Plow-down or mow and incorporate into the top 6 in. of soil sometime in September or October, after flowering but before the plants are able to produce seed. Killed by hard frost. May also be used in spring. Wait at least four weeks after plow-down before planting the next crop. (Drill at 7-10 lbs/ac on 6" spacing or broadcast at 15-20 lbs/acre.)

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Forage Legumes

forage / for-ij / noun:
1. food for animals such as grass or hay, especially when taken by browsing or grazing.

legume / le-gyoom / noun:
1. plants or the fruit or seed thereof in the Fabaceae family which bear nodules on the roots containing nitrogen-fixing bacteria.

Legumes are notable for their ability to fix atmospheric nitrogen into a biologically useful form for their own growth needs, thereby improving plant health and overall soil fertility. Granite Seed offers a wide selection of improved legumes for pasture and hay, wildlife food plots, pollinator forage, cover cropping, green manure and erosion control. Legumes are also used in agricultural rotations to restore soil health and improve subsequent crops. Many species and varieties are uniquely adapted to establish easily and tolerate difficult growing conditions. Ask us about which types are best suited to your location and needs.

BUMBLEBEE ON A SAINFOIN (*ONOBRYCHIS VICIIFOLIA*) FLOWER AT ESVELT FARMS IN RICE, WASHINGTON.

© ANNJE ESVELT

'Lutana' Cicer milkvetch (*Astragalus cicer*) seed production field at Bruce Seed Farm in Townsend, Montana. ©Gord Pearse/Bruce Seed Farm

Bee foraging on Birdsfoot trefoil (*Lotus corniculatus*).

'Don' Falcata alfalfa (*Medicago sativa ssp. falcata*) in a seed production field at Bruce Seed Farm in Townsend, Montana. ©Gord Pearse/Bruce Seed Farm

*Astragalus cicer,** Cicer milkvetch

Long-lived, nitrogen-fixing perennial legume with vigorous rhizomes and showy pale yellow to white flowers. Adapted to all soil textures; moderately tolerant of acidic, alkaline and salty soils. Somewhat drought tolerant, but also suitable for wet sub-irrigated soils. Cold hardy; up to 7,000 ft. elevation. Non-bloating, excellent for hay and pasture; moderate value for wildlife habitat. Yield is similar to Alfalfa (*Medicago sativa*) in areas with long growing seasons. Higher protein content than many other legumes, but somewhat less palatable. Heavy grazing stimulates growth and increases stand density. Establishes slowly due to poor seedling vigor, but competitive over time. Also use in mixtures on streambanks, roadsides, mine tailings and as a cover crop in orchards and vineyards. Seeds are eaten by birds, including sage-grouse. Primarily pollinated by native bumblebees. Varieties:

Lutana
Hardy, frost resistant cultivar selected for early spring growth, rapid recovery after cutting, rapid rhizome spread and uniformity of seed maturation. Forage yield is slightly less than comparably adapted varieties of alfalfa, except in areas affected by frost or excessive moisture. (Released 1970). *Pictured on page 89.*

Monarch
Improved seedling emergence, quicker stand establishment and forage yields greater than or equal to Lutana. (Released 1980)

Oxley II
Seedling vigor, forage yield and seed yield greater than Oxley. Forage yields higher under both irrigated and dryland production. Also faster regrowth after cutting. (Released 2001, origin: Oxley variety)

*Lotus corniculatus,** Birdsfoot trefoil

Perennial nitrogen-fixing legume with a branching taproot and bright yellow clustered flowers. Potentially long-lived in northern regions; cold hardy. Tolerant of marginal ground, including shallow soils with low fertility, low pH, and poor drainage, as well as heaving soils unsuited to Alfalfa (*Medicago sativa*). Less forage yield than alfalfa in well-drained, fertile soils. Non-bloating and fine stemmed, excellent for hay, grazing pasture and wildlife habitat. Superior forage quality to alfalfa. Low seedling vigor; mix with non-aggressive perennial grasses to improve forage yield and prevent lodging. Intolerant of summer overgrazing. Avoid fall grazing to improve winter survival and spring growth. Readily reseeds itself. Grow to maturity every third year to allow seed-set and maintain the stand. Pollen and nectar used by honeybees and bumble bees. *Pictured on page 89.* Varieties:

Bruce
Semi-erect type suited for hay or grazing. Developed for plant vigor, winter hardiness and regrowth after grazing. Superior spring yields. Forage yields higher than Leo. (Released 2007, origin: Leo and Empire varieties and other populations)

Leo
Semi-erect to erect grazing type. Long-lived, late maturing. Forage yields as good as Viking. Slightly more winter hardy than Norcen. Matures slightly earlier than Empire. (Released 1963, origin: Europe)

Norcen
Semi-erect type suited for hay or grazing. Late maturing. Superb forage yield. Faster regrowth rate than Empire and easier to establish; slower regrowth rate than Viking. (Released 1981, origin: Europe)

Viking
Erect hay type. Earliest maturing of all varieties. Rapid spring growth of vigorous seedlings. Good forage yields. Faster growth than Norcen. (Released 1930's, origin: Europe)

*Medicago sativa,** Alfalfa

Potentially long-lived nitrogen-fixing perennial legume with a significant taproot and purple flowers. Adapted to fertile, deep, well-drained soils. Intolerant of poor drainage, high water tables and acidic soils. The world's most well-known and widely used perennial forage legume for pasture, hay, silage, green-chop and rangeland. Excellent forage yield, quality and palatability. Seed alone or in mixed grass pastures; establishes easily. High bloat potential; use caution when grazing. Also use for wildlife habitat for grazing ungulates, geese, grouse and other wild birds. Primarily pollinated by leafcutter bees and many types of native bees; honeybees are reluctant pollinators. Winter hardy, rhizomatous and multifoliate (MF) varieties available. *Pictured on pages 90 & 134.* Varieties:

Public varieties (Fall Dormancy Rating)		Proprietary varieties (Fall Dormancy Rating)	
Ladak	(2)	1080 High Country	(2-4)
Ladak 65	(2)	1080 Top Cut	(2-4)
Ranger	(2)	9111 MF	(3)
Rhizoma	(2)	Bridger MF	(3)
Shaw	(3)	Matrix	(2)
Travois	(2)	Spredor V	(3)
Vernal	(2)		
Wrangler	(3)		

Numerous other proprietary varieties are available upon request and license agreement. Contact us for specific information about any of the above varieties or any others not listed here.

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Selecting an Alfalfa Variety

Fall Dormancy & Winterhardiness
Alfalfa is a unique crop inasmuch as its varieties have been developed to accommodate broad differences in regional climates and crop management practices.

Alfalfa varieties are distinguished for suitability to a particular geographic region by their fall dormancy (FD) rating, a numeric scale (from 1-11) reflecting the reaction of their potential forage yield to the changing temperatures and day lengths of autumn. Exceptionally dormant varieties (FD = 1) slow their growth as temperatures cool, by as early as September. This response is favorable where long, harsh winter conditions are the norm, as the plant will reduce forage growth in favor of bolstering its root reserves to survive a long winter.

On the other end of the scale, extremely non-dormant varieties (FD = 11) will continue growth toward maximum forage yield until an environmental stressor such as a frost or a shortage of water shuts down its growth.

The differences in fall dormancy between varieties demonstrates why alfalfa can be managed for only one hay cutting per year in tough dryland conditions of northern Montana and high elevation regions of Colorado, or for more than a dozen cuttings per year under irrigation in southern California.

Alfalfa Fall Dormancy (FD) Ratings

RATING	DESCRIPTION
1-2	Very Dormant
3-4	Dormant
5	Moderately Dormant
6-7	Semi-Dormant
8-9	Non-Dormant
10-11	Very Non-Dormant

Source: National Alfalfa & Forage Alliance (NAFA)

New Trait Development
Significantly more money and effort has been invested in the research and development of new alfalfa varieties than any other perennial forage.

Alfalfa (*Medicago sativa*). See also yellow-flowered Falcata alfalfa (*Medicago sativa ssp. falcata*) pictured on page 89.

Over the last few decades huge advances in the development of specific alfalfa traits has occurred, including:

- Disease resistance to verticilium wilt, fusarium wilt, etc., as well as a rating system for the six significant alfalfa diseases (Disease Resistance Index or DRI).
- Improved multifoliate (MF) expression, increasing the leaf-to-stem ratio and thereby improving protein content and feed value.
- Development of unique rooting characteristics such as branch roots, sunken crown and creeping roots for use in a wide range of growing conditions, including traffic tolerance.
- Soil salinity tolerance for either seedling establishment or stand persistence.
- Development of low initial rates of digestion (LIRD) for bloat reduction in cattle.
- Development of low-lignin plant tissues to extend the time period before harvest, thus allowing for increases in yield while maintaining forage quality and nutritive value; also provides for unintended delays in harvest schedules.
- Extremely long-lived grazing varieties for mixed-grass arid rangelands and irrigated pastures, increasing forage production and nutrient values over decades. (See: Falcata alfalfa, *Medicago sativa ssp. falcata, page 91.*)

Whether you need a tough alfalfa for grazing harsh rangelands or want to maximize the quality and productivity of your irrigated hay production, we can help you identify the best alfalfa variety for your needs.

Native Legumes & Nitrogen Fixers

Native legumes and other nitrogen-fixing species are commonly used for habitat restoration projects in wildland environments. Find them described in other sections of this catalog.

GRASSES & GRASSLIKES

Eleocharis palustris, Creeping spikerush † (p. 25)

Juncus balticus, Baltic rush † (p. 30)

WILDFLOWERS & FORBS

Astragalus canadensis, Canadian milkvetch (p. 46)

Astragalus filipes, Basalt milkvetch (p. 46)

Chamaecrista fasciculata, Partridge pea (p. 47)

Dalea spp., Prairie clovers (p. 48-49)

Desmanthus illinoensis, Illinois bundleflower (p. 49)

Hedysarum boreale, Northern sweetvetch (p. 52)

Lupinus spp., Lupines (p. 54-56)

Senna covesii, Desert senna (p. 61)

Thermopsis montana, Goldenbanner (p. 62)

Vicia Americana, American vetch (p. 63)

SHRUBS & TREES

Acmispon rigidus, Shrubby deervetch (p. 67)

Amorpha canescens, Leadplant (p. 68)

Calliandra eriophylla, Fairyduster (p. 71)

Ceanothus integerrimus, Deerbrush † (p. 71)

Ceanothus sanguineus, Redstem ceanothus † (p. 71)

Cercocarpus ledifolius, Curl-leaf mountain mahogany † (p. 71)

Cercocarpus montanus, True mountain mahogany † (p. 71)

Olneya tesota, Ironwood (p. 75)

Parkinsonia spp., Palo verdes (p. 75)

Prosopis spp., Mesquites (p. 76)

Purshia mexicana, Mexican cliffrose † (p. 76)

Purshia tridentata, Antelope bitterbrush † (p. 77)

Purshia tridentata var. glandulosa, Desert bitterbrush † (p. 77)

Senegalia greggii, Catclaw acacia (p. 78)

Shepherdia argentea, Silver buffaloberry † (p. 79)

Shepherdia canadensis, Russett buffaloberry † (p. 79)

Vachellia spp., Acacias (p. 79-80)

† *Indicates a non-leguminous species with the ability to fix nitrogen.*

*Medicago sativa ssp. falcata,** Falcata alfalfa (Yellow-flowered alfalfa)

Persistent, long-lived, very resilient nitrogen-fixing perennial legume with yellow flowers. Widely adapted within semi-arid environments. Leaves and stems are finer than conventional purple-flowered Alfalfa (*M. sativa*) and its root system is much more shallow and fibrous. Crown is set uniquely low beneath the soil surface. Low crown depth prevents damage from trampling and combined with significant plant dormancy, results in extreme tolerance to drought and cold. Excellent palatability to livestock and wildlife, including big game and waterfowl. Use in grazing systems, rangelands, wildlife habitat enhancement and erosion control projects. Readily hybridizes with common purple-flowered alfalfa. Varieties:

Don
Grazing-type alfalfa for mixed-grass seedings on semiarid rangelands and irrigated pastures, intended to increase forage production and nutrient values over decades. Non-aggressive but significantly more persistent than purple-flowered alfalfas on harsh rangelands and in competitive grazing systems. Grows below the canopy of most forage grasses. Enters dormancy when water is limited for an extended period, regrowing when moisture returns. (Released 2009, origin: Don Province, Russia) *Pictured on page 89.*

*Melilotus alba,** White sweetclover
*Melilotus officinalis,** Yellow sweetclover

Tall annual or biennial nitrogen-fixing legume with small white or yellow flowers. Traditionally thought to be two distinct species, but now often considered the same and readily hybridizing. Not true clovers (*Trifolium spp.*). Very drought, frost and cold tolerant. Adapted to all soil textures and moderate salinity; intolerant of acidic soils. Effective on clay pan, gravel, infertile and wet soils unsuitable for Alfalfa (*Medicago sativa*) and true clovers. Used for hay, silage, pasture and as a valuable honeybee plant, as well as for roadsides and mine reclamation. Establishes easily. Yellow-type blooms and matures earlier, is finer stemmed, shorter, more drought tolerant and persistent in pastures, and is much more commercially available. White-type is more productive, winter hardy and better for honey production. Either type may become weedy, invading nearby areas; cut or graze before seed-set where necessary.

*Onobrychis viciifolia,** Sainfoin

Tall nitrogen-fixing perennial legume with hollow, succulent stems and pink-striped flowers. Large, deep branching taproot and fine lateral roots. Drought tolerant and winter-hardy. Low salt tolerance. Intolerant of high water tables and wet soils; long-lived on dryland when managed properly. Matures faster than Alfalfa (*Medicago sativa*), providing early spring forage. Quickly gaining popularity as a non-bloat forage alternative to alfalfa. Extremely palatable and highly nutritious; digestibility equal to alfalfa. Use for hay, pasture, rangeland or silage, alone or with grasses. Also use for wildlife habitat enhancement and food plots for elk, deer, pheasant and sage-grouse. Superior honey plant to alfalfa. Not invasive or weedy. *Pictured on pages 87 and 94.*

Delaney
Multiple-cut variety with excellent regrowth potential. Higher forage yields under irrigation than other varieties, as well as

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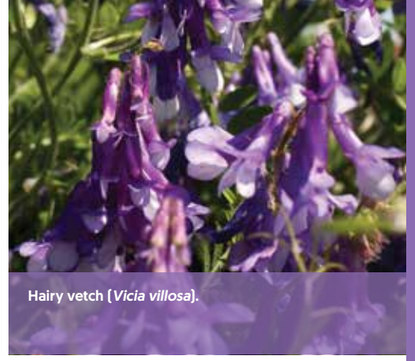
Crimson clover (*Trifolium incarnatum*).

Red clover (*Trifolium pratense*).



Hairy vetch (*Vicia villosa*).

Birdsfoot trefoil (*Lotus corniculatus*), Cicer milkvetch (*Astragalus cicer*) and Ladak 65 (*Alfalfa, Medicago sativa*). Use as a replacement for Remont under high rainfall or irrigation. (Released 2007, origin: Eski, Remont and other populations)

Eski
Developed for use in non-irrigated pastures or land with limited water. Used frequently in reclamation, rangelands and wildlife habitat mixtures. Later to mature than Remont. (Released 1964, origin: Turkey)

Remont
Extremely cold hardy variety with early spring growth and rapid regrowth after haying or grazing. Susceptible to frost damage. High yield potential in areas with a long growing season. (Released 1971, origin: Iran)

Shoshone
Developed for high tolerance to the northern root-knot soil nematode. Resistant to alfalfa stem nematode. Cold hardy. Regrows better than Remont and Eski. Higher yield than Remont in both dryland and irrigated settings. (Released 2004, origin: Eski, Remont and other populations)

*Pisum sativum ssp. arvense,** Field pea (Spring pea, Austrian winter pea)

Climbing nitrogen-fixing annual legume with white to pink flowers, closely related to the garden pea. Prefers fertile, light-textured, well-drained soils; sensitive to salinity and high acidity. Water efficient and cold tolerant. Rapid and abundant forage producer with low bloat potential. Use for hay, silage, green manure or in wildlife food plots. May be grazed but easily damaged by trampling. Often seeded with cereal crops, especially Oats (*Avena sativa*), for climbing structure and to improve hay nutrition. May be fall-seeded, but also may be seeded in spring as a summer annual. Early and long blooming period attracts beneficial insects, honeybees and native pollinators. Some varieties are semi-leafless, with vining tendrils that replace leaflets and aid in upright growth and improved harvest.

*Trifolium alexandrinum,** Berseem clover

Fast growing annual legume with yellowish-white flowers. Shallow taproot grows well in all soil textures except sands. Tolerant of wet soils and alkalinity. Superior nitrogen-fixer. Non-bloat, high protein forage with excellent palatability that meets or exceeds the quality of Alfalfa (*Medicago sativa*) and Crimson clover (*T. incarnatum*). Use in rotations for grazing, hay, silage, green manure, wildlife food plots or cover. Also use to enhance companion crops, especially alfalfa. Winter kills easily. Use as a summer and fall annual in northern latitudes and a winter annual in southern latitudes. Varieties:

Frosty
Multiple-cut type. Extends the grazing season and lowers nitrogen inputs. Excellent companion crop to alfalfa during stand establishment, or overseed into declining or winter-killed fields.

*Trifolium fragiferum,** Strawberry clover

Low growing nitrogen-fixing perennial legume with stolons and round pink flower heads resembling strawberries. Widely adapted to all soil textures. Highly tolerant of saline and alkaline soils; able to withstand flooding and poorly drained sites. Will survive short periods of drought. Easily established and grows rapidly but seedlings are not competitive with weeds. Persistent once established and more tolerant of heavy grazing than other clovers. Use for erosion control, pasture, hay, green manure, pollinator habitat and groundcover in orchards and vineyards. Leaves and seeds foraged by wild game animals and upland birds. Varieties:

Palestine
Large-leaved, erect, vigorous growth. Better adapted to higher elevations than other varieties, but susceptible to frost. (Released 1938, origin: Israel)

*Trifolium hirtum,** Rose clover

Short to medium statured nitrogen-fixing annual legume with pink flowers. Adapted to well-drained, strongly acidic to moderately alkaline soils on dry, infertile sites. More drought tolerant than other annual clovers. Seedling vigor is lower than Crimson clover (*T. incarnatum*). Used to enhance marginal dryland pastures and as a low growing, self-perpetuating cover crop in vineyards and orchards, requiring little management. Highly nutritious and palatable. May become weedy, invading nearby areas; till, cut or graze before seed-set where necessary.

*Trifolium hybridum,** Alsike clover

Medium statured, relatively short-lived nitrogen-fixing perennial legume with pale pink to white flowers. Not a hybrid, despite its name. Adapted to a wide range of soil types, including sites too acidic for Red clover (*T. pratense*); more alkaline tolerant than most clovers. Prefers wet sites, tolerating waterlogged soils and up to six weeks of flooding. Winter hardy, able to survive at northern latitudes and high elevations. Use for hay, pasture and soil improvement on cool, wet sites. Plant with Timothy (*Phleum pratense*) or Meadow brome (*Bromus*

*Introduced to North America.

biebersteinii) to improve hay production and prevent lodging. Excellent nectar and pollen source for bees, especially honeybees.

*Trifolium incarnatum,** Crimson clover

Short to medium statured, nitrogen-fixing annual legume with long bright scarlet flowers. Prefers fertile, well-drained sand to clay soils. Intolerant of poor drainage and high alkalinity. Acidity tolerance is higher than White clover (*T. repens*) and Red clover (*T. pratense*). More productive at lower temperatures than most other clovers; popular winter annual pasture in many southern states. Use for hay, pasture and as a silage companion crop. Less bloat risk than white clover or Alfalfa (*Medicago sativa*). Also use for firebreaks, green manure and as a self-seeding, weed suppressing cover crop in vineyards and orchards. Excellent in wildlife food plot mixes, including deer and wild turkeys. Flowers attract native bees, honeybees and beneficial insects. May become weedy, invading nearby areas; till, cut or graze before seed-set where necessary. *Pictured on page 92.*

Dixie
Developed for improved reseeding from strains exhibiting excellent reseeding ability, high forage yields and a high percentage of hard seed, helping to delay self-seeded germination until fall when conditions are most favorable. (Released 1953)

*Trifolium michelianum,** Balansa clover

Extremely productive, nitrogen-fixing winter annual legume with small white-pink flowers. Grows on heavy clays to moderately sandy soils. Tolerant of acidity; mildly tolerant of salinity. Mature plants are tolerant of waterlogged soils and short periods of flooding. Prostrate, hollow stemmed plants form a dense, highly productive mat of extremely palatable forage. Use as cover crop, pasture, wildlife food plots, hay or silage, either in a monoculture or mixed with other species. Germinates quickly. Persists even under continuous, intensive grazing. Readily reseeds itself when allowed to set seed. Attractive pollinator and honeybee plant. Varieties:

FIXatioN
Produces huge amounts of biomass, suppressing weeds. Matures up to 14 days later than Dixie (Crimson clover, *T. incarnatum*) and up to 28 days later than previously developed varieties, resulting in greater overall growth and productivity. Better recovery from grazing or cutting than crimson clover. More winter hardy than other varieties.

*Trifolium pratense,** Red clover

Popular nitrogen-fixing biennial or short-lived perennial legume with rose-pink flowers. Prefers heavy, well-drained soils but is tolerant of some poor drainage. More tolerant of moderate acidity than Alfalfa (*Medicago sativa*). Quick growing and easily established, tolerating moderate summer heat when adequate moisture is available. Widely used with forage grasses for hay, pasture and silage as well as for wildlife food plots and soil enhancement. Two forms: medium-types (double-cut) and mammoth-types (single-cut). Medium-types are most common, grow back quickly after cutting and are suited for multi-cut or grazing systems. Mammoth-types mature later, recover slower after cutting and are recommended for single-cut hay systems in areas with a short growing season or biennial plowdown applications. Pollinated by native bees and honeybees. State flower of Vermont. *Pictured on page 92.* Varieties:

Kenland
Medium-type (double-cut) with a superior forage yield over most other varieties; also longer-lived. Good resistance to southern anthracnose fungus and some resistance to crown and root rot. (Released 1947, origin: Europe)

*Trifolium repens,** White clover

Short, stoloniferous nitrogen-fixing perennial legume with white flowers. Adapted to shallow, moist clay and silt soils or fertile sands with adequate moisture. Difficult to establish and short-lived on dry sites. Slightly acidic to mildly alkaline tolerant. Somewhat winter hardy. Possibly the world's most widely distributed and commonly used forage legume. Use with grasses in wet or irrigated grazing systems. Highly palatable and nutritious forage for livestock and wildlife. Leaves and seeds are eaten by bears, large herbivores and numerous birds, including sage-grouse, ruffed grouse and sharp-tailed grouse. Pollen and nectar source for honeybees, bumblebees and beneficial insects. Varieties:

Ladino
Large-type, distinguished by its large growth form, thicker stems and stolons, and fewer flowers and seeds. Use in pastures with grasses, or tall enough to harvest for hay, silage and green chop. Produces more tonnage than other types.

White Dutch
Medium-type, distinguished by its low growth form, aggressive tillering, and numerous flowers. Good for grazing and high traffic areas. Also used in lawns to aid in fertilization.

*Vicia villosa,** Hairy vetch

Vining, nitrogen-fixing winter annual or short-lived perennial legume with soft woolly stems and leaves and purple flowers. Adapted to a wide range of well-drained soils; intolerant of acidity and salinity. Suited to wetter soils and colder winters than most other winter-active legumes. More drought tolerant than other vetches. Fast growth for hay, pasture, silage or green manure. Highly palatable and nutritious. Often grown with annual forage grasses as climbing structure and to improve hay quality. Also use as a self-perpetuating, weed-smothering cover crop, in agricultural rotations and in orchards and vineyards. Attractive seed and nesting cover to doves, pheasants, quail and pigeons. Attracts bumblebees and beneficial insects. May become weedy, invading nearby areas; till, cut or graze before seed-set where necessary. *Pictured on page 92.*

*Vicia villosa ssp. varia,** Woolly pod vetch

Formerly *Vicia dasycarpa*. Vining, nitrogen-fixing winter annual or short-lived perennial legume with pink-purple flowers. Adapted to a wide range of well-drained soils; tolerant of moderately acidic and alkaline soils. Not as cold or drought tolerant as Hairy vetch (*V. villosa*). Faster growing, earlier maturing and more productive than hairy vetch; better climbing ability. Use for hay, pasture, silage or green manure. Highly palatable and nutritious. Often seeded with annual forage grasses to reduce lodging and improve hay quality. Also use as a self-perpetuating cover crop and in agricultural rotations. Able to smother weeds, including noxious species such as yellow starthistle and medusahead. Valuable seed and nesting cover to doves, pheasants, quail and pigeons. Attracts numerous pollinators and beneficial insects. May become weedy, invading nearby areas; till, cut or graze before seed-set where necessary. Varieties:

Lana
Earliest maturing of all the vetches, blooming two to three weeks earlier than hairy vetch. Also used for revegetating roadsides, channel banks and soil stabilization. (Released 1956, origin: Turkey)

*Introduced to North America.

Inoculating Legumes

Legumes are able to fix atmospheric nitrogen as a result of a symbiotic relationship with soil bacteria called rhizobia. The available nitrogen serves plant growth, health and soil fertility.

Inoculating legume seed with the correct strain of rhizobia is important to ensure optimal plant growth and development.

Rhizobia strains are species specific. For example, many alfalfas, sweetclovers and some true clovers come pre-inoculated with their specific rhizobia held in a carrier applied at the time of packaging.

Generally, all other legume species should be inoculated with their specific rhizobia strain just prior to planting. Rhizobia inoculant is very much a living product, so proper storage and application must be followed.

Granite Seed provides species specific rhizobia. Feel free to discuss inoculation with our sales staff at the time of ordering.

Pure Sainfoin (*Onobrychis vicilifolia*) seed ready to be bagged after cleaning and processing.

Turfgrass & Turf Blends

turfgrass / terf-grahs / noun:
1. any of numerous grasses grown densely, maintained and mowed for lawn and turf

Efforts to develop novel turfgrasses with more desirable characteristics have resulted in numerous new and improved lawn varieties available to today's consumer. Genetic color, leaf texture, seedling vigor, sod density, shade tolerance, drought and heat tolerance, and insect and disease resistance are among the characteristics breeders continue to develop. Instead of being limited to only varieties from a single producer, Granite Seed carefully selects the best performing, highest quality turf varieties available. The following turfgrass products are those that we routinely stock at the time of this publication, however be sure to ask us if a variety or blend you require is not listed here.

TURFGRASS BLENDS

Every lawn and sports field has patchy areas with differences in moisture, sun, shade and soil properties. Blending turfgrasses is a good strategy to lessen the effects of site variations and create consistent and even turf. Granite Seed carefully selects high quality varieties for our blends—with tolerances to shade, heat, drought, cold, pests and diseases—in order to ensure uniform turf, even when the site is not. Whether for golf courses, parks, schools, athletic fields or home yards, our blends create luxurious, healthy lawns. Be sure to ask if there is a type of blend you are interested in that is not listed here.

Recommended rates are based on mechanical broadcast or hydroseed application.

Blue Ribbon Blend

Several elite-type Kentucky bluegrasses and Perennial ryegrasses with dark green color and high traffic tolerance. This attractive blend has a wide range of uses from golf course fairways and roughs, to sports turf, parks and residential lawns. Perennial ryegrass in the mix provides fast establishment, though it can be coarse when mowed at taller heights. [*Apply at 4-5 lbs/1,000 ft²*.]

Velvet Blue Blend

Various elite Kentucky bluegrass varieties for use on golf courses, sports turf, parks, commercial campuses and residential lawns. Dark green color, fine textured with good turf density. High traffic tolerance; good winter color. Slower to establish than Blue Ribbon Blend because it contains no Perennial ryegrass. [*Apply at 2-3 lbs/1,000 ft²*.]

Triple Play Blend

Three low-growing, dark green turf-type Tall fescue varieties blended for wear and drought tolerance, heat tolerance and good disease resistance. For use on athletic fields, campuses and residential lawns. [*Apply at 8-10 lbs/1,000 ft²*]

Fine Fescue Blend

Numerous low-growing fine-leaved fescues, including Hard, Sheep, Chewings and Creeping red fescues; do not confuse with more traditional, coarser-leaved Tall fescue. Tolerant of shade, reduced irrigation and soils with low fertility. Use as turf in commercial landscapes and low maintenance residential lawns. May also be used for erosion control under various soil conditions, or apply at a low rate to add a low-growing ornamental grass component within wildflower mixes. [*Apply at 6-8 lbs/1,000 ft²*.]

Perennial Ryegrass Blend

Three premium Perennial ryegrasses with salt tolerance and grey leaf spot disease resistance. Quick to establish. Dark green color and good turf density for residential and commercial lawns. Also use for fall/winter overseeding of Bermudagrass lawns, sports turf and golf courses in the Southwest. [*Apply at 10 lbs/1,000 ft²*.]

Sun & Shade Turf Blend

Elite Kentucky bluegrass, Perennial ryegrass, Hard fescue and Chewings fescue varieties. Dark green and fine textured with high turf density. Similar to Blue Ribbon Blend, but for use in lawn areas having both full sun and heavy shade. [*Apply at 4-5 lbs/1,000 ft²*.]

Bermudagrass Blend

Varieties of low-growing, high density, low water using, warm season Bermudagrass. Moderate to dark green colored, medium textured leaves. Use in golf courses, parks, commercial landscapes and premium home lawns in the Southern states. [*Apply at 2-3 lbs/1,000 ft²*.]

Buffalograss Blend

Dark green, fine textured blend of drought tolerant, warm season Buffalograss varieties. Uses less water and fertilizer, requires less mowing, and can be used in place of Bermudagrass for low maintenance turfgrass. Use in low foot-traffic parks, commercial campuses and residential lawns. [*Apply at 3 lbs/1,000 ft²*.] golf courses, commercial campuses and residential lawns in the cool, humid Northeast. [*Apply at 4-5 lbs/1,000 ft²*.]

Northeast Turf Blend

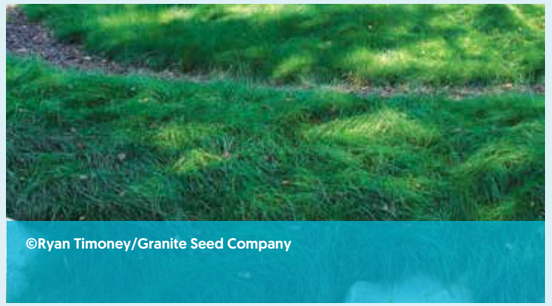
Chewings fescue and Creeping red fescue blended with three elite Kentucky bluegrass varieties. More shade tolerant than the Velvet Blue Blend. This premium blend is for use on golf courses, commercial campuses and residential lawns in the cool, humid Northeast. [*Apply at 4-5 lbs/1,000 ft²*.]

Northwest Turf Blend

Three premium Perennial ryegrasses, along with elite-type Creeping red fescue and Kentucky bluegrass varieties. Salt and drought tolerant and resistant to grey leaf spot disease. Use on golf courses, parks, commercial landscapes and residential lawns in the Northwest. [*Apply at 5-6 lbs/1,000 ft²*.]

Meadow Lawn Blend

Three low-growing native and naturalized grasses blended for a low-maintenance, water-wise, alternative to traditional lawns. Designed to be left unmowed for weeks at a time, creating a rugged, naturalized appearance. Requires less frequent watering and maintenance and thrives in infertile soils; shade tolerant. [*Apply at 8-10 lbs/1,000 ft²*.]



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TURFGRASS VARIETIES

Agrostis capillaris,* Colonial bentgrass
- Highland

Agrostis palustris,* see *Agrostis stolonifera*

Agrostis stolonifera,*
Creeping bentgrass (Creeping bentgrass)
- Alpha, L-93, Penn A-1, Penn A-4, Penncross, PennLinks II, Seaside II, Southshore, T-1, V8

Agrostis tenuis,* see *Agrostis capillaris* (Colonial bentgrass)

Bouteloua dactyloides, Buffalograss
- Bison, Bowie, Cody, Plains, SWI 2000, Texoka, TopGun

Bouteloua gracilis, Blue grama
- Alma, Bad River, Bird's Eye, Hachita, Lovington

Buchloe dactyloides,
see *Bouteloua dactyloides* (Buffalograss)

Cynodon dactylon,* Bermudagrass
- Bermuda Triangle, Blackjack, Gobi, Jackpot, Maya, Mohawk, Princess 77, Sahara, Savannah, Southern Star, Sultan, Sunbird, Sundevil II, Yukon

Festuca arundinacea,* Tall fescue
- Amity, Arid 3, Blade Runner II, Cochise IV, Corbett, Corona, Coyote II, Crossfire 3, Falcon IV, Inferno, Mustang 4, Renegade DT, Spyder LS

Festuca arvernensis,* Blue fescue
- Azure

Festuca brevipila,* Hard fescue
- Aurora Gold, Predator, Reliant IV, Viking H_2O

Festuca longifolia,* see *Festuca brevipila* (Hard fescue)

Festuca ovina,* Sheep fescue
- Azay, Bighorn, Covar, Marco Polo

Festuca ovina glauca,
see *Festuca arundinacea* (Blue fescue)

Festuca rubra,* Creeping red fescue
- Audubon, Epic, Garnet, Jasper II, Lighthouse, Shademaster III

Festuca rubra commutata,*
see *Festuca rubra ssp. fallax* (Chewings fescue)

Festuca rubra ssp. fallax,* *Chewings fescue*
- Ambrose, J-5, Shadow II, Windward

Lolium multiflorum,* Annual ryegrass
see *Grasses & Grasslikes*

Lolium perenne,* Perennial ryegrass
- Accent II, Amazing GS, Brightstar SLT, Caddieshack II, Citation Fore, Dasher 3, Deschutes, Fiesta 4, La Quinta, Metolius, Molalla, Palmer III, Paragon GLR, Silver Dollar, Top Gun II

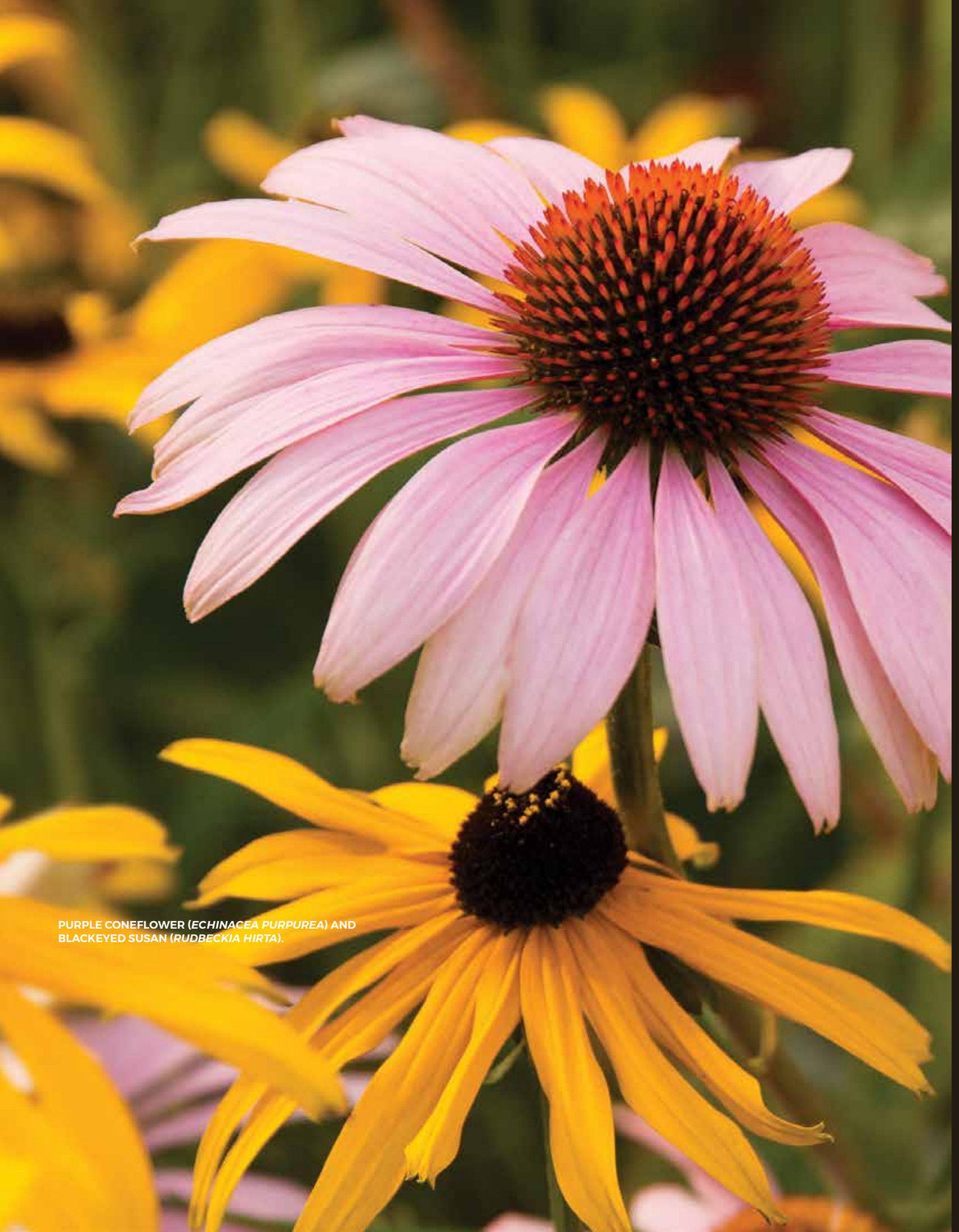
Paspalum vaginatum,* Seashore paspalum
- Desert Oasis, Sea Spray

Poa pratensis,* Kentucky bluegrass
- Armada, Ashland, Avalanche, Award, Baron, Blue Note, Corsair, Diva, Everest, EverGlade, Full Moon, Ginney II, Jumpstart, Kenblue, Langara, Legand, Mazama, Mercury, Midnight, Midnight II, Moonlight SLT, Mystere H_20, NuDestiny, NuGlade, P-105, Prosperity, Quartz, Right, Rugby II, Thermal Blue

Poa trivialis,* Rough bluegrass
- Darkhorse, Laser, Sabre, Winterstar

Puccinellia distans,* Alkaligrass
- Fults II, Salty

**Introduced to North America.*



PURPLE CONEFLOWER (*ECHINACEA PURPUREA*) AND BLACKEYED SUSAN (*RUDBECKIA HIRTA*).

Regional
Wildflower Blends

regional / ree-juh-nl / adjective:
affecting or serving a particular region.

wildflower / wyld-flaur / noun:
1. a flower or the plant bearing it which grows freely without human intervention.
2. flowering plant that generally grows in fields, deserts and forests without deliberate cultivation.

Wildflower blends create attractive clusters of changing colors throughout the growing season, while also providing essential food and nesting habitat for beneficial insects and pollinators. Granite Seed provides a large selection of premixed wildflower blends for use in ornamental landscaping and naturalized areas. Each blend is specifically designed to be adaptable to a wide range of conditions within its geographic region, with emphasis on native species and a balanced percentage of annuals and perennials, while containing absolutely no inert fillers. We also provide blends intended to satisfy the functional needs of unique sites and projects—considering height, shade tolerance and lifespan—while remaining well-adapted to most regions of the United States. Wildflower blends may be used in prepared beds or mixed with short ornamental grasses to create flowering meadow areas (see *Fine Fescue Blend*, page 97). Mixes may change slightly from time to time due to availability.

California poppy (*Eschscholzia californica*).

Bachelor button (*Centaurea cyanus*).

Mexican hat (*Ratibida columnifera var. pulcherrima*).

California Wildflower Blend

Adapted to Pacific coastal areas and the Central Valley region.

Annuals
Scarlet flax, California poppy, African daisy, Chinese houses, Gilia species, Bachelor button, Plains coreopsis, Farewell-to-spring, California bluebells, Lacy phacelia.

Perennials
Lupine species, Lewis flax, Mexican hat, Yellow prairie coneflower, Purple coneflower, Blanketflower, Lanceleaf coreopsis, Blackeyed Susan, Colorado blue columbine, Primrose species.

Great Basin Wildflower Blend

Adapted to the low valleys and foothills regions of the Intermountain West.

Annuals
Scarlet flax, California poppy, Rocky Mountain beeplant, Sulphur cosmos, Wallflower, Firewheel, Bachelor button, Baby snapdragon, Gilia species, Plains coreopsis, Shirley poppy, Drummond phlox, Lacy phacelia.

Perennials
Lanceleaf coreopsis, Lewis flax, Purple coneflower, Lupine species, Aster species, Blanketflower, Penstemon species, Blackeyed Susan, Yellow prairie coneflower, Mexican hat, Globemallow species, Paintbrush species, Arrowleaf balsamroot.

Midwest Wildflower Blend

Adapted for areas throughout the central United States and Great Plains.

Annuals
Firewheel, Scarlet flax, California poppy, Lemon beebalm, Rocket larkspur, Bachelor button, Clasping coneflower, Shirley poppy, Plains coreopsis, Baby snapdragon, Drummond phlox, Sulphur cosmos, Birds eye.

Perennials
Purple coneflower, Lewis flax, Lanceleaf coreopsis, Blanketflower, Purple prairie clover, Blackeyed Susan, Thickspike blazingstar, Yellow prairie coneflower, Mexican hat.

Northeast Wildflower Blend

Adapted to areas throughout New England and the Mid-Atlantic states.

Annuals
California poppy, Scarlet flax, Bachelor button, Firewheel, Gilia species, Shirley poppy, Plains coreopsis, Baby snapdragon, Baby blue eyes, Five spot, Wallflower, Sulphur cosmos.

Perennials
Lupine species, Lewis flax, Lanceleaf coreopsis, Mexican hat, Purple coneflower, Thickspike blazingstar, Blanketflower, Blackeyed Susan, Eastern red columbine, Aster species, Yellow prairie coneflower, Standing cypress.

Northwest Wildflower Blend

Adapted to northern California, the Pacific Northwest and into British Columbia.

Annuals
California poppy, Scarlet flax, Bachelor button, Gilia species, African daisy, California bluebells, Shirley poppy, Farewell-to-spring, Mountain phlox, Plains coreopsis, Baby snapdragon, Tidy tips, Firewheel, Rocket larkspur, Sulphur cosmos, Wallflower, Lacy phacelia.

Perennials
Lewis flax, Lupine species, Penstemon species, Blanketflower, Mexican hat, Blackeyed Susan, Lanceleaf coreopsis, Colorado blue columbine, Aster species, Aspen daisy, Yellow prairie coneflower, Purple coneflower.

Regional Pollinator Blends

Perennial-heavy blends designed to optimize pollen and nectar availability for as much of the blooming season as possible. Includes a wide variety of wildflowers and legumes attractive to both native pollinators and honeybees. Mixes vary by geographic region.

Rocky Mountain Wildflower Blend

Adapted to mountain elevations with greater than 15 inches annual precipitation.

Annuals
California poppy, Scarlet flax, Sulphur cosmos, Wallflower, Firewheel, Bachelor button, Mountain phlox, Plains coreopsis, Shirley poppy, Baby snapdragon, Gilia species, Drummond phlox.

Perennials
Lewis flax, Purple coneflower, Rocky Mountain iris, Lanceleaf coreopsis, Lupine species, Blanketflower, Sweet anise, Penstemon species, Blackeyed Susan, Mexican hat, Yellow prairie coneflower, Colorado blue columbine, Aspen daisy, Showy goldeneye, Iceland poppy, Paintbrush species, Aster species.

Sonoran Desert Wildflower Blend

All-native blend adapted to the Sonoran Desert and adjacent areas.

Annuals
Mexican Poppy, Arizona poppy, Blanketflower, California poppy, Cosmos, Desert daisy, Tidy tips, Arizona lupine, Desert lupine, Purple owl's clover, Desert bluebells, Firewheel, Lacy phacelia.

Perennials
Desert senna, Parry's penstemon, Desert marigold, Showy evening primrose, Firecracker penstemon, Desert globemallow, Desert sunflower, Brittlebush.

Southeast Wildflower Blend

Adapted to the warmer and wetter Southeastern United States.

Annuals
Sulphur cosmos, Scarlet flax, Rocket larkspur, Clasping coneflower, Birds eyes, Plains coreopsis, Shirley poppy, Baby blue eyes, Five spot, Lemon beebalm, Baby snapdragon, Firewheel.

Perennials
Purple coneflower, Blanketflower, Perennial lupine, Lanceleaf coreopsis, Blackeyed Susan, Yellow prairie coneflower, Mexican hat, Aster species, Primrose species.

Southwest Wildflower Blend

Adapted to the arid Southwestern United States.

Annuals
Scarlet flax, Firewheel, Lupine species, Tidy tips, California poppy, Mexican gold poppy, California bluebells, Shirley poppy, Plains coreopsis, Baby blue eyes, Five spot, Sulphur cosmos, Lacy phacelia.

Perennials
Lanceleaf coreopsis, Blanketflower, Lupine species, Penstemon species, Aster species, Globemallow species, Primrose species, Yellow prairie coneflower, Mexican hat, Purple prairie clover, Blackeyed Susan, Desert marigold.

Functional blends designed for height, shade tolerance and lifespan, while remaining well-adapted to most regions of the United States.

Annual Wildflower Blend

Blend of annual species for overseeding and replenishing the color of an existing perennial garden or naturalized area.

Annuals
California poppy, Cosmos, Drummond phlox, Rocket larkspur, Gilia species, Sulphur cosmos, Scarlet flax, Firewheel, Rocky Mountain beeplant, Wallflower, White alyssum, Bachelor button, Lemon beebalm, Shirley poppy, Baby snapdragon, Mountain phlox, Plains coreopsis, Tidy tips, Lacy phacelia.

Lacy phacelia (*Phacelia tanacetifolia*).

Low Growing Wildflower Blend

Annuals and perennials with average heights of 6 to 18 inches.

Annuals
Scarlet flax, Gilia species, California poppy, Drummond phlox, Wallflower, Tidy tips, Weatherglass, White alyssum, Shirley poppy, Baby blue eyes.

Perennials
Mountain lupine, Utah sweetvetch, Lewis flax, Aster species, Penstemon species, Scarlet globemallow, Sulphur buckwheat, Primrose species, Rocky Mountain iris.

Sun & Shade Wildflower Blend

Species adapted to partial sun and shady sites with greater than 15 inches annual precipitation.

Annuals
Fivespot, Scarlet flax, California poppy, Baby blue eyes, Bachelor button, Weather glass, Birds eyes, Shirley poppy, Plains coreopsis, Farewell-to-spring, Baby snapdragon.

Perennials
Mountain lupine, Lanceleaf coreopsis, Lewis flax, Blanketflower, Aster species, Colorado blue columbine, Penstemon species, Aspen daisy, Sulphur buckwheat, , Purple coneflower.

Wetland
Species Index

Wetlands are the transitional areas between aquatic and upland habitats where the water table is at or near the soil surface, saturating the ground or covering it with a shallow layer of water for all or part of the year. Wetlands have obvious aesthetic and recreational worth but they are also vital to the overall health of the environment, providing ecosystem functions and values such as:

- Restoration of water quality
- Filtration of pollutants and chemicals
- Flood prevention and control of stormwater runoff
- Decreased shoreline erosion
- Groundwater recharge
- Persistence of summer stream flows
- Habitat for spawning fish and other aquatic life
- Productive and diverse plant communities for terrestrial wildlife

Even constructed wetlands intended as landscape features within communities, parks and golf courses may provide similar aesthetic, recreational and ecosystem services for people and wildlife.

The Federal government accords special priority to preserving healthy wetlands and has developed the National Wetland Plant List (NWPL) as the standard reference of vascular plants for use in wetland delineation, assessment, mitigation and restoration. Each species on the NWPL has been given an indicator status to signify its preference for wetland or non-wetland habitats.

WETLAND INDICATOR STATUS	DESCRIPTION
Obligate (OBL)	Almost always occurs in wetlands.
Facultative Wet (FACW)	Usually occurs in wetlands, but may occur in non-wetlands.
Facultative (FAC)	Occurs in wetlands and non-wetlands.
Facultative Upland (FACU)	Usually occurs in non-wetlands, but may occur in wetlands.
Upland (UPL)	Almost never occurs in wetlands.

Wetland creation, mitigation and restoration projects are increasing and Granite Seed's diverse inventory of new wetland grass, sedge, rush, forb, shrub and tree species is growing as well. If you require species not found here, please ask.

The following table lists the NWPL species included within this catalog as well as their wetland indicator statuses. Only species which have at least a partial indicator status of OBL, FACW or FAC are listed. A species having more than one indicator status signifies its variability of habitat across its geographic distribution. Species which may be appropriate for use in riparian habitats, detention basins or other wet site applications, but were not on the NWPL at the time of this printing, have not been included in this table. If you believe a plant not listed here may work for such a project, consult the information provided in other sections of this catalog or contact us.

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS	PAGE
GRASSES & GRASSLIKES			
*Agrostis capillaris**	Colonial bentgrass	FAC	18
*Agrostis gigantea**	Redtop	FACW/FAC	18
*Agrostis scabra**	Rough bentgrass (Ticklegrass)	FAC	18
*Agrostis stolonifera**	Creeping bentgrass	FACW/FAC	18
*Alopecurus arundinaceus**	Creeping meadow foxtail	FACW/FAC	18
*Alopecurus pratensis**	Meadow foxtail	FACW/FAC	18
Beckmannia syzigachne	American sloughgrass	OBL	19
Bolboschoenus maritimus	Alkali bulrush	OBL	19
Bromus ciliatus	Fringed brome	FACW/FAC	22
Calamagrostis canadensis	Bluejoint reedgrass	OBL/FACW	22
Carex aquatilis	Water sedge	OBL	22
Carex athrostachya	Slenderbeak sedge	FACW	22
Carex bebbii	Bebb's sedge	OBL	23
Carex microptera	Smallwing sedge	FAC/FACU	23
Carex nebrascensis	Nebraska sedge	OBL	23
Carex obnupta	Slough sedge	OBL	23
Carex pellita	Woolly sedge	OBL	23
Carex praegracilis	Clustered field sedge (Blackcreeper sedge)	FACW	23
Carex simulata	Analogue sedge	OBL	23
Carex stipata	Awlfruit sedge	OBL	23
Carex utriculata	Beaked sedge	OBL	23
Carex vulpinoidea	Fox sedge	OBL/FACW	23
Danthonia californica	California oatgrass	FAC/FACU	24
Deschampsia caespitosa	Tufted hairgrass	FACW	24
Deschampsia elongata	Slender hairgrass	FACW/FAC	24
Distichlis spicata	Inland saltgrass	FACW/FAC	24
Eleocharis palustris	Creeping spikerush	OBL	25
Elymus canadensis	Canada wildrye	FAC/FACU	25
Elymus virginicus	Virginia wildrye	FACW/FAC	27
*Festuca rubra**	Creeping red fescue	FAC/FACU	29
Festuca rubra	Native red fescue	FAC/FACU	29
Glyceria grandis	American mannagrass	OBL	30
Glyceria occidentalis	Western mannagrass	OBL	30
Glyceria striata	Fowl mannagrass	OBL	30
Hordeum brachyantherum	Meadow barley	FACW/FAC	30
Juncus balticus	Baltic rush	OBL/FACW	30
Juncus effusus	Common rush (Soft rush)	OBL/FACW	31
Juncus ensifolius	Swordleaf rush (Daggerleaf rush)	FACW	31
Juncus tenuis	Poverty rush (Path rush)	FACW/FAC	31
Juncus torreyi	Torrey's rush	FACW	31
Leymus cinereus	Great Basin wildrye	FAC/UPL	31

**Introduced to North America.*

VEGETATION DIVERSITY AT CHILLY SLOUGH WETLAND CONSERVATION AREA NEAR MACKAY, IDAHO

SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS	PAGE
Leymus triticoides	Beardless wildrye (Creeping wildrye)	FAC	32
Muhlenbergia asperifolia	Scratchgrass	FACW	33
Panicum virgatum	Switchgrass	FACW/FAC	33
*Paspalum vaginatum**	Seashore paspalum	OBL/FACW	34
Phalaris arundinacea	Reed canarygrass	FACW	34
Phleum alpinum	Alpine timothy	FACW/FAC	34
Poa alpina	Alpine bluegrass	FAC/FACU	35
Poa palustris	Fowl bluegrass	FACW/FAC	36
*Poa trivialis**	Rough bluegrass	FACW/FAC	36
*Puccinellia distans**	Alkaligrass	OBL/FACW	37
Puccinellia nuttalliana	Nuttall's alkaligrass	OBL/FACW	37
Schoenoplectus acutus var. acutus	Hardstem bulrush	OBL	38
Schoenoplectus americanus	Olney threesquare	OBL	38
Schoenoplectus pungens	Common threesquare	OBL	38
Schoenoplectus tabernaemontani	Softstem bulrush	OBL	38
Scirpus microcarpus	Smallfruit bulrush	OBL	38
Spartina pectinata	Prairie cordgrass	OBL/FACW	39
Sporobolus airoides	Alkali sacaton	FAC	39
Sporobolus wrightii	Big sacaton	FACW/FAC	40
Triglochin maritima	Arrowgrass	OBL	41
Tripsacum dactyloides	Eastern gamagrass	FAC	41
Typha latifolia	Cattails	OBL	41
WILDFLOWERS & FORBS			
Aquilegia canadensis	Eastern red columbine	FAC	45
Aquilegia coerulea	Colorado blue columbine	FAC/FACU	45

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SCIENTIFIC NAME	COMMON NAME	WETLAND INDICATOR STATUS	PAGE
Aquilegia formosa	Western red columbine	FAC	45
Asclepias incarnata	Swamp milkweed	OBL/FACW	45
Asclepias speciosa	Showy milkweed	FAC	46
Astragalus canadensis	Canadian milkvetch	FACW/FAC	46
Camassia quamash	Camas	FACW	47
Campanula rotundifolia	Harebell	FAC/FACU	47
Castilleja minor	Lesser Indian paintbrush	OBL	47
Castilleja rhexiifolia	Splitleaf Indian paintbrush	FAC	47
Dracopis amplexicaulis	Clasping coneflower	FACW/FAC	50
Geranium viscosissimum	Sticky purple geranium	FAC/FACU	51
Helianthus nuttallii	Nuttal's sunflower (Marsh sunflower)	FACW	52
Iris missouriensis	Rocky Mountain iris (Western blue flag)	FACW	52
Liatris spicata	Dense blazingstar (Marsh gayfeather)	FAC	53
Lupinus polyphyllus	Bigleaf lupine	FAC/FACU	55
Lupinus rivularis	Riverbank lupine	FAC/FACU	55
Mimulus guttatus	Monkeyflower	OBL	56
*Myosotis sylvatica**	Forget-me-not	FAC/FACU	56
Oenothera elata	Hooker's evening primrose	FACW	57
Penstemon procerus	Smallflower penstemon (Littleflower penstemon)	FAC/UPL	59
Penstemon rydbergii	Rydberg's penstemon	FAC/FACU	59
Rudbeckia occidentalis	Western coneflower	FAC	61
Sisyrinchium bellum	Blue-eyed grass	FACW	62
Symphyotrichum chilense	Pacific aster	FAC	62
Symphyotrichum novae-angliae	New England aster	FACW	62
Thermopsis montana	Mountain goldenbanner	FAC	62
Verbena hastata	Blue verbena (Swamp vervain)	FACW/FAC	63
SHRUBS & TREES			
Atriplex lentiformis	Quailbush	FAC	70
Chilopsis linearis	Desert willow	FAC/FACU	72
Cornus canadensis	Bunchberry	FAC/FACU	72
Cornus sericea	Redosier dogwood	FACW	72
Parkinsonia aculeata	Mexican palo verde (Jerusalem thorn)	FAC	75
Prosopis pubescens	Screwbean mesquite (Tornillo)	FAC	76
Prunus virginiana	Chokecherry	FAC/FACU	76
Ribes aureum	Golden currant (Buffalo currant)	FAC/FACU	77
Sambucus nigra ssp. cerulea	Blue elderberry	FAC/FACU	78
COVER CROPS & ANNUAL FORAGES			
*Echinochloa esculenta**	Japanese millet	FACW/FACU	83
FORAGE LEGUMES			
*Trifolium fragiferum**	Strawberry clover	FAC/FACU	92
*Trifolium hybridum**	Alsike clover	FAC/FACU	92
*Trifolium repens**	White clover	FAC/FACU	93

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Grasses & Grasslikes

Scientific Name / Common Name / Varieties	Native / Introduced	Bunch / Sod / Annual	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
							SOIL TEXTURE					SOIL pH						
Achnatherum hymenoides	N	B	C	M	8	☼	3	3	3	1	0	0	3	1	8-10	141,000	F	Yes
Indian ricegrass																		
Nezpar, Paloma, Rimrock, Star Lake, White River																		
Achnatherum lettermanii	N	N	C	S-M	8	☼◒	0	2	3	2	0	1	3	1	6-8	225,000	F/S	Yes
Letterman's needlegrass																		
Achnatherum speciosum	N	B	C	T	6	☼◒	2	3	3	1	0	1	3	1	6-8	182,000	F/S	Yes
Desert needlegrass																		
Achnatherum thurberianum	N	B	C	M	7	☼	1	2	2	3	3	1	3	1	10-12	150,000	F/S	Yes
Thurber's needlegrass																		
Princeton																		
Agropyron cristatum	I	B	C	M	8-10	☼◒	1	3	3	2	1	0	3	2	5-7	265,250	F/S	Yes
Crested wheatgrass																		
Ephraim, Fairway, Kirk, RoadCrest																		
Agropyron desertorum	I	B	C	M-T	8	☼◒	1	3	3	3	1	0	3	2	7-9	175,000	F/S	Yes
Standard crested wheatgrass																		
Hycrest, Hycrest II, Nordan																		
Agropyron fragile	I	B	C	M	6	☼◒	2	3	3	2	0	1	3	3	8-10	170,000	F	Yes
Siberian wheatgrass																		
Stabilizer, Vavilov, Vavilov II																		
Agrostis capillaris	I	B	C	M	32-W‡	☼◒	2	1	3	3	1	2	3	1	0.5-1	5,742,000	F/S/SU	Yes
Colonial bentgrass																		
Agrostis gigantea	I	S	C	T	30-W‡	☼◒	1	1	3	3	3	3	3	0	0.5-1	4,900,000	F/S	Yes
Redtop																		
Streaker																		
Agrostis scabra	N	B	C	T	14-W‡	☼	0	1	3	3	2	2	3	1	0.5-1	5,000,000	F/S/SU	Yes
Rough bentgrass (Ticklegrass)																		
Agrostis stolonifera	I	S	C	M-T	32-W‡	☼◒	0	1	3	3	1	2	3	0	0.5-1	6,400,000	F/S/SU	Yes
Creeping bentgrass																		
For varieties see Turfgrass & Turfgass Blends																		
Alopecurus arundinaceus	I	S	C	T	18-W‡	☼◒	1	2	3	3	2	2	3	3	0.5-1	786,000	F/S	Yes
Creeping meadow foxtail																		
Garrison																		
Alopecurus pratensis	I	B	C	M-T	18-W‡	☼◒	0	1	3	3	2	2	3	1	3-4	407,000	F/S	Yes
Meadow foxtail																		
Andropogon gerardii	N	B/S	W	T	12	☼◒	0	2	3	3	2	1	3	2	10-13	130,000	S	Yes
Big bluestem																		
Bison, Bonilla, Champ, Kaw, Pawnee, Rountree																		
Andropogon hallii	N	S	W	T	10	☼◒	3	3	1	0	0	0	3	1	12-15	113,000	S	Yes
Sand bluestem																		
Chet, Garden, Goldstrike, Woodward																		
Aristida purpurea var. purpurea	N	B	W	S-M	8	☼	1	3	2	0	0	0	3	1	5-7	250,000	F/S-SU	Yes
Purple threeawn																		
Beckmannia syzigachne	N	B	C	T	30-W‡	☼◒	0	1	3	3	2	2	3	1	1-2	1,150,000	F/S	Yes
American sloughgrass																		

Mature Height (inches)
S = Short (less than 12)
M = Medium (13 - 24)
T = Tall (greater than 24)

Sun/Shade Tolerance
☼ Full sun
◒ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

Planting Season
F = Fall
S = Spring
SU = Summer

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Scientific Name / Common Name / Varieties	Native / Introduced	Bunch / Sod / Annual	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
							SOIL TEXTURE					SOIL pH						
Bolboschoenus maritimus	N	S	C	T	W‡	☼◒	0	1	2	3	3	1	2	3	8-11	162,600	F/S	No
Alkali bulrush																		
Bothriochloa barbinodis	N	B	W	M-T	9	☼	3	2	2	1	0	1	3	2	2-3	754,000	SU	Yes
Cane beardgrass																		
Saltillo																		
Bothriochloa ischaemum	I	B	W	M-T	14	☼	1	2	3	3	1	1	3	1	3-4	479,000	SU	Yes
Old-world bluestem (Yellow bluestem)																		
Plains, WW Iron Master, WW Spar																		
Bouteloua aristidoides	N	A	W	S	12	☼	1	3	3	1	0	0	3	1	2-3	414,000	S-SU	Yes
Needle grama																		
Bouteloua barbata	N	A	W	S	6	☼	1	3	3	1	0	0	3	1	5	400,000	S-SU	Yes
Sixweeks grama																		
Bouteloua curtipendula	N	B/S	W	M	9-14	☼◒	1	3	3	3	2	0	3	2	7-9	191,000	S	Yes
Sideoats grama																		
Butte, El Reno, Haskell, Killdeer, Niner, Pierre, Trailway, Vaughn																		
Bouteloua dactyloides	N	S	W	S	7	☼◒	0	1	3	3	2	0	3	2	10-20	56,000	S	Yes
Buffalograss																		
Bison, Bowie, Cody, Plains, Texoka																		
Bouteloua eriopoda	N	S	W	M	7	☼	1	3	2	1	0	0	3	2	1-2	1,335,000	SU	Yes
Black grama																		
Nogal																		
Bouteloua gracilis	N	B/S	W	S-M	7	☼	2	2	3	3	2	0	3	2	2-3	825,000	S	Yes
Blue grama																		
Alma, Bad River, Bird's Eye, Hachita, Lovington																		
Bouteloua rothrockii	N	B	W	S	8	☼	3	2	2	1	1	1	3	2	1-2	2,360,000	SU	Yes
Rothrock's grama																		
Bromus anomalus	N	B	C	M	14-16	☼◒	2	3	3	2	0	0	3	1	16-22	142,800	F/S	Yes
Nodding brome																		
Bromus biebersteinii	I	S	C	M	15	☼◒	1	2	3	3	1	1	3	0	9-12	80,000	F/S	Yes
Meadow brome																		
Cache, Fleet, High West, MacBeth, Paddock, Regar																		
Bromus carinatus	N	B	C	M-T	8	☼◒	0	1	3	3	1	2	3	1	13-17	100,000	F/S	Yes
California brome																		
Bromus ciliatus	N	B	C	M-T	12-W‡	☼◒	1	2	3	2	0	3	3	1	6-7	236,000	F/S	Yes
Fringed brome																		
Bromus inermis	I	S	C	T	12-18	☼◒	1	3	3	3	2	2	3	2	10-14	125,000	F/S	Yes
Smooth brome																		
Carlton, Lincoln, Manchar																		
Bromus marginatus	N	B	C	T	16	☼◒	0	1	3	3	1	0	3	1	20-27	64,000	F/S	Yes
Mountain brome																		
Bromar, Garnet, UP Cold Springs																		
Calamagrostis canadensis	N	S	C	T	14-W‡	☼◒	0	2	3	3	1	2	2	1	0.5-1	2,270,000	F/S	Yes
Bluejoint reedgrass																		

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Calamovilfa longifolia	N	S	W	T	10-12	☼	3	3	2	1	0	1	3	1	5-6	273,000	late S	Yes
Prairie sandreed																		
Goshen																		
Carex aquatilis	N	S	C	T	14-W‡	☼	0	0	1	3	2	3	3	1	3-4	485,000	F/S	No
Water sedge																		
Carex athrostachya	N	B	C	M	14-W‡	☼◔	0	0	1	3	2	0	3	2	2	1,424,000	F/S	No
Slenderbeak sedge																		
Carex bebbii	N	B	C	S-T	14-W‡	☼◔	0	0	1	3	2	0	3	2	1-2	1,402,000	F/S	No
Bebb's sedge																		
Carex microptera	N	B	C	M-T	10-W‡	☼	2	3	2	1	0	1	3	1	1-2	847,000	F/S	No
Smallwing sedge																		
Carex nebrascensis	N	S	C	M-T	14-W‡	☼	0	0	1	3	2	1	3	3	2-3	534,100	F/S	No
Nebraska sedge																		
Carex obnupta	N	S	C	M-T	W‡	☼◔	0	1	2	3	2	2	3	0	2-3	567,000	F/S	No
Slough sedge																		
Carex pellita	N	S	C	M-T	10-W‡	☼◔	0	0	1	3	2	0	3	2	4-6	312,075	F/S	No
Woolly sedge																		
Carex praegracilis	N	S	C	M	10-W‡	☼◔	2	2	3	3	3	0	3	2	2-3	664,900	F/S	No
Clustered field sedge (Blackcreeper sedge)																		
Carex simulata	N	S	C	M	9-W‡	☼◔	2	3	3	2	1	1	3	0	1-2	1,043,000	F/S	No
Analogue sedge																		
Carex stipata	N	B	C	T	12-W‡	☼◔	0	1	2	3	3	2	3	1	2-3	654,000	F/S	No
Awlfruit sedge																		
Carex utriculata	N	S	C	T	10-W‡	☼◔	0	0	2	3	2	0	3	2	3-4	444,000	F/S	No
Beaked sedge																		
Carex vulpinoidea	N	B	C	T	12-W‡	☼	1	2	3	2	1	2	3	3	1-2	1,112,000	F/S	No
Fox sedge																		
Cynodon dactylon	I	S	W	M-T	10	☼	1	2	3	2	1	2	3	3	0.5-1	2,000,000	S/SU	Yes
Bermudagrass																		
For varieties see Turfgrass & Turfgass Blends																		
Dactylis glomerata	I	B/S	C	M-T	12-18	☼◔	0	1	3	2	1	2	3	0	3-4	427,200 Paiute 654,000	S	Yes
Orchardgrass																		
Crown Royale, Latar, Paiute, Pennlate, Persist, Potomac, Profile, Tekapo																		
Danthonia californica	N	B	C	M	17-W‡	☼◔	2	3	3	2	2	1	3	1	10-15	165,000	F/S	Yes
Califonia oakgrass																		
Deschampsia cespitosa	N	B	C	M-T	14-W‡	☼◔	0	1	3	3	1	3	3	0	1-2	1,500,000	F	Yes
Tufted hairgrass																		
Nortran																		
Deschampsia elongata	N	B	C	M	17-W‡	☼◔	3	3	2	1	1	1	3	1	0.5-1	2,300,000	F/S	Yes
Slender hairgrass																		
Digitaria californica	N	B	W	M	5	☼◔	1	3	3	2	1	0	3	1	1-2	980,000	F/S-SU	Yes
Arizona cottontop																		
Loetta																		

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Distichlis spicata	N	S	W	S-M	5-W‡	☼◔	0	1	2	3	3	0	1	3	3-5	520,000	S/SU	Yes
Inland saltgrass																		
Eleocharis palustris	N	S	C	S	16-W‡	◔●	2	2	2	3	3	1	3	2	2-3	620,000	S/SU	No
Creeping spikerush																		
Elymus canadensis	N	B	C	T	12-W‡	☼◔	3	3	2	1	0	2	3	1	11-15	115,000	F/S	Yes
Canada wildrye																		
Helena Valley, Mandan																		
Elymus dahuricus	I	B	C	M-T	12	☼◔	2	2	3	2	2	1	3	2	16-22	80,000	F/S	Yes
Dahurian wildrye																		
James																		
Elymus elymoides	N	B	C	M	8	☼	2	3	3	3	1	1	3	2	7-9	192,000	F	Yes
Bottlebrush squirreltail																		
Antelope Creek, CRNG, Fish Creek, Pleasant Valley, Pueblo, Rattlesnake, Toe Jam Creek, Turkey Lake, Wapiti																		
Elymus glaucus	N	B	C	M-T	16	☼◔	1	3	3	2	1	2	3	1	10-13	134,500	F/S	Yes
Blue wildrye																		
Arlington, Elkton, Union Flat, White Pass																		
Elymus hoffmannii	I	S	C	M	12-14	☼◔	0	2	3	3	1	0	2	3	11-14	122,000	F/S	Yes
RS Hybrid wheatgrass																		
AC Saltlander, NewHy																		
Elymus lanceolatus ssp. lanceolatus	N	S	C	M	6-8	☼◔	2	3	3	2	0	0	3	2	8-11	154,000	F/S	Yes
Thickspike wheatgrass																		
Bannock, Bannock II, Critana, Schwendimar																		
Elymus lanceolatus ssp. psammophilus	N	S	C	S-M	6-8	☼◔	1	2	3	3	2	0	3	2	8-11	156,000	F/S	Yes
Streambank wheatgrass																		
Sodar																		
Elymus multisetus	N	B	C	S-M	8	☼◔	3	3	2	1	1	1	3	2	6-8	220,000	F/S	Yes
Big squirreltail																		
Elymus trachycaulus ssp. trachycaulus	N	B	C	M	10	☼◔	0	2	3	2	0	2	3	2	8-11	159,000	F	Yes
Slender wheatgrass																		
Copperhead, FirstStrike, Pryor, Revenue, San Luis																		
Elymus virginicus	N	B	C	M-T	36-W‡	☼◔	0	1	2	3	2	3	3	0	18-24	74,000	F/S	Yes
Virginia wildrye																		
Elymus wawawaiensis	N	B	C	M-T	8	☼◔	2	3	3	2	1	0	3	1	17-23	120,000	F/S	Yes
Snake River wheatgrass																		
Discovery, Secar																		
Eragrostis curvula	I	B	W	M	16	☼◔	2	2	3	3	1	3	3	2	1-2	1,000,000	S/SU	Yes
Weeping lovegrass																		
Ermelo																		
Eragrostis intermedia	N	B	W	M-T	5	☼	2	3	3	2	1	0	3	3	0.5-1	3,500,000	F/S-SU	Yes
Plains lovegrass																		
Eragrostis lehmanniana	I	B/S	W	M-T	10	☼	2	3	2	2	1	0	3	3	0.25-0.5	6,500,000	S/SU	Yes
Lehmann lovegrass																		
Eragrostis lehmanniana x E. trichophora	I	B	W	T	10	☼	2	3	2	2	1	0	3	3	0.25-0.5	6,500,000	S/SU	Yes
Cochise lovegrass																		

Mature Height (inches)
S = Short (less than 12)
M = Medium (13 - 24)
T = Tall (greater than 24)

Sun/Shade Tolerance
☼ Full sun
◔ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

Planting Season
F = Fall
S = Spring
SU = Summer

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Grasses & Grasslikes

Scientific Name / Common Name / Varieties	Native / Introduced	Bunch / Sod / Annual	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
							SOIL TEXTURE					SOIL pH						
Eragrostis trichodes	N	B	W	T	14	☼	3	3	2	1	0	1	3	2	0.75-1	1,500,000	S/SU	Yes
Sand lovegrass																		
Bend, Nebraska 27																		
Festuca arizonica	N	B	C	M-T	10	☼◑	1	3	3	2	0	0	3	1	2-3	550,000	F	Yes
Arizona fescue																		
Redondo																		
Festuca arundinacea	I	B	C	T	16-20	☼◑	0	2	3	3	3	2	3	3	6-8	227,000	S	Yes
Tall fescue																		
Fawn, Kentucky 31 (K-31), Rustler; *see also Turfgrass & Turf Blends*																		
Festuca arvernensis	I	B	C	S-M	12	☼◑	2	3	2	1	0	1	3	1	3-4	488,000	F/S	Yes
Blue fescue																		
Festuca brevipila	I	B	C	M	12	☼◑	2	3	3	3	1	2	3	0	2-3	680,000	F/S	Yes
Hard fescue																		
Durar																		
Festuca campestris	N	B	C	M	17	☼◑	1	3	3	2	2	1	3	1	7-9	200,000	F/S	Yes
Rough fescue																		
Festuca idahoensis	N	B	C	T	12-14	☼◑	0	2	3	3	1	1	3	1	3-4	450,000	F/S	Yes
Idaho fescue																		
CTUIR, Joesph, Nezpurs, Winchester																		
Festuca occidentalis	N	B	C	T	14	☼◑	0	2	3	2	0	2	3	0	4-5	336,000	F/S	Yes
Western fescue																		
Festuca ovina	I	B	C	S	10-12	☼◑	2	3	3	3	1	2	3	0	2-3	680,000	F/S	Yes
Sheep fescue																		
Azay, Azure, Covar																		
Festuca pratensis	I	B	C	S	33	☼◑	1	3	3	3	1	1	3	2	6-8	225,500	F/S	Yes
Meadow fescue																		
Festuca roemeri	N	B	C	M	20	☼◑	0	1	2	3	3	2	3	2	3-4	500,000	F/S	Yes
Roemer's fescue																		
Puget																		
Festuca rubra	I	S	C	M-T	30-W‡	◑●	1	2	3	3	1	2	3	0	3-4	500,000	F/S	Yes
Creeping red fescue																		
For varieties see Turfgrass & Turf Blends																		
Festuca rubra	I	S	C	M-T	30-W‡	◑●	1	2	3	3	1	2	3	0	3-4	500,000	F/S	Yes
Native red fescue																		
Festuca rubra ssp. fallax																		
Chewings fescue	I	B	C	M-T	18	◑●	1	2	3	3	1	2	3	0	3-4	500,000	F/S	Yes
For varieties see Turfgrass & Turf Blends																		
Festuca saximontana																		
Rocky Mountain fescue	N	B	C	T	10	☼	3	3	2	2	1	1	3	1	1-2	1,202,000	F/S	Yes
Festuca spp. x Lolium spp.																		
Festulolium	I	B	C	M-T	16-20	☼◑	0	2	3	3	3	2	3	3	6-8	250,000	F/S	Yes
Duo, Johnstone																		
Glyceria grandis																		
American mannagrass	N	S	C			☼◑	0	0	1	3	2	0	2	3	1-2	1,280,000	F/S	Yes

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							SOIL TEXTURE					SOIL pH						
Glyceria occidentalis				T	W‡	☼◑	0	0	1	3	2	0	3	2	7-9	196,000	F/S	Yes
Western mannagrass	N	S	C	T	10-W‡													
Glyceria striata						◑●	0	0	1	3	2	2	2	3	7-10	180,000	F/S	Yes
Fowl mannagrass	N	S	C	T	10-W‡													
Hesperostipa comata ssp. comata						☼	2	3	3	2	0	0	3	2	11-15	115,000	F	Yes
Needle and thread	N	B	C	M-T	5													
Hesperostipa neomexicana						☼	1	3	3	3	1	0	3	1	19-25	70,000	S-SU-F	Yes
New Mexico feathergrass	N	B	C	T	10													
Heteropogon contortus						☼◑	2	3	3	1	0	0	3	1	4-5	3,447,000	S-SU	Yes
Tanglehead	N	B	W	M-T	5													
Hilaria belangeri						☼	1	2	3	3	2	1	3	2	5-6	270,000	S-SU	Yes
Curly mesquite	N	B	W	S	5													
Hordeum brachyantherum						☼◑	0	1	3	3	2	0	3	3	15-21	85,000	F/S	Yes
Meadow barley	N	B	C	S-M	20-W‡													
Jackson-Frazier																		
Juncus balticus						☼◑	0	0	2	3	2	0	2	3	0.1	10,900,000	F/S	No
Baltic rush	N	S	C	M-T	7-W‡													
Juncus effusus						☼	1	2	2	3	3	3	2	0	1-2	958,000	F/S	No
Common rush (Soft rush)	N	S	C	M-T	18-W‡													
Juncus ensifolius						☼	1	2	3	3	1	1	3	1	0.5-1	2,914,000	F/S	No
Swordleaf rush (Daggerleaf rush)	N	S	C	S-M	8-W‡													
Juncus tenuis						☼◑	0	0	1	3	2	2	3	1	0.1	51,300,000	F/S	No
Poverty rush (Path rush)	N	S	C	M-T	10-W‡													
Juncus torreyi						☼◑	0	0	2	3	3	0	2	3	0.1-0.25	12,300,000	F/S	No
Torrey's rush	N	S	C	S-M	14-W‡													
Koeleria macrantha						☼◑	2	3	2	1	0	0	3	1	0.5-1	2,315,400	S	Yes
Prairie junegrass	N	B	C	M	14													
Umatilla, UP Sims Mesa																		
Leptochloa dubia						☼	2	3	3	2	1	0	3	2	2-3	538,000	F/S-SU	Yes
Green sprangletop	N	B	W	T	11													
Leymus angustus						☼◑	0	2	3	3	1	0	3	2	22-30	58,300	F	Yes
Altai wildrye	I	B	C	T	14													
Mustang																		
Leymus cinereus						☼◑	1	2	3	3	2	0	3	2	10-13	130,000	F/S	Yes
Great Basin wildrye	N	B	C	T	8-W‡													
Continental, Crooked River, CTUIR, Magnar, NBR, Trailhead, Trailhead II																		
Leymus multicaulis						☼◑	2	3	3	2	1	0	2	3	8-10	170,000	F/S	Yes
Manystem wildrye	I	S	C	M-T	14													
Shoshone																		
Leymus racemosus ssp. racemosus						☼◑	3	2	1	0	0	0	3	2	13-17	100,000	F/S	Yes
Mammoth wildrye	I	S	C	T	7													
Volga																		
Leymus salinus						☼	1	2	3	2	1	1	3	1	10-13	135,000	F/S	Yes
Salina wildrye	N	B	C	M-T														

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Grasses & Grasslikes

Scientific Name / Common Name / Varieties	Native / Introduced	Bunch / Sod / Annual	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine (SOIL TEXTURE)	Acidic	Neutral	Basic (SOIL pH)	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
Leymus triticoides					10	☼◐	2	3	3	2	1	0	2	3	8-10	170,000	F/S	Yes
Beardless wildrye (Creeping wildrye)	N	S	C	T	18-W‡													
Lolium perenne						☼◐	2	2	3	3	1	1	3	1	6-8	227,000	F	Yes
Perennial ryegrass	I	B	C	M-T	15													
Albion, Linn, Oro Verde, *see also Turfgrass & Turf Blends*																		
Lolium perenne ssp. multiflorum						☼◐	1	2	3	2	1	3	2	1	6-8	227,000	S	Yes
Annual ryegrass	I	A	C	T	15													
Ed, Gulf																		
Muhlenbergia asperifolia						☼◐	1	2	3	3	3	1	2	3	0.1-0.75	1,500,000	S-SU	Yes
Scratchgrass	N	B	W	S-M	12-W‡													
Muhlenbergia montana						☼◐	3	3	2	1	1	0	3	0	0.75-1	1,500,000	S-SU	Yes
Mountain muhly	N	B	W	M-T	13													
Muhlenbergia porteri						☼	3	3	2	1	1	0	3	0	0.75-1	1,500,000	S-SU	Yes
Bush muhly	N	B	W	M-T	10													
Muhlenbergia wrightii						☼◐	1	3	3	1	1	0	3	1	0.75-1	1,600,000	S-SU	Yes
Spike muhly	N	B	W	S-M	13													
El Vado																		
Nassella viridula						☼◐	0	1	2	3	3	0	3	1	7-10	181,000	F	Yes
Green needlegrass	N	B	C	M	12													
Cucharas, Fowler, Lodorm																		
Panicum antidotale						☼	0	2	3	3	2	0	3	1	2-3	630,000	F/S-SU	Yes
Blue panicgrass	I	B	W	T	11													
Panicum coloratum						☼	1	2	3	3	1	0	3	2	3-4	490,000	S-SU	Yes
Kleingrass	I	B	W	M-T	19													
Panicum obtusum						☼◐	0	2	3	3	2	0	3	2	9-12	145,000	SU	Yes
Vine mesquite	N	S	W	M-T	8													
Panicum virgatum						☼	2	3	3	3	1	3	3	2	3-5	389,000	S/SU	Yes
Switchgrass	N	S	W	T	12-W‡													
Alamo, Blackwell, Dacotah, Forestburg, Kanlow, Nebraska 28, Pathfinder, Sunburst, Trailblazer																		
Pascopyrum smithii						☼◐	0	1	2	3	3	1	3	3	12-16	110,000	F/S	Yes
Western wheatgrass	N	S	C	M	10													
Arriba, Barton, Recovery, Rodan, Rosana																		
Paspalum vaginatum						☼◐	2	3	3	3	2	2	3	3	1-2	1,500,000	S-SU	Yes
Seashore paspalum	I	S	W	M	10-W‡													
Phalaris arundinacea						☼	0	2	3	3	2	3	3	2	2-3	533,000	F/S	Yes
Reed canarygrass	N	S	C	T	16-W‡													
Phleum alpinum						☼◐	0	1	2	2	3	1	3	1	1-2	1,000,000	F/S	Yes
Alpine timothy	N	B/S	C	S-M	17-W‡													
Phleum pratense						☼◐	0	2	3	3	2	2	3	1	1-2	1,300,000	F/S	Yes
Timothy	I	B	C	M	16													
Climax, Tuukka																		
Pleuraphis jamesii						☼	1	2	2	3	3	0	3	2	8-11	159,000	late S	Yes
Galleta grass	N	B/S	W	S	5													
Viva																		

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Pleuraphis rigida						☼◐	2	3	2	1	0	0	3	2	4-5	350,000	S	Yes
Big galleta	N	B	W	M	5													
Poa alpina						☼◐	0	2	3	2	0	2	3	0	1-2	1,000,000	F/S	Yes
Alpine bluegrass	N	B	C	S	20-W‡													
AEC Glacier																		
Poa compressa						☼◐	0	1	3	3	2	2	3	1	0.5-1	2,500,000	F/S	Yes
Canada bluegrass	I	S	C	M	16													
Reubens, Talon																		
Poa fendleriana						☼◐	1	2	3	3	2	0	3	2	1-2	890,000	F/S	Yes
Muttongrass	N	B	C	S-M	10													
UP Ruin Canyon																		
Poa nervosa						☼◐	2	3	3	1	0	2	3	2	1-2	950,000	F/S	Yes
Wheeler bluegrass	N	S	C	M	12													
Poa nevadensis						☼◐	1	3	3	3	1	1	3	2	1-2	900,000	F/S	Yes
Nevada bluegrass	N	B	C	S-M	10													
Opportunity																		
Poa palustris						☼◐	0	1	3	3	2	3	3	1	0.5-1	3,156,000	F/S	Yes
Fowl bluegrass	N	B/S	C	M-T	20-W‡													
Poa pratensis						☼◐	0	2	3	3	1	1	3	1	0.5-1	2,177,000	F/S	Yes
Kentucky bluegrass	I	S	C	M	18													
Ginger; *see also Turfgrass & Turf Blends*																		
Poa secunda ssp. ampla						☼◐	1	3	3	2	1	1	3	0	1-2	882,000	F/S	Yes
Big bluegrass	N	B	C	T	10													
Sherman																		
Poa secunda ssp. canbyi						☼◐	1	2	3	2	1	0	3	1	1-2	926,000	F/S	Yes
Canby's bluegrass	N	B	C	M	10													
Canbar																		
Poa secunda ssp. sandbergii						☼◐	1	3	3	3	1	1	3	2	1-2	1,047,000	F/S	Yes
Sandberg bluegrass	N	B	C	S	8													
Handford, High Plains, Mountain Home, Reliable, UP Colorado (Sims Mesa), Vale																		
Poa trivialis						☼◐	1	2	3	2	1	2	3	1	0.5-1	2,100,000	F/S	Yes
Rough bluegrass	I	S	C	S	20-W‡													
Psathyrostachys juncea						☼	0	2	3	2	1	0	2	2	7-10	175,000	F	Yes
Russian wildrye	I	B	C	M-T	8													
Bozoisky-Select, Bozoisky II, Swift, Tom																		
Pseudoroegneria spicata ssp. inermis						☼◐	0	2	3	2	0	0	3	1	11-15	117,000	F/S	Yes
Beardless bluebunch wheatgrass	N	B	C	M	10													
Whitmar																		
Pseudoroegneria spicata ssp. spicata						☼◐	0	2	3	3	1	0	3	1	9-12	140,000	F/S	Yes
Bluebunch wheatgrass	N	B	C	M-T	8-10													
Anatone, Boardman, Columbia, Goldar, P-7																		
Puccinellia distans						☼◐	0	1	2	3	2	0	2	3	1-2	1,200,000	F/S	Yes
Alkaligrass																		
Fults II																		

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Puccinellia nuttalliana	I	S	C	S-M	15-W‡	☼◍	0 0 2 3 1	0 2 3	0.5-1	2,788,700	F/S	Yes
Nuttall's alkaligrass	N	B	C	M	24-W‡							
Schismus barbatus						☼	2 3 2 1 0	0 3 1	0.5-1	4,000,000	SU	Yes
Mediterranean grass	I	A/B	C	S	10							
Schizachyrium scoparium						☼◍	2 2 3 2 0	2 3 2	5-7	260,000	late S/SU	Yes
Little bluestem	N	B	W	M	12-16							
Aldous, Badlands, Blaze, Camper, Cimarron, Itasca, Pastura												
Schoenoplectus acutus var. acutus						☼◍	0 0 2 3 3	0 1 3	4-5	377,600	F/S	No
Hardstem bulrush	N	S	C	T	12-W‡							
Schoenoplectus americanus						☼◍	0 0 1 3 2	0 3 3	7-10	179,800	F/S	No
Olney threesquare	N	S	C	M-T	W‡							
Schoenoplectus pungens						☼◍	0 0 1 3 2	2 3 2	5-6	300,000	F/S	No
Common threesquare	N	S	C	M-T	12-W‡							
Schoenoplectus tabernaemontani						☼◍	0 1 2 2 3	1 3 3	2-3	550,000	F/S	No
Softstem bulrush	N	S	C	T	18-W‡							
Scirpus microcarpus						☼	0 1 2 3 2	0 3 2	1-2	4,500,000	F/S	No
Smallfruit bulrush	N	S	C	T	12-W‡							
Setaria vulpiseta						☼◍	1 3 3 2 0	0 3 1	5-6	293,000	F/S-SU	Yes
Plains bristlegrass	N	B	W	M-T	12							
Sorghastrum nutans						☼◍	2 3 3 3 1	2 3 1	8-10	170,000	late S/SU	Yes
Indiangrass	N	S	W	T	12							
Cheyenne, Chief, Holt, Nebraska 54, Osage, Scout, Tomahawk												
Spartina pectinata						☼	0 1 2 2 3	0 3 2	7-9	197,000	late S/SU	Yes
Prairie cordgrass	N	S	W	T	14-W‡							
Red River												
Sporobolus airoides						☼◍	1 2 3 3 3	0 2 3	0.75-1	1,758,000	Late SU	Yes
Alkali sacaton	N	B	W	M-T	5-W‡							
Salado, Vegas												
Sporobolus compositus						☼◍	2 3 3 3 2	1 3 1	2-3	760,000	Late SU	Yes
Tall dropseed	N	B	W	T	10							
Sporobolus contractus						☼◍	3 3 3 1 0	1 3 3	0.5-1	3,107,000	Late SU	Yes
Spike dropseed	N	B	W	T	12							
Cochise												
Sporobolus cryptandrus						☼◍	3 3 2 1 0	1 3 1	0.25-0.5	5,298,000	Late SU	Yes
Sand dropseed	N	B	W	M	6							
Asotin, UP Dolores, Western												
Sporobolus giganteus						☼	3 3 1 0 0	1 3 0	0.75-1	1,723,000	Late SU	Yes
Giant dropseed	N	B	W	T	12							
Sporobolus heterolepis						☼◍	1 3 3 2 1	1 3 1	0.5-1	1,200,000	Late SU	Yes
Prairie dropseed	N	B	W	S-T	12							
Sporobolus wrightii						☼◍	2 2 3 2 1	1 3 2	0.5-1	2,000,000	Late SU	Yes
Big sacaton	N	B	W	M-T	12-W‡							

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Thinopyrum intermedium	I	S	C	M-T	12-14	☼◍	0 1 3 3 2	1 3 1	15-20	88,000	F/S	Yes
Intermediate wheatgrass												
Chief, Clarke, Manifest, Oahe, Reliant, Rush												
Thinopyrum intermedium ssp. barbulatum	I	S	C	M-T	11-13	☼◍	1 2 3 3 0	1 3 2	13-17	100,000	F	Yes
Pubescent wheatgrass												
Greenleaf, Luna, Manska												
Thinopyrum ponticum	I	B	C	T	10	☼	0 2 3 3 2	0 2 3	17-22	79,000	late F/S	Yes
Tall wheatgrass												
Alkar, Alkar XL, Jose												
Triglochin maritima	N	S	C	S-M	W‡	☼◍	0 0 2 3 2	0 1 3	3-4	469,000	F/S	No
Arrowgrass												
Tripsacum dactyloides	N	B	W	T	15-W‡	☼◍	2 3 3 2 2	1 3 1	30-35	7,200	F/S	No
Eastern gamagrass												
Pete												
Trisetum spicatum	N	B	C	M	12	☼◍	1 2 3 1 0	2 3 1	0.5-1	2,500,000	F/S	No
Spike trisetum												
Typha latifolia	N	S	C	T	W‡	☼	0 1 2 3 2	1 3 1	0.1	10,000,000	F/S-SU	No
Cattails												
Vulpia microstachys	I	A/B	C	S-M	5	☼◍	2 3 3 3 2	2 3 0	2-4	825,000	F	Yes
Small fescue												
Vulpia octoflora	N	A/B	C	S	10	☼◍	2 3 3 2 1	2 3 2	1-2	965,000	F/S	Yes
Sixweeks fescue												

Wind turbines within a native grass and forb community in the hills of eastern Washington.

Mature Height (inches)
S = Short (less than 12)
M = Medium (13 - 24)
T = Tall (greater than 24)

Sun/Shade Tolerance
☼ Full sun
◍ Partial shade
◉ Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
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0 = Not adapted

Planting Season
F = Fall
S = Spring
SU = Summer

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Wildflowers & Forbs

Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
Abronia villosa	N	A	purple-pink	S	6-12	Low	☼	3	3	2	0	0	0	3	0	6-10	38,000	Yes
Desert sand verbena																		
Achillea millefolium	I	P	white	S-F	12-24	Low-W‡	☼	2	3	2	1	0	1	3	1	1	2,770,000	Yes
White yarrow (Common yarrow)																		
Achillea millefolium var. occidentalis	N	P	white	S-F	12-18	Low-W‡	☼	2	3	2	1	0	1	3	1	1	2,770,000	Yes
Western yarrow																		
Columbia, Eagle, Yakima																		
Aquilegia canadensis	N	P	red & yellow	S-SU	12-24	Mod-W‡	☼◐	0	3	3	2	0	1	3	0	3-5	496,000	Yes
Eastern red columbine																		
Aquilegia coerulea	N	P	blue & white	SU	12-30	Low-W‡	◐	0	2	3	3	1	1	3	0	3-6	368,000	Yes
Colorado blue columbine																		
Aquilegia formosa	N	P	red & yellow	S-SU	3-36	Mod-W‡	◐	0	2	3	3	0	1	3	0	3-5	400,000	Yes
Western red columbine																		
Argemone polyanthemos	N	P	white	S-SU-F	24-36	Low	☼	2	3	2	1	0	1	3	2	20-30	9,000	Yes
Crested pricklypoppy																		
Asclepias incarnata	N	P	pink-red or violet	SU-F	24-60	Low-W‡	☼	1	2	3	2	1	1	3	1	6-10	153,000	Yes
Swamp milkweed																		
Asclepias speciosa	N	P	rose-purple	S-SU	24-48	Low-W‡	☼	2	3	3	3	2	1	3	1	7-15	72,000	Yes
Showy milkweed																		
Asclepias syriaca	N	P	rose or white	S-SU-F	24-60	Low	☼	3	3	3	3	2	2	3	2	7-15	72,000	Yes
Common milkweed																		
Asclepias tuberosa	N	P	orange	SU-F	12-24	Mod	☼	3	3	3	2	0	3	2	0	7-12	102,400	Yes
Butterfly milkweed																		
Astragalus canadensis	N	P	greenish white	S-SU	12-40	Mod-W‡	☼	0	1	3	1	0	1	3	1	15-17	226,000	Yes
Canadian milkvetch																		
Astragalus filipes	N	P	yellow-white	S-SU	12-24	Low	◐	3	3	3	1	0	1	3	0	7-12	120,000	Yes
Basalt milkvetch																		
Dry River, NBR-1																		
Aurinia saxatilis	I	P	golden yellow	S	8-12	L-Mod	☼	2	3	3	1	0	0	3	1	3-5	461,000	No
Basket of gold																		
Bahiopsis parishii	N	P	yellow	SU	18-30	Low	☼◐	1	3	3	1	0	0	3	1	2-3	654,700	Yes
Parish goldeneye (Desert sunflower)																		
Baileya multiradiata	N	P	yellow	S-SU-F	12-24	Low	☼	3	3	2	1	0	0	3	1	1-2	1,060,000	Yes
Desert marigold																		
Balsamorhiza macrophylla	N	P	yellow	S-SU	12-36	L-Mod	☼◐	0	2	3	2	0	1	3	1	7-15	55,000	Yes
Cutleaf balsamroot																		
Balsamorhiza sagittata	N	P	yellow	S-SU	16-30	L-Mod	☼	0	2	3	2	0	1	3	1	7-15	55,000	Yes
Arrowleaf balsamroot																		
Bellis perennis	I	B	white-pink	S-SU-F	3-6	High	☼◐	2	3	3	1	1	1	3	1	1	2,800,000	Yes
English lawn daisy																		
Camassia quamash	N	P	blue	S-SU	12-30	Mod-W‡	☼◐	2	3	3	3	2	1	3	0	7-12	117,000	Yes
Camas																		

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Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
Campanula rotundifolia	N	P	blue	SU-F	4-40	Low-W‡	☼◐	1	3	2	1	0	1	3	0	0.25	1,200,000	Yes
Harebell																		
Castilleja applegatei ssp. martinii	N	P	red	S-SU	4-18	Low	☼	0	2	3	2	1	0	3	1	1	4,900,000	Yes
Wavyleaf Indian paintbrush																		
Castilleja exserta ssp. exserta	N	A	purple	S	4-12	L-Mod	☼	1	2	3	2	0	0	3	2	1	11,000,000	Yes
Purple owl's clover (Exserted Indian paintbrush)																		
Castilleja linariifolia	N	P	red	SU	12-40	L-High	☼	1	3	3	2	0	0	3	2	1	4,915,000	Yes
Wyoming Indian paintbrush																		
Castilleja minor	N	A	red	SU	12-32	Mod-W‡	☼◐	0	0	2	3	2	0	2	3	1	4,586,000	Yes
Lesser Indian paintbrush																		
Castilleja rhexiifolia	N	P	pink-violet or orange	SU	8-32	Low-W‡	☼◐	0	2	3	2	0	1	3	0	1	4,900,000	Yes
Splitleaf Indian paintbrush																		
Castilleja sulphurea	N	P	pale yellow	SU-F	6-20	L-Mod	☼◐	0	1	3	2	0	1	3	0	1	4,500,000	Yes
Sulphur Indian paintbrush																		
Centaurea cyanus	I	A	blue	S-SU	8-30	Low	☼◐	1	2	3	2	0	0	3	1	9-14	96,000	Yes
Bachelor button (Cornflower)																		
Chamaecrista fasciculata	N	A	yellow	SU	12-30	L-Mod	☼◐	2	3	3	2	0	1	3	1	12-15	65,000	Yes
Partridge pea																		
Chamerion angustifolium	N	P	pink	SU-F	14-84	L-Mod	☼	1	2	3	2	2	2	3	0	0.25	8,500,000	Yes
Fireweed																		
Cheiranthus allionii	I	A	orange	S-SU	12-18	L-Mod	☼	1	3	2	0	0	0	3	1	3-5	300,000	No
Wallflower																		
Clarkia amoena	N	A	pink & red	S-SU	6-36	L-Mod	☼◐	0	2	3	2	0	0	3	0	1-2	1,790,000	Yes
Farewell-to-spring																		
Collinsia heterophylla	N	A	lavender & white	S-SU	12-24	Mod	◐●	0	2	3	1	0	0	3	0	2-4	410,000	Yes
Chinese houses																		
Consolida ajacis	I	A	white, pink, blue	S-SU	12-36	L-Mod	◐●	1	2	3	2	1	1	3	1	6-10	150,000	Yes
Rocket larkspur																		
Coreopsis lanceolata	N	P	yellow	SU	18-36	L-Mod	☼◐	2	3	3	1	0	1	3	1	4-8	221,000	Yes
Lanceleaf coreopsis (Lanceleaf tickseed)																		
Coreopsis tinctoria	N	A	yellow & burgundy	SU-F	24-48	Low	☼◐	1	2	3	1	0	0	3	1	1-2	1,400,000	Yes
Plains coreopsis (Golden tickseed)																		
Cosmos bipinnatus	I	A	pink	SU-F	30-48	Low-W‡	☼	2	2	3	2	1	1	3	1	15-20	60,000	Yes
Cosmos																		
Cosmos sulphureus	I	A	orange-yellow	SU-F	24-36	Low	☼	2	2	3	2	1	1	3	1	15-20	55,000	Yes
Sulphur cosmos (Yellow cosmos)																		
Crepis acuminata	N	P	white	S-SU	12-36	Low	☼◐	3	3	3	1	0	1	3	1	2-4	800,000	Yes
Tapertip hawksbeard																		
Dalea candida	N	P	white	S-F	12-30	L-Mod	☼	2	3	3	1	0	0	3	1	3-6	354,000	Yes
White prairie clover																		
Antelope																		
Dalea ornata	N	P	pink-purple	S-SU	12-24	Low	☼◐	2	3	3	2	1	1	3	1	4-8	350,000	Yes
Western prairie clover (Blue Mountain prairie clover)																		
Aridlands, Majestic, Spectrum																		

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Wildflowers & Forbs

Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
Dalea purpurea	N	P	red-purple	SU	12-24	L-Mod	☼◐	2	2	3	3	1	0	3	0	4-8	210,000	Yes
Purple prairie clover																		
Bismark, Kaneb																		
Dalea searlsiae	N	P	pink-purple	S-SU	12-24	Low	☼◐	3	3	3	2	1	1	3	1	4-8	350,000	Yes
Searles' prairie clover																		
Bonneville, Carmel, Fanny																		
Desmanthus illinoensis	N	P	white	SU	24-40	M-High	☼◐	1	2	3	2	1	1	3	1	10-15	85,000	Yes
Illinois bundleflower																		
Dianthus barbatus	I	P	white, pink, & red	S-SU	18-24	Mod	☼◐	1	2	3	2	1	1	3	1	3-4	408,000	No
Sweet William																		
Dianthus deltoides	I	P	pink-red	S-SU	12-18	Mod	☼	1	2	3	2	0	0	3	0	1	2,480,000	No
Maiden pinks																		
Dieteria bigelovii var. bigelovii	N	B	purple	S-SU-F	8-36	Low	☼◐	2	2	3	1	0	0	3	1	1-2	1,550,000	Yes
Plains aster																		
Dieteria canescens	N	P	blue-purple	S-SU-F	6-30	Low	☼◐	2	3	3	1	0	1	3	2	1-2	1,400,000	Yes
Hoary tansyaster																		
Amethyst																		
Digitalis purpurea	I	B	pink-lavender	SU	24-48	M-High	☼	0	1	3	3	1	2	3	0	0.5	4,360,000	Yes
Foxglove																		
Dimorphotheca sinuata	I	A	yellow-orange	S-SU	8-12	Low	☼	0	2	3	2	1	0	3	2	4-8	251,000	Yes
African daisy																		
Dracopis amplexicaulis	N	A	yellow	SU-F	18-26	Low-W‡	☼	0	3	3	2	0	0	3	0	1-2	922,000	Yes
Clasping coneflower																		
Echinacea angustifolia	N	P	rose-purple	SU	12-15	L-Mod	☼◐	3	2	2	1	0	1	3	3	10	128,000	Yes
Blacksamson																		
Echinacea pallida	N	P	lavender	SU	18-36	Low	☼◐	0	1	3	2	0	1	3	0	7-12	117,000	Yes
Pale purple coneflower																		
Echinacea purpurea	N	P	purple	SU	24-36	L-Mod	☼◐	0	2	3	2	0	0	3	0	7-12	117,000	Yes
Purple coneflower																		
Erigeron speciosus	N	P	lavender-white	SU-F	12-24	Mod	☼◐	1	3	3	1	0	0	3	1	1	1,600,000	Yes
Aspen fleabane (Aspen daisy)																		
Eriogonum heracleoides	N	P	white or pinkish	S-SU	6-16	Low	☼	1	3	3	2	0	1	3	1	6-10	135,700	Yes
Wyeth buckwheat (Parsnipflower buckwheat)																		
Eriogonum racemosum	N	P	white-pink	SU-F	3-12	Low	☼◐	3	3	2	1	0	1	3	1	5-9	200,000	Yes
Redroot buckwheat																		
Eriogonum umbellatum	N	P	yellow	SU	6-12	Low	☼◐	2	3	3	2	0	0	3	1	4-7	209,000	Yes
Sulphur flower buckwheat																		
Eriophyllum lanatum	N	P	yellow	S-SU	4-24	Low	☼◐	3	3	3	1	0	2	3	1	1-2	1,700,000	Yes
Oregon sunshine (Common woolly sunflower)																		
Eschscholzia caespitosa	N	A	yellow	S-SU	4-12	Low	☼◐	0	1	2	3	2	0	3	1	5	320,000	Yes
Tufted poppy																		
Eschscholzia californica	N	A	orange	S-SU	12-18	Low	☼	2	3	2	2	0	0	3	1	5-10	293,000	Yes
California poppy																		
Eschscholzia californica ssp. mexicana	N	A	yellow-orange	S	6-15	Low	☼	2	3	2	2	0	0	3	1	2-5	850,000	Yes
Mexican gold poppy																		
Gaillardia aristata	N	P	yellow & red	SU-F	18-24	Low	☼◐	1	3	3	2	0	0	3	1	7-10	132,000	Yes
Blanketflower																		
Meriwether																		
Gaillardia pulchella	N	A	red & yellow	SU	18-24	Low	☼	2	3	2	1	0	0	3	1	6-10	238,000	Yes
Firewheel (Indian blanket)																		
Gazania rigens	I	P	red, yellow, orange	SU	10-18	L-Mod	☼	1	2	3	1	0	0	3	1	7-11	125,000	Yes
Gazania (Treasure flower)																		
Geranium viscosissimum	N	P	pink-lavender	SU	12-48	L-W‡	☼◐	0	2	3	2	0	1	3	0	6-12	52,000	Yes
Sticky purple geranium																		
Gilia capitata	N	A	blue	S	12-24	Low	☼◐	2	3	2	0	0	0	3	1	1	1,020,000	Yes
Globe gilia																		
Gilia tricolor	N	A	blue & orange	S-SU-F	12-28	L-Mod	☼◐	1	3	3	1	0	0	3	1	1	1,020,000	Yes
Birds eyes																		
Glandularia gooddingii	N	P	pink-lavender	S	18-24	Low	☼	3	3	2	0	0	0	3	1	2-4	482,800	Yes
Gooding's verbena (Southwestern mock vervain)																		
Glandularia pulchella	I	P	purple	S-SU	12	Low	☼	1	3	2	0	0	0	3	1	2-4	473,600	Yes
Moss verbena (South American mock vervain)																		
Hedysarum boreale	N	P	pink-purple	S-SU	10-24	L-Mod	☼◐	2	2	3	2	1	2	3	1	15-25	46,000	Yes
Utah sweetvetch (Northern sweetvetch)																		
CP-UP, Timp																		
Helianthella uniflora	N	A	yellow	SU	12-24	Low	☼	3	3	1	0	0	0	3	1	15-25	40,000	Yes
Oneflowered helianthella																		
Helianthus annuus	N	A	yellow	SU	36-72	Low	☼	1	3	3	2	0	2	3	1	10-20	58,500	Yes
Annual sunflower																		
Helianthus maximiliani	N	P	yellow	SU-F	36-60	Low	☼	1	2	3	3	1	0	3	0	4-8	225,000	Yes
Maximilian sunflower																		
Medicine Creek																		
Helianthus nuttallii	N	P	yellow	SU	60-120	Mod-W‡	☼	0	1	3	3	2	1	3	0	12-16	125,000	Yes
Nuttal's sunflower (Marsh sunflower)																		
Heliomeris multiflora	N	P	yellow	SU-F	12-40	Mod	☼◐	0	2	3	1	0	0	3	1	1-2	1,055,000	Yes
Showy goldeneye																		
Herrickia glauca	N	P	white-lavender	SU-F	18-24	L-Mod	☼◐	1	3	3	2	1	0	3	1	2-4	540,000	Yes
Blueleaf aster (Gray aster)																		
Heterotheca villosa	N	P	yellow	S-SU-F	12-36	Low	☼◐	3	3	3	1	0	1	3	2	6-8	336,500	Yes
Hairy goldenaster																		
Ipomopsis aggregata	N	B	red	S-F	12-36	Low	☼◐	3	3	3	2	2	0	3	3	6-8	357,000	Yes
Scarlet gilia (Skyrocket)																		
Ipomopsis rubra	N	B	red	S-SU	24-72	Mod	☼◐	0	2	3	2	0	1	3	0	3-5	341,000	Yes
Standing cypress																		
Iris missouriensis	N	P	blue-purple	S-SU	8-20	Mod-W‡	☼◐	1	2	3	3	1	0	3	1	20-30	21,000	Yes
Rocky Mountain iris (Western blue flag)																		
Kallstroemia grandiflora	N	A	orange to crimson	SU-F	12-36	Low	☼	2	3	2	0	0	0	3	1	8-12	93,700	Yes
Arizona poppy (Arizona caltrop)																		

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Layia platyglossa	N	A	yellow & white	SU	6-12	Low	☼	1	3	3	1	0	0	3	1	2-5	350,000	Yes
Coastal tidytips																		
Leptosiphon grandiflorus	N	A	white	S-SU	4-20	Low	☼	2	3	3	1	0	0	3	1	1-2	907,000	Yes
Mountain phlox (Large-flower linanthus)																		
Leucanthemum maximum	I	P	white	SU	12-24	Mod	☼◐	1	2	3	2	1	1	3	1	3-5	300,000	Yes
Shasta daisy																		
Liatris punctata	N	P	lavender-pink	SU-F	12-24	Low	☼◐	2	3	3	3	2	1	3	1	10-15	63,000	Yes
Dotted blazingstar (Dotted gayfeather)																		
Liatris pycnostachya	N	P	rose-purple	SU-F	24-60	L-Mod	☼	1	3	3	1	0	0	3	1	7-12	128,000	Yes
Thickspike blazingstar (Thickspike gayfeather)																		
Liatris spicata	N	P	rose-purple	SU	12-72	Mod-W‡	☼	0	2	3	2	1	2	3	1	6-12	138,000	Yes
Dense blazingstar (Marsh gayfeather)																		
Linaria maroccana	I	A	mixed	S-SU	18-24	L-Mod	☼◐	0	2	3	2	1	0	3	1	0.5	6,850,000	Yes
Moroccan toadflax (Baby snapdragon)																		
Linum grandiflorum	I	A	scarlet	S-F	14	L-Mod	☼◐	1	3	3	2	0	0	3	1	7-14	122,000	Yes
Scarlet flax																		
Linum lewisii	N	P	blue	S-SU	12-36	Low	☼◐	1	3	3	2	1	1	3	2	3-6	170,000	Yes
Lewis flax (Prairie flax)																		
Columbia, Maple Grove																		
Linum perenne	N	P	blue	S-SU	24	Low	☼◐	1	3	3	1	0	1	3	2	3-6	293,000	Yes
Blue flax																		
Appar																		
Lobularia maritima	I	A	white	S-F	8-12	any	☼◐	2	3	3	1	0	0	3	1	1-2	1,100,000	No
Sweet alyssum																		
Lomatium dissectum	N	P	yellow	S-SU	12-36	L-Mod	☼◐	1	3	3	3	1	1	2	3	5-10	45,000	Yes
Fernleaf biscuitroot																		
Lomatium foeniculaceum	N	P	yellow	S-SU	6-12	Low	☼	3	3	3	1	0	1	3	1	5-10	40,000	Yes
Desert biscuitroot																		
Lomatium grayi	N	P	yellow	S-SU	12-24	L-Mod	☼	3	3	3	1	0	0	3	1	5-10	39,000	Yes
Gray's biscuitroot																		
Lomatium macrocarpum	N	P	white	S-SU	3-6	L-Mod	☼	3	3	2	1	0	1	3	2	5-10	100,000	Yes
Bigseed biscuitroot																		
Lomatium nudicaule	N	P	yellow	S-SU	8-18	L-Mod	☼	3	3	2	1	0	1	3	2	5-10	50,000	Yes
Barestem biscuitroot																		
Lomatium triternatum	N	P	yellow	S-SU	12-28	L-Mod	☼	3	3	2	1	0	0	3	2	5-10	64,000	Yes
Nineleaf biscuitroot																		
Lupinus albicaulis	N	A	blue-purple	SU	24-48	Mod	☼	0	2	3	2	1	2	3	0	20-30	29,500	No
Sicklekeel lupine																		
Lupinus x alpestris	N	P	blue-lavender	SU-F	12-20	L-Mod	☼◐	1	2	3	1	0	0	3	1	20-30	12,500	No
Mountain lupine (Great Basin lupine)																		
Lupinus argenteus	N	P	blue, bluish-white	SU	10-28	L-Mod	☼◐	1	2	3	2	0	0	3	1	20-30	18,300	No
Silvery lupine																		
Lupinus arizonicus	N	A	blue-purple	S	12-48	Low	☼	2	3	3	1	0	0	3	1	6-12	135,000	No
Arizona lupine																		

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Sun/Shade Tolerance
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● Full shade

Soil Adaptation (Texture & pH)
3 = Best
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Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine (SOIL TEXTURE)	Acidic	Neutral	Basic (SOIL pH)	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
Lupinus bicolor	N	A	blue & white	S-SU	4-16	Low	☼	2	3	2	1	0	1	3	1	8-15	75,000	No
Miniature lupine																		
Lupinus caudatus	N	P	blue	S-SU	12-24	L-Mod	☼	2	2	3	1	0	0	3	1	20-30	18,000	No
Tailcup lupine																		
Lupinus perennis	N	P	purplish-blue	S-SU	12-24	L-Mod	☼◐	2	2	3	1	0	1	3	0	20-30	21,000	No
Wild lupine (Sundial lupine)																		
Lupinus polyphyllus	N	P	blue to violet	S-SU	24-60	M-H-W‡	◐	1	2	3	2	1	1	3	1	8-15	75,000	No
Bigleaf lupine																		
Lupinus rivularis	N	P	purple, blue-white	S-SU	12-48	M-H-W‡	☼	3	3	3	2	1	1	3	1	20-30	31,000	No
Riverbank lupine																		
Herdema																		
Lupinus sericeus	N	P	blue-lavender	S-SU	12-24	L-Mod	☼◐	2	3	2	1	0	0	3	1	20-30	12,900	No
Silky lupine																		
Lupinus sparsiflorus	B	A	violet	S	8-16	Low	☼	2	3	3	1	0	0	3	0	7-13	124,000	No
Coulter's lupine (Desert lupine)																		
Lupinus succulentus	N	A	violet-blue	S	24-28	L-Mod	☼	2	3	2	0	0	0	3	1	20-30	15,600	No
Arroyo lupine (Hollowleaf annual lupine)																		
Lupinus texensis	N	A	blue & white	S	16-20	L-Mod	☼	1	3	3	1	0	0	3	1	20-30	16,000	No
Texas bluebonnet																		
Lychnis chalcedonica	I	P	scarlet	SU-F	12-15	L-Mod	☼◐	1	2	3	2	1	1	3	0	1	1,040,000	No
Maltese cross																		
Machaeranthera tanacetifolia	N	B	purple	SU	18-24	Low	☼◐	2	3	2	1	0	0	3	1	3-5	408,000	Yes
Prairie aster																		
Malacothrix glabrata	N	A	yellow	S-SU	6-16	Low	☼◐	3	3	2	1	0	2	3	1	2-4	560,000	Yes
Smooth desertdandelion																		
Mentzelia albicaulis	N	A	yellow	S-SU	12-34	Low	☼	3	3	2	1	0	2	3	1	8-14	130,000	Yes
Whitestem blazingstar																		
Mentzelia laevicaulis	N	B	yellow	SU	12-34	Low	☼	3	3	2	1	0	1	3	1	7-10	110,000	Yes
Smoothstem blazingstar																		
Mentzelia lindleyi	N	A	yellow	S-SU	12-48	Low	☼	1	3	2	0	0	0	3	1	1-2	586,000	Yes
Lindley's blazingstar																		
Mimulus guttatus	N	P	yellow-red	S-SU	12-30	Mod-W‡	☼◐	2	3	3	2	1	1	3	1	0.5-1	4,000,000	Yes
Monkeyflower																		
Mirabilis multiflora	N	P	purple-magenta	S-SU-F	12-24	Low	☼	3	3	3	1	0	0	3	1	20-30	8,000	Yes
Colorado four o'clock																		
Monarda citriodora	N	A	lavender-white	S-SU	12-36	L-Mod	☼	0	2	3	1	0	0	3	0	1-2	820,000	Yes
Lemon beebalm (Lemon mint)																		
Monarda fistulosa	N	P	lilac-pink	SU	12-60	L-Mod	☼◐	0	2	3	2	0	1	3	0	1	1,272,500	Yes
Wild bergamot (Beebalm)																		
Myosotis sylvatica	I	P	blue & yellow	S-SU	10-18	High-W‡	◐●	0	1	2	3	2	0	3	2	1-2	720,000	Yes
Forget-me-not																		
Nemophila maculata	N	A	white & purple	S	6	L-Mod	☼◐	0	2	3	1	0	0	3	1	10-16	87,000	Yes
Five spot																		

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Wildflowers & Forbs

Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
								SOIL TEXTURE					SOIL pH					
Nemophila menziesii	N	A	blue	S	6-10	L-Mod	☼◑	1	2	3	2	0	0	3	1	3-6	258,000	Yes
Baby blue eyes																		
Oenothera biennis	N	B	yellow	SU	12-60	L-Mod	☼	2	3	2	0	0	0	2	1	1	1,589,000	Yes
Common evening primrose																		
Oenothera elata	N	B	yellow	SU	36-48	Low-W‡	☼◑	0	2	3	2	0	1	3	1	1	1,300,000	Yes
Hooker's evening primrose																		
Oenothera lamarckiana	I	A	yellow	SU	36-60	L-Mod	☼◑	1	3	3	2	1	1	3	1	1-2	864,000	Yes
Evening primrose																		
Oenothera macrocarpa	N	P	yellow	SU	8	Low	☼	1	3	3	2	0	0	3	1	10-15	85,700	Yes
Missouri evening primrose (Bigfruit evening primrose)																		
Oenothera pallida	N	P	white	S-SU	8-20	Low	☼	2	3	3	1	0	1	3	1	1-2	512,000	Yes
Pale evening primrose																		
Oenothera speciosa	N	P	white & pink	S-SU	10-20	Low	☼	1	3	3	1	0	0	3	1	1	2,500,000	Yes
Showy evening primrose																		
Oligoneuron rigidum	N	P	golden yellow	SU-F	36-60	Mod-W‡	☼	1	3	2	2	0	1	3	0	1-2	771,800	Yes
Stiff goldenrod																		
Osmorhiza occidentalis	N	P	yellow-white	SU	16-36	L-Mod	◑	0	2	3	1	0	1	3	0	15-30	29,800	Yes
Sweet anise (Western sweetroot)																		
Papaver nudicaule	N	P	yellow-orange	S	24	Mod	☼	0	2	3	2	1	2	3	1	1	2,780,000	Yes
Iceland poppy (Arctic poppy)																		
Papaver rhoeas	I	A	red or mixed	S-SU	24	L-Mod	☼◑	1	2	3	2	0	0	3	1	1	3,200,000	Yes
Flanders poppy (Corn poppy)																		
Penstemon acuminatus	N	P	blue-lavender	S-SU	12-24	Low	☼◑	2	3	3	1	0	1	3	1	2-4	400,000	Yes
Sharpleaf penstemon																		
Penstemon angustifolius	N	P	lavender to blue	S-SU	12-36	Low	☼	3	3	2	1	0	1	2	3	2-4	223,000	Yes
Narrowleaf penstemon (Broadbeard beardtongue)																		
Penstemon barbatus	N	P	red	SU	24	Low	☼	1	3	3	0	0	0	3	1	2-4	550,000	Yes
Beardlip penstemon																		
Penstemon cyananthus	N	P	blue	S-SU	18	L-Mod	☼◑	1	3	3	0	0	0	3	0	2-4	290,000	Yes
Wasatch penstemon																		
Penstemon cyaneus	N	P	blue violet	S-SU	8-24	Low	☼◑	1	3	3	1	0	0	3	0	1-3	656,000	Yes
Blue penstemon																		
Penstemon deustus var. deustus	N	P	white	S-SU	8-24	Low	☼◑	2	3	3	1	0	1	3	1	0.5-1	2,900,000	Yes
Hotrock penstemon (Scabland penstemon)																		
Penstemon eatonii	N	P	red	S-SU	12-40	Low	☼	2	3	2	0	0	0	3	1	1-3	400,000	Yes
Firecracker penstemon																		
Richfield																		
Penstemon eriantherus	N	P	lavender-purple	S-SU	4-16	Low	☼◑	2	3	3	1	0	2	3	0	1-3	358,000	Yes
Fuzzytounge penstemon																		
Old Works																		
Penstemon grandiflorus	N	P	pink-white	S-SU	24-48	Mod	☼◑	0	2	3	2	0	0	3	0	2-4	550,000	Yes
Large beardtongue																		

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Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
								SOIL TEXTURE					SOIL pH					
Penstemon pachyphyllus	N	P	blue-violet	S-SU	12-25	Low	☼◑	1	3	3	0	0	1	3	1	4-8	227,600	Yes
Thickleaf penstemon (Thickleaf beardtongue)																		
Penstemon palmeri	N	P	light pink	S-SU	48	Low	☼	1	3	3	2	0	0	3	1	2-3	610,000	Yes
Palmer's penstemon																		
Cedar																		
Penstemon parryi	N	P	rose-magenta	S-SU	24-48	Low	☼◑	2	3	2	0	0	0	3	1	2-3	610,000	Yes
Parry's penstemon (Parry's beardtongue)																		
Penstemon procerus	N	P	purple	SU	8-24	Mod-W‡	☼◑	1	2	3	2	1	1	3	1	2-3	600,000	Yes
Smallflower penstemon (Littleflower penstemon)																		
Penstemon pseudospectabilis	N	P	pink-purple	S	36-70	Low	☼	2	2	3	0	0	0	3	1	1-3	750,000	Yes
Desert penstemon																		
Penstemon rydbergii	N	P	blue-violet	SU	8-24	Low-W‡	☼◑	0	2	3	2	0	0	3	1	1-2	850,000	Yes
Rydberg's penstemon																		
Penstemon strictus	N	P	blue-violet	SU	12-36	L-Mod	☼◑	2	3	3	1	0	0	3	0	1-3	592,000	Yes
Rocky Mountain penstemon																		
Bandera																		
Penstemon subglaber	N	P	blue-purple	SU	10-28	L-Mod	◑	0	2	3	2	0	1	3	0	2-4	405,000	Yes
Smooth penstemon																		
Penstemon superbus	N	P	coral	S-SU	12-48	L-Mod	☼◑	2	3	2	0	0	0	3	1	3-4	1,213,000	Yes
Superb beardtongue																		
Penstemon venustus	N	P	lavender-purple	S-SU	12-24	L-Mod	☼◑	2	3	3	0	0	2	3	1	2-4	550,000	Yes
Venus penstemon (Alpine penstemon)																		
Clearwater																		
Peritoma lutea	N	A	yellow	S-SU	4-45	Low	☼	0	2	3	3	2	1	3	2	7-11	101,000	Yes
Yellow beeplant (Yellow spiderflower)																		
Peritoma serrulata	N	A	pink-purple	SU-F	12-48	L-Mod	☼	0	1	3	3	2	0	3	1	10-16	65,900	Yes
Rocky Mountain beeplant																		
Perityle emoryi	N	A	white	S-F	7-10	Low	☼	3	2	1	0	0	0	3	1	1	3,222,700	Yes
Emory's rockdaisy (Desert daisy)																		
Phacelia campanularia	N	A	blue	S	12-24	Low	☼	2	3	2	0	0	0	3	1	1-3	856,000	Yes
California bluebells																		
Phacelia crenulata	N	A	violet to purple	S	6-36	Low	☼	3	3	2	1	0	2	3	2	1-3	800,000	Yes
Desert bluebells (Cleftleaf wildheliotrope)																		
Phacelia tanacetifolia	N	A	purple-blue	SU	12-36	Low	☼	2	2	3	2	1	0	3	1	1-2	245,000	Yes
Lacy phacelia																		
Phlox drummondii	N	A	rose, red-purple	SU-F	8-20	Low	☼	0	2	3	2	1	1	3	0	4-8	234,000	Yes
Drummond phlox																		
Physaria gordonii	N	A	yellow	S	3-24	Low	☼◑	1	2	3	3	1	1	3	1	2-4	439,085	Yes
Gordon's bladderpod																		
Plantago ovata	N	A	white	S	6-10	Low	☼◑	3	3	1	0	0	0	3	1	3-10	325,000	Yes
Desert Indianwheat																		
Ratibida columnifera	N	P	yellow	SU-F	12-24	L-Mod	☼	1	2	3	2	0	1	3	1	1	737,000	Yes
Yellow prairie coneflower																		
Stillwater																		

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Wildflowers & Forbs

Scientific Name / Common Name / Varieties	Native / Introduced	Life Cycle	Bloom Color	Flowering Season	Mature Height (inches)	Moisture Requirements	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	Acidic	Neutral	Basic	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Mycorrhizal Dependent
								SOIL TEXTURE					SOIL pH					
Ratibida columnifera var. pulcherrima	N	P	red	SU-F	12-24	L-Mod	☼	1	2	3	2	0	1	3	1	1	737,000	Yes
Mexican hat (Upright prairie coneflower)																		
Ratibida pinnata	N	P	yellow	SU-F	18-48	L-Mod	☼	0	2	3	2	0	2	3	0	2-4	410,000	Yes
Grayheaded coneflower																		
Rudbeckia hirta	N	P	yellow	SU-F	18-48	L-Mod	☼◑	1	3	3	2	1	1	3	1	1-2	1,710,000	Yes
Blackeyed Susan																		
Rudbeckia occidentalis	N	P	nondescript	SU	24-60	Mod-W‡	☼◑	0	1	2	3	3	0	3	1	4-5	345,000	Yes
Western coneflower																		
Salvia coccinea	N	P	red	S-SU-F	12-36	M-High	☼◑	1	3	3	1	1	1	3	1	5-7	280,000	Yes
Scarlet sage (Blood sage)																		
Salvia columbariae	N	P	pale blue	S-SU	1-24	Low	☼	2	3	3	2	0	0	3	1	2-4	428,650	Yes
Chia (Chia sage)																		
Sanguisorba minor	I	P	pink	SU	8-24	Low	☼	1	2	3	2	0	1	3	1	15-25	49,000	Yes
Small burnet																		
Delar																		
Senna covesii	N	P	yellow	S-F	12-24	Low	☼	3	3	2	1	0	0	3	1	8-14	110,000	Yes
Desert senna																		
Silene armeria	I	A	pink	SU-F	24	L-Mod	☼◑	0	2	3	2	0	1	3	1	1	3,900,000	No
Sweet William catchfly																		
Sisyrinchium bellum	N	P	dark blue	S	6-18	Mod-W‡	☼	0	1	3	3	1	0	3	1	3-5	315,000	Yes
Blue-eyed grass																		
Sphaeralcea ambigua	N	P	orange-red	S	20-38	Low	☼	3	3	2	0	0	0	3	1	2-4	500,000	Yes
Desert globemallow																		
Sphaeralcea coccinea	N	P	red-orange	S-SU	6-12	Low	☼	2	3	3	2	1	0	3	2	2-4	500,000	Yes
Scarlet globemallow																		
Sphaeralcea coulteri	N	A	orange	W-S	18	Low	☼	3	3	2	1	0	0	3	2	2-4	533,000	Yes
Coulter's globemallow																		
Sphaeralcea grossulariifolia	N	P	orange-red	S-SU	27-38	Low	☼	3	3	2	1	0	1	3	1	2-4	500,000	Yes
Gooseberryleaf globemallow																		
Sphaeralcea munroana	N	P	red-orange	S	30	Low	☼◑	3	3	2	1	0	0	3	1	2-4	500,000	Yes
Munro's globemallow																		
Sphaeralcea parvifolia	N	P	red-orange	S	18-40	Low	☼	2	3	3	2	0	0	3	1	2-4	500,000	Yes
Nelson globemallow (Smallflower globemallow)																		
Symphyotrichum chilense	N	P	lavender-white	SU-F	12-24	Low-W‡	☼	2	3	3	3	2	1	3	2	1	2,668,000	Yes
Pacific aster																		
Symphyotrichum laeve	N	P	blue - purple	SU-F	24-48	Mod	☼◑	2	3	3	1	0	1	3	1	1	1,014,000	Yes
Smooth blue aster																		
Symphyotrichum novae-angliae	N	P	purple	F	24-68	Mod-W‡	☼◑	0	2	3	3	1	2	3	0	1-2	1,216,000	Yes
New England aster																		
Thermopsis montana	N	P	yellow	S	12-48	Mod-W‡	☼◑	0	2	3	1	0	1	3	1	20-40	15,000	Yes
Mountain goldenbanner																		
Thymophylla pentachaeta	N	P	yellow	S-SU-F	6-12	Low	☼◑	2	3	3	1	0	1	3	1	0.5-1	2,733,000	Yes
Fiveneedle pricklyleaf (Golden dyssodia)																		

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								SOIL TEXTURE					SOIL pH					
Verbena hastata	N	P	blue to purplish, or pink	SU-F	36-60	Mod-W‡	☼	1	3	3	1	0	0	3	1	1	1,792,800	Yes
Blue verbena (Swamp vervain)																		
Verbena stricta	N	P	purple	SU	24-48	Low	☼	1	2	3	2	0	1	3	0	2-4	425,000	Yes
Hoary verbena																		
Vicia americana	N	P	purple	S-F	6-24	Low	☼◑	1	2	3	3	2	1	3	2	25-35	33,000	Yes
American vetch																		
Wyethia amplexicaulis	N	P	yellow	S-SU	12-15	L-Mod	☼◑	0	1	3	3	2	0	3	2	16	28,000	Yes
Mule ears																		
Wyethia mollis	N	P	white	S-SU	24-30	L-Mod	☼	1	3	3	2	1	0	3	2	20-25	25,000	Yes
Woolly mule ears																		
Zinnia acerosa	N	P	white	S-SU-F	5-10	Low	☼	3	3	2	0	0	0	3	3	1-3	760,000	Yes
Desert zinnia																		

Lewis flax (*Linum lewisii*) on a ridge in the Sierra Nevada, California. *See also page 54.*

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‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Shrubs & Trees

Scientific Name / Common Name / Varieties	Native / Introduced	Bloom / Fruit Color	Flowering Season	Mature Height (feet)	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: SOIL TEXTURE Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	SOIL pH Acidic	Neutral	Basic	Seeds per Pound	Mycorrhizal Dependent
Acmispon rigidus	N	yellow-orange	S	1-2	6	☼◑	3	3	2	1	1	0	3	1	1,001,000	Yes
Shrubby deervetch (Desert rock pea)																
Allenrolfea occidentalis	N	inconspicuous	SU-F	1-3	8-W‡	☼	3	3	2	2	1	0	2	3	30,000	Yes
Iodinebush (Pickleweed)																
Ambrosia ambrosioides	N	green	W-S	6	4	☼◑	2	3	2	0	0	0	3	2	6,300	Yes
Canyon ragweed																
Ambrosia deltoidea	N	inconspicuous	S	1-3	4	☼◑	1	3	3	1	0	0	3	2	9,000	Yes
Triangleleaf bursage																
Ambrosia dumosa	N	yellow	S-F	1-3	4	☼	2	3	3	1	0	0	3	2	33,000	Yes
White bursage																
Ambrosia salsola	N	white	S	2-3	6	☼◑	3	3	2	0	0	0	3	2	110,000	Yes
Cheesebush (White burrobush)																
Amelanchier alnifolia	N	white/blue-purple berries	SU	3-15	12	☼◑	2	2	3	1	0	2	3	1	25,800	Yes
Saskatoon serviceberry																
Amelanchier utahensis	N	white/blue-purple berries	S-SU	3-12	10	☼◑	2	2	3	1	0	0	3	1	25,800	Yes
Utah serviceberry																
Amorpha canescens	N	purple & orange	SU-F	12-36	15	☼◑	2	3	3	1	0	2	3	2	195,000	Yes
Leadplant																
Arctostaphylos uva-ursi	N	white to pink/pink to red drupes	S-SU	≤1	14	◑●	2	3	2	1	0	2	3	1	37,900	Yes
Kinnikinnick (Bearberry)																
Artemisia arbuscula	N	inconspicuous/white	SU	0.5-1.5	7	☼	0	1	3	3	2	0	2	3	972,000	Yes
Low sagebrush																
Artemisia cana	N	inconspicuous/yellow	F	2-5	8	☼	2	3	2	1	0	1	3	2	850,000	Yes
Silver sagebrush																
Artemisia filifolia	N	inconspicuous/yellow	F	2-4	6	☼◑	3	3	1	0	0	0	3	1	2,000,000	Yes
Sand sagebrush																
Artemisia frigida	N	inconspicuous/white	SU	0.5-1.5	10	☼◑	1	2	3	2	1	1	3	2	4,536,000	Yes
Fringed sagebrush (Prairie sagewort)																
Artemisia ludoviciana	N	inconspicuous/white	F	1-2	10	☼◑	1	3	3	2	0	0	3	2	4,500,000	Yes
White sagebrush (Prairie sagebrush)																
Artemisia nova	N	inconspicuous/brown	F	0.5-2	6	☼	2	2	3	2	1	0	3	2	907,200	Yes
Black sagebrush																
Artemisia tridentata ssp. tridentata	N	inconspicuous	late SU	3-12	6	☼	1	2	3	2	0	1	3	1	2,500,000	Yes
Basin big sagebrush																
Artemisia tridentata ssp. vaseyana	N	inconspicuous	F	2-5	11	☼	0	2	3	2	0	1	3	1	2,500,000	Yes
Mountain big sagebrush																
Artemisia tridentata ssp. wyomingensis	N	inconspicuous	late SU	1-3	8	☼	1	3	3	1	0	1	3	1	2,500,000	Yes
Wyoming big sagebrush																
Atriplex canescens	N	inconspicuous/yellow	SU	2-7	5	☼◑	3	3	3	3	1	0	2	3	52,000	No
Fourwing saltbush																
Wytana																
Atriplex confertifolia	N	inconspicuous/yellow	S-SU	1-3	4	☼	2	2	3	3	2	0	1	3	64,900	No
Shadscale saltbush																
Atriplex corrugata	N	inconspicuous	S	<1	6	☼	0	0	1	3	3	0		3	60,000	No
Mat saltbush																

Flowering Season
F = Fall
W = Winter
S = Spring
SU = Summer

Sun/Shade Tolerance
☼ Full sun
◑ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Scientific Name / Common Name / Varieties	Native / Introduced	Bloom / Fruit Color	Flowering Season	Mature Height (feet)	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: SOIL TEXTURE Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	SOIL pH Acidic	Neutral	Basic	Seeds per Pound	Mycorrhizal Dependent
Atriplex cuneata	N	inconspicuous	S-SU	0.5-1	6	☼	0	2	2	3	3	0	1	3	30,300	No
Castle Valley saltbush													2			
Atriplex gardneri	N	inconspicuous	SU	0.5-1	6	☼	0	1	2	3	2	0		3	111,500	No
Gardner's saltbush													2			
Atriplex lentiformis	N	inconspicuous	S-SU	4-10	4-W‡	☼◑	0	2	3	3	1	0		3	500,000	No
Quailbush													2			
Atriplex obovata	N	inconspicuous	S	1	6	☼	2	3	2	1	1	0		3	207,600	No
New Mexico saltbush (Mound saltbush)													1			
Atriplex polycarpa	N	inconspicuous	S-SU	1-4	3	☼◑	0	2	3	3	1	0		3	800,000	No
Desert saltbush (Cattle spinach)													2			
Atriplex tridentata	N	inconspicuous	S-SU	1-2	7	☼	0	0	2	3	3	0		3	111,500	No
Trident saltbush (Basin saltbush)													2			
Bassia prostrata	I	inconspicuous	SU-F	1-3	5	☼	1	3	3	3	2	0		3	407,700	Yes
Forage kochia (Prostrate summer cypress)													3			
Immigrant, Snowstorm																
Calliandra eriophylla	N	purple	S	2-3	5	☼◑	2	2	3	2	0	0		2	18,000	Yes
Fairyduster (False mesquite)													3			
Ceanothus integerrimus	N	white, blue or lilac	SU-F	3-12	15	☼◑	2	3	2	2	2	3		1	70,000	Yes
Deerbrush													2			
Ceanothus sanguineus	N	white	S	4-10	14	◑●	1	2	3	2	0	1		1	131,900	Yes
Redstem ceanothus													3			
Ceanothus velutinus	N	white	SU	3-10	16-18	◑●	1	2	3	2	0	2		0	124,275	Yes
Snowbrush ceanothus													3			
Celtis ehrenbergiana	N	red	S	10	5	☼	2	3	3	1	0	0		1	18,000	Yes
Desert hackberry (Spiny hackberry)													3			
Cercocarpus ledifolius	N	pale yellow	S-SU	8-30	11	☼◑	2	2	3	2	0	1		1	51,000	Yes
Curl-leaf mountain mahogany													3			
Cercocarpus montanus	N	pale yellow	S-SU	3-15	10	☼◑	1	2	3	2	0	1		1	47,400	Yes
True mountain mahogany (Birchleaf mountain mahogany)													3			
Chilopsis linearis	N	lavender to pink	S-F	20-30	6-W‡	☼◑	2	3	3	2	1	0		2	75,000	Yes
Desert willow													3			
Chrysothamnus viscidiflorus	N	yellow	SU-F	1-2.5	6	☼◑	2	3	3	2	1	1		2	782,000	Yes
Douglas rabbitbrush (Low rabbitbrush)													3			
Coleogyne ramosissima	N	yellow	S	2-4	6	☼	2	3	2	1	0	0		1	22,400	Yes
Blackbrush													3			
Cornus canadensis	N	white/red berries	S-SU	<1	18-W‡	◑●	0	2	3	2	0	2		0	67,000	Yes
Bunchberry													3			
Cornus sericea	N	white/white berries	S-SU	3-9	18-W‡	◑●	1	2	3	3	2	2		1	17,300	Yes
Redosier dogwood													3			
Dasylirion wheeleri	N	white	S-SU	3	6	☼	2	3	3	1	0	0		2	24,000	Yes
Desert spoon (Sotol)													3			
Encelia farinosa	N	yellow	W-S	1-3	5	☼	2	2	3	2	0	0		2	175,000	Yes
Brittlebush													3			
Encelia frutescens	N	yellow	S-SU	1.5-5	2-8	☼	3	3	2	1	0	0		3	47,300	Yes
Button brittlebush													3			

Flowering Season
F = Fall
W = Winter
S = Spring
SU = Summer

Sun/Shade Tolerance
☼ Full sun
◑ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Shrubs & Trees

Scientific Name / Common Name / Varieties	Native / Introduced	Bloom / Fruit Color	Flowering Season	Mature Height (feet)	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: SOIL TEXTURE — Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	SOIL ADAPTATION: SOIL pH — Acidic	Neutral	Basic	Seeds per Pound	Mycorrhizal Dependent
Ephedra nevadensis	N	inconspicuous	S	2-5	5		2	2	3	2	0	0	2	3	19,900	Yes
Nevada ephedra (Nevada Mormon tea)																
Ephedra viridis	N	inconspicuous	S	1-5	7		3	3	2	1	0	0	3	2	25,000	Yes
Green ephedra (Green Mormon tea)																
Ericameria laricifolia	N	yellow	F	1-5	6		2	3	3	1	0	0	3	1	850,000	Yes
Turpentine bush																
Ericameria nauseosa	N	yellow	F	2-7	6		2	3	3	3	2	1	3	2	400,000	Yes
Rubber rabbitbrush																
Eriogonum fasciculatum	N	white	S-F	1.5-3	7		1	3	3	2	0	0	3	2	450,000	Yes
Flat-top buckwheat (California buckwheat)																
Fallugia paradoxa	N	white-rose	S-SU	3-6	4		2	3	2	1	0	0	3	1	420,000	Yes
Apache plume																
Ferocactus wislizeni	N	orange or red/yellow fruit	SU	2-9	2-5		3	3	3	1	0	0	3	2	275,575	Yes
Barrelcactus (Candy barrelcactus)																
Grayia spinosa	N	inconspicuous	S	2-4	5		2	3	3	3	1	0	3	3	254,000	No
Spiny hopsage																
Gutierrezia sarothrae	N	yellow	F	2	8		2	2	3	3	2	0	3	3	1,600,000	Yes
Broom snakeweed																
Isocoma tenuisecta	N	yellow	F	1-5	7		0	1	3	3	2	0	3	2	878,200	Yes
Burroweed																
Juniperus scopulorum	N	inconspicuous/blue berries	S	15-40	10		0	2	3	2	0	1	3	1	27,000	Yes
Rocky Mountain juniper																
Krascheninnikovia lanata	N	inconspicuous	S	1-3	5		2	3	3	2	1	0	3	3	123,000	Yes
Winterfat																
Larrea tridentata	N	yellow	S-SU-F	3-10	4		2	3	3	2	1	0	3	2	80,000	Yes
Creosote bush																
Lycium andersonii	N	lavender/red berries	S-SU	1-4	5		2	3	3	2	0	0	3	2	592,000	Yes
Wolfberry																
Lycium exsertum	N	white-purple	S	3-10	5		2	3	3	2	0	0	3	2	500,000	Yes
Thornbush (Arizona desert-thorn)																
Mahonia repens	N	yellow/purple berries	S	0.5-1.5	14		1	3	3	1	0	2	3	1	54,000	Yes
Creeping Oregon grape																
Olneya tesota	N	pink-purple	S-SU	30	4		3	3	2	1	1	0	3	2	2,440	Yes
Ironwood (Desert ironwood)																
Parkinsonia aculeata	N	yellow	S-SU	15-25	11-W‡		1	3	2	1	0	0	3	3	3,100	Yes
Mexican palo verde (Jerusalem thorn)																
Parkinsonia florida	N	yellow	S	15-30	7		1	3	3	2	1	0	3	2	3,000	Yes
Blue palo verde																
Parkinsonia microphylla	N	pale yellow	S	10-25	8		1	3	3	2	1	0	3	2	4,500	Yes
Yellow palo verde (Foothill palo verde)																
Parthenium incanum	N	cream to white	S	1-3	7		1	3	3	2	1	0	3	3	100,000	yes
Mariola																
Peritoma arborea	N	yellow	S-SU	3-5	6		0	2	3	3	1	0	3	2	4,000	Yes
Bladderpod (Bladderpod spiderflower)																
Prosopis pubescens	N	yellow	S	15-25	6-W‡		1	3	3	3	1	0	2	3	14,000	Yes
Screwbean mesquite (Tornillo)																
Prosopis velutina	N	cream to white	S	8-30	4		1	3	3	2	1	0	3	2	13,500	Yes
Velvet mesquite																

Flowering Season
F = Fall
W = Winter
S = Spring
SU = Summer

Sun/Shade Tolerance
Full sun
Partial shade
Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Scientific Name / Common Name / Varieties	Native / Introduced	Bloom / Fruit Color	Flowering Season	Mature Height (feet)	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: SOIL TEXTURE — Coarse	Moderately Coarse	Medium	Moderately Fine	Fine	SOIL ADAPTATION: SOIL pH — Acidic	Neutral	Basic	Seeds per Pound	Mycorrhizal Dependent
Prunus fasciculata var. facsiculata	N	white/grey to green berries	S	3-7	8		2	3	3	2	0	0	3	1	4,500	Yes
Desert almond (Desert peach)																
Prunus virginiana	N	white/purple to black berries	S	5-30	14-W‡		1	2	3	2	0	2	3	2	4,800	Yes
Chokecherry																
Psilostrophe cooperi	N	yellow	S-F	1-2	4		3	3	2	1	1	0	3	2	491,200	Yes
Paperflower (Whitestem paperflower)																
Purshia mexicana	N	pale yellow	S-SU	3-20	10		1	3	3	2	0	0	3	1	64,600	Yes
Mexican cliffrose																
Purshia tridentata	N	yellow	S-SU	2-15	10		1	3	3	2	0	1	3	2	15,000	Yes
Antelope bitterbrush																
Purshia tridentata var. glandulosa	N	yellow	S-SU	3-7	6		2	3	3	2	0	0	3	1	20,800	Yes
Desert bitterbrush																
Rhus aromatica	N	yellow/red berries	S	2-6	8		2	3	3	1	0	0	3	1	20,300	Yes
Skunkbush sumac (Aromatic sumac)																
Rhus glabra	N	yellow/dark red berries	S	4-7	10		1	2	3	2	0	2	3	1	49,000	Yes
Smooth sumac																
Rhus ovata	N	cream to pink/red berries	S	5-15	10		1	2	3	2	0	2	3	1	16,170	Yes
Sugar sumac (Sugar bush)																
Ribes aureum	N	yellow/yellow to red berries	S	3-8	12-W‡		0	2	3	2	0	1	3	1	356,200	Yes
Golden currant (Buffalo currant)																
Ribes cereum	N	white to pink/red berries	S-SU	3-5	14		0	2	3	2	0	0	3	1	350,000	Yes
Wax currant																
Rosa woodsii	N	pink/orange to red hips	S-SU	2-6	12-W‡		1	2	3	2	0	2	3	1	45,300	Yes
Woods rose																
Sambucus nigra ssp. cerulea	N	cream to white/blue to black berries	Sum	6-20	10-W‡		2	2	3	2	0	1	3	1	216,800	Yes
Blue elderberry																
Sambucus racemosa	N	cream to white/red berries	S-SU	3-6	18-W‡		0	1	3	3	0	1	3	1	286,000	Yes
Red elderberry																
Sarcobatus vermiculatus	N	inconspicuous	S-SU	2-8	6		0	0	2	3	3	0	2	3	245,000	Yes
Black greasewood																
Senegalia greggii	N	yellow	S	8-20	4		2	3	2	1	0	0	3	2	2,500	Yes
Catclaw acacia																
Shepherdia argentea	N	yellow/gold or scarlet berries	S-SU	6-13	12-W‡		1	2	3	2	0	2	3	2	45,000	Yes
Silver buffaloberry																
Shepherdia canadensis	N	cream to yellow/gold berries	S-SU	3-12	12		1	3	3	1	0	1	3	1	59,215	Yes
Russett buffaloberry																
Simmondsia chinensis	N	inconspicuous	W-S	3-6	6		0	2	3	2	0	1	3	1	700	Yes
Jojoba																
Symphoricarpos albus	N	white to pink/white berries	SU	2-5	12		2	2	3	2	0	1	3	0	76,000	Yes
Common snowberry																
Symphoricarpos oreophilus	N	white to pink/white berries	Sum	2-5	12		0	2	3	2	0	2	3	0	54,700	Yes
Mountain snowberry																
Vachellia constricta	N	orange-yellow	S	2-10	4		3	3	2	1	0	0	3	2	25,000	Yes
Whitethorn acacia																
Vachellia farnesiana	N	yellow	S	15-20	6		1	2	3	2	1	0	3	3	7,700	Yes
Sweet acacia																
Yucca glauca	N	cream to white	S-SU	3-5	7		3	3	2	1	0	0	3	1	22,680	Yes
Soapweed yucca (Small soapweed)																

Flowering Season
F = Fall
W = Winter
S = Spring
SU = Summer

Sun/Shade Tolerance
Full sun
Partial shade
Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.

Cover Crops & Annual Forages

Scientific Name / Common Name / Varieties**	Native / Introduced	Annual / Winter Annual / Biennial / Perennial	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine (SOIL TEXTURE)	Acidic	Neutral	Basic (SOIL pH)	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
Avena sativa	I	A	C	M-T	13	☼	0	2	3	2	1	2	3	2	80-125	14,000	S	Yes
Oats																		
Brassica juncea	I	A	C	M-T	30	☼	0	1	2	3	3	1	3	2	25	283,000	F/S	No
Brown mustard & Oriental mustard																		
Cutlass																		
Brassica napus	I	A	C	M-T	40	☼	0	1	3	3	3	1	3	2	5	157,000	S/SU	No
Forage rapeseed																		
Brassica rapa	I	A	C	M-T	35	☼◐	2	3	3	3	3	1	3	2	5	193,000	S/SU/F	No
Forage turnip																		
Carthamus tinctorius	I	A	W	M-T	10	☼	2	3	2	1	0	1	3	2	25-30	15,000	S/SU	Yes
Safflower																		
Cichorium intybus	I	B/P	W	M	20	☼	2	3	2	2	2	1	3	2	8	400,000	S/SU	Yes
Chicory																		
Echinochloa esculenta	I	A	W	T	12-W‡	☼	1	3	3	2	1	1	3	1	25-40	225,000	S/SU	Yes
Japanese millet																		
Eragrostis tef	I	A	W	S-M	24	☼	2	3	3	2	2	2	3	2	10	1,300,000	S/SU	Yes
Teff																		
Fagopyrum esculentum	I	A	W	M-T	15	☼◐	2	3	3	1	1	1	3	1	50	20,000	S/SU	Yes
Buckwheat																		
Helianthus annuus	N	A	W	T	12	☼	3	3	3	1	1	1	3	2	15-25	8,000	S/SU	Yes
Common sunflower																		
Hordeum vulgare	I	A/WA	C	M-T	12	☼	0	2	3	3	2	1	3	2	60-80	12,500	F/S	Yes
Barley																		
Panicum miliaceum	I	A	W	M-T	12-14	☼	1	2	3	2	1	1	3	1	20-30	200,000	SU	Yes
Proso millet																		
Pennisetum glaucum	I	A	W	T	8	☼	3	3	3	2	1	3	3	1	25	60,000	S/SU	Yes
Pearl millet																		
Phacelia tanacetifolia	N	A	C	M-T	10	☼	2	2	3	2	1	0	3	1	1-2	245,000	S/SU	Yes
Lacy phacelia																		
Raphanus sativus var. longipinnatus	I	A	C	S	12	☼◐	2	2	3	3	2	1	3	1	8	8,000	S/SU/F	No
Forage radish (Daikon radish)																		
GroundHog																		
Secale cereale	I	A/WA	C	T	8	☼	2	3	3	3	1	2	3	1	100	18,000	S	Yes
Cereal rye																		
Setaria italica	I	A	W	M	12-14	☼	1	3	3	2	1	1	3	1	25-40	225,000	S/SU	Yes
Foxtail millet																		
Golden German, Siberian																		
Sinapis	I	A	C	T	15	☼	3	3	3	2	1	1	3	2	7	250,000	S/SU	No
White mustard																		
Martigena																		
Sorghum bicolor	I	A	W	M-T	15	☼	1	2	3	3	2	2	3	0	10	60,000	S	Yes
Grain sorghum (Milo)																		

Mature Height [inches]
S = Short (less than 12)
M = Medium (13 - 24)
T = Tall (greater than 24)

Sun/Shade Tolerance
☼ Full sun
◐ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

Planting Season
F = Fall
S = Spring
SU = Summer

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.
**Some cover crops have numerous of varieties to choose from. Ask our experts for recommendations.

Scientific Name / Common Name / Varieties**	Native / Introduced	Annual / Winter Annual / Biennial / Perennial	Cool / Warm Season	Mature Height	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine (SOIL TEXTURE)	Acidic	Neutral	Basic (SOIL pH)	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Season	Mycorrhizal Dependent
Sorghum bicolor x Sorghum bicolor var. drummondii	I	A	W	M-T	15	☼	1	2	3	3	2	2	3	0	15	68,000	S	Yes
Sorghum-Sudangrass																		
Triticum aestivum	I	A/WA	C	M-T	12	☼	0	2	3	2	1	2	3	1	45-60	14,000	F/S	Yes
Wheat																		
Triticum aestivum x Elytrigia elongata	I	A	C	M-T	12	☼	1	2	3	2	1	2	3	2	10-40	11,000	F/S	Yes
Regreen																		
Triticum aestivum x Secale cereale	I	A	C	T	12	☼	1	2	3	3	1	1	3	1	5-15	13,000	F/S	Yes
QuickGuard® Sterile Triticale																		
Triticum aestivum x Secale cereale	I	A/WA	C	T	12	☼	1	2	3	3	1	1	3	1	60-100	13,000	F/S	Yes
Triticale																		

Seed harvest at L&H Seeds in Connell, WA. ©L&H Seeds

Mature Height [inches]
S = Short (less than 12)
M = Medium (13 - 24)
T = Tall (greater than 24)

Sun/Shade Tolerance
☼ Full sun
◐ Partial shade
● Full shade

Soil Adaptation (Texture & pH)
3 = Best
2 = Average
1 = Marginal
0 = Not adapted

Planting Season
F = Fall
S = Spring
SU = Summer

‡ W = Wetland adapted. See *Wetland Species Index*, page 103.
**Some cover crops have numerous of varieties to choose from. Ask our experts for recommendations.

Forage Legumes

Scientific Name / Common Name / Varieties**	Annual / Perennial / Biennial	Bloat / Non-bloat	Mature Height (inches)	Cold Hardiness	Minimum Annual Precipitation (inches)	Sun / Shade Tolerance	SOIL ADAPTATION: Coarse	Moderately Coarse	Medium	Moderately Fine	Fine (SOIL TEXTURE)	Acidic	Neutral	Basic (SOIL pH)	Seeding Rate PLS lbs/acre (monoculture)	Seeds per Pound	Planting Time	Mycorrhizal Dependent
Astragalus cicer	P	NB	M	H	12-18	☼◉	1	2	3	2	1	1	3	2	20-25	126,000	S/F	Yes
Cicer milkvetch																		
Lutana, Monarch, Oxley II																		
Lotus corniculatus	P	NB	M	H	24	☼◉	0	2	3	2	0	2	3	1	4-6	370,000	S	Yes
Birdsfoot trefoil																		
Bruce, Leo, Norcen, Viking																		
Medicago sativa	P	B	M-T	H/NH	15-18	☼◉	1	2	3	2	0	1	3	2	8-15	210,000	S/F	Yes
Alfalfa																		
Numerious varieties available																		
Medicago sativa ssp. falcata	P	B	T	H	10	☼	1	2	3	2	1	1	3	1	6-8	211,000	S/F	Yes
Falcata alfalfa (Yellow-flowered alfalfa)																		
Don																		
Melilotus alba	B	B	M-T	H	10-12	☼	1	2	3	3	1	1	3	2	10-15	260,000	S/F	Yes
White sweetclover																		
Melilotus officinalis	B	B	M-T	H	10-12	☼	1	2	3	3	1	1	3	2	10-15	260,000	S/F	Yes
Yellow sweetclover																		
Onobrychis viciifolia	P	NB	T	H	10	☼	0	2	3	2	0	1	3	2	35-45	22,000	S	Yes
Sainfoin																		
Delaney, Eski, Remont, Shoshone																		
Pisum sativum ssp. arvense	A	B	M-T	H	16	☼◉	1	1	3	3	1	1	3	1	60-100	2,000	S/F	Yes
Field pea (Spring pea, Austrian winter pea)																		
Trifolium alexandrinum	A	NB	M	NH	10-12	☼◉	1	2	3	3	3	1	3	3	8-15	134,000	SU/F	Yes
Berseem clover																		
Frosty																		
Trifolium fragiferum	P	B	S	H/NH	15-W‡	☼◉	0	2	3	3	1	1	2	3	5-15	300,000	S/F	Yes
Strawberry clover																		
Palestine																		
Trifolium hirtum	P	B	S-M	NH	14	☼◉	0	2	3	2	0	1	3	1	20	140,000	F	Yes
Rose clover																		
Trifolium hybridum	P	B	M	H	35-W‡	☼◉	0	1	2	3	2	1	3	1	6-8	680,000	S	Yes
Alsike clover																		
Trifolium incarnatum	A	B	S-M	NH	35	☼◉	2	3	3	2	1	2	2	1	10-20	107,200	S-SU-F	Yes
Crimson clover																		
Dixie																		
Trifolium michelianum	A	B	S-M	H	17	☼◉	1	2	3	3	3	2	3	2	5-6	500,000	S/F	Yes
Balansa clover																		
FiXatioN																		
Trifolium pratense	B	B	T	H	18	☼◉	0	2	3	2	1	2	3	1	6-12	275,000	S/F	Yes
Red clover																		
Kenland																		
Trifolium repens	P	B	S	H	35-W‡	☼◉	1	2	3	2	1	1	3	1	2-6	850,000	S/F	Yes
White clover																		
Ladino, White Dutch																		

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Vicia villosa	A	NB	S-M	NH	12	☼◉	2	2	3	3	1	1	3	1	25-35	20,000	S/F	Yes
Hairy vetch																		
Vicia villosa ssp. varia	A	NB	S-M	NH	12	☼◉	0	1	3	2	1	1	3	1	15-25	100,000	S/F	Yes
Woolly pod vetch																		
Lana																		

Mule deer in an Alfalfa (*Medicago sativa*) hay field in western Colorado.

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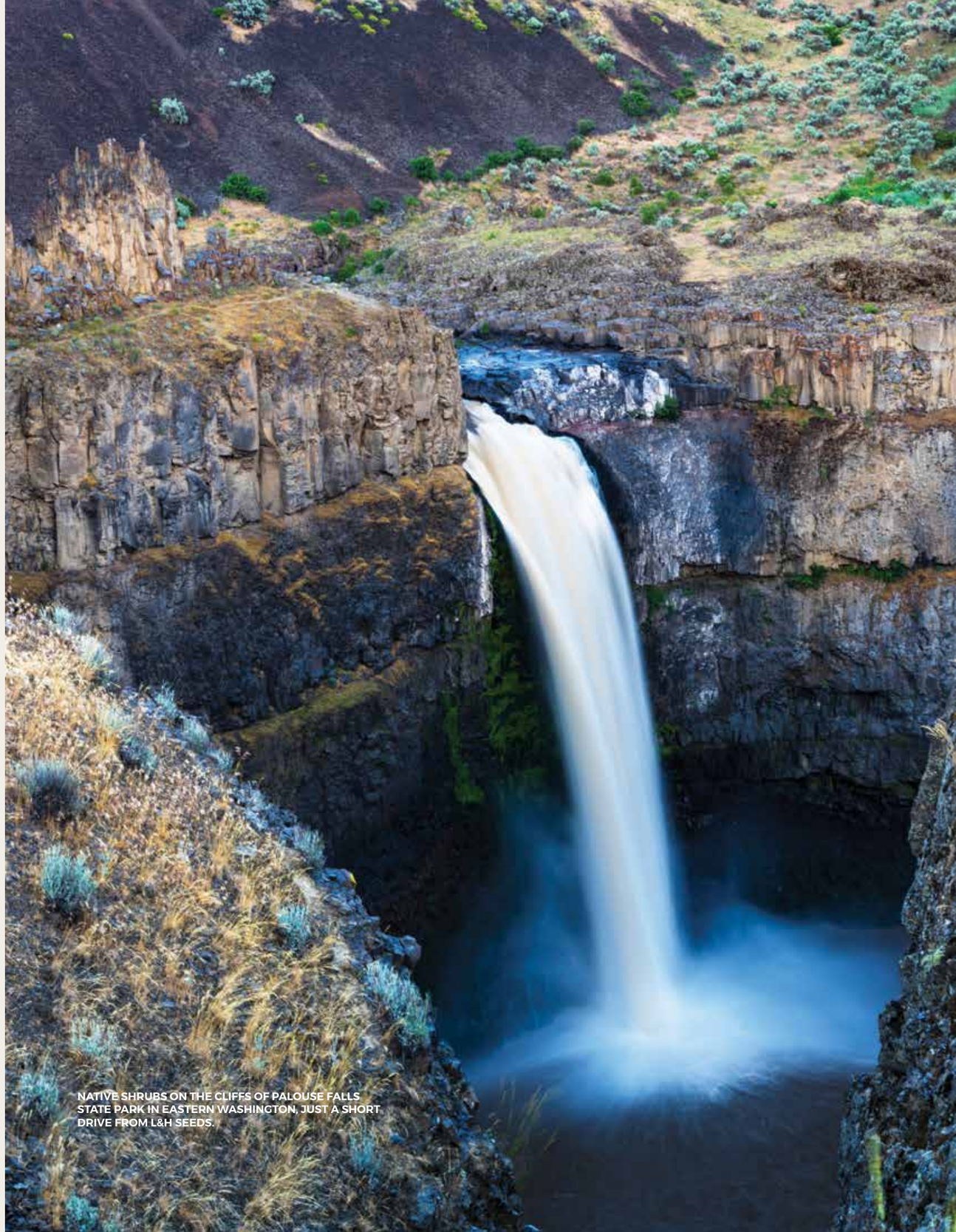

NATIVE SHRUBS ON THE CLIFFS OF PALOUSE FALLS STATE PARK IN EASTERN WASHINGTON, JUST A SHORT DRIVE FROM L&H SEEDS.