

Mid Diversity Moist Buffer South & West 32-251

Updated: 2023

This riparian buffer mix has been designed for southern and western Minnesota areas with moist soils and full sun for at least 70% of the day where there are goals for providing wildlife habitat, soil stabilization and water quality benefits.



Partners also include collaboration among Non-profits, Seed vendors, SWCD, Tribal Governments, Consultants, County and Cities. (See partner list on [website](#))

32-251

Mid Diversity Moist Buffer South & West Mix

Code	Common Name	Scientific Name	PLS lb/ac	% by PLS lb/ac	Seeds/ft2	% by Seeds/ft2
andger	Big Bluestem	<i>Andropogon gerardii</i>	2.45	7.56%	9.00	10.00%
calcan	Bluejoint Grass	<i>Calamagrostis canadensis</i>	0.04	0.12%	4.11	4.57%
elyvir	Virginia Wild Rye	<i>Elymus virginicus</i>	3.24	10.00%	5.00	5.55%
glygra	American Manna Grass	<i>Glyceria grandis</i>	0.25	0.77%	6.43	7.14%
leeory	Rice Cut Grass	<i>Leersia oryzoides</i>	0.17	0.52%	2.12	2.36%
poapal	Fowl Bluegrass	<i>Poa palustris</i>	0.29	0.90%	13.85	15.38%
spapec	Prairie Cord Grass	<i>Spartina pectinata</i>	0.21	0.65%	0.51	0.57%
		Grasses Subtotal	6.65	20.52%	41.02	45.57%
carsti	Common Fox Sedge	<i>Carex stipata</i>	0.23	0.71%	2.87	3.19%
carvul	Brown Fox Sedge	<i>Carex vulpinoidea</i>	0.14	0.43%	5.14	5.71%
sciatr	Dark Green Bulrush	<i>Scirpus atrovirens</i>	0.08	0.25%	13.52	15.02%
		Sedges & Rushes Subtotal	0.45	1.39%	21.53	23.92%
ascinc	Swamp Milkweed	<i>Asclepias incarnata</i>	0.04	0.12%	0.07	0.08%
bidcer	Nodding Bur Marigold	<i>Bidens cernua</i>	0.04	0.12%	0.31	0.34%
doeumb	Flat-topped Aster	<i>Doellingeria umbellata</i>	0.01	0.03%	0.25	0.27%
eupper	Boneset	<i>Eupatorium perfoliatum</i>	0.01	0.03%	0.59	0.65%
eutgra	Grass-leaved Goldenrod	<i>Euthamia graminifolia</i>	0.01	0.03%	1.29	1.43%
eutmac	Joe Pye Weed	<i>Eutrochium maculatum</i>	0.01	0.03%	0.35	0.39%
helaut	Sneezeweed	<i>Helenium autumnale</i>	0.02	0.06%	0.96	1.06%
helgro	Sawtooth Sunflower	<i>Helianthus grosseserratus</i>	0.01	0.03%	0.06	0.06%
lobsip	Great Blue Lobelia	<i>Lobelia siphilitica</i>	0.01	0.03%	1.84	2.04%
mimrin	Monkey Flower	<i>Mimulus ringens</i>	0.01	0.03%	8.45	9.39%
pycvir	Virginia Mountain Mint	<i>Pycnanthemum virginianum</i>	0.01	0.03%	0.81	0.90%
silper	Cup Plant	<i>Silphium perfoliatum</i>	0.04	0.12%	0.02	0.02%
symlan	Panicled Aster	<i>Symphotrichum lanceolatum</i>	0.01	0.03%	0.57	0.64%
symnov	New England Aster	<i>Symphotrichum novae-angliae</i>	0.01	0.03%	0.24	0.27%

verhas	Blue Vervain	<i>Verbena hastata</i>	0.01	0.03%	0.34	0.38%
zizaur	Golden Alexanders	<i>Zizia aurea</i>	0.05	0.15%	0.20	0.22%
		Forbs Subtotal	0.30	0.93%	16.33	18.14%
cover	Oats/Winter Wheat	<i>Avena sativa/Triticum aestivum</i>	25.00	77.16%	11.14	12.37%
		Cover Crop Subtotal	25.00	77.16%	11.14	12.37%
		Total	32.40	100.00%	90.02	100.00%

Seed Mix Enhancements or Substitutions

List of Additional Species to Add Diversity or for Substitutions

Grasses:

Scientific Name	Common Name
<i>Bromus ciliatus</i>	Fringed Brome
<i>Bromus pubescens</i>	Hairy Wood Chess
<i>Elymus riparius</i>	Riverbank Wild Rye
<i>Elymus villosus</i>	Downy Wild Rye
<i>Glyceria striata</i>	Fowl Manna Grass
<i>Leersia virginica</i>	White Grass
<i>Panicum virgatum</i>	Switchgrass
<i>Sorghastrum nutans</i>	Indian Grass

Forbs:

Scientific Name	Common Name
<i>Chelone glabra</i>	White Turtlehead
<i>Cicuta maculate</i>	Spotted Water Hemlock
<i>Doellingeria umbellate</i>	Flat-topped Aster
<i>Gentiana andrewsii</i>	Bottle Gentian
<i>Helianthus giganteus</i>	Giant Sunflower
<i>Lobelia cardinalis</i>	Cardinal Flower
<i>Lobelia spicata</i>	Rough-spiked Lobelia
<i>Lysimachia ciliate</i>	Fringed Loosestrife
<i>Phlox pilosa</i>	Prairie Phlox
<i>Ranunculus fasciculatis</i>	Early Buttercup
<i>Sisyrinchium montanum</i>	Mountain Blue-eyed Grass
<i>Symphotrichum puniceum</i>	Red-stemmed Aster
<i>Teucrium canadense</i>	Germander
<i>Vernonia fasciculata</i>	Bunched Ironweed
<i>Zizia aptera</i>	Heart-leaved Alexanders

Sedges:

Scientific Name	Common Name
<i>Carex bebbii</i>	Bebb's Sedge
<i>Carex scoparia</i>	Lance-fruited Oval sedge
<i>Juncus dudleyi</i>	Dudley's Rush
<i>Scirpus cyperinus</i>	Woolgrass

Mid Diversity Moist Buffer South & West Seed Mix Guidance

(MIX IMAGE)

Seed mix name: Mid Diversity Moist Buffer South & West 32-251

Geographic area: Minnesota, South and West

Year of development: 2023

Year/s of update: 2023

Status (*Standard or Pilot mix*): Standard

Primary and Secondary Functions:

Primary – Water quality benefits, soil stabilization and wildlife habitat

Secondary – Carbon Sequestration, emission reductions, pollinator habitat (potential, depending on placement), songbird and other non-game wildlife habitat

Similar State Mixes: Mid-Diversity Mesic to Dry Buffer South & West, Mid-Diversity Mesic to Dry Buffer South & West South & West, Mid-Diversity Moist Buffer NE, Native Forage Buffer South & West, Low Diversity Floodplain Mix

Compatible NRCS Practice Standards: 393

Compatible Minnesota CRP Practices: CP21

Suitable Site Conditions: Areas with moist soils adjacent to a stream, wetland or lake is being converted from other uses such as agriculture or non-native grasses to a native prairie reconstruction.

How to Modify for Site Conditions and Goals: This mix includes a list of additional species that can be considered to add species diversity. Site conditions such as sunlight, soils, hydrology, and existing vegetation along with functional goals for the project such as carbon sequestration, pollinator habitat, and benefit to grassland bird species can all have an influence on species selection and the modification of seed mixes.

Site Preparation: Primary goals for site preparation tend to focus on controlling weed species and providing ideal growing conditions for seed or plants to be installed. Site preparation methods vary depending on past uses of the site that can contribute to soil condition and the amount and type of problematic weed species present. The protection of microorganism populations and native seedbanks, preventing soil erosion, and managing weed establishment are all considerations during the site preparation process. In most cases, non-herbicide methods are preferred over methods that include repeated, intensive herbicide methods to protect aquatic organisms and soil microfauna, but on large acreages herbicides may be the most efficient method of controlling some invasive perennial species. It is common for many conservation plantings to transition from corn or soybean production. Fields that have been in agricultural production will need a chemical history in order to know if there will be herbicide carry-over that may prevent growth or harm vegetation establishment. Another consideration is that several chemicals being used for weed control, including Glyphosate act as pre-emergents or post-emergents (designed to inhibit germination) and can be a problem for native vegetation

establishment from seed. Investigate prior chemical use and labels to help define probability of having chemical carryover that could/should be addressed by using temporary cover crops to allow time for chemicals to break down. If a site is dominated by problematic perennial weeds such as smooth brome, quack grass, or bluegrass, it will need to have a longer site prep time prior to planting. One way to do this is to use 1-2 seasons of agricultural row-crops or densely seeded temporary covers. Temporary covers both act to smother problematic weeds and improve overall soil structure and function. For sites in agricultural production, herbicide application is often recommended, as tilling alone may re-suspend the rhizomes, allowing them to continue growing.

Seeding Dates: Native seed mixes can be installed in the spring or fall. Spring seedings should be done on or around May 1-July 1 when soil temperatures are at least 60 degrees Fahrenheit or higher. Fall seeding should occur when soil temperatures fall below 50 degrees Fahrenheit for a consistent period of time (usually around October 15 in the northern half of the state and November 1 in the southern half of the state). Fall dormant seedings can help reduce weed pressure during the first year of growth because cool-season grasses and forbs germinate earlier and start competing with weed species right away. For wet sites or sites prone to flooding, a fall seeding may be ideal to avoid wet conditions that are more common in the spring than in the fall. Frost seedings are also an option if the snow cover is not too deep. For a frost seeding, seeding rates may need to be increased by 25 percent due to lower germination rates and loss of seed that is consumed by wildlife over the winter months. In general, grasses are most successful with a spring/early summer seeding while forbs are most successful with a fall dormant seeding, as most forbs require a winter to break their seed dormancy before they can start growing. Planting dates will vary depending on the weather in a particular year and where the planting site is located (e.g., northern Minnesota versus southern Minnesota). Consult with native seed suppliers to determine the best planting dates for that year.

Seedbed preparation: Methods that are used to prepare a seedbed can vary depending on the type of seeding equipment to be used. If a traditional native seed drill will be used, a smooth, firm seedbed is required. Soybean fields generally are sufficiently prepared for a native seed drill, but sites that were recently tilled will require additional soil treatment such as harrowing and rolling to prepare an adequate seedbed and prevent seed from being buried too deep. Broadcast seeding can be conducted on soybean or corn fields, or fields that have been disked, as long as the soil is allowed to settle before seeding. Some practitioners have found that broadcast seeding on a smooth surface (not tilled or disked) leads to the establishment of higher diversity. It is important that the soil surface is not too hard packed, so cultipacking or light harrowing of crop fields before broadcast seeding may be needed. Seed can be lost on smooth surfaces, so it is recommended to seed into temporary cover crops or to roll sites after seeding.

Temporary Cover Crops and Mulch: The use of short-lived temporary cover crops help stabilize project sites and minimize the need for additional mulch in preparation of planting native seed mixes. They can also provide time to observe weed problems, and to allow for proper weed control before fall seeding. Temporary cover crops such as oats or winter wheat (the two species most commonly used) should be mowed to 10-12 inches before seeds mature (or harvested upon maturity) to prevent re-seeding. Other cover crops typically used in agricultural fields, such as buckwheat, pennycress, and radishes, can help stabilize soil, build soil quality, or provide weed competition as part of restoration projects. Also see NRCS Agronomy Technical Note 31. If you are seeding into a temporary cover, it is recommended to use a native grass drill to maximize seed to soil contact. When using a broadcast seeder, it is recommended to increase seeding rates to maximize the seed to soil contact.

Seeding Methods: A variety of seeding equipment is used for upland prairie seeding including broadcast seeders, traditional native seed drills, no-till drills, Billion seeders and Trillion seeders. Specialized native seed drills can handle a wide variety of seed (fluffy, smooth, large and small) and low seeding rates. Since no-till drilling can plant directly into a light stubble layer, this method reduces erosion on the newly seeded site. Conventional grain drills are not capable of handling diverse seed sizes and are unlikely to provide satisfactory results. While no-till native seed drills can plant through light stubble, success is still likely to be greatest when most excess residue is removed. For broadcast seeding equipment should be used that is designed to spread mixes with different sized seeds (e.g., Vicon Seeders).

Management Methods

Integrated Pest Management – Land managers and seed mix practitioners should utilize [Integrated Pest Management](#) in their efforts to establish and manage plantings. Integrated Pest Management, or IPM, is an environmentally sensitive approach to pest management that relies on the use of a combination of practices (conservation grazing, haying, prescribed burning, etc.) to successfully establish and manage native vegetation while minimizing the use of chemicals and accomplishing goals such as the protection and restoration of pollinators and other beneficial insects. Ultimately, using a variety of practices is the most effective, sustainable, and culturally appropriate way to achieve project goals.

Establishment Mowing – Mowing can be an important step in the establishment of upland prairie restoration sites that have high pressure from annual weeds. Mowing at least twice the first season and once the second season with a flail mower or stalk chopper (to prevent smothering plants) may be needed to decrease competition and to provide sufficient sunlight for seedlings. Haying is another method to remove mowed vegetation that prevents smothering of the new seeding. Mowing should be conducted before weeds mature and seed out and it is important that mowed vegetation does not smother the planting. Problematic weeds should be mowed to between five and eight inches before seed is allowed to set (usually as weeds reach 12-14 inches). Mowing height should be raised as native plants establish. Mowing too short can be detrimental to the outcomes of a successful planting. The timing and frequency of mowing should be planned to allow sufficient light to reach native plant seedlings and to prevent weed seed production. Some grassland managers see success without mowing but the need will vary depending on site conditions (such as soil productivity) and weed pressure.

Prescribed Burning – Prescribed burning is beneficial to remove thatch, control invading woody and invasive plants in prairies, fertilize the soil with ashes, stimulate seed germination and new plant growth, and increase diversity in plantings. Burning is typically initiated after the third or fourth years of establishment, after native vegetation is reaching maturity. Uplands benefit from burning every three to five years. The timing of a burn helps with management goals. Late spring burns are used to combat cool-season non-native species such as brome and reed canary grass. Burning a portion of the property each spring instead of an “all at once” burn will leave undisturbed nesting cover for ground nesting birds. Fall and spring burns should be alternated periodically to simulate natural variation. Burn plans are needed to define the details of how the burn will be conducted, who will be involved and for contingency planning. In many cases, permits are also required. It is recommended to only burn one-half or less of a project site at a time if they are large (over 50 acres), or don’t have any adjacent refuge such as other conservation lands adjacent to the site for wildlife species. Partial burns and burns that are patchy may also benefit pollinator populations if timed correctly (when pollinators are not actively foraging or pollinators have pupated and are mobile).

Spot Mowing – After vegetation has established it may be beneficial to spot mow areas with invasive or noxious plants. Spot-mowing can slow some of the aggressive and fast-growing invasive plants while allowing the native species to become established. Spot-mowing should be done at a raised height between 4-6 inches in order to target the invasive plants and to not damage the native species. Spot-mowing for control of invasive or noxious

weeds can be done every year to ensure planting health, even during 10 establishment years. Care should be taken to avoid mowing the planting too frequently or too aggressively, such as weekly or shorter than the recommended height as this can damage the native vegetation and cause the planting to fail. A list of noxious/invasive weed species that should be eradicated can be viewed at the Minnesota Department of Agriculture's website

Spot Management of Weeds – Problematic perennial weeds that cannot be managed effectively with other methods may require digging, pulling, smothering or spot treatment with herbicide for sufficient control. Examples include reed canary grass, smooth brome, quack grass, purple loosestrife, Canada thistle, Kentucky bluegrass, crown vetch, and birds-foot trefoil. These methods often are not conducted during the first year of establishment due to potential impact to native plant seedlings, but it may be important to control some weeds before they have a chance to spread. If herbicides will be used it is important that monitoring indicates that they are needed, and treatments are made with the goal of removing only the target plant or plants. Herbicides should be selected and applied in a manner that minimizes risks to human health, beneficial and nontarget organisms, and the environment. For example, they should only be used when pollinators and other insects are not active (A common approach is to mow or grazing invasive weeds in the summer followed by herbicide application in the fall). Minimize herbicide first year/spot spray year 2. Unless significant problem weeds show up.

What to Expect in Year 1: During year one of growth many native grasses and flowers will remain about one to three inches tall. The mowing will play an important role to keep weeds managed so the native plant seedlings receive sufficient water and sunlight. The planting may have a somewhat weedy appearance this first year (see establishment mowing paragraph above).

(IMAGE)

What to Expect in Year 2: During year two the native grasses and flowers may reach their mature height and some of them may flower. Mowing may still play a key role in managing weeds and allowing seedlings to grow.

(IMAGE)

What to Expect in Year 3 and Beyond: By the end of year three most of the native plants will be nearing maturity and should flower. There may be some species that are slow to establish and may not show up for several years.

(IMAGE)

Problem Solving

Poor Establishment After Year 1 – It is often difficult to determine if a seeding is successful during the first year as establishment may vary depending on weather conditions and some species may be slow to establish. It is typically best to wait until the second year to conduct any corrective actions. Look for species such as Black-Eyed Susan flowering in year 1 for confirmation the seeding was a success.

Poor Establishment After Year 2 – If native plant seedlings are not establishing about every one to two feet it may be necessary to inter-seed some species into the planting. If this is a concern it is recommended to inspect the site during the growing season to recommend what species could be supplemented.

High Annual and Biennial Weed Competition – Typically, annual and biennial weed competition is not a big problem in prairie plantings as they are short lived and as long as mowing is conducted before seed is set they should not add additional seed into the planting.

High Perennial Weed Competition – Dense establishment of perennial species can be a problem as it can prevent the establishment of forbs. Prescribed burning, prescribed grazing, and/or herbicide application may be needed to manage perennial weeds.

Low Forb Diversity After Year 3 – If grasses and sedges are establishing successfully but there is a lack of forbs it is recommended to conduct inter-seeding of additional forbs in late fall or after a prescribed fire in spring or fall. See the [Xerces Society guide](#) for additional information about inter-seeding wildflowers.