EXAMPLE: Riparian Seed Mix Installation Requirements

Seed Mix Species and Percentages

GRAND DIVERSITY PRAIRIE SEED MIX- 13.79 lbs per acre I 256 Seeds per sq/ft			
Group	Botanical Name	Common Name	Approx. % by Weight
Forbs			
	Agastache foeniculum	Anise Hyssop	0.45
	Agastache nepetoides	Yellow Giant Hyssop	1.36
	Allium stellatum	Prairie Onion	0.23
	Anemone canadensis	Canada Anemone	0.1 l
	Anemone patens var; wolfgangiar	Pas que Flower	0.45
	Anemone virginiana	Tall Thimbleweed	0.91
	Asclepias incamata	Rose Milkweed	0.45
	Asclepias syriaca	Common Milkweed	0.23
	Asclepias verticillata	Whor-led Milkweed	0.23
	Astragalus canadensis	Canada Milk Vetch	0.91
	Baptisia alba	White Wild Indigo	0.91
	Baptisia australis	Blue Wild Indigo	0.45
	Boltonia decurrens	DecurTent Fase Aster-	0.23
	Cacalia atriplicifolia	Pale Indian Plantain	0.23
	Cacalia muhlenbergii	Gr-eat Indian Plantain	0.91
	Camassia scilloides	Wild Hyacinth	2.72
	Chamaecrista fasciculata	Patridge Pea	1.81
	Coreopsis lanceolata	Lance-Leaf Coreops is	1.36
	Oalea candida	White Pr-air-ie Clover-	0.45
	Dalea foliosa	Leafy P r-airie Clover	1.36
	Dalea purpurea	Purple Prairie Clover	0.45
	Desmanthus illinoensis	Illinois Bundle Flower	0.23
	Desmodium canadense	Showy Tick Trefoil	0.45
	Desmodium illinoense	Illinois Tick Trefoil	0.34
	Oodecatheon meadia	Midland Shooting Star	3.17
	Echinacea pa/lida	Pale Pur-ple Coneflower-	0.91
	Echinacea paradoxa	Bus h's Coneflower	1.36
	Echinacea purpurea	Purple Coneflower	1.81
	E ryngium yuccifolium	Rattlesnake Master	0.45
	E uphorbia corolla ta	F lower-ing Spurge	0.45
	Gaur-a biennis	Biennial Gaura	0.68
	Gentiana (la vida	Cr-earn Gentian	0.45
	Glycyrrhiza lepidota	Wild Licorice	0.45
	Helianthus pauciflorus	Showy Sunflower	0.45
	Heliopsis helianthoides	Early Sunflower	0.91
	Hibiscus laevis	Rose Mallow	0.45
	Hypericum pyramidatum	Gr-eat St Johns Wort	0.23
	1/iamna remota	Kankakee Mallow	0.45
	Kuhnia eupatorioides	False Boneset	0.45
	Les pedeza capita ta	Round-Headed Bush Clover	1.81
	Liatris pycnostachya	Prairie Blazing Star	1.81
	Liatris pycnostachya	Prairie Blazing Star	0.45
	Liatris scariosa	Northern Blazing Star-	0.45
	Liatris scariosa	Northern Blazing Star	2.27
	Liatris spicata	Marsh Blazing Star	0.1 l
	Lobelia inflata	Indian Tobacco	0.68
	Lobelia siphilitica	Greta Blue Lobelia	0.91
	Monarda fistulosa	Wild Bergamot	0.45
	Napaea dioica	Glade Mallow	1.36
	Parthenium integrifolium	Wild Quinine	0.45
	Pedicularis canadensis	Wood Betony	1.36
	Penstemon digitalis	Floxglove Beardtongue	0.45
	Penstemon tubaef/orus	Tube Beardtongue	0.45
	Physostegia angustifolia	Narrow-leaved Obedient Flower	0.45
	Physostegia virginiana	Obedient Plant	0.23
	Potentilla arguta	Pr-air-ie Cinquefoil	0.45
	Pycnanthemum tenuifolium	Slender Mountain Mint	0.91
	Pycnanthemum verticillatum var.	Hairy Mountain Mint	0.45
	Pycnanthemum virginianu	Mountain Mint	0.45
	Ratibida pinnata	Yellow Coneflower-	1.81
	R udbeckia hirta	Black-eyed Susan	0.45
	Rudbeckia subtomentosa	Sweet Black Eyed Susan	0.45
	Rudbeckia triloba	Brown Eyed Susan	0.45
	Ruellia humilis	Wild Petunia	0.91
	Senna hebecarpa	Wild Senna	0.45
	Senna marilandica	Maryland Senna	0.68
	S ilene n gia	Roayal Catchfly	0.23
	S ilphium integrifolium	Rosin Weed	0.45
	S ilphium laciniatum	Compass Plant	0.23
	S ilphium per.foliatum	Cup Plant	0.45
	S ilphium terebinthinaceum	Prairie Dock	0.34
	S isyrinchium angustifolium	Stout Blue-eyed Grass	0.45
	S olidago graminifolia	Gr-ass IE aved Goldenrod	0.45

	S olidago rigida	Stiff Goldenrod	0.45
	S olidago speciosa	S hoy Goldenrod	0.45
	Symphyotrichum laeve	Smooth Blue Aster	0.45
	Symphyotrichum novae-angliae	New England Aster	0.45
	S ymphyotrichum oblongifolium	Aromatic Aster	0.91
	Thalictrum dasycarpum	P ur-ple Meadow Rue	0.91
	Tradescantia ohiensis	Ohio Spiderwort	0.45
	Triosteum per.foliatum	Late Horse Gentain	0.91
	Verbena hastata	Blue Vervain	0.91
	Verbena stricta	Hoary Vervain	0.45
	Vernonia altissima	Tall Ironweed	0.45
	Veronicastrum virginicum	Culver's Root	0.45
	Zizia aptera	Heart-Leafed Golden Alexander:;	1.81
	Zizia aurea	Golden Alexanders	0.6138
TREES, SHRUBS* & *VINES			
	Amorpha canescens	Lead Plant	0.91
	Ceanothus americanus	New J er-sey Tea	0.45
	Hypericum prolificum	Shrubby St Johns Wort	0.45
	Rosa blanda	Early Wild Rose	0.45
GRASSES, SEDGES* & *RUSHES			
	Andropogon gerardii PLS	Big Bluestem PLS	1.36
	Bouteloua curtipendula	Side-oats Grama PLS	I 0.87
	Carex bebbii	Bebb's Oval Sedge	0.45
	Carex brevior	Plains Oval Sedge	2.72
	Carex vulpinoidea	Brown Fox Sedge	1.36
	Elymus canadensis	Canada Wld Rye PLS	4.53
	E lymus virginicus	Virginia Wild Rye PLS	2.27
	j uncus dudleyi	Dudley's Rush	0.45
	Muhlenbergia racemosa	Upland Wild Timothy	0.45
	Panicum virgatum	Switch Grass PLS	0.1 I
	S chyzachyrium scoparium	Little B luestem P LS	7.25
	S orghastrum nutans	Indian Grass P LS	1.81
	S porobolus asper	Rough Dropseed	1.81
	S porobolus heterolepis PLS	P r-air-ie Dropseed P LS	0.91

I: SITE PREPARATION METHODS

To prepare your site for planting, you must first remove the existing vegetation, which may consist of perennial weeds, annual weeds, or both. Existing weeds will compete with prairie seeds for nutrients, moisture and sunlight. Although it is nearly impossible to remove all annual weed seeds from the seedbank stored in the soil, it is crucial to kill and/or remove perennial weeds and rhizomes before planting. Perennial weeds such as Quackgrass, Bromegrass, Canada Thistle, Canada Goldenrod and Red Clover can inhibit the growth and development of your prairie. **Eliminating all perennial weeds prior to seeding is ESSENTIAL to success with your prairie. Site preparation options may vary according to the vegetation type that you are converting to a prairie planting and include the methods which are outlined on the proceeding pages.**

A. Lawns

1. Smothering (Organic)

- Cover the site with either black plastic, old carpet, plywood or a thick layer of leaves or newspapers, held in place to prevent blowing. (We do not recommend covering newspapers with topsoil, as the soil may contain numerous weeds).
- Leave in place for a full growing season and remove in the fall or the following spring.
- Prepare bed, (see specific planting instructions in section III and IV).

2. Sod Cutting (for lawns free of perennial weeds only) (Organic)

- Remove the top two to three inches of grass and soil with roots using a sod cutter.
- Prepare bed, (see specific planting instructions in section III and IV).

3. Cultivating (Organic)

- Cultivate with rototiller, cultivator or similar tool. Do this two to three times at one week intervals to kill the lawn. Remove clumps of sod & thatch to create a smooth seed bed.
- If perennial weeds are present in the lawn, cultivate for a full growing season, at intervals of every two to three weeks. This should kill both the lawn and the perennial weeds.
- Prepare seed bed after all weeds have been killed, (see specific planting instructions in section III and IV).

4. Herbiciding

- Apply a Glysophate herbicide (such as Roundup, Kleenup etc.) when the lawn is actively growing (in fall or spring). Weedy lawns may need further applications of herbicide.

- When the grass has turned brown, turn the soil under to prepare for seeding. Remove clumps of sod and thatch to create a smooth seed bed, (see specific planting instructions in section III and IV).

B. Old Fields:

Note: Fields that have been abandoned and allowed to grow up into grasses and weeds require at least on full year for proper site preparation. Completing two years of weed control is even better, due to the presence of established perennial weeds and weed seeds in the soil. Please do not rush your site preparation if you are planting an old field. Kill all the weeds first!

1. Herbiciding

- Mow and rake or burn the existing vegetation to the ground in late fall or early spring.
- Apply a Glysophate herbicide (such as Roundup, Kleenup etc.) three times throughout the growing season at 6-8 week intervals (mid-spring, mid-summer, early fall), when plants are green and actively growing.
- If perennial weeds are still present on the site after a full year of herbiciding, do not seed. Leave the soil undisturbed over winter, and apply one more herbicide treatment in late spring of the following year to kill any remaining weeds. (**If in doubt that this additional application is sufficient, wait, spray for a second year at 6-8 week intervals and seed in the fall.)**
- When all the vegetation is dead, work the ground to create a prepared seed bed, (see specific planting instructions in section III and IV).

2. Cultivating (Organic)

- Mow and rake, or burn off the existing vegetation to the ground in late fall or early spring.
- Cultivate to a depth of four to five inches every two to three weeks from spring through fall.
- Before planting, make sure all the existing weeds have been killed. This procedure may require two consecutive years of cultivating to kill pernicious, noxious weeds.
- Plant in fall or the following spring into a prepared bed, (see specific planting instructions in section III).

C. Existing Fields (Corn, Soybeans or small grains)

Note: Corn and grain fields can easily be converted to prairie immediately after harvest or the following spring. Before planting into corn fields, test the soil for persistent agri-chemicals such as Atrazine. If present, Atrazine can kill germinating prairie wildflower seedlings!! To determine if it is present in your soil, perform this simple test: Grow ten oat seeds in a pot with the cornfield soil. In another pot, grow ten oat seeds in potting soil, or unaffected garden soil (this is your experimental "control"). When the oats reach a height of

about 4 inches, those growing in Atrazine-laden soil will stop growing and turn yellow. Oats growing in untreated soil will continue to grow, without yellowing. Compare the oats growing in the cornfield soil with those in the untreated "control" soil to make sure that any positive results for Atrazine are not shared by the oats in the untreated soil. If Atrazine is present, we recommend allowing the site to sit for 1-2 years before you plant your prairie. If unsure of the site's herbicide history, contact the farmer that who owned the land; they must keep records of Atrazine use.

1. Herbiciding

- **Spring:** Spray once in mid to late spring, this will kill annual weeds. Wait 10 days until vegetation is brown and plant into a prepared seedbed.
    - If problem perennial weeds such as Quackgrass, Bromegrass, Canada Thistle, and Clover are present, treat the field with a Glysophate three times throughout one full growing season, at six to eight week intervals **(same as for Old Fields in Section B above).**
- **Fall:** After crop is harvested, if weedy vegetation is present and is still actively growing, spray with Glysophate, wait 10 days and plant into a prepared seedbed.
    - If the crop is removed late in the season, wait until spring to spray the field when weeds are again green and actively growing. If problem perennial weeds such as Quackgrass, Bromegrass, Canada Thistle, and Clover are present, treat with Glysophate three times throughout one full growing season, at six to eight week intervals, **(same as for Old Fields in Sections B above).**

2. Cultivating (Organic)

- Mow and rake, or burn off the existing vegetation to the ground in late fall or early spring.
- Cultivate to a depth of four to five inches every two to three weeks from spring through fall.
- Before planting, make sure all the existing weeds have been killed.
- Plant in fall or the following spring into a prepared bed, (see specific planting instructions in section III).

3. No till Fall or Spring Seeding

- If planting in fall, the seed can be scattered into the dead vegetation without tilling so long as **EXPOSED** soil is visible below the vegetation. The seed will work its way down into the soil over winter through freeze and thaw cycles and germinate the following spring. This method is a "dormant seeding". Fall dormant seedings typically result in higher germination of wildflower seeds but produce lower germination of warm season prairie grasses. Spring seedings result in higher germination of warm season prairie grasses, and somewhat lower germination of certain wildflowers.

- Prairies can be planted in spring using a no till Drill or Slit Seeder (**Tye, Truax etc**). This equipment inserts the seed ¼ to ½ inches into the soil and is suitable for planting large sites.

II. FINAL SEED AND PLANT BED PREPARATION

Note: Just prior to planting, the soil should be prepared according to the type of planting method used:

A. Achieving good seed to soil contact requires a well-tilled finely graded soil surface prior to planting. If seeding by hand broadcasting, rake or drag the soil with a rake or drag (a length of chain link fence attached to a garden tractor or ATV works well to smooth soil which has been freshly tilled). If seeding sites one half acre or larger, seed mechanically using a Brillion drop seeder or similar implement is ideal. A Brillion's heavy cast iron packing wheels ensures firm seed to soil contact.

B. No Till Drills or Slit Seeders (Tye, Truax, and John Deere etc) is best suited for large sites. This equipment requires a smooth, level soil surface, but little or no tilling. Tilling will only expose more weed seeds from the seed bank in the soil below and is not recommended when using no-till drills and slit seeders.

C. Organic Process: Wait for a good spring rain after the site is fine-graded. This will stimulate weed seeds in the soil to germinate. Five to seven days after the rain, till the soil very lightly, no more than one inch in depth (a field drag works admirably for this job). This will kill the newly germinated weeds before they emerge from the ground. We recommend dragging or tilling in mid-morning of a warm, sunny day, so that the weed seedlings will be killed by the heat of the sun. Plant immediately.

D. A Final Pre-Planting Tip
If planting in late spring or early summer, you can reduce weed densities by applying a Glysophate (Round-up, Kleenup etc) to the site when newly-sprouted weeds are two to three inches tall. Wait 10 days after spraying, till the soil very lightly, less than one inch if possible (tilling deeper will only bring up more weed seeds). Smooth planting surface. Plant immediately.

III. PLANTING YOUR PRAIRIE SEED

A. WHEN TO PLANT

1. Fall-(September 1st up until the soil is partially frozen (dates vary by location)

Advantages

- Seed overwinters as it would in nature and comes up in spring on its own schedule when conditions are right. This breaks most seed dormancies naturally over winter.
- In general, flower species exhibit increased spring germination with fall seeding.
- Recommended for droughty, sandy soils because seed germinates earlier in the season, when moisture levels are optimal, and before summer heat.
- Recommended for clay and wet soils. Clay and wet soils are easier to work in the fall than in spring, and seeds will germinate earlier in the season. Clay soils often remain wet well into spring, and by the time they can safely be worked, the heat and drought of summer are often right around the corner, which can reduce the success of seedling survival. Fall seeding on clay and wet soils encourages earlier germination and better root development prior to the onset of summer.
- Fall seedings do not require watering, as the seeding is dormant.

Disadvantages

- Warm season grass seed typically exhibits reduced germination.
- There is no opportunity for early spring weed control by cultivation or herbiciding.
- Be careful on erosion prone sites. Plant erosion prone sites paired with a nurse crop of annual rye or oats to help hold the soil over the fall and winter. Annual Rye is planted at a rate of 15 pounds per acre in fall (and 5 pounds per acre in spring).

2. Early Spring (March- April, dates vary by location)

Advantages

- In general, results in better flower germination than planting in late spring.
- Watering is generally not as critical, as spring rains fulfill this need.
- Warm season grass seed generally has better germination than in fall.
- Best option for sandy soils if unable to plant in fall.

Disadvantages

- Limited opportunity for early cool season weed control.
- Not recommended for heavy soils, as it is difficult to work these soils if we in spring.

3. Late Spring- (May to June, dates vary by location)

Advantages

- More time for good soil preparation-particularly important on heavy soils.
- More time for spring weed control prior to seeding.
- Optimal time for ideal germination of warm season grasses.

Disadvantages

- Increased chance for low moisture conditions or the onset of drought later in season.
- Reduced germination of some flower species.

IV. HOW TO PLANT YOUR PRAIRIE SEED

A. Hand broadcasting your seed

- Start with a freshly tilled seed bed free of rocks or soil clumps greater than two inches in diameter. **If seeding in fall, please see the special fall planting tip below.**
- **Do not plant when your soil is wet, especially in heavy clay soils. Wait until the soil has dried and is workable before planting.**
- Mix all seed (including annual rye or oat nurse crop) with a carrier. This carrier can be sawdust, peat moss, clean sand (playground or builders sand), or vermiculite, (it does not matter what carrier you use; whatever is most readily available to you). **You will need to use two bushel baskets or 2.5 cubic feet of any one of these "carriers" per 1,000 square feet of area you are covering with seed.** For one acre this equals filling the bed of a standard pick-up truck with the carrier, (which holds 72 cubic feet). Using this quantity of carrier is critical to achieve even distribution of the prairie seed. **Please do not skip this step, or you will quickly Run out of seed to cover your site!!!**
- Dampen the seed/carrier mixture with water, just until it is slightly damp to the touch. The water is necessary so the light prairie seed adheres to the carrier which aids in even distribution of the seed.
- After mixing your seed into the light carrier, divide this mixture into two equal parts.
- Hand broadcast one half of the seed mixture over the entire site (i.e. in a north to south direction).
- Hand broadcast the second half of the seed over the site; walking perpendicular to the direction you seeded the first half. This "cross pattern" seeding ensures even seed distribution.
- Rake or drag the area lightly, covering the broadcasted seed/carrier with about ¼ to ½ inch of soil. (Do not bring in topsoil to achieve this, as this will potentially introduce more weed seed on your site).
- Firm the seeded area by rolling the site with a hand roller, cultipacker, tractor or vehicle. Prairie seed requires firm seed to soil contact for good germination.
- Mulch the planting area with approximately 1 inch of **weed free straw or marsh hay (do not use field hay as it contains weeds!).** Mulch can be laid by hand or blown onto the site mechanically. The mulch will help control erosion on slopes and helps to retain soil moisture during the germination period. If working on gradual slopes or erosion prone sites, cover the mulch with a photo-degradable plastic or natural mesh with **one half inch openings** to allow for un-impeded wildflower seedling development. Secure the mesh with landscape staples placed at one to two foot intervals.
- **WATERING YOUR NEW PRAIRIE: (Optional; prairies will germinate without additional watering, they will perhaps germinate more slowly, but watering is optional if you cannot do this).**

- **If watering is possible,** water spring and summer seedings regularly during the first 6-8 weeks after planting for higher germination and seedling survival. Water just enough to keep the soil moist, every other day for 15 minutes to half an hour. Over watering can drown seedlings, especially on heavy clay soils. **Water in the early morning,** as watering during the day can be ineffective and wasteful. **After eight weeks, water only if it does not rain for one week.** Afternoon and evening water encourages seedling loss by fungal attack.
- **Special Fall Planting Tip:** This technique works only on sites that have had all weed eliminated by smothering or herbicide use (Round up, Kleenup etc). If the result of this process reveals dead vegetation which is very sparse with a good deal of mineral soil present below the dead vegetation, you can seed right into this vegetation. First cut down any vegetation with a lawnmower and rake it off, the cut vegetation may impede seed to soil contact. The seed will work its way down into the soil through the freeze and thaw process throughout winter. This method can only be accomplished in the fall. **This method will not work in spring as the seed will not be worked into the soil without ground freeze and thaw.** It is important to roll the seeded area so the seed is impacted into the soil.

B. Mechanical planting of prairie seed

On areas greater than one acre, it is more efficient to plant using a broadcast or a no-till planter. The broadcast planter spreads the seed over the soil, whereas the no-till seeders plant the seeds in rows by opening slits in the soil. A good broadcast seeder is the Brillion double box agricultural model, typically used to seed alfalfa and grass mixture, but equipped with native grass bristle brushes in the larger front box rather than the standard steel wire agitators. No-till seeders commonly used for prairie plantings include the Truax drill, the Tye wildflower and native grass seeder, and John Deere seeders. On gradual slopes, mulching and erosion fabric may be necessary to prevent the seed from washing prior to its establishment. For hydromulching, only use cellulose-based mulch and do not use a tackifier. Although grasses are able to penetrate through a tackifier, the wildflowers typically cannot.

C. Hydroseeding

We do not recommend hydroseeding of prairies. Hydroseeding does not achieve firm seed to soil contact and will result in poor germination. We have encountered numerous failures using this method.

Please refer to our website (www.prairienursery.com <http://www.prairienursery.com>) in the "How to" section of the site to view a series of pictures detailing the seeding methods described above. Contact Customer Service if you have any questions: cs@prairienursery.com or 800-476-9453, M-F 8am-5pm (CST).

V. POST PLANTING MAINTENANCE

A. Year One

Weed control during the first growing season is essential. The perennial prairie seedlings grow slowly, and are easily out-competed by the faster growing weeds that will inevitably germinate.

- Mow your prairie about once a month during the first growing season. The actual mowing frequency will depend on rainfall in any given year, actual weed density and height.
- Mow the entire planting when weeds reach the height of 12 inches. As a general rule of thumb, anything that grows taller than 8 inches in the first year is most likely a weed. Taller weeds shade out prairie seedlings. Mowing the vegetation as 6 inches will cut back taller weeds, while leaving the shorter prairie seedlings unharmed.
- To mow, use a string trimmer or weed eater on small areas. On larger areas, a flail mower is the best choice. Flail mowers chop the weeds as they are cut, instead of laying the cut weeds on top of the prairie seedlings. If a flail mower is unavailable, a rotary mower or sickle bar mower may be used.
- In the first season prairie seedlings rarely grow taller than 4-6 inches, with the possible exception of the Black Eyed Susan. As difficult as it is, we recommend cutting all vegetation, including the tops of the Black Eyed Susans. Cutting will not kill the Black Eyed susans.
- Be sure to mow weeds before weeds set seed, to prevent further infestation.
- Although tempting, we do not recommend pulling weeds, as this will disturb or destroy the developing prairie seedlings.
- At the end of the first growing season, leave the dead vegetation and or stubble standing, this helps to catch winter snows which helps insulate the soil seedlings and reduce winter frost heaving.

B. Continued Buffer Maintenance (Year Two and Beyond)

During the spring of the second year, mow the standing residual vegetation as close to the ground as possible in mid spring, and rake off any cuttings. Mowing in mid spring helps to set back non-native cool season weeds and grasses such as Quackgrass, Bluegrass, and Bromegrass etc. Timing is very important when mowing your prairie. **The optimal date for mowing can vary as much as a month in any given year, due to the differences in weather.** However, we can use plants as our calendar to ensure optimal timing. **The best time to mow most prairies is when the buds of the Sugar Maple tree (*Acer saccharum)* begin to break open in spring. This usually will occur sometime between April 1 and May 15,**

depending on your location and the weather in any given year. This is usually about the time we are mowing our lawns for the first time.

- Removing the vegetation and raking the vegetation encourages soil warming, which triggers the warm season prairie plants to break dormancy.
- If Biennial weeds such as Sweet Clover, Burdock, and Wild Parsnip etc appear or are a problem, mow again at approximately 12 inches when weeds are in full flower. **Make sure to mow the weeds before they make seed!** Expect this second mowing for controlling biennial weeds to occur in June, depending on your location.
- **Do not mow after new plant growth has reached one foot or taller,** as this could damage your prairie plants.