



Rebuilding your land with Native Grasses

A PRODUCER'S GUIDE



The goal of this publication – part of a joint project funded by Ducks Unlimited Canada (DUC) and Agriculture and Agri-Food Canada’s (AAFC) Greencover Canada Program – is to assist farmers, ranchers and environmental agencies with native grass revegetation efforts. These insights and guidelines are designed for readers who have a basic understanding about native grass revegetation. A more detailed, step-by-step overview is in the “Revegetating with Native Grasses in the Northern Great Plains” manual. (www.nativeplantsolutions.com)

Quality Cover That Lasts

There is a strong move afoot by reclamation agencies and, increasingly, the agricultural community to “revegetate” significant land parcels within the Canadian Prairies to return some of the land to its original roots or, at least, its original state.

Native grass revegetation is not a fad, it is a common-sense effort backed by sound science. Native grasses, when properly reintroduced to a much-changed environment, can provide the best, longest lasting cover for erosion-prone land, degraded fields and once-broken areas that were better suited to production of perennial than annual crops.

Reintroducing native grasses is not a simple exercise. It requires a renewed round of agronomic research and field testing and a focus on quality seed development and production. Extension programs to help farmers and ranchers “pioneer” permanent native grass seeding and management are evolving. Strong research support is being provided in Canada by DUC and AAFC. Farmers, ranchers, utility companies and mining companies have developed a growing expertise to ensure native grass is incorporated into their land use plans.

Cautionary Note

Within this publication, references to specific herbicides and rates of application are based on preliminary research and field experience. Unless stated otherwise, they should NOT be construed as recommendations for herbicide use. For example, the effect of a particular herbicide on native grass seedlings can vary with the level of weed infestation and the stage of seedling development. In addition, a herbicide may not have an impact on vegetative growth or biomass production, but may significantly reduce seed yields. For specific recommendations for local conditions, refer to provincial weed control publications, herbicide label information and experienced local personnel.

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The authors wish to thank the DUC staff whose experience has contributed to this document.

Acknowledgements

The authors wish to thank funding partners who underwrote the preparation and publication of this manual.

**Agriculture and Agri-Food
Canada’s Greencover Canada Program
Department of Fisheries and Oceans
Ducks Unlimited Canada
Proven Seed**

SOME PERCEPTIONS

Tough Hide

In the proper location, the right native grass mixture produces a tough, permanent vegetative cover or “hide” over land once battered by wind and water. Native grasses provide palatable hay and sustainable pasture vegetation for livestock that remains productive throughout highly variable grazing seasons, generation after generation. Native grasses also provide exceptional habitat for a diversity of wildlife. Further, deep-rooted native grasses are known to be able to sequester significant amounts of atmospheric carbon.

More Than Seeds

Revegetating with native grass species requires a detailed management plan including a clean seedbed, sowing seed of appropriate native species, and nurturing the sensitive new growth into a hardy grass cover.

Most Influence

Factors such as topsoil depth, soil texture, available soil moisture, land slope and exposure, precipitation, soil fertility and salinity influence native plant species composition and biomass production. Advice on generally suitable, standardized mixtures can be found in the “Revegetating with Native Grasses in the Northern Great Plains” manual (www.nativeplantsolutions.com) or contact DUC, AAFC or your provincial agriculture department’s grassland specialist.

Cool, Warm or Both?

For the sake of plant diversity and better all-season grass growth for pasture applications, most recommended native grass mixtures combine **cool season** and **warm season species**.

Cool season grasses begin annual growth in early spring, grow rapidly through early summer and usually become dormant during the hottest, driest portion of summer. There may be a second flush of growth in late summer and early fall. Warm season grasses begin growth in late spring. Production continues throughout the summer, especially from July to mid-September. Large-scale patterns and trends exist across the Canadian Great Plains.

In the northeastern prairie, adequate soil resources and a comparatively short growing season favours highly productive, cool season grasses over short, warm season species. Conversely, lower levels of soil resources (water and/or nutrients) in the northwestern prairies favour short-statured cool season grasses with well developed root systems. Warm season grasses tend to do well as the number of growing degree days increases. In the southeastern prairies, productive tall, warm season grasses are generally favoured, whereas short, warm season grasses are common in association with drought-tolerant, cool season grasses in the southwestern prairies.

The Challenge

Generally, most native grass species are somewhat less competitive than traditional forage species at the seedling stage. During establishment the importance of site preparation and weed control is more critical than when establishing a tame forage stand. The extra effort in site preparation and managing the seedling stand will pay off in a long-lived, low maintenance stand.

Establishment Considerations

- Plant **only** quality seed into a firm, weed-free seedbed.
- Do **not** seed natives if more than 10 per cent of the field is infested with perennial weeds.
- Drill seeding is **strongly recommended** over broadcast seeding.
- Cover crops should be avoided **unless** seeding into erosion-prone soil.
- If cover crop must be used, seed a cereal at **no more** than 10 lb/acre.
- Maintain effective weed control **until** the grass stand is vigorous and competitive.

TRANSITION ZONES

A healthy landscape has many microenvironments. These variations can result from differing elevations and slopes, soil composition and fertility, soil moisture content and salinity, to name a few factors. In nature, such variations support slightly to widely different combinations of native plant species. Under a commercial crop regime, it is simply not practical to adjust what is planted to account for these frequent “range site” variations. The single commercial crop or uniform forage mixture simply varies in performance from site to site within a field.

When the objective is long-term or permanent revegetation, however, both diversity of plants and persistent good cover are important. It makes sense, then, to make the effort to fit the native vegetation mixture to each significant range site. For example, a native grass mixture for eroded knolls might be seeded on the highest elevation just above the mid prairie zone slope (see Figure 1), while another, more appropriate mix is seeded below that in the wet meadow zone.

The planting design must reflect environmental variability.

This approach makes good ecological and economic sense.

Ecological

- Planting species that will not persist is not recommended because, as seedlings they compete with site-appropriate species for moisture and nutrients.
- This can result in under-representation of site-appropriate species as the stand matures, leaving open areas which are prone to weed invasion.
- Establishing species in the environment to which they are best suited will yield more stable, diverse and more sustainable ground cover in the short and long term.

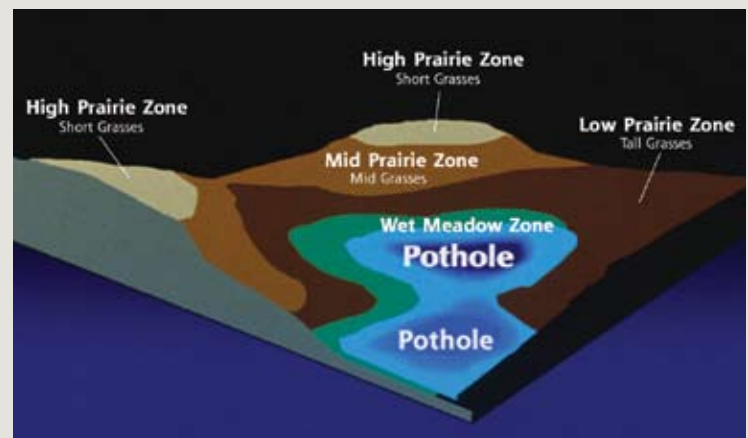
Economic

- Planting expensive seed of native species in sites where they will not persist is not a wise investment, due to increased need for reseeded and reduced productivity.

Sculptured Seeding

Sculptured seeding is the matching of native grass species mixtures to varying site conditions. With quality native grass seed now more readily available in greater variety, sculptured seeding has become more feasible. If the variations between range sites are distinct and encompass a significant portion of the field and transition zones are abrupt, two or three special location mixes may be needed. However, if the transition zones are more gradual, one carefully designed seed mix should meet planting objectives. Please consult your local range agronomist for more specific instructions. The added vigour, diversity and longevity of the stand make sculptured seeding worth the extra effort.

Figure 1



PROJECT PLANNING

Depending upon the complexity of the mix and site characteristics, the establishment of native grasses requires a degree of planning that is comparable to any specialty crop.

SET CLEAR OBJECTIVES:

What is the end use of the planting?

Grazing:

- Early, mid, late season
- Livestock needs

Haying:

- Timing

Reclamation:

- Erosion control
- Wildlife habitat development
- Regulatory requirements
- Level of diversity

Answers will roughly indicate the extent of field preparation required, equipment needs, weed control requirements, and the quantity and variety of seed to be purchased.

Know the land and options for it:

Acreage:

- To estimate costs, acreage must be known. Aerial photos may be helpful. If landscape features suggest that more than one seed mix is required, identify and quantify each range site.

Seed:

- Seed costs vary depending on the combinations of grass species to be planted and the supply/demand in the marketplace.
- Generally, native grass seed costs are higher than tame grass/legume mixes.

Weed Control:

- Thoroughly inspect the field to determine the type, density and distribution of weed species. Accuracy is important since the goal is a weed-free seedbed.
- Costs for weed control will vary depending on the level of weed infestation and the type and rates of herbicides. Tillage for weed control on highly erodible sites is not recommended.
- Consider an integrated approach to weed control, possibly using a combination of crop competition, herbicides and tillage.

- Consult your regional weed control guide for costs and weed control strategies.

Cropping History:

- Gather information regarding the cropping history of the area to be seeded. Of key importance is the herbicide application history. Residues of some herbicides, such as Group 2 (Odyssey and Sundance), Group 3 (Edge and Treflan), Group 5 (Atrazine, Velpar, etc.), and Group 8 (Avadex), may prevent the establishment of some native species for up to two years.
- Herbicide-tolerant volunteers from previous crops should also be identified as they may require additional herbicide management to provide adequate control.

Fertility / Soils:

- Fertilizer is not usually required for native species plantings.
- Soil samples should be collected and analyzed for nutrients, pH and conductivity (salinity).
- Soil texture should be determined in the field.
- Infertile soils (e.g. knolls, very coarse textured soils) may benefit from application of phosphate fertilizer.

Equipment:

Pre-seeding Equipment Needs

- Site preparation techniques will dictate equipment needs.
- If tillage is required, use equipment that maintains surface residues and is capable of maintaining shallow tillage depths. Recommended tillage equipment includes rod weeders, wide blade cultivators or cultivators equipped with low crown sweeps and/or trailing rod attachments.
- Spraying equipment used for weed control activities should be properly calibrated. Custom herbicide applications can be contracted.

Seeding Equipment Needs

Specialized grass seed drills, air drills, and some conventional drills can be used, providing that the following can be achieved:

- Consistent and accurate rate of seed flow
- Accurate and uniform seed placement
- Adequate seed-to-soil contact (adequate packing).

When seeding awned and/or light and fluffy seeds, specialized grass seed drills featuring agitation systems are preferred.

Air drills that provide a consistent rate of flow and place the seed at uniform depth can also be used. Tank agitators are recommended to prevent seed bridging. In the absence of an agitation system, the use of an inert carrier or phosphate fertilizer will improve seed flow characteristics. Air drills fitted with sweeps are not recommended. Low-disturbance, hoe or disc openers can be used successfully.

PRE-SEEDING PREPARATIONS

Prepare as thoroughly as possible for a new planting – even if that means delaying actual seeding for a season.

Clean Up:

Where two or more fields are being combined into one, remove old fence lines. Rock piles and abandoned buildings are often sources of Canada thistle, smooth brome and quack grass – the three weeds most threatening to native stands. It is recommended that these sites be cleared and treated for weeds.

Weed Survey:

While a quick census of weeds might have been undertaken during the initial decision-making process, now is the time for a detailed assessment. Walk through the field in an “M” or zigzag pattern and make notes on the type, density and distribution of all weeds. If needed, consult weed identification references available from extension agencies or herbicide companies.

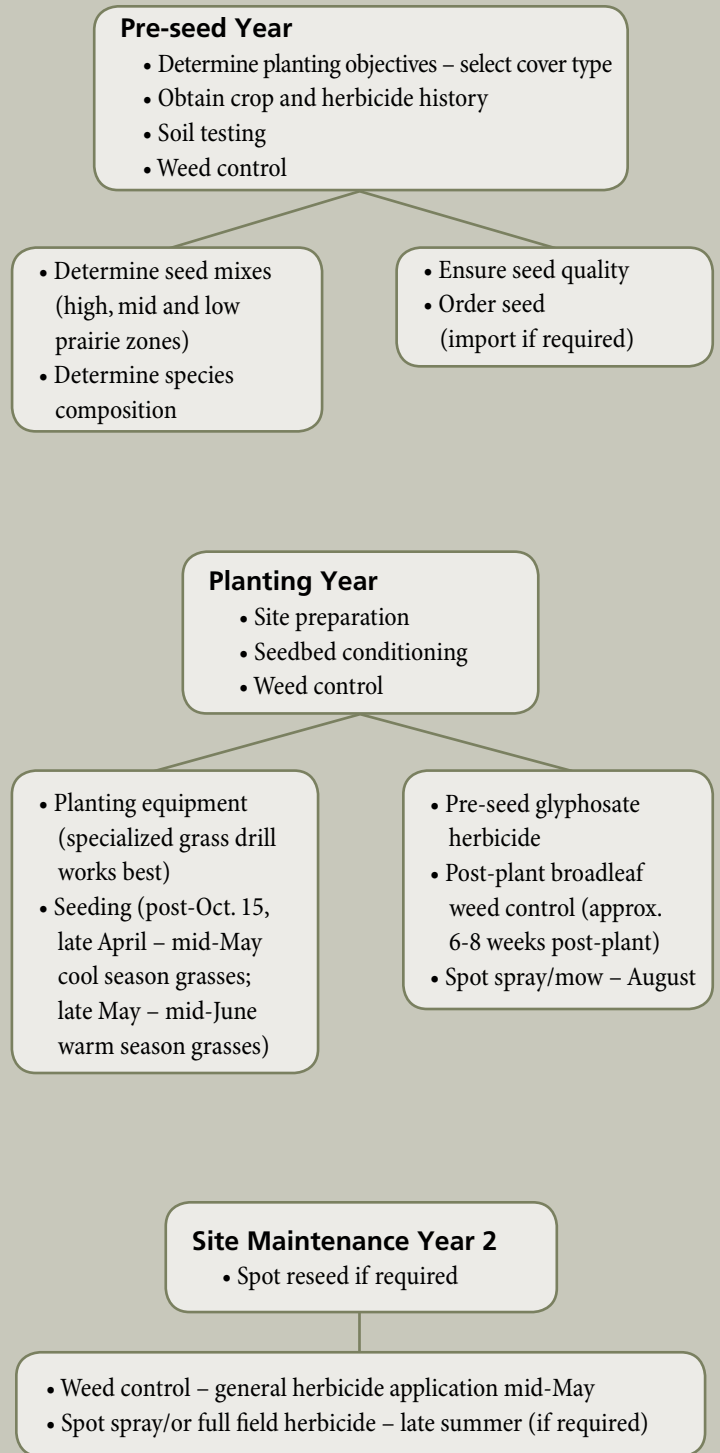
Seed Sourcing:

- Seed sourcing should begin in the fall of the year prior to planting, with delivery set up well before planting date.
- Ensure, before settling on a seed source, that the seed originates within an area no more than 200 miles north or 300 miles south of where it will be planted; otherwise problems of hardiness, longevity and disease resistance may be encountered.
- Contact local forage seed suppliers to start seed sourcing.



Photo courtesy: Brandt Industries

A suitable field sprayer is an important part of a weed control strategy for large-scale native grass revegetation plantings.



The above flow chart indicates the agronomic and management steps to be taken over a three- to four-year period in order to establish a native grass stand. Details in handling each operation during the pre-seeding year, planting year and maintenance years are contained in the manual “Revegetating with Native Grasses in the Northern Great Plains”. Highlights of the principal steps required in establishing native grass stands are provided in the following pages.

PRE-SEEDING WEED CONTROL

Pre-seeding weed control is of critical importance to successful revegetation. In most cases, it means devoting an entire growing season to weed elimination. Depending on the existing weed community, two years may be necessary. Principal targets are the perennials: smooth brome grass, quack grass, foxtail barley, Canada thistle, leafy spurge, field bindweed and the annual western ragweed.

The most commonly used options for preplant weed control include both chemical and tillage summerfallow and weed control in the preceding crop. Tillage is generally not recommended as, in most cases, the land to be revegetated is prone to erosion and should not be deeply disturbed or left bare. An integrated approach is more effective.

Preceding crop:

If the soil is prone to erosion or the level of weed infestation is light, consider in-crop weed control for one or even two years prior to planting native grasses. A greenfeed cereal is recommended for cropping the year prior to seeding native grasses. The use of a greenfeed crop will:

- Minimize volunteer cereal growth during the following year when the native grasses are planted.
- Allow for the removal of the crop residue along with weed seeds during the baling process.
- Maximize soil moisture retention and provide a firm seedbed of standing stubble to seed into.

Heavy residues from the preceding cereal crops may create unfavourable conditions and inhibit native grass establishment. Conventional or herbicide-tolerant canola may be a useful alternative to mitigate this problem. Perennial weeds, given their extensive root reserves, are typically harder to control than annual weeds. It is important to understand perennial weed growth habits in order to adequately prescribe herbicide treatments. For perennials such as Canada thistle and dandelion, a

pre- or post-harvest glyphosate application is required. Alternatively, for control of grassy perennial weeds, a glyphosate application during the spring (pre-seeding) is advised. For weed control in the preceding crop please refer to provincial weed control guides.

Invasive Weeds:

Headlands, adjacent old hayfields and old fence lines are a major source of annual and hardy perennial weeds untouched by the routine weed control efforts in the main field. If not quickly controlled, such weeds infiltrate and outflank the native grass stand and can soon overwhelm the comparatively slow establishing seedlings.

Tillage/Herbicide Fallow:

A pre-seeding year that combines both tillage and herbicide treatments (rather than a crop) can provide excellent weed control. However, summerfallowing may increase the risk of soil erosion. In the southern Prairies, tillage operations beginning in early spring through late July will cause Canada thistle to produce a herbicide-susceptible rosette in mid- to late August. Refer to provincial weed control guides for herbicide recommendations on summerfallow.

Chemfallow:

Successful herbicide fallow begins with an application of a broadleaf herbicide in the fall of the previous year, or early spring of the pre-seeding year to control winter annuals such as stinkweed and flixweed. Annual broadleaf and grassy weed control can be achieved with applications of glyphosate and/or glyphosate and dicamba throughout the growing season. If perennials are present, a higher rate of glyphosate (i.e. approximately 2 L/acre) should be applied during the spring and fall applications. Refer to provincial weed control guides for specific herbicide recommendations regarding perennial weed types.

SEED

The process of buying native grass seed is the same as buying top quality seed of any food crop or tame forage. The selection of commercially available native plant species is expanding, and includes many varieties and classes of plant material. A wide variety of native species is currently available to meet revegetation objectives in most range site conditions on the Prairies and southern Parkland. Choosing seed of site-appropriate species of a known origin is fundamental to a successful planting.

What to Look For:

Designing seed mixes that are suitable for your region can be a challenge. It may be easier to select a predetermined mixture for certain range sites developed and tested in the field. For examples of recommended regional seed mixes, consult the “Revegetating with Native Grasses in the Northern Great Plains” manual (www.nativeplantsolutions.com) or inquire with your local range agronomist or forage seed supplier.

Always buy certified native grass seed of known origin if it is available. Otherwise, “common seed” is an acceptable second choice

SEED cont.

as long as it is “Canada #1” or “U.S. common” and the origin is known. Native wild harvest seed is an optional source of supply, particularly for some of the species not yet developed as varieties.

Where to Look:

Native grass seed should originate within the same climatic zone in which it will be sown. Certified and common stock seed of varieties and species originating in Western Canada, Minnesota, North Dakota, South Dakota, Montana, Wyoming and Idaho will perform well on revegetation project sites in Western Canada. Several forage seed suppliers in Western Canada may be able to supply the required seed blend. If the seed is being imported into Canada, insist that each seed lot be tested to meet Canadian import standards and that the U.S. seed analysis report states that fact.

Ensuring Quality:

Ensure that seedlots from prospective suppliers are analyzed at recognized laboratories to assess quality. When purchasing seed, even if it is blended, the seed certificate of analysis for each component can be requested from the supplier. Look or ask for:

- **Seed with a high “Pure Live Seed” (PLS) percentage**—the indicator of the proportion of a seed lot that will potentially produce seedlings. It is calculated, from the analysis report, by multiplying the purity of the seed lot (e.g. 98 per cent pure seed) by the germination percentage (e.g. 89 per cent germination) and dividing by 100. (The PLS in this case would be 87.22 per cent.) Since native grass species tend to have high levels of seed dormancy, it is acceptable to combine “per cent dormancy” with “per cent germination” in the equation to get a measure of “total viable seed”. Another accepted test for determining seed viability is the TZ or tetrazolium chloride test. The TZ indicates viable seed, and does not measure seed dormancy.
- **Types and amounts of weed seeds present in each seed lot.** Allow zero tolerance for species such as downy brome grass, hairy chess, rattailed fescue, Japanese brome grass, smooth brome grass, quack grass and any other weeds or invasive species (i.e. crested wheatgrass).
- **Seed origin can be determined** for certified seed or seed that is classed as ‘Source Identified’ (SI) or ‘Selected Class.’ The supplier can provide you with seed lot origin and the Native Plant Certification designation, if known. If the seed origin cannot be determined, use caution, as that seed may not meet site adaptation requirements.

Insist that the analysis be undertaken and reported at the 0.01 per cent level for seed imported from the U.S. Even trace amounts of nuisance weed seeds will then be identified. In addition, it is acceptable to ask the seed analyst about types and numbers of seeds noted in the “other crop” category.

HOW TO ORDER SEED

Order species individually and have them mixed afterwards. You can save money can be saved by ordering on a pure live seed basis rather than a bulk basis. This ensures you are not paying for inert material. A customs broker who knows the procedures should handle import orders. Seed supplied through a single vendor can be purchased in a blend providing the seed certificate of analysis for each lot meets your quality criteria.

How much to purchase of each species to suit your needs requires calculations based on species proportions within a mix and the recommended seeding rates. Detailed directions for designing seed mixes are contained in the “Revegetating with Native Grasses in the Northern Great Plains” manual. (www.nativeplantsolutions.com)

ZONES AND MIXES

The information provided below is intended to highlight the principles that must be understood in the revegetative/mix design process. Understanding the natural plant community and how its components are combined is the sure way to construct a vigorous native grass stand, likely to thrive for decades.

On a project basis, note the presence of native grass species that thrive on non-disturbed, non-cultivated range sites within each zone, and the subsequent species mix that would be suited to the growing conditions that now prevail. The proportion of different species in the mixes are balanced so that no one species will overwhelm the others after establishment. The mixes listed are generic constructions and are examples for the dry mixed grass prairie (western) and more eastern regions. For specific mixes suited to particular locations contact a local grasslands specialist, a forage seed supplier or consult the “Revegetating with Native Grasses in the Northern Great Plains” manual. (www.nativeplantsolutions.com)

MIXED GRASS PRAIRIE

(southern Saskatchewan/southeastern Alberta)

“Loamy Range Site”, simple pasture mix:

Species	Seeds/lb.	PLS lb./acre
Western wheatgrass	110,000	2.0
Northern wheatgrass	154,000	1.0
Green needlegrass	181,000	2.0
Awne d wheatgrass	138,000	1.3
June grass	2,000,000	0.1
Slender wheatgrass	135,000	0.3
Purple prairie clover	300,000	0.1
		6.8

PLANTING YEAR

If the seedbed preparation efforts of the previous year have been effective, the seedbed should be almost ready to receive the native grass seed in the spring. The next operational phase can get underway with the warming of the soil.

Pre-seeding Weed Control

Treat the seedbed with an application of glyphosate immediately before seeding or up to four days after seeding. If only annual weeds are present, a lower rate of glyphosate is acceptable. Perennial weeds such as foxtail barley or quack grass will require higher rates. Consult with the provincial crop protection guides (Alberta, Manitoba and Saskatchewan) or local provincial weed control guide to determine pre-seeding glyphosate rates for perennial weeds.

Seedbed Condition:

The land should be firm and free of debris to accommodate the seeding equipment. In most cases, a site that was previously a greenfeed crop and in standing stubble will be firm and residue-free. If the site has been tilled, the seedbed should be firm enough so that the impression left by a footprint is approximately 1 1/8 to 1 1/4 inch deep. Ideally the seedbed should be undisturbed except for the minimum surface disruption of the seeder.

Time to Seed:

Cool season grass mixtures can be planted in early spring or “dormant-seeded” after Oct. 20. Spring plantings typically occur between late April and June 1. Late summer plantings are not recommended.

Warm season grasses require soil temperatures of at least 10 C (50 F) before they will germinate. Plant warm season grasses between mid-May and mid-June. Seeding dates may be extended two or three weeks past the normal range if soil moisture is ample.

Seeding Equipment:

Equipment for seeding native grass should:

- Provide for a consistent rate of seed flow
- Place the seed at a uniform depth
- Ensure the seed is in close contact with the soil (adequate on-row packing).

Row Spacing

- Drills with 6, 7, 8 and 10 inch row spacing are suitable for native grass plantings.
- Drills with 6, 7 and 8 inch spacing work well in the eastern prairies.
- In drier regions, drills with 8 and 10 inch row spacing work well provided some of the grass species in the mix have strong creeping root systems. (Consult the list of seed mixes provided.)

Conventional Equipment

If a standard gravity-flow grain drill without seed box agitators is being used, mix the seed with an inert carrier such as cracked wheat or phosphate fertilizer carrier which will help maintain even seed flow.

If using fertilizer as a carrier:

- Blend only enough seed and fertilizer to seed out the same day. Do not store blended product as seed damage may occur.
- Clean the drill box and seed cups after use, as fertilizer can be corrosive to equipment parts.
- Monitor the flow and use only enough fertilizer to create a flowable blend.

The ratio of carrier to seed will depend on the flow characteristics of the seed mix. Mixes with a large component of fluffy and/or awned seeds will require more carriers. For these mixes, a ratio of up to 8:1 of an 11-52-0 fertilizer to seed has been used. **Higher rates may cause seed damage!**

Most conventional drills do not have depth bands. When seeding into tilled seedbeds, ensure the seed placement is at the desired depth (1 1/4 to 1 1/2 inch on fine textured soils; 1/2 to 3/4 inch on coarse soils).

Specialized Drills:

Specialized grass seeding drills usually have seed box agitators and/or specially designed seed cups to help ensure uniform flow. These drills typically do not require a carrier, and usually are designed with depth bands to ensure proper planting depth.

Air Drills:

Air drills with disc or hoe type openers with on-row packers can be successfully used to seed native grasses providing careful attention is paid to the three basic functions mentioned earlier. Most air drills do not have a seed tank agitator. These tanks can be retrofitted with an agitator (see PAMI Research Update #733). The carrier recommendations presented for conventional drills should be followed. Regardless of drill make and seed mix components, the use of a minimum 1:1 carrier to seed ratio is recommended. The auger on the air drill tank can be used to blend the seed and carrier. Further suggestions include:

- Use clean seed free of debris to minimize plugging of system components.
- Do not use sweeps or shovels for seeding native grass mixes.
- Blend and fill the tank with a maximum of 200 pounds of product at a time. This will help alleviate bridging and separation of seed.

ZONES AND MIXES cont.

MIXED GRASS PRAIRIE cont.

"Loamy Range Site", diverse pasture mix:

Species	Seeds/lb.	PLS lb./acre
Western wheatgrass	110,000	1.0
Northern wheatgrass	154,000	0.8
Green needlegrass	181,000	1.5
Awnead wheatgrass	138,000	0.5
Canada wildrye	121,000	0.1
Little bluestem	240,000	1.0
Needle-and-thread grass	115,000	0.8
June grass	2,000,000	0.1
Blue grama	725,000	0.3
Prairie sandreed	274,000	0.3
Purple prairie clover	300,000	0.2
Slender wheatgrass	135,000	0.1
		6.5

TALL GRASS/MIXED GRASS PRAIRIE

(southeastern Saskatchewan and southern Manitoba)

"Light (coarse textured) Sandy" Range Site:

Species	Seeds/lb.	PLS lb./acre
Western wheatgrass	110,000	1.00
Northern wheatgrass	154,000	0.75
Green needlegrass	184,000	0.50
Little bluestem	260,000	1.20
Awnead wheatgrass	138,000	0.40
Slender wheatgrass	159,000	0.10
Switchgrass	389,000	0.50
Big bluestem	165,000	2.00
Purple prairie clover	300,000	0.25
Side-oats grama	191,000	1.00
Prairie sandreed	274,000	0.25
		7.95

"Loamy/Clayey" Range Site:

Species	Seeds/lb.	PLS lb./acre
Western wheatgrass	110,000	1.00
Northern wheatgrass	154,000	0.75
Green needlegrass	184,000	1.00
Little bluestem	260,000	1.00
Awnead wheatgrass	138,000	0.40
Slender wheatgrass	159,000	0.10
Switchgrass	389,000	0.50
Big bluestem	165,000	2.50
Purple prairie clover	300,000	0.25
Sideoat grama	191,000	1.00
		8.50

- Start with a fan speed setting on the lower end of the range. Monitor placement to ensure the seed is not 'blown out' of the furrow by excessive air volumes.
- If the equipment does not have depth control devices on each shank, closely monitor seed placement and adjust the settings to achieve the desired depth.
- When using machines with double shoot hoe type openers, seed through the fertilizer point if it is configured to normally place product below the seed, or switch the hoses to accommodate this adaption.

Seeding Depth:

Place seed $\frac{1}{4}$ to $\frac{1}{2}$ inch deep in fine textured soils and $\frac{1}{2}$ to $\frac{3}{4}$ inch deep in sandy soils. As a 'rule of thumb,' some seed **(5 to 10 per cent) should be visible on the surface**; otherwise the machine is likely seeding too deep. Depth bands or gauge wheels linked to the openers on the drill provide positive seed depth control.

Sod Seeding:

Seeding native grasses directly into existing sod has met with variable success. Specialized seeders equipped with disc openers, or very narrow knives and cutting coulters are required. On-row packers are another "must have" feature to ensure the slot is closed after seed drop and the soil is firmed around the seed. A non-selective herbicide should be applied to the existing sod before planting to suppress the competition from the mature grass. This sod suppression or control may require an additional year of treatment depending on the sod species and planting objectives. This treatment is essential to achieve any measure of successful germination.



An example of an air drill with disc openers seeding native grasses at Swift Current, Sask.

POST-PLANTING MANAGEMENT

Even though the grass seed has been sown into a clean seedbed, a monitoring plan should be followed to check on plant emergence and growth stage, weed emergence, and potential grasshopper damage. Broadleaf and grassy weed competition can (negatively impact) stand establishment.

A native grass planting will fail if grass-type weeds such as wild oats, green foxtail and Persian dandelion are allowed even a light foothold during the establishment year. Five wild oats or 15 foxtail plants per square foot are enough to warrant control methods. Herbicide applications and mowing options are discussed below.

Herbicide Options:

For grassy weed control, do not spray the field until the native grasses are in at least the two- to three-leaf stage. Several choices exist for broadleaf weed control. In cases where forbs have been included in the seed mix, some broadleaf herbicides will damage or eliminate these plants. If purple prairie clover is the only forb in the mix, most broadleaf herbicides will only suppress or only slightly damage the seedlings. Although few, some options for grassy weed control with herbicides do exist, depending on species components of the stand. Check the “Revegetating with Native Grasses in the Northern Great Plains” manual or consult the provincial “Guide to Crop Protection”, agronomists with Ducks Unlimited Canada, extension agencies or chemical manufacturers for guidance. **Follow label directions closely and check for potential feeding or grazing restrictions for each intended herbicide!**

Other Options:

If it is not possible to spray for wild oats and green foxtail because of warm season grasses in the mix, mow or swath the field before the wild oats set seed. Pick up the bales or the windrows, if present, within a week to prevent smothering of the grass seedlings and renewed weed growth in any subsequent bare patches. In the case of broadleaf weed competition, the field should be mowed before seed set of the weeds. The preferred method is to swath and bale the windrows, providing there is enough residue to bale. Once the grasses have reached the

permanent root stage, successive flushes of annual weeds during the summer can be mowed. Fall mowing is not recommended if the field has been mowed more than once during the summer season.

Invasive weeds, such as smooth brome grass, crested wheatgrass and quack grass, may creep into the field from headlands and old fence lines. One control method is to brush the stems and leaves of the invaders (wick application) with a 33 per cent solution of glyphosate. Barrier plantings of sheep’s fescue all around the field have also been proven effective in keeping invasive weeds at bay. The fescue strip should be 30 to 40 feet wide.

Grasshopper Control

Threshold levels for grasshopper control (densities per sq. yd.)

Field	Roadside	Management
> 12	> 23	Control required
7-11	12-22	Control may be required
< 7	< 12	Control not required

An infestation of grasshoppers in a newly planted field can very quickly destroy emerged seedlings. Several insecticide options exist for grasshopper control. Consult the provincial “Guide to Crop Protection” or provincial weed control guide for insecticide choices. The use of a bran bait insecticide is least likely to harm non-target organisms, and can be applied even if grazing or haying is done at the same time.

Vegetative barrier defences may be planted around the field, such as a 100-foot wide ring of oats, which the insects do not like to eat, or alternatively a lure crop such as fall rye that appeals to the insects. Insecticides can then be applied to the rye strip as required to manage grasshopper populations.

POST-ESTABLISHMENT MANAGEMENT

While native plantings may be considered permanent, depending on the planting objective and use, periodic managements are required to keep a stand robust. Where grazing use is planned, stand health should be maintained with properly planned grazing management. For wildlife

habitat, where goals include idling the stand, management routines may be as infrequent as every six to seven years depending on the annual rainfall and site productivity. If the summers are relatively wet and grass production high, the management intervals should be shortened.

POST-ESTABLISHMENT MANAGEMENT cont.

1. STANDS PLANTED WITH A GRAZING OBJECTIVE

Management objectives for recently planted native grass stands are generally set to ensure and enhance plant establishment. A well established stand will provide a future of grazing opportunities and help to outcompete weeds and invading species. Generally, rotational grazing or deferred grazing of the grass, in contrast to continuous grazing, ensures that the native grasses will remain productive for decades. Timing of grazing should be determined as a planting objective from the initial planning.

Establishment year:

- Grazing is not recommended.

Year after establishment:

- Do not graze until midsummer.
- Intensity: 'Take half – leave half'.

Second year:

- Follow sustainable grazing practices for the plant species seeded.
- In western areas dominated by cool season species, delay grazing until late May to mid-June (plants approximately 4 – 6 inches high).
- For eastern areas (i.e. eastern Saskatchewan and Manitoba) with significant warm season components, start grazing when plants are about six inches high, usually near the start of July.
- Warm season plantings in eastern regions may benefit from a controlled burn in late May to early June.

2. STANDS PLANTED WITH A RECLAMATION/ WILDLIFE HABITAT OBJECTIVE

Controlled Burning:

A properly timed burn cleans up old plant residue and stimulates new growth, halts invasive weeds and controls brush. Managed fires also reduce the risk of large wildfires.

In the eastern Prairies, with higher precipitation, cool season grass plantings should be subjected to a managed burn within the first three to four years. In plantings containing warm season grasses, a burn in late May/early June of the second or third year is highly recommended.

Swathing:

Most waterfowl have hatched their nests by July 15. After that date, swath the stand as low as possible with a mower-conditioner. Remove as much of the old plant litter as possible to stimulate new growth. If the mower does not do that part of the job, use heavy harrows.

Grazing:

Managed rotational grazing will increase stand vigour on wildlife habitat plantings. Consult local grazing or pasture specialists to help set up a pasture layout and develop a grazing strategy for this category of planting.

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