

INTERSEEDING FORBS AND/OR LEGUMES INTO Existing CRP COVER

The following information is to be used for the Conservation Reserve Program (CRP) sign-up number 15. This information will be incorporated into the appropriate standard and specification at the time of their update.

The term interseeding has been used for over 50 years. To some people the term means to significantly disturb the soil, and drill desired seed mixtures into "low quality" rangeland. This was frequently accomplished in a single equipment pass and left the soil surface too rough for truck, human, or horse traffic. To others, the term interseeding is simply the addition of desired seed mixtures to areas having some level of perennial plant cover already established. The later will be the meaning of the term as it is used in this document.

The purpose of interseeding is to increase plant species diversity, plant density and/or to significantly change to a more desirable species composition. This document will also discuss the various options needed prior to and following interseeding to successfully accomplish and maintain the desired effect. Additional information is found in the FOTG Range Seeding (550) and Pasture and Hayland Planting (512) Standard and Specifications.

To successfully enhance established CRP cover, each site should have an on-site review with the client present. A discussion of the client's long range goals and objectives will allow NRCS to offer the best information and technical recommendations. We are looking for the best management decisions that are the most logical and are goal driven.

The objectives for interseeding are listed in the order that they should be considered and implemented. It will take a combination of management practices applied over multiple years to achieve optimum success. Several options are given within each objective to allow flexibility in working with the client.

This information was developed with many different types of existing CRP cover in mind. Those considered include:

- Smooth Bromegrass
- Crested Wheatgrass
- Intermediate and Pubescent Wheatgrass
- Switchgrass, Big Bluestem, Indiangrass (other warm season single species)
- Native Mixtures
- Cool season grasses with alfalfa and/or clover mixtures

Other covers may require different or additional treatments than those given here. One general requirement is that noxious weeds must be controlled and control method(s) planned before interseeding is initiated.

Trade names are used solely to provide specific information. Mention of a trade name does not constitute a guarantee of the product by the U.S. Department of Agriculture nor does it imply endorsement by the Department or the Natural Resources Conservation Service over comparable products that are not named.

Objective: Residue Management (Remove, manage excess amounts)

Established CRP lands, typically, have several years of grass growth remaining as residue. For successful reseeding, excessive levels may need to be removed or broken down prior to planting.

Residue levels are excessive when:

1. Drilling (planting) equipment cannot be effectively operated on the area.
2. Proper seed placement and seed contact with the soil are prohibited.
3. The residue physically or chemically prevents seed germination and establishment.

Reducing competitiveness from existing vegetation might be accomplished concurrently with residue management depending on option(s) selected. However, since competition problems can be increased by residue management practices, selecting the proper option(s) including; timing, frequency, and intensity is important.

Options/Considerations:

1. **Prescribed burning** - timing is important to accomplish objectives: (Refer to Prescribed Burning Standard (338) for more information).
 - a. To reduce plant vigor - burn when cover is green.
 - b. To enhance vigor as preparation for herbicide treatment - burn when desired cover plants are just initiating growth.
2. **Shredding** - if residue is heavy - shredding can make proper seed placement difficult and can slow seedling growth and establishment.
3. **Early out, use, then seed** - a preferred option if landowner wants to hay or graze intensively. Request FSA authorization for early out well in advance of planned date of use.
4. **Mowing and removing** *
5. **Mowing** - if residue is heavy - shredding can make proper seed placement more difficult and can slow seedling growth and establishment.
6. **Flogging grazing** * - very high stock density where the goal is to obtain hoof action to reduce and incorporate residue.
7. **Grazing** * - time of year and intensity will determine: amount of regrowth prior to seeding, species that will be stressed or stimulated, amount of mulch broken down.
8. **Multiple disking** - not a preferred option - follow by preparation for seeding into a clean tilled seed bed (cover crop will probably be needed for erosion control).
9. **Plowing** - not a preferred option - used to prepare the field for seeding into a clean-tilled seedbed. A cover crop may be required. See FOTG seeding standards for guidelines.
10. **Shredding then disking**
11. **Leaving residue** - as is may be the best option for thin stands, low growing species, sandy sites, gravelly sites, sites with low residue and/or high percentage of bare ground.
12. **Burndown** - with appropriate herbicide then till or no till.

* requires FSA authorization

Objective: Competition Control

Vegetative competition comes from previously planted vegetation or invading woody or herbaceous plants. Healthy established plants can nearly always out-compete seedlings. Sunlight, nutrients, and water are limited due to above and below-ground competition in an existing stand. Establishment of interseeded species will decrease if any one of these resources are limited. In addition, some plant species can chemically inhibit other plants from becoming established in their vicinity. It may be necessary to remove invading woody species from the site by burning, cutting, or shredding if they impair seeding equipment. If damage from grasshoppers and rodents is a concern, delay planting cool season species until September 10 or consider dormant seedings according to the FOTG planting standards.

Stressing and/or killing existing plants can reduce their competitiveness and increase establishment of interseeded species. The desired results of competition control may vary from slight weakening of a particular species to complete mortality of all existing plants in the stand. Selecting the proper option or combination including: timing, intensity, and frequency is key. Controlling competitive plants will be difficult if new seedlings and competitive plants have the same growth cycle.

Options:

1. **Prescribed burning** - best when used for:
 - a. Herbaceous plants that are actively growing or storing root reserves.
 - b. For some non-sprouting woody species.
 - c. Preparing for herbicide treatments.
2. **Herbicides**
 - a. Burndown - see current Guide for HERBICIDE USE IN NEBRASKA and Plateau label.
 - b. Pre emergent - see current Guide for HERBICIDE USE IN NEBRASKA and Plateau label.
 - c. Post emergent - see current Guide for HERBICIDE USE IN NEBRASKA and Plateau label.
 - d. Combination of pre and post emergents.
 - e. Most post emergence broadleaf herbicides should not be used in the spring prior to planting forbs/legumes (see current Guide for HERBICIDE USE IN NEBRASKA.
3. **Mowing and removing** *
4. **Shredding** - proper timing can significantly stress warm season grasses and woody plants.
5. **Mob grazing** * - a very high stock density (animals/acre) for a very short period of time.
6. **Grazing** * - short duration of grazing timed to stress competitive plants.
7. **Leaving residue** - as is may be the best alternative and even preferred for thin stands, low growing species, sandy sites, gravelly sites, sites with low residue and/or high percentage bare ground.

* requires FSA authorization

Objectives: Site Preparation (ideal site condition)

Additional site preparation may not seem to be needed once residue and competition are managed. However, at least four soil conditions need to be considered. They are soil firmness, soil surface roughness, soil fertility, and soil moisture.

Desired conditions:

1. Soil firmness - average shoe heel imprint should not exceed 0.5 to 0.75 inches.
2. Soil surface roughness - should not prevent adequate seed depth placement or inhibit seedling emergence.
3. Soil fertility - determine need by soil test. High fertility levels may initiate excessive weedy species competition.
4. Soil moisture - seed only when soil profile moisture levels are likely to continue seedling growth through root development. Do not seed when a surface layer of soil is sufficient for germination but a dry layer of soil occurs within the normal rooting depth needed to establish seedling.

Options which can be used to address one or more of these include:

1. Mechanical packing - may be necessary if using tillage for competition control or residue management.
2. Harrowing and/or railroad rail - can smooth up field, break clods, and firm the seedbed in a clean tilled field. Can also be used to incorporate broadcast seed.
3. Light disking - can smooth up field, break clods, and firm seedbed in a clean tilled field. Can also be used to incorporate broadcast seed. ^{1/}
4. Fertilization - soil testing should be considered on calcareous soils and if establishing cool season grasses and legumes in existing cool season cover.
5. Liming - depends on soil test, see Nebraska Conservation Planning Sheet No. 11 (Nutrient Management).
6. Chemical fallow - may be used to conserve moisture and control competitive vegetation. Site would be seeded the following year (not a preferred option).
7. Alfalfa sod - (Refer to the Agronomy Technical Note #98 (April 1988) on planting grasses in alfalfa sod).

^{1/} Light disking can be best explained in terms of percentage of soil surface disturbed or depth of disturbance. If using light disking to smooth a clean tilled field, the entire soil surface should be disturbed to no more than a 3 inch depth. Light disking, used before broadcast seeding to incorporate seed, should be limited to disturbing 10 - 50 % of the soil surface as shallowly as possible (1/2 to 1" optimum). Lower intensities of disturbance should be used on sites dominated by bunchgrasses or where erosion could be a problem. Higher intensities are appropriate on brome grass, switchgrass, and native mixtures if excessive erosion is not likely.

Objectives: Enhancing Plant Establishment / Seeding

Field Office Technical Guide Standards for Range Seeding (550) and Pasture and Hayland Planting (512) address most considerations and questions related to proper seeding methods. Also, utilize the Nebraska Conservation Planning Sheets number 13 (Pasture and Hayland Planting) and 15 (Range Seeding). Seeding rates and mixtures used need to be included in the locally approved CRP seeding docket. For species best suited to wildlife - refer to the "Cover Selection Considerations for Wildlife Habitat Nebraska" prepared by Gerald Jasmer. This will be issued as a Biology Technical Note.

If seeding low rates are problematic consider the use of fillers or closing some of the seed cups in the seed box. Fillers are materials that, when mixed with grass or forb seed, provide bulk and help equipment meter out low rates of seed. Some potential fillers include ground corn wheat, oats, barley, rice hulls, and P fertilizer (0-46-0).

If needed to achieve proper seeding rates, up to 2/3 of the seeding cups can be closed. For example if attempting to apply 0.5 lbs of seed per acre proves to be too low for the equipment available, close every other seed cup and adjust it to apply 1.0 lb., or close every second and third cup and set for 1.5 lb.

Options: (also refer to FOTG 512 Pasture and Hayland Planting Standard & Range Technical Note #43)

- Grass drill
- No-till grass drill (fluted coulter in front of seed placement)
- Power drill
- No-till grain drill
- Corn planters with an insecticide box (for native forbs only)
- Grain drill
- Brillion seeder
- Broadcast seeding plus harrow for incorporation

1. **Grass Drill** - preferred equipment. May not be suitable for sites with heavy mulch and/or extremely firm seedbeds, may not be able to close seed box enough to seed very low rates of native forbs without mixing forb seeds with grass seed or with fillers. Forbs, legumes, and slick grass seed must be placed in small seed box.
2. **No-till grain drill** - good for seeding clean, slick grass seeds, debarbed seed, introduced legumes, and or native annual forbs on sites with heavy mulch and/or extremely firm seed beds. May not be able to handle light, fluffy grass seeds. High risk of planting seeds too deep if drill does not have depth control.
3. **Grain drills** - may be adequate for drilling smooth clean, grass seeds and/or introduced legumes on sandy sites. High risk of planting seeds too deep or leaving seedbed too soft unless equipped with depth control and packer wheels.
4. **Broadcast seeding** - consider only if drilling is not a feasible option. Limited only to introduced legumes, native annual forbs, and switchgrass. Seeds must be incorporated with a light disking, harrowing, or similar light tillage activity after seeding. If site has a heavy mulch layer, a light disking may be needed both before and after broadcasting.
5. **Brillion seeder** - see broadcast seeding.
6. **Corn planters with insecticide boxes** - this method is as of yet unproven, but may be useful when seeding native forbs alone. Success depends on correctly setting the seeding rate and attaining a very shallow seeding depth.

Irrigation - supplemental irrigation from tow lines, center pivots, or other sprinkler systems will aid in establishment of grass. When available supplemental irrigation should be encouraged.

Objective: Maintenance of desired species and improved health and vigor

Poorly maintained plantings may cease to perform as intended or revert to undesired species. Plants will die, become weak, shaded out, or sod bound. Stands become dominated by "wolf" plants interspersed with large areas devoid of vegetation. When species diversity declines, wildlife cover declines due to increase of or expansion of undesirable species. Noxious and undesirable plants invade and increase without proper control and/or maintenance. Residue levels will increase.

Native and introduced grassland plants have adapted to and usually require some level and frequency of defoliation or disturbance. In order to keep the diverse plant cover on CRP grasslands healthy and vigorous, maintenance practices are needed to simulate or replicate natural sources of disturbance. To protect and benefit wildlife and their habitats, tillage, burning, mowing, shredding, and grazing is best done on a rotational basis so that some cover is left undisturbed each year. If possible, these activities should not be done between May 1 and July 15 to protect nesting birds and young wildlife.

Conditions present that require maintenance techniques (problems to be addressed):

1. Increased bare ground (lack of desired cover).
2. Excessive wolf plants or other undesirable plants.
3. Decreasing forbs or other desirable plants.
4. Plant decadence.
5. Excessive mulch (sod bound or shaded grasses).
6. Noxious weeds.

Options/Considerations:

1. **Prescribed burning** - properly timed will provide the most improvement of decadent grasses.
2. **Herbicides**
 - a. Use of Plateau on warm season mixes with forbs/legumes to eliminate/reduce cool season grass, broadleaf weeds, grass weeds to enhance stand (see current Guide for HERBICIDE USE IN NEBRASKA and Plateau label).
 - b. Refer to current Guide for HERBICIDE USE IN NEBRASKA and Plateau label for post emergent control options.
 - c. Atrazine for warm seasons (no forbs).
3. **Light tillage**
 - a. To enhance wildlife habitat by encouraging early successional plants.
 - b. To stimulate sod bound grasses.
4. **Shredding**
 - a. Whole field - must be on a rotational basis with several other fields in order to enhance wildlife habitat.
 - b. Spot/strip - for wildlife habitat and weed control.
5. **Mowing and removal** * - must time to stress undesired plants and improve desired plants.
6. **Grazing** * - prescription will vary with objectives (usually timed to stress undesirable plants).
7. **Noxious weed** - mowing, spraying, or roguing:
 - a. Avoid tilling areas infested with leafy spurge and Canada thistle.
 - b. Roguing of musk thistle and Canada thistle.
 - c. Spot spraying with Tordon or other labeled herbicide (see current Guide for HERBICIDE USE IN NEBRASKA).

Conditions pres

* requires FSA authorization

Examples

Example One: Convert crested wheatgrass to a cool or warm season grass mixture with forbs/legumes

1. **Residue management** - none needed.
2. **Competition control** - spray with 2 to 3 quarts Roundup and Plateau mixture or Roundup or Touchdown in fall (must have good moisture and be actively growing)
3. **Seeding** - seed with grass drill (November 1 - May 20)
 - a. Seed warm season mix with forbs/legumes at 100 % rate (according to Range Seeding (550) standard), or
 - b. Seed cool season grasses and forbs/legumes at 75 % of full rate (30 PLS#/sq.ft.).
5. **Maintenance** - light disc after three or more years.

Example Two: Convert bromegrass to a warm season grass mixture without forbs/legumes

1. **Residue management**
 - a. Burn
 - b. Mow and remove*, or
 - c. Shred late summer then use burn down herbicide.
2. **Competition control** - early fall burndown herbicide application to kill or reduce species to desired percentage composition:
 - a. Roundup or Touchdown (burndown),
 - b. Roundup & Atrazine (burndown & residual), or
 - c. Roundup & Plateau (burndown & residual).
3. **Residue management** - prescribed burn or shred only if needed.
4. **Seeding** - seed with no-till, grass drill - November 1 to May 20.
5. **Maintenance** - prescribed burn or light disking after three or more years.

Example Three: Convert a cool season grass mixture (with little or no bromegrass) to warm season grass mixture with forbs/legumes

1. **Residue management** - burn, mow and remove *, or shred late summer then use herbicide
2. **Competition control** - early fall herbicide application to kill or reduce species to desired percentage composition:
 - a. Gramoxone Extra *** (burndown - won't kill most perennials),
 - b. Roundup or Touchdown (burndown), or
 - c. Roundup & Plateau (burndown & residual).
3. **Residue management** - prescribed burn or shred only if needed.
4. **Seeding** - seed with no-till or grass drill - November 1 to May 20, apply Plateau before planted grasses emerge to provide season-long control of annual grass and broadleaf weeds, check label for forb/legume damage for pre-emergence applications.
5. **Maintenance** - Plateau at labeled rates to enhance warm season forbs/legume mixtures.

Example Four: Convert switchgrass to a cool season mix with legumes

1. **Residue management** - prescribed burn in mid-late summer to remove excess switchgrass residue.
2. **Competition control** - apply Roundup to switchgrass regrowth to provide control.
3. **Seeding** - plant cool-season grasses no-till in late August early September (when moisture conditions are favorable).
4. **Fertilize** - in early spring to stimulate cool-season grasses so they can gain a competitive advantage over remaining switchgrass.

Example Five: Supplement a mixed warm season grass stand by adding forbs/legumes

1. **Residue management** - prescribed burning in the spring or late mowing and removal.*
2. **Competition control** - not needed.
3. **Seeding** - seed with no-till drill or no-till corn planter with insecticide box (native forbs).
4. **Maintenance** - Plateau at labeled rates/timing to enhance warm season forbs/legumes mix.

Example Six: Supplement a bromegrass stand by adding other cool season grasses with legumes (less bromegrass desired)

1. **Residue management** - shredding in fall.
2. **Competition control** -
 - a. Roundup or Touchdown in fall (must be actively growing),
 - b. Spring Roundup application in some areas - see current Guide for HERBICIDE USE IN NEBRASKA, or
 - c. Roundup and Plateau mixture in fall.
3. **Seeding** - no-till drill or grass drill in spring (before May 20).
4. **Maintenance** - light disc after three or more years.

Example Seven: Supplement a switchgrass stand by adding a cool season mix with legumes

1. **Competition control** -
 - a. Apply Gramoxone Extra *** in late summer or early fall or
 - b. Mow and remove* switchgrass in late summer or early fall.
2. **Residue management** - if herbicide is used for competition control, a prescribed burn in early spring to remove excess residue is needed, otherwise none is needed.
3. **Seeding** - use a no-till drill or grass drill in early spring (before May 20 the earlier the better).
4. **Fertilize** - in the spring to stimulate cool-season grasses so they gain a competitive advantage over switchgrass.

Example Eight: Supplement a thin mixed warm season grass stand by adding forbs/legumes

1. **Residue management** - not needed.
2. **Competition control** - not needed.
3. **Seeding** - seed with grass drill, no-till drill, or no-till corn planter with insecticide box (native forbs).
4. **Maintenance** - prescribed burn or light disking after three or more years.

Example Nine: Supplement a switchgrass stand by adding a warm season mix with forbs/legumes

1. **Residue management** - prescribed burning in the spring.
2. **Seeding** - seed with grass drill or no-till drill before May 20.

3. **Competition control** - apply Roundup and Plateau before planted grasses/legumes emerge, check label for forb/legume damage pre-emergence. (In many cases, it may be preferable to apply Roundup in the Fall preceding spring grass seeding).
4. **Maintenance** - prescribed burn or light disking after three or more years.

* requires FSA authorization

*** Gramoxone (Paraquat) will not kill established perennial grasses. The herbicide will 'burn' live leaves, but regrowth will occur. Gramoxone does not translocate in the plant, it burns down what it contacts.