

No-Till Seeding of Forage Grasses and Legumes

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No-till seeding of forage grasses and legumes can be successful and has become an accepted practice for a number of reasons. One of the primary concerns in establishing new forage stands in a well-tilled seedbed is the threat of soil erosion during the establishment period. Not only is valuable topsoil lost, but resulting ruts and gullies damage equipment and are dangerous to equipment operators. In addition to reducing soil erosion, no-till seedings conserve moisture already present in the seedbed. Moisture conservation, along with a dramatic reduction in water run-off, improves the water supply for the new seedlings. No-till seeding methods also require less time and fuel than traditional methods because rocks remain below the soil surface.

No-till seeding has a definite place in improving forage quality of existing pastures and hay fields. No-till seeding practices can also be used to completely reseed forage stands that have become unproductive. Forage stands can be improved using no-till methods to add legumes to pure grass stands and to strengthen weak grass stands through the introduction of both legumes and/or grasses. The concept of no-till seeding has further potential in forage production when rotating crop fields to pasture or hay production and when changing the type of forage stand to summer or winter annuals in the crop rotation scheme.

There are several rules that must be followed for no-till seeding to be successful. The five most important are:

1. *Proper Soil Testing is a Must* - It is a waste of time and money to try to establish or improve stands when the soil fertility and/or pH are too low to support productive plants. Fertilize and lime according to soil test recommendations prior to seeding. Ideally, lime should be applied at least six months in advance of seeding so it has time to react with the soil and increase soil pH. Red clover requires a minimum pH 6.2 to 6.5 and alfalfa requires 6.4-6.8.

2. *Minimize Competition from the Existing Sod or Cover* - Every effort must be made to prevent weeds or existing forage plants from competing with the new seedlings. Heavy thatch and plant growth tall enough to shade the soil surface must be removed. Grazing, hay cutting and/or application of herbicides are the primary means for reducing this competition prior to seeding. After seeding into an existing pasture or hay stand, periodically graze or mow the growth of existing pasture or hay plants to favor growth of the newly established seedlings.
3. *Seed on the Proper Date* - Depending on the situation, no-till seeding can be successful in late winter, spring or late summer/early fall. It is extremely important to make plans and preparations well in advance so the seeding can be made on time.
4. *Use High-Quality Seed* - Utilize forage plants and varieties that are adapted to Virginia and use seed with a high germination percentage. Check with your local Extension Agent for forage plants and varieties adapted to your area. Cheap, low quality seed is often the most costly item in no-till seeding because it results in low productivity stands or thin, weak plant density.
5. *Control Depth of Seeding* - Seeds of most forage plants are small and cannot be counted upon to emerge from a seeding depth of greater than 1/2 inch. Adjust seeding equipment to place the seed at a shallow depth of 1/4 - 1/2 inch. Placing the seed too deep is the most common single reason for failure to get a stand. If you see a few seeds on the soil surface after seeding, then your seeding depth is about right.

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Broadcast-seeding or Frost-seeding clover

Often, a pasture or hay field has an adequate stand of grass, but lacks clover. The absence of a legume results in poor growth and vigor of the grass stand unless regular applications of nitrogen are applied. Forage quality also suffers. It is certainly not desirable to kill the grass simply to add clover to the mixture since the goal is to have clover make up only 30-40% of the stand. The most practical way to get clover back into such grass sods is to broadcast the clover seed over the sod in late winter.

In order for broadcast seeding to be successful, the existing sod must be grazed or mowed short (so you can see your shoe soles when standing on it). During the fall, kill any perennial weeds that are present and apply lime and fertilizer based on current soil test recommendations. Apply the seed from late January to early March (depending on your location) when the sod is not actively growing and when the soil still has a tendency to freeze. Seeding at this time is called "frost seeding" because overnight frosts followed by daytime thaws will bury the seed at a shallow seeding depth. It is essential that seeding occur early enough that you still have several weeks of freezing and thawing to "plant" the seed. Leaving livestock on the area to tread-in the seed may also help. This technique works and it is quick, easy, inexpensive, and can be done on steep, rocky areas where tillage equipment cannot be used.

As the existing sod begins to break dormancy and grow, it is important to graze or mow it periodically to prevent it from crowding out the new clover seedlings. Monitoring of grazing height is essential. When allowing livestock to graze, it is vital to prevent overgrazing and damage to new seedlings. Grazing too short will set back new seedlings and have a more detrimental effect than the competition of the existing sod.

Herbicides needed

It is critical to control broadleaf weeds prior to clover reseeding because these weeds cannot be removed selectively with herbicides after the clover is established. Control herbaceous perennial weeds with 2,4-D, dicamba, triclopyr, metsulfuron-methyl, and/or clopyralid in the summer prior to late January-early March clover reseeding. Match the herbicide, rate, and timing of application to the specific weed infestation. See Virginia Cooperative Extension Publication 456-016, *Pest Management Guide for Field Crops*, and/or consult your local Extension Agent for specific chemicals, rates, and intervals from herbicide application to grass or legume seeding. The use of these chemicals will remove any clover remaining in the stand. Control the biennial thistles (bull, musk, curled) while they are in the rosette stage in the late fall or early spring. Observe label restrictions regarding the interval from application to reseeding. These weeds cannot be effectively controlled with summer herbicide treatments. After the clover is re-established,

watch for re-infestation by the perennial broadleaf weeds, and spot treat if possible to avoid a general re-infestation.

Legume Seeding Rates and Mixtures for Broadcasting/Frost Seeding Hay and Pasture	
Hay	
Plant Species	lb/acre
Red Clover	6-10

Annual Lespedeza	10
Pasture	
Species Mixtures	lb/acre
Red Clover	4-6
Ladino Clover	1-2

Annual Lespedeza	8
Ladino Clover	1

Improve existing sods by drilling legumes and grasses

When a sod is weak due to a thinning of desirable grasses and legumes and encroachment of broadleaf weeds, it often can be dramatically improved by interseeding legumes and grasses. Before seeding it is essential to apply herbicides to the weeds, fertilize, lime, and graze or clip if more than 2-4 inches of growth is present. It is not recommended that alfalfa be seeded into an existing stand of alfalfa more than one year old.

While clover can usually be established by broadcasting seed on the soil surface in the winter, drilling provides even greater assurance of establishment success. On the other hand, it is very difficult to establish most grasses and alfalfa by broadcasting or frost seeding. When thickening grass-clover sods, it is best to plant the grass and clover seed with a no-till drill. Conventional grain drills will work as long as they penetrate the soil surface and adequately cover the seed. It is extremely important to have the sod grazed closely to have adequate weed control, fertility, and soil pH.

If alfalfa is to be established in a strong tall fescue sod, it is helpful to suppress the sod with a low rate of paraquat when the sod is 2-4 inches tall. For spring seedings apply paraquat in October and for late summer seedings apply approximately two weeks before planting. Sod suppression with paraquat is a useful establishment technique for all forage plants. A low rate of glyphosate is sometimes used for sod suppression, but paraquat is generally preferred because it leaves grass stems and leaves very brittle and easy to seed into.

As with broadcasting clover over a live sod, it is also important with drilled grasses and alfalfa to graze the existing pasture stand as growth progresses in order to minimize competition with the new seedlings. If the no-till seeding is a hay field, harvest it for hay early to give the young plants an opportunity to compete with the established plants in the stand.

Seeding Rates and Mixtures to Improve Existing Hay and Pasture Stands by Drilling

Mixed Hay	
Plant Species and Mixtures	lb/acre
Orchardgrass	6-10
Red Clover	3-4
Tall Fescue	5-10
Red Clover	6-8
Timothy	4-8
Red Clover	6-8
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10
Pasture	
Plant Species and Mixtures	lb/acre
Orchardgrass	6-10
Red Clover	4-6
Ladino Clover	1-2
Tall Fescue	5-10
Red Clover	4-6
Ladino Clover	1-2
Alfalfa into Grass Sod	10-15
Red Clover into Grass Sod	6-10

Kill the old sod and reseed

An alternative to improving the existing hay or pasture stands is to completely kill the existing sod and reseed. In such cases, it is usually best to apply a broad spectrum herbicide like glyphosate to eliminate the existing forage plants and weeds, then reseed grasses and clover using a no-till drill. New stands of alfalfa can also be established in this manner.

As with the previously described no-till methods, liming and fertilizing to soil test recommendations is essential in advance of seeding. The best time to seed depends upon such factors as the weeds present, soil moisture and the need for grazing or hay production. However, late-summer/early-fall and late-winter/early spring seedings are most likely to be successful.

In late summer, weed competition is usually not severe and the seedlings have an opportunity to become well established before the next season. This is especially true with forage grass establishment. One option is to seed the forage grass either alone or with small grain in the fall, then over-seed with clover in late February/early March. Fall seedings without small grain nurse crops should be done between mid-August and mid-September west of the Blue Ridge and between late-August and late-September east of the Blue Ridge. Late summer seedings are usually better than early fall as long as there is sufficient soil moisture, because they allow for strong seedling development before frost.

Sclerotinia crown and stem rot may be a problem with late summer legume seedings some years, especially when seeding alfalfa into a sod having clover present. Since sclerotinia damage is most severe on small plants, alfalfa establishment success can be significantly increased by seeding in mid-August. Another option is to seed alfalfa in the spring. Insects can sometimes be a serious problem when seeding into a killed sod in late summer.

The most reliable procedure for killing the existing sod and seeding in late summer is to first graze or take a hay cutting from the stand to be reseeded in the late spring. Then in early June, when the plants are 2-4 inches tall, apply a broad-spectrum herbicide and seed foxtail (German) millet with a no-till drill at the rate of 20 lbs per acre. The millet serves as a smother crop, provides an excellent hay cutting and makes no regrowth to interfere with the new seeding. After the millet is harvested in early August, apply herbicide if there are weeds or survivors from the old sod present and seed the new forage with a no-till drill. Even more effective is to kill existing sod in late summer. Seed a cereal crop such as rye, followed by a summer annual and then fall seed your new forage stand.

In order for the late-winter seeding to work, it is necessary to apply herbicides during the preceding late fall while the weeds and other plants are still growing. Seed into the killed sod in early March. This is more effective than waiting until spring to kill the sod because in spring it is necessary to wait until the plants are actively growing before applying herbicides. This delays seeding until weed competition is often so severe it chokes out the new seedlings or hot, dry conditions slow the growth of the forage seedlings.

Herbicides for No-Till Seeding

In general, killing existing grass sods is best accomplished by the use of glyphosate or paraquat. For both fall and spring seedings, high rates of glyphosate are generally required to control both the grass sod and perennial broadleaf weeds. For spring seeding, glyphosate should be applied the previous fall. Ideally, the sod should be grazed or mowed before application to reduce surface residue. A short regrowth period (1 week) is useful to insure that actively growing leaves are present to absorb the herbicide. In some instances, it may be necessary to apply a second glyphosate application at a lower rate or to apply appropriate broadleaf herbicides to control certain perennial broadleaf weeds. Seeding should usually be delayed for at least seven days after application to allow desiccation of weeds and sod and prevent competition with the germinating seedlings. For fall seeding, it is best to control perennial broadleaf weeds in spring and summer.

Another option, especially with predominately tall fescue stands, is to apply paraquat plus surfactant in October on sod grazed to 2-4 inches. Seeding is done in early March the following year. If winter annual weeds are present, they can be controlled before seeding with an additional application of paraquat. Many perennial broadleaf weeds will not be controlled with paraquat, and must be controlled with glyphosate or appropriate broadleaf herbicides.

Seeding Mixtures and Rates for Reseeding Killed Sod

Hay	
Plant Species and Mixtures	Col. 2. lb/acre
Alfalfa	15-20
Orchardgrass	10-14
Tall fescue	12-16
Orchardgrass	8-12
Red Clover	6-10
Tall Fescue	8-12
Red Clover	6-10
Timothy	6-8
Red Clover	6-10
Alfalfa	10-12
Orchardgrass	4-6
Timothy	3-4
Pasture	
Plant Species and Mixtures	lb/A
Orchardgrass	8-12
Red Clover	5-7
Ladino Clover	1 1/2-2
Tall Fescue	8-12
Red Clover	5-7
Ladino Clover	1 1/2-2
Orchardgrass	4-6
Alfalfa	10-12

New forage seedlings following crops other than sod

A common situation is the need to establish new grass-clover or alfalfa stands following a crop such as corn, small grain, sorghum, millet, or soybeans. This can be done very effectively by no-till methods rather than disturbing the soil to prepare a seedbed. In fact, it is not uncommon to use these crops as a means of controlling weeds prior to no-till forage seedlings.

For example, spring no-till planting of grasses, clover, or alfalfa can be successful in fields planted to corn the previous season. Before seeding the following spring, make sure that the seedbed is free of weeds. If even small weed seedlings are present, a herbicide such as glyphosate paraquat should be applied. Preferably, the corn field would be planted to a small grain cover crop in the fall, but this is not absolutely necessary.

There are several ways to successfully seed forages no-till into a small-grain crop in the spring. One method is to spray the small grain with paraquat when growth is 4-6 inches tall, then seed. Small grain regrowth will probably occur and must be mowed or grazed to prevent smothering the grass or

legume seedlings. Another option is to completely kill the small grain with glyphosate before seeding.

Forages may also be seeded without tillage into standing (8-10 inches tall) small-grain prior to harvesting for silage. Rye harvested for silage in the boot stage will normally produce regrowth that must be mowed when 4-6 inches tall to reduce competition to the seedlings. Barley and wheat cut at the dough stage will produce very little regrowth.

Forages may also be seeded into small-grain stubble after a silage or grain harvest. If the silage harvest was made prior to dough stage, wait 5-10 days for regrowth to develop, then apply paraquat or a low rate of glyphosate to burn back the regrowth and kill weed seedlings. If the harvest was made at dough stage or later, apply paraquat or a low rate of glyphosate immediately and seed. Since grain harvest is late in the spring, waiting until early August to spray with paraquat or glyphosate and then seeding the forages is usually best. Volunteer small grains must be mowed or pure legume stands can be killed with a grass herbicide like Poast. Another option is to apply paraquat or glyphosate and seed foxtail (German) millet no-till instead of the forage after the small-grain crop is removed. The forage is then seeded in August after harvesting the millet as discussed earlier.

Herbicide considerations

Be cautious about soil residues from herbicides applied to the preceding crop. Triazine herbicides (atrazine, simazine) will kill or injure legumes planted in the fall following a spring application and, with certain herbicides, injury can even occur the following spring. If a legume seeding is anticipated, minimize triazine residues by eliminating simazine and restricting the amount of atrazine used. Consult Virginia Cooperative Extension Publication 456-016, *Pest Management Guide for Field Crops*, and/or consult your local Extension Agent for more specific recommendations.

Pesticide Precautions

Select and use all pesticides carefully. Before using any pesticide, read the instructions printed on the label of its container; follow those instructions, heed all cautions and warnings, and note precautions about residues. Store pesticides in their original containers. Store them where children and animals cannot get to them; away from food, feed, seed, and other materials that may become harmful if contaminated. Dispose of empty pesticide containers in the manner specified on their labels. See your doctor if symptoms of illness occur during or after use of any pesticide.

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