

Frost Seeding Clover: A Recipe for Success

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Legumes are an essential part of a strong and healthy grassland ecosystems (Figure 1). They form a symbiotic relationship with *Rhizobium* bacteria in which the bacteria fix nitrogen from the air into a plant available form and share it with the legume. Clover also increases forage quality and quantity and helps to manage tall fescue toxicosis. In the past, the positive impact of clover on tall fescue toxicosis has always been thought to simply be a dilution effect, but [new research from the USDA's Forage Animal Production Unit in Lexington](#) shows that compounds found in red clover can reverse vasoconstriction that is caused by the ergot alkaloids in toxic tall fescue. The primary compound found in red clover is a vasodilator called Biochanin A.

Clover stands in pastures thin overtime due to various factors and require reseeding every three to four years. There are several techniques for reintroducing clover into pastures including no-till seeding, minimum tillage, and frost seeding. Of these techniques, frost seeding requires the least amount of equipment and is the simplest to implement. Frost seeding is accomplished by broadcasting clover seed onto existing pastures or hayfields in late winter and allowing the freezing and thawing cycles to incorporate the seed into the soil (Figure 2 and 3). This method works best with red and white clover and annual lespedeza. It is NOT recommended for seeding grasses or alfalfa. This publication covers the important factors for successful frost seeding.

Frost Seeding Tips

- *Control broadleaf weeds.* Ideally, broadleaf weeds should be controlled prior to seeding legumes since most herbicides will damage clover seedlings. This is best accomplished by controlling weeds the season prior to renovation. More information on controlling weeds in pastures and hayfields can be obtained contacting your local [extension office](#) or consulting [AGR-207 Broadleaf Weeds of Kentucky Pastures](#).
- *Soil test and adjust fertility.* For clover and other improved legumes to persist and thrive in pastures, an environment conducive for their growth must be created. This starts with proper soil fertility. Prior to frost seeding clover, soil test pastures and hayfields then lime and fertilize pastures according to the soil test recommendations.
- *Suppress sod and decrease residue.* The existing sod must be suppressed and plant residue reduced prior to seeding. The reduction in plant residue allows seed to reach the soil surface where it can be incorporated by freezing and thawing events. Sod suppression and residue reduction is best accomplished by hard grazing in late fall and early winter.

- *Ensure good soil-seed contact.* Good soil-seed contact is required for seed germination and emergence. In frost seedings, this occurs when freeze and thaw cycles form cracks in the soil surface, often referred to as a honeycomb (Figure 1).
- *Seed on proper date.* Frost seeding is best accomplished in late winter or very early spring (February and early March). Frost seeding is accomplished by simply broadcasting the seed on the soil surface and allowing the freeze and thaw cycles to incorporate the seed into the soil. Success with frost seeding can be enhanced by dragging the pasture as the seed is being broadcast or immediately after. Rolling the field with a corrugated roller after seeding will also improve success.
- *Use high-quality seed and adapted varieties.* Choose clover varieties that have been tested in Kentucky. The most current variety testing results can be found on the [UK Forage Extension](#) website or by visiting your local [county extension office](#). Using the [Long-Term Summary of Kentucky Forage Variety Trials](#), choose varieties that have performed above average (>100%) for multiple site-years. This indicates that they are well adapted to conditions found in Kentucky. Use either a certified or proprietary seed to ensure high germination, good seed genetics, and low noxious weed content. Do NOT use common or VNS (Variety Not Stated) seed since there is no way to tell how it will perform in Kentucky.
- *Legume mixture for Kentucky.* In Kentucky, a good mixture for renovating pastures with is 6-8 lb/A of red clover, 1-2 lb/A of ladino or intermediate white clover. On rented farms or where soil fertility is marginal, adding 10-15 lb/A of annual lespedeza can be beneficial. Annual lespedeza is a warm-season annual legume that was used extensively in the past before producers had ready access to lime and fertilizer. In general, cool-season legumes (red and white clover) will be more productive under good growing conditions.
- *Use correct seeding rate.* Make sure to maintain and calibrate broadcast seeding equipment prior to planting (see video on [KYForages YouTube Channel on seeder calibration](#)). Seeding at too high of a rate needlessly results in higher seed costs. On the other hand, seeding at too low a rate results in weak stands and lower productivity.
- *Inoculate legume seed.* Most improved clover seed comes with a lime-based seed coating that contains inoculant. Make sure that the seed is fresh and has not been stored under adverse conditions. If the seed is not pre-inoculated, inoculate it with the proper strain of nitrogen-fixing bacteria prior to seeding. This is relatively inexpensive insurance that optimum nitrogen fixation will take place.
- *Check seed distribution pattern.* When using a spinner type spreader/seeder make sure and check your spreading pattern. In many cases small seeded forages are not thrown as far as you think. This can result in strips of clover in your pastures rather than a uniform

stand. Also check your seed distribution pattern. Single disk spinners often throw more seed to one side if not correctly adjusted.

- *Use GPS guidance to maintain a consistent distance between passes and speed.* It is often difficult to see where seed has already been broadcast and many ATV/UTVs are do not have a functioning speedometer. Using a portable GPS unit can reduce misses and overlaps and help the operator maintain a consistent speed (Figure 2).
- *Control post-seeding competition.* Not controlling post-seeding competition is one of the most common causes of stand failures. One of the best management practices is to leave cattle on pastures that have been overseeded with clover until the clover seedlings have germinated and are tall enough that the cattle start to graze them. Then remove animals from the pasture and allow the clover to reach a height of 6-8 inches. At that time the paddock can be placed back into the rotation. If the existing vegetation is not controlled, the new clover seedlings will be shaded out.

For more information on frost seeding contact your local extension agent or visit the [UK Forage Extension Website](#).

Frost Seeding at a Glance

- ✓ Legumes are an essential part of sustainable grassland ecosystems.
- ✓ Overseeding may be required to maintain and thicken stands.
- ✓ Frost seeding is the simplest method for reintroducing clover back into pastures.
- ✓ Control broadleaf weeds prior to frost seeding.
- ✓ Soil test and apply any needed lime or fertilizer before frost seeding.
- ✓ Suppress the existing sod and reduce residue with hard grazing in the fall and winter.
- ✓ Choose well adapted varieties of red and white clover using the UK forage variety testing data.
- ✓ Calibrate seeder and check spread pattern.
- ✓ Broadcast 6-8 lb/A of red clover and 1-2 lb/A of white clover that has been inoculated in February or early March.
- ✓ Control post seeding competition by grazing pastures until clover seedlings become tall enough to be grazed off.
- ✓ Put pasture back into rotation once seedlings reach a height of 6-8 inches.



Figure 1. Clover and other legumes are an important part of sustainable grassland ecosystems. They form a symbiotic relationship with *Rhizobium* bacteria in which nitrogen from the air into a plant available form, improve nutritive value, and help to alleviate tall fescue toxicosis. *(Photo by Chris Teutsch)*



Figure 2. Frost seeding is accomplished by broadcasting clover seed onto closely grazed pastures in late winter or early spring. Using GPS guidance helps operators maintain equal spacing between passes and consistent speed (inset picture). *(Photos by Chris Deutsch)*



Figure 3. Freeze and thaw cycles during late winter result in the formation of cracks in the soil surface often referred to as a “honeycomb”. This heaving incorporates clover seeds into the soil and is commonly referred to as “frost seeding”. *(Photo by Jimmy Henning)*