



Improve Pastures and Hay Fields by Overseeding Perennial Forage Grasses and Legumes with a No-till Drill

by Kitty O'Neil, PhD, CCA

Spring is here and it is time to seed, or overseed, perennial grass and legume stands for hay and pasture production. Across the North Country, our fields are mostly dry enough for soil preparation and seeding of these cool season species. We generally recommend a May 1st to 15th window for this operation, but earlier is OK too in a spring like this one, when fields are dry and no torrential precipitation events are expected. We have always worked toward preparing a fine and firm seedbed for successful forage seedings, but more farms are making no-tillage seeding successful too – whether to improve an existing living stand or a new seeding planted into a killed sod. Spring forage seedings typically find more soil moisture than late summer seedings and also yield better in the seeding year.

Many farms continue the traditional forage seeding method of dropping or drilling seed at a shallow depth into a well-prepared, fine and firm seedbed. These shallow seedings are typically rolled afterward to maximize seed-soil contact for optimal and uniform germination and establishment. No-till drills permit forage grass and legume seed placement into existing pastures and hay fields, or establishment of a completely new seeding following harvest of a row crop, with less soil disturbance and less fuel consumption than conventional planting methods. The no-till approach eliminates the need for plowing or disking, minimizes soil loss from erosion and protects soil structure and health. No-till seeding also conserves soil moisture and limits surface water run-off, and requires fewer field operations. Because of these advantages, no-till seeding has become popular method for seeding forage grasses and legumes in some different situations. All seeding methods result in better establishment if soil fertility and pH is addressed first.



I. Improve existing, living hay field or pasture by drilling in supplemental legume and/or grass seed.

Pastures and hay fields can become low-yielding over time as soil fertility declines and weeds and less productive grasses increase in number. More desirable species may be overseeded with a no-till drill to improve the stand. Some clover species can be established with frost-seeding in late winter or early spring, but we are past that window now. Alfalfa and most grass species establish better with drilling. For good establishment, competition from the existing stand must first be reduced by mowing or grazing closely. Alfalfa may not establish as well as other species with this method. Species and yield improvements are typically less dramatic with this approach, as compared with a complete termination and reseedling. An overseeding approach does not limit seeding year yield as severely, however.

II. Kill an existing sod and reseed without tilling.

As an alternative to overseeding a living hay or pasture stand, the field may be completely killed and reseeded. In this case, the existing sod is normally killed with a broad-spectrum herbicide such as glyphosate or a mixture to address specific weed pressures. This approach works best in late summer/early fall and in late winter/early spring to avoid peak weed competitiveness. August is a good time to seed forage grasses and legumes in a killed sod if soil moisture is sufficient. This leaves ample time for seedling development before first frost. A small grain nurse crop can be used along with a late summer/early fall planted forage also.

III. Plant a new forage seeding following a row crop.

In this situation, a grass-alfalfa or grass-clover stand is planted into a corn, small grain or soybean stubble during the same spring or late summer forage seeding windows. A no-till drill is a very effective way to plant grasses and/or legumes without soil disturbance in the early spring, or to plant cover crops or forages in the fall. Be aware of residual herbicides used in the preceding crop. Spring applications of various triazine-type chemicals can injure legume seedlings in the following fall, or even in the following spring.

Across these three scenarios, following a few rules will help the success of a forage seeding.

1. Soil testing prior to seeding is always a good idea. It can be difficult or impossible to establish or improve stands when soil pH or fertility are not within acceptable range to support seedling establishment and productive plant growth. Sample soils after crop removal in the fall or before planting in the spring. Apply lime and fertilizers according to soil analysis recommendations. Ideally, lime needs to be applied 6-12 months before seeding to allow adequate time for pH effect, but there is no time like the present if it's needed.
2. Minimize competition from existing sod or crop. Prevent weeds or existing forage plants from competing with new seedlings. Seedlings will not compete as well if they are well-shaded. Drill new seed just after mowing, grazing or herbicide application to reduce competition. Mowing or grazing combined with herbicide application can be the most effective way to eliminate all competition from existing plants and weeds. Allow the old stand to 'green up' slightly after mowing or grazing and before herbicide application for good results.

After seeding into an existing pasture or hay field, periodically graze lightly or mow to favor the growth of new seedlings.

3. Seed at the proper time. No-till seeding can succeed in late winter, spring, or in late summer and fall, depending on objectives. Plan and prepare to ensure planting within an optimal window of time to match your objectives. Avoid seeding perennial forages during late May, June and July to give them the best chance of establishment while minimizing weed pressures.
4. Properly adjust, calibrate and monitor your no-till drill. The no-till drill is designed to plant seeds in an unprepared, uneven, residue-covered soil or in sod. Despite the imperfect seedbed, the drill is equipped to open a furrow, place seed ¼" to ¾" deep and cover and firm the soil over the seed without causing compaction. For good establishment, the drill must be equipped and adjusted properly, especially for small-seeded legumes and grasses. No-till drills are heavy, and are usually equipped with heavy frames and with fluted coulters and openers in the front to move residues away, cut into the sod and leave a furrow for seed placement. Downward pressure on the coulters is adjustable, to provide adequate force to cut through cornstalks or sod, and also to trip and reset when rocks or other obstructions are encountered. Avoid allowing residue or debris to collect or bunch up in front of the coulters – residue can get pinched down into the furrow which will impede soil-seed contact.

Depth control is often not as precise with a no-till drill as with row-crop planters, so begin planting, but stop occasionally to check seed placement and make adjustments if needed. Measure the depth of the firmed soil over the seed behind the closing wheels. Most forage species have relatively small seeds and do not emerge well when planted deeper than about ½". Placing seed too deeply is a common reason for emergence and establishment failure. Another cause of poor establishment is poor seed-soil contact in the furrow, if furrows are not closed well.

Ideally, drill calibration should be performed for every different lot of seed. Seed from different lots and species vary in size and shape and will flow through the drill at different rates. Follow the drill manufacturer's procedure for calibration. Seeding rate charts printed on the drill or in the manual are just a starting point for settings. Most drills are equipped with 2 sets of seed boxes and both should be calibrated separately. Some drills are equipped with a special crank to allow calibration in-place. Other drills must be calibrated by 'planting' a short distance in the driveway and weighing or counting seeds dropped on the ground or into cups. Before calibrating, know what the target seeding rate is for your forage species and situation. The seeding rate is simply the amount of seed planted per acre. You will need some equipment – a small balance or scale, some cups or bags to catch seed from the drop tubes, and a measuring tape. Here are some necessary equations:

$$\text{Seeding Rate} = \frac{\text{Amount of seed}}{\text{Area planted}}$$

$$\text{Area planted (acres)} = \frac{\text{Seeder width (feet)} \times \text{travel distance (feet)}}{43560 \text{ square feet per acre}}$$

Seeder width is the measurement across the drill and travel distance is the distance the seeder traveled on the driveway or field to drop seed into cups.

See <http://www.ricetec.com/Toolbox/grain-drill-calibration> for a good video illustrating one way to calibrate grain drill. This fact sheet describes another method: http://www.uaex.edu/Other_Areas/publications/PDF/FSA-3111.pdf.

5. Use high quality, well adapted seed. Choose forage species and varieties that are well-suited to the Northern New York climate, to your specific soil types and to your specific needs. Check the seed tag and be sure to choose seed with a high germination percentage and purity and low percentage of other undesired seeds and inert material. Adjust your seeding rate to compensate for the percentage pure live seed listed on the tag. The lower the germination rate, the more seeds you will need to plant.

The Soil and Water Conservation District offices across the North Country have no-till drills to rent or they can often help to pay a custom operator to drill forages for you. Contact CCE or your local SWCD office to inquire about their support services for no-till planting.

Additional Resources:

1. Cornell Field Crops website. <https://fieldcrops.cals.cornell.edu/forages/planting-perennial-legumes-and-grasses/>
2. Cornell Forages.org website. (Species selector tool is non-functional.) <http://www.forages.org/>
3. Schuster, B., Q. Ketterings, K. Czymmek J. Cherney, J. Degni, K. Ganoe, and J. Lawrence. 2019. "Restoring Perennial Hayfields", Factsheet #109. Cornell University Nutrient Management Spear Program. <http://nmisp.cals.cornell.edu/publications/factsheets/factsheet109.pdf>
4. Hunter, M. and J. Lawrence. 2020. "Weed Control in Grass Hayfields" https://nydairyadmin.cce.cornell.edu/uploads/doc_872.pdf
5. Cornell Guide for Integrated Field Crop Management. 2021. J. Thomas-Murphy, ed. <https://www.cornellstore.com/product/188581?location=&quantity=1&size=83>

For more information about field crop and soil management, contact your local Cornell Cooperative Extension office or NNY Cornell University Cooperative Extension Regional Field Crops and Soils Specialists, Mike Hunter and Kitty O'Neil.

Kitty O'Neil
CCE Canton Office
(315) 854-1218
kitty.oneil@cornell.edu

Mike Hunter
CCE Watertown Office
(315) 788-8450
meh27@cornell.edu

Our Mission

"The Northern New York Regional Ag Team aims to improve the productivity and viability of agricultural industries, people and communities in Jefferson, Lewis, St. Lawrence, Franklin, Clinton and Essex Counties by promoting productive, safe, economically and environmentally sustainable management practices and by providing assistance to industry, government, and other agencies in evaluating the impact of public policies affecting the industry."

Contact us directly through our website: <http://nnyrp.cce.cornell.edu>

Building Strong and Vibrant New York Communities

Cornell Cooperative Extension provides equal program and employment opportunities. NYS College of Agriculture and Life Sciences, NYS College of Human Ecology, and NYS College of Veterinary Medicine at Cornell University, Cooperative Extension associates, county governing bodies, and U.S. Department of Agriculture cooperating.