ESTABLISHING ALFALFA USING NO-TILL TECHNIQUES

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There have been many changes in agriculture over the last 50 years. One of the greatest has been the use of no-till planting methods. The development of drill and herbicides has made no-till seedings as successful as seeding into prepared land.

WHY USE NO-TILL?

There are several advantages to no-till planting. First is the obvious decrease in soil erosion. There are several other reasons, however. With no-till, planting can occur soon after a rain, while the soil must be allowed to dry before disking to prepare for conventional seeding. After planting, the soil retains moisture longer when no-till is used, because the soil is not directly exposed to the sun. Cost comparisons between conventional and no-till plantings generally show the expenses for both to be similar. No-till plantings require less fuel and labor than conventional planting, but require a chemical kill of the existing vegetation.

STEPS FOR SUCCESSFUL NO-TILL ESTABLISHMENT OF ALFALFA

Most people who have tried to establish alfalfa through no-till methods can tell of great successes and total failures. As the successes and failures are compared, it becomes evident that several points may make the difference between these two. In order to be effective with no-till planting of alfalfa, research and experience has shown the following details should be focused on.

(1)  Don't forget the basics of alfalfa establishment. Most of the same things that are important for conventional establishment are still important with no-till. Select a deep, well-drained soil. Also be sure to select an adapted variety with resistance to any diseases that have been a problem for previous alfalfa stands. Just because an alfalfa stand is planted no-till does not mean that wet feet will not be a problem, or that an unadapted variety will become golden.

(2)  Prepare for establishment at least one year ahead. Proper planning can often prevent many of the potential problems that can occur during alfalfa establishment. Starting early when getting a field ready can ensure that the last minute problems that creep up can be minimized.
A. **Soil test and apply lime as needed.** Research has shown that liming on top of the soil is as effective as when the lime is incorporated, it just takes longer to move into the soil. Figure 1 shows the length of time required for the pH to be raised from 5.3 to above 6 in a no-till system. Don't expect to apply lime one month ahead of planting and to have the pH high enough to be successful.

![Figure 1. Changes in pH after liming no-till planting.](Ritchey and Tyler. 1998. UT Master's Thesis)

B. **Clean up weed problems.** Most weed problems are easier to take care of before the alfalfa is seeded rather than after. Weeds like curly dock, buckhorn and broadleaf plantain, as well as horsenettle can be chemically controlled before alfalfa is seeded. Once the alfalfa is present, the herbicide options are drastically limited. Often times, the weeds can't be controlled in alfalfa, they can only be suppressed. Plan ahead and get rid of these problems before they cause severe problems.

(3) **Seed at the proper time.** The time of seeding may be one of the biggest differences between seeding methods of alfalfa. Conventionally seeded alfalfa can be seeded in both the spring and fall. With no-till, experience has shown that spring seedings are best. Sclerotinia crown rot can be a major problem with fall-seeded alfalfa, but its greatest potential for damage is with no-till alfalfa. This fungus is a problem on young alfalfa seedlings going into the first winter. After the stand is established, the plants develop tolerance to the fungus. Spring seeding allows the alfalfa plants to become well established before winter. Fall seedings, especially with no-till, result in plants that are young as winter approaches, which increases the susceptibility of the alfalfa plants to sclerotinia crown rot.

Experience has also shown that the seeding window for spring seeding is longer for no-till than for conventional plantings. Killed sods retain moisture longer into the late spring, so plantings can occur later with no-till. Plantings can be made 2-4 weeks later with no-till compared to planting in conventional seedbeds.

(4) **Seed into killed vegetation.** A major reason for stand failures with alfalfa is weed competition. With conventional seeding, all existing plants are
killed by mechanical means. In simple terms, they are plowed up. With no-till seeding, since the field is not worked, herbicides need to be used to kill existing vegetation. The two most common chemicals used are glyphosate and paraquat. Both are non-selective herbicides, but their modes of action are different. The best herbicide to use will depend upon your specific conditions. Contact your local Extension agent for help in determining which herbicide to use. Be sure to read and follow all label instructions.

One of the most consistent sods to plant into is wheat. A successful program has been to kill the original sod in the fall, seed wheat in October, spray the wheat with paraquat in April/May, and seed the alfalfa the day after spraying. Plants like tall fescue are easier to kill in the fall than spring, so the fall spray will kill those, and wheat is easily killed by paraquat, so plant competition is removed by the spring spray. This is not the only program that can be successful, but it has worked well for many producers.

(5) Plant the proper amount of seed. For both no-till and conventional seeding, 15-20 lb per acre of seed is required. Without the proper number of seed, there is no way to get enough plants to provide a full stand. The reason this is pointed out in this paper is because of the difference in machinery. For many no-till plantings, drills are not owned, but are rented. Most drills have some type of seed flow chart to help with seeding rates. However, as drills age and are used over more acres, the actual seed flow may vary considerably from expected values from the chart. Also, some of the coatings used on alfalfa and other legume seeds may cause the seed to flow faster than predicted by the calibration charts on drills. It is not unusual to have increases in seed flow up to 30-40 percent above that of uncoated seed.

It is important to calibrate a no-till drill before seeding to ensure the proper seeding rate is used. For both coated and uncoated seed, a 15-20 lb per acre seeding rate is still recommended. Calibrating the drill will prevent an extra trip to buy more seed because all of the original seed was drilled on half of the field.

(6) Plant when moisture is available. In order for a seed to germinate, it must take in water and swell before the young root and stem begin to emerge. The moisture in the surrounding soil is critical for seed germination. A good stand of alfalfa will depend on planting the alfalfa into a moist soil so plenty of moisture is available. Just because the drill is able to get into the soil does not mean there is enough moisture for germination. There is generally not a problem with a lack of moisture with spring seedings, but it is important to keep this point in mind.

(7) Plant at the proper depth. Research has shown that seeding depth is a critical factor in alfalfa emergence and establishment (Figure 2). For a seed to become established, it has to germinate and push up through the soil. Once the young leaves are exposed to sunlight, they can begin to produce energy by photosynthesis to grow. Until this occurs, they depend on stored energy in the seed to develop. The deeper a seed is planted, the more energy required to get
through the soil. Small seeded plants like alfalfa have very limited amounts of energy stored in the seed, so they should be planted shallow. Recommended depths for alfalfa seeding are $\frac{1}{4}$ to $\frac{1}{2}$ inches deep. It is preferable to be on the more shallow side of this recommendation.

Most no-till drills have been designed to be heavy enough to cut through sod and into the soil with coulters. The depth that a drill will place seed can vary based on soil moisture and the amount of pressure that is put on the press wheels. Be sure to run the drill in the field before seeding to determine the depth the coulter are cutting. If the drill is cutting a furrow deeper than $\frac{1}{4}$ to $\frac{1}{2}$ inches, adjust the drill to make a more shallow furrow. On most drills this is done by putting more pressure on the press wheels, which will raise the coulters.

(8) Control weeds after planting. One of the major weed competitors for spring seeded alfalfa is crabgrass. If not controlled, crabgrass can cause a severe reduction in the number of alfalfa plants that become established. Several grass herbicides are available for use in the situation. The proper one to use will be based on the presence of other types of grass or broadleaf weeds. Be sure to keep an eye on a newly seeded field of alfalfa. This will allow you to treat the fields before the weeds become a competitive problem.

When spring seeding of alfalfa is first mentioned to some producers, weed pressure is often listed as the number one problem. Often times it is viewed as a great enough problem that some people avoid spring seedings. If no-till seeding is to be used, it is better to have weeds, which can be chemically controlled, than to have sclerotinia crown rot, which has no method of treatment, and can completely wipe out a stand of fall-seeded alfalfa.

CONCLUSION

No-till establishment of alfalfa is a viable and attractive alternative to the conventional seeding of alfalfa. Attention to detail is often the difference between
getting a good stand, and getting a stand that is weak and will be difficult to deal with. Just as with conventional alfalfa, select a good variety, remove all existing vegetation, get the fertility in good shape, plant seed the proper depth, and control weeds after planting are the key points. The difference between the two planting methods occur mainly because of the differences in the way some of these tasks are accomplished.