No-Till Alfalfa Establishment

After Small-Grain Cereals

Alfalfa is the most important forage crop in the United States. It is widely adapted, an excellent protein and nutrient source for livestock, a valuable source of nitrogen for succeeding crops, and a soil builder.

A major concern in alfalfa production is stand establishment. It is common for producers to plow, disc, and harrow the ground several times to obtain a firm, level, mellow, weed-free seedbed. While this makes it easier to plant the seed firmly into the soil at the proper depth, it also adds to the cost of establishment, wastes time, leaves the soil vulnerable to erosion, increases the risk of crusting, and increases loss of valuable moisture. The loss of soil moisture often leads to stand establishment failure. No-till planting is an excellent way to avoid this failure.

This publication introduces the concept of no-till alfalfa establishment after small-grain cereals and suggests planning considerations and planting methods.

In Kansas, most alfalfa is planted during August. Under dryland conditions, stand establishment problems are common with late-summer plantings due to drought conditions, which are intensified by excessive tillage. Seed planted in dry seedbeds may not germinate until a rain occurs or it may germinate only to die soon thereafter from lack of moisture. With no-till alfalfa planting, there is often more moisture available for germination and establishment because there is little soil disturbance. This soil moisture can mean the difference between success and failure.

Another concern associated with conventional seedbed preparation for alfalfa planting is the potential for soil erosion. It is common for alfalfa to follow a small-grain cereal in a rotation, because there is ample time to prepare the seedbed after cereal harvest before planting alfalfa. Most small-grain cereal residue is destroyed during seedbed preparation, creating the possibility of excessive soil erosion.

Planning Considerations

No-till alfalfa planting requires more planning a year in advance. The first step in obtaining excellent no-till alfalfa yields is planning a fertility program similar to one for conventional alfalfa plantings. It requires a soil test to determine soil nutrient needs. Alfalfa requires a soil pH of 6.5 to 7.5 for optimum production. Because the soil will not be tilled, lime applications to correct a low pH must be incorporated with seedbed preparation for the preceding crops.

In Kansas, phosphorus and potassium are two nutrients that alfalfa most often requires. Many producers attempt to correct phosphorus and potassium deficiencies in the field where alfalfa will be planted the year prior to planting. However, fertilizer applications also can be banded with or near the seed at planting time. No more than 10 pounds per acre of nitrogen plus potassium should be placed in direct contact with the seed. Broadcast fertilizer applications in standing small-grain cereal residue prior to planting are not as effective as banded applications at planting. Wheel tracks from the broadcast applications also crush the residue, making it more difficult for the drill to penetrate.

The field's herbicide history influences how soon alfalfa can be planted safely after cereals. There are severe rotational restrictions with some herbicides labeled for small-grain cereals such as Tordon, Glean, Ally, Amber, Peak, Rave, Ally Extra, and Finesse. Some of these herbicides can carryover for more than one growing season, especially in high pH soils. Planning herbicide use is essential before alfalfa can follow a small-grain cereal that has been treated with residual herbicides.

Producers need to plan how they will plant through the small-grain cereal residue and how it will fit into their total program. To reduce clumps of straw, a straw shredder/spreader on the combine will distribute the straw evenly and make planting easier and place the seed at a uniform depth.

After cereal harvest, weed growth must be monitored to avoid valuable moisture loss prior to no-till alfalfa establishment in late summer. If excessive weed growth occurs, a nonpersistent herbicide such as glyphosate or Gramoxone Extra can be used anytime prior to crop emergence for control of emerged weeds. If there are only a few scattered broadleaf weeds that won't interfere with planting, producers may decide to forego a herbicide application.

After rain, the volunteer small-grain cereal, such as wheat, can have excessive growth that uses valuable moisture. If not controlled, volunteer cereal crops make it difficult for the drill to penetrate and close the drill slot for good seed-soil contact. Because volunteer winter wheat survives the winter, it causes more concern than volunteer spring barley or spring oats.

Volunteer wheat that emerges with or soon after the alfalfa may compete for moisture. In addition to competing for moisture and nutrients, volunteer wheat can be a haven for wheat curl mites, which carry the wheat streak mosaic virus to adjacent wheat fields. A Poast Plus, Select, or Raptor application prior to winter dormancy is labeled for control of volunteer cereals in a standing alfalfa crop. After volunteer wheat has gone through dormancy, it is more difficult to control in early spring. Many producers are

Kansas State University

Agricultural Experiment Station and Cooperative Extension Service

Planning Time Line for No-Till Alfalfa Planting After Small-Grain Cereal

JUL	*soil test*
AUG	*apply lime and other nutrients*
SEPT *and* **OCT**	*plant wheat*
NOV *thru* **MAY**	*avoid residual herbicides, such as, Tordon, Glean, Ally, Amber, Peak and Finesse*
JUN	*wheat harvest; spread straw*
JUL	*bale straw; control weeds*
AUG	*burn stubble; plant alfalfa*
SEPT	*monitor volunteer cereal growth and control if excessive*

not concerned with volunteer wheat in alfalfa as it will be harvested near the boot stage with the first cutting of alfalfa.

Other decisions in no-till alfalfa plantings, such as drill row spacing, planting date, planting depth, variety selection, inoculation and postemergence weed control are no different than for conventional alfalfa plantings. Seeding rates should be no more than 2 to 4 pounds per acre higher than the recommended rates for conventional planting.

Planting Methods

Alfalfa can be no-till planted three ways after small-grain cereals: 1) no-till directly into the cereal stubble; 2) bale the stubble, then no-till plant; and 3) burn the stubble, then no-till plant.

Planting directly into standing cereal stubble requires a drill with good residue clearance and the ability to penetrate the straw. Sharp, narrow coulters should be used. If the straw is crushed or spread unevenly, it is more difficult for the drill to penetrate and place the seed at a specific depth with good seed-soil contact. Residue moisture affects how well the drill can penetrate. High residue moisture will cause "hairpinning" of the straw, but as the residue dries, the coulters can cut the straw. Planting depth should be only $^1/_4$ to $^3/_4$ inch with seed coverage, which is vital for seed-soil contact and good emergence. Drill press wheels are desirable.

Many conventional drills cannot penetrate cereal residue. In this case, the residue must be removed by baling the straw after cereal harvest or harvesting the growing crop—spring oats, for example—as silage or hay, which will leave stubble only several inches tall. (Because we have observed reduced alfalfa growth planted into standing oat stubble, we recommend that oat stubble be removed by haying or burning prior to no-till planting.) With the residue removed, a no-till drill and most offset, double-disc opener drills can be used, especially in moist soil. Removing the residue still may not allow some drills to plant properly, however.

Burning the stubble is another method to remove the residue prior to planting; then plant no-till into the burned residue. This will reduce or eliminate weeds that are growing at planting time. The stubble can be burned any time after harvest, but should be done as close to planting time as possible. This will reduce the time the soil is subject to erosion. Generally, some residue is unburned and, with the prior crop's dead roots intact, erosion should not be a problem. The result will be a firm, weed free seedbed perfect for planting no-till alfalfa.

Many producers think burning small-grain cereal straw will damage the soil. Burning the straw every year may, in fact, reduce the soil organic matter, but burning infrequently will cause little damage to the soil.

Producers interested in using this method should contact their local Natural Resources Conservation Service and Farm Service Agency offices to include the no-till alfalfa planting practice in their conservation compliance plans. Burning can be dangerous, and all safety precautions should be considered. The local fire department and neighbors should be notified prior to burning. A burning permit should be obtained in counties that require one. Producers are encouraged to visit their local K-State Research and Extension office to obtain prescribed burning information.

No-Till Alfalfa

Plantings

FIGURE 1. Planting no-till alfalfa into standing wheat stubble in August.

FIGURE 2. Planting no-till alfalfa into burned wheat stubble in August.

FIGURE 3. A no-till alfalfa stand the first summer after planting.

FIGURE 4. A no-till alfalfa stand 6 weeks after planting into burned wheat stubble.

Summary

Planting alfalfa is an expensive undertaking. One of the biggest risks is stand establishment failure. No-till alfalfa establishment after small grain cereals has several advantages compared with conventional alfalfa establishment. No-till establishment conserves soil moisture, reduces soil erosion, and saves time and money. No-till alfalfa field studies and demonstrations in Kansas have shown excellent stands with yields comparable to conventional alfalfa plantings. Possible disadvantages are more extensive planning and lack of suitable drills.

James P. Shroyer
Extension Specialist
Crop Production

Scott A. Staggenborg
Extension Specialist, NE Area
Crops and Soils

Bill Heer
South Central Experiment Field
Hutchinson, KS

Stewart Duncan
Extension Specialist, SC Area
Crops and Soils

Dallas E. Peterson
Extension Specialist
Weed Science

Kansas State University Agricultural Experiment Station and Cooperative Extension Service

L-875 (Revised) April 2003