

Reseeding or Thickening Thin Alfalfa Stands

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Factors to consider when deciding whether to interseed, renovate, or establish an entirely new field of alfalfa after existing stands become thin.

Alfalfa provides nutritious forage for all types of livestock, especially dairy cattle, beef cattle, horses, and sheep, and is an important crop for many farmers and ranchers. Alfalfa stands often last five to more than 10 years, depending on the number of cuttings per year, variety, fertility, and moisture. During this time, plant density continually declines and eventually becomes too sparse to maintain satisfactory yields and remain economically viable.

Stand Evaluation

Several factors should be assessed when determining your options for reseeding or thickening thin alfalfa stands. Thickening stands is useful only if it increases yield. Alfalfa stands that produce 55 or more shoots per square foot will produce maximum yields. For each one-shoot decrease below this level, yield typically declines about 1/10th of a ton per acre.

Also, for thickening to be successful fertilizer and harvest management must be able to support additional alfalfa plants and sufficient moisture must be available to obtain higher yields. Alfalfa requires 4 to 8 inches of moisture to produce one ton of dry forage. Under dryland conditions, young dense stands produce high yields because they use the current year's precipitation plus stored soil moisture. After three to four years of production, yields decrease, partly because most of the stored soil moisture has been depleted. Thus, yield is limited to what can be grown with the current year's precipitation.

As a result, most older, dryland stands will produce maximum yields if they have 30 or more shoots coming

from two or three alfalfa plants per square foot. Stands thicker than this will not produce more forage because lack of moisture limits production. It is usually better to rotate to a different crop for several years before reseeding alfalfa to permit subsoil moisture to accumulate and increase the chance of success for the new stand.

Many crops produce higher yields when planted after alfalfa rather than following other crops. Most cereals (wheat, oats, rye, triticale, and barley), corn, sorghums, and other grasses benefit from both extra nitrogen supplied by decomposing alfalfa plant material and a rotation effect. Even though some legume crops, like soybeans, will not benefit from the extra nitrogen, they often benefit from the rotation effect.

In older, irrigated or subirrigated fields it takes about 50 shoots from four to six plants per square foot to achieve maximum production. Since soil moisture is not necessarily limiting, establishing more plants may increase production; however, interseeding success may be limited by many barriers that pressure new seedlings.

Barriers to New Alfalfa

Alfalfa growers often seek ways to thicken or reseed existing alfalfa stands to increase production; however, this practice is often unsuccessful. Factors such as soil condition, age of stand, weed and pest pressure, competition from existing alfalfa plants, and the availability of irrigation will influence the effectiveness of reseeding.

Pests

Insects and seedling diseases often are common in older stands and can quickly reduce or eliminate new seedlings. Yield losses are apt to occur more quickly when planting into old alfalfa fields rather than fields with fewer pest problems.

Table I. Percentage of total yield attributable to new alfalfa interseeded on April 21 into old alfalfa sprayed with herbicide on April 9 at the UNL Agricultural Research and Development Center near Mead. Yields for the following three harvests were measured and the contribution of new alfalfa to the total stand was assessed the following spring.

Herbicide	Harvests			Stands the following spring (Percentage of full potential)	
	1	2	3	Total alfalfa stand	New alfalfa stand
----- % -----					
Paraquat	0	10	10	76	0
Glyphosate	40	40+	40+	98	40+

Competition

Competition, especially for sunlight, from existing alfalfa plants or weeds can severely restrict growth of new seedlings.

Autotoxicity

Water-soluble compounds produced by existing alfalfa plants may inhibit root growth of new alfalfa seedlings. This condition is called “autotoxicity” and occurs most frequently when alfalfa is killed shortly before reseeding or when many live alfalfa plants remain in the stand.

Autotoxicity stunts root development, which lowers seedling emergence and vigor. Plants that emerge have shallow and smaller than normal root systems that limit water and nutrient uptake, reducing yields for the life of the plant and potentially reducing long-term survival.

The impact of autotoxic compounds is affected by many factors, including soil type, moisture, temperature, age of stand, stand density, tillage, and time. On sandy soils, the compounds initially are more available and, thus, more toxic; however, rainfall and irrigation can leach and dilute the autotoxic compounds, reducing their impact. These compounds also are degraded by soil microbes. Aggressive tillage will mix the compounds with soil and dilute their impact. Warm, moist conditions will reduce toxicity more rapidly.

Fields with plants less than a year old contain less toxin than fields with older plants. Likewise, thin stands contain less toxin than full stands; however, stand density needs to be much less than one plant per square foot before autotoxicity is not a concern. Seedlings within 8 inches of an older plant often do not survive and seedlings within 16 inches often have reduced yield.

Research in east-central Nebraska on a silty clay loam soil showed that when an existing alfalfa stand was suppressed by a spring application of paraquat and then interseeded with more alfalfa, new seedlings developed slowly and did not survive to the second year. When glyphosate was used, much of the existing alfalfa was killed and new seedlings developed more rapidly and became a full part of the stand in the second year (Table I).

The length of interval between destroying one stand and planting a new one greatly affects the success of the new stand. Autotoxicity appears to be eliminated when a full growing season separates alfalfa stands on all soils.

Two to three months may be sufficient for light textured, well-drained sites. Research in western Nebraska on an irrigated fine sandy loam soil showed that when old alfalfa stands were killed with herbicides (glyphosate plus 2,4-D) by mid-June and replanted two months later in mid-August, the first cutting the following spring yielded an average of 24 percent more than if herbicide application was delayed until late July (Table II).

Table II. Alfalfa yield in spring following destruction of previous alfalfa stand with herbicides after first harvest and subsequent August reseeding.

Destruction date	Tilled	No-Till	Average
Pounds of dry matter per acre			
Mid-June	3958	3206	3582
Early July	3876	2623	3250
Late July	3038	2727	2882
Average	3624	2852	—

Adequate stands may develop when a new stand is planted after an old stand is destroyed, however, usually yields will be reduced if there wasn't sufficient time for any autotoxicity compounds to be eliminated. Research in western Nebraska showed that first cutting yield of new alfalfa following a small grain crop was 20 percent higher than when the new alfalfa followed an old alfalfa stand (Table III).

Table III. Alfalfa yield in spring following destruction of previous crop with herbicides and subsequent August reseeding.

Previous crop	Tilled	No-Till	Average
Pounds of dry matter per acre			
Small grain stubble	3943	3870	3906
Old alfalfa	3624	2852	3238
Average	3784	3361	—

Renovation

Whenever possible, plant new alfalfa into soil that has not grown alfalfa for at least one year. Wait even longer if dryland fields need to accumulate moisture reserves in the subsoil.

The most reliable way to rapidly develop a new stand of alfalfa in an old alfalfa field is to completely destroy the old stand, then wait at least two months before planting the new stand. One option is to destroy the stand with herbicides or tillage after the final harvest, then plant the following spring. Normal stands should develop; however, pest problems, a lack of subsoil moisture, and autotoxicity likely will mean lower yields than if planting where alfalfa has not been grown for at least one year. If sufficient moisture is present, delaying planting until late summer the following year will increase the likelihood of success because most barriers will decrease with time.

Reseeding a new stand of alfalfa within a single growing season into a field where an old stand currently exists takes careful planning and timing. Since alfalfa will be planted in late summer when rainfall is less reliable, the availability of irrigation will be important to its success. If adequate moisture is not available in the fall or planting isn't possible until after mid-August in northwest Nebraska or early September in southeast Nebraska, it usually is better to delay planting until the following spring.

The usual procedure is to take a first harvest by early June. Allow alfalfa to regrow until it has about 6 inches of new growth, then spray with 1 quart glyphosate plus 1 quart 2,4-D. Spray a second time if needed near the end of July. Till and prepare a firm, weed-free seedbed for planting alfalfa. Stands established by tilling and mixing the soil usually produce better yields than no-till plantings (*Table II*); however, if the risk of soil erosion is high, use no-till.

An alternative procedure is to take a first harvest and then spray. Both steps must occur earlier so foxtail millet can be planted early enough (mid to late June) to allow at least 50 to 60 days of growth before it's harvested for hay. If weeds are present in the stubble, spray with sufficient glyphosate to kill them and then no-till plant alfalfa into the stubble.

Direct Interseeding

Under certain conditions, alfalfa can be interseeded directly into existing alfalfa to thicken stands. It is most often successful when done to fill in bare spots or skipped rows soon after and no later than one year after a new stand was planted. Neither competition nor autotoxicity will be as high as with an older stand.

For alfalfa stands more than one year old, interseeding usually is not successful. When attempted, this practice is most practical and successful on irrigated sandy soils using a low-till drill that cuts the sod and places seed in contact with mineral soil. Use herbicides to reduce competition from the existing alfalfa and other vegetation. Paraquat, at 1 to 2 pints per acre, often will provide sufficient suppression of alfalfa and associated grass or weed growth on sandy irrigated sites to allow seedlings to become established. Glyphosate, at a rate of 1 to 2 quarts per acre, is usually needed on heavy or fine-textured soils as well as on some sandy sites to adequately reduce competition. After applying either herbicide, plant alfalfa as soon as possible.

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