

REQUIREMENTS FOR SUCCESSFUL ALFALFA ESTABLISHMENT

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Establishing a good stand of alfalfa is expensive and time consuming, but the success rate is high if you give attention to the important factors. The following steps won't insure success, but will increase greater likelihood.

Step 1. Soil selection

The ideal alfalfa soil is deep and well drained. Alfalfa has a vigorous root system which enables it to obtain water and nutrients from a large volume of soil. This characteristic helps alfalfa produce high yields and live through dry periods. Poor soil drainage restricts oxygen supply to the roots, increases winter heaving problems, causes more disease problems, and damages alfalfa's nitrogen-fixing bacteria. These effects all lead to low productivity or loss of the stand.

Less than ideal soils can be used for growing alfalfa. However, you will need to give more attention to management factors. Also, you should expect lower yields and shorter stand life. Soils maps provided by the Natural Resource Conservation Service are useful for helping you select the fields best suited to growing alfalfa.

Step 2. Lime and fertilizer needs

Alfalfa removes large amounts of nutrients from the soil. A ton of alfalfa hay contains 54 lb of nitrogen, 12 lb of phosphate, 50 lb of potash, 30 lb of calcium, 5 lb of magnesium, and 5 lb of sulfur plus the micronutrients. Nitrogen fertilization is not necessary because alfalfa gets nitrogen from the air by converting nitrogen to a usable form by special bacteria that live in nodules on the roots. Soils vary considerably in their ability to supply nutrients and some require the addition of large amounts of lime and fertilizer to meet alfalfa's needs.

Test soils before sowing alfalfa to determine the nutrients needed. Lime should be applied to adjust the soil pH to 6.5 to 7.0. If the starting pH is below 6.2, apply lime at least 6 months before alfalfa is to be sown because the increase in pH does not occur immediately.

Phosphate and potash are the two fertilizers needed in the greatest amounts to establish and grow alfalfa. The soil test recommendation will show how much lime, phosphorus, and potassium are needed. All other nutrients are

normally supplied by the soil or from the atmosphere, except for boron. Apply boron at the rate of 1.5 to 2 lb of elemental boron per acre. All fertilizers needed to establish alfalfa should be applied before sowing. Established stands should be top-dressed with the amounts of each element required based on a combination of soil test results and amount of hay/silage removed.

Step 3. Variety selection

A large number of adapted varieties are available to select from. Selection of varieties should be based on yield potential, pest resistance, winter hardiness, and tolerance to grazing. Roundup Ready varieties became available in 2006 with an increased amount available in 2007. See U.K. Forage Variety Tests for performance results under Kentucky conditions.

Step 4. Seeding rates

Alfalfa should be seeded at 15 to 20 lb of seed per acre for pure alfalfa stands. When moisture, timing, and seed-bed preparation are optimum, the lower rate can be used. When conditions are less than optimum, use the 20-lb/acre rate.

In many cases, grasses should be planted with alfalfa to control soil erosion on sloping land and reduce weed problems. Use 15 lb of alfalfa seed per acre when sowing with a grass. Table 1 shows the grasses adapted to Kentucky conditions and suitable for sowing with alfalfa. If you use tall fescue, select an endophyte-free variety. Use only one species of grass in a given field.

Species	Seeding Rate (lb/acre)
Orchardgrass	6
Timothy	4
Tall Fescue	6
Kentucky Bluegrass	4

Step 5. When to sow

Alfalfa can be sown either in early spring or late summer in Kentucky. Make spring seedings in prepared seedbeds after the danger of late freezes has passed. Adding grass suppression herbicides such as paraquat or glyphosate before sod-seeding alfalfa is highly recommended to allow the legume to get established.

Late summer seedings need 6 to 8 weeks to germinate and grow before the first hard freeze. This usually means planting between August 15 and September 15. Major concerns at this time are a lack of adequate soil moisture and, in some areas, sclerotinia crown rot. Sclerotinia stems and crown rot of alfalfa only infects in the late fall (October/November) and almost always only affects tender seedling plants. Planting alfalfa early in the late summer seeding period allows the plant to grow and develop more before the infectious period. Earlier seeding is helpful but does not guarantee immunity to sclerotinia. Where sclerotinia has been known to occur and be a problem, strongly consider establishing in the spring.

If the soil is dry, prepare the seedbed but do not plant alfalfa until an inch or more of rain falls. Then, finish preparation and plant the alfalfa as soon as possible. If an inch or more of rain does not fall before September 15, it is best to sow ½ to 1 bu/acre of small grain and wait until spring to sow alfalfa.

Step 6. Seed inoculation

Poor nodulation can be a problem with new alfalfa seedings. Some causes of this problem are low soil pH, low molybdenum levels in the soil, the wrong type of inoculant, dead inoculant, and poor inoculant application. The following checklist will help ensure that live nitrogen-fixing bacteria are present when the seed is planted:

- Have a soil test done before planting alfalfa and follow the instructions on liming discussed previously.
- Be sure the word “alfalfa” is listed on the inoculant container.
- Check to be sure the inoculant expiration date has not passed and that the container has no breaks.
- Verify that the inoculant was stored in a cool, dry place before you purchase it.
- Inoculate the seed just before planting.
- When using pre-inoculated seed, check the date it was inoculated. If more than 6 months have passed, re-inoculate before planting.

To be sure the inoculant stays on the seed, use a commercial adhesive, a sugar solution, milk, etc., as a sticking agent. Add a small amount of the sticking agent to the seed and mix thoroughly so that all the seed is moistened. Then, add the inoculant and mix thoroughly with the moistened seed. The inoculant will absorb the moisture and the seed will flow through the seeder.

Other Seed Treatments

Other materials in the form of seed coatings are currently being added to alfalfa seed prior to planting. These materials may include lime, inoculant, and

fungicide. Seed may be treated with any combination of these three additives and the treatments used will vary by variety, distributor, and seed producing company. Pre-inoculating or treating with fungicides will not displace any significant weight of seed in each bag. However, lime treatments cuts the weight of actual raw seed in each bag by up to one-third. Recent research indicates there is no need to increase seeding rate when using lime coated seed. Pre-inoculated seed must have an expiration date for the Rhizobium bacteria printed on the label. Check this date to make sure that the bacteria are still guaranteed to be viable. Seeds are being treated with fungicides to protect the seedlings from diseases such as Pythium and damping-off during early emergence and development.

Research is currently underway at the University of Kentucky Research & Education Center in Princeton evaluating the impact of other seed treatments on establishment.

Step 7. Tillage method

Alfalfa can be established using conventional tillage or no-till. Tillage may be necessary to cover excess crop residues, control competition from other plants, or smooth the soil surface. A corrugated roller can be used to smooth and firm the seedbed after disking. A second rolling after the seed is sowed helps cover the seed and ensure good contact with the soil.

No-till planting of alfalfa following a row crop may be best if soil erosion is a risk. No-till seeders are available that will open a narrow slit in the soil and drop the seed at the right depth ($\frac{1}{4}$ to $\frac{1}{2}$ inch). Weed control is very important in no-till plantings, and pre- and post-emergence herbicides are often required.

If alfalfa is to be interseeded into a small grain crop, use a light seeding rate ($\frac{1}{2}$ to 1 bu/acre) of small grain. Alfalfa can be planted no-till or broadcast after a light disking and smoothed with a corrugated roller. For best development of the alfalfa stand, remove the small grain by grazing or cutting for silage in the boot stage.

Step 8. Weed control

Unless controlled, weeds such as crabgrass, foxtail, fall panicum, and chickweed can drastically reduce alfalfa stands. Alfalfa is especially susceptible to weed pressure during establishment. Fortunately, herbicides are available that do a good job of controlling the annual grasses and some broadleaf weeds. See UK Extension publication "Weed Control Strategies for Alfalfa and Other Forage Legume Crops" (AGR-146) for current herbicide recommendations for alfalfa.

If pre-emergence herbicides are used to control annual grassy weeds when planting alfalfa, you cannot plant forage grasses with the alfalfa. If mixed

stands are desired, the grass should be drilled into the established alfalfa in late summer.

Research is underway in several states to evaluate different establishment options now that Roundup Ready varieties are available.

Summary

Many factors are involved in establishing a thick, dense, weed-free stand of alfalfa. Attention to details before, during and after seeding are all important. Many of these factors are under our control; soil selection, fertility, varieties, seeding method, rate, date, and depth and control of many pests. Others, especially weather, are not. Our challenge is to do the best job of controlling the controllable so that the end result of a thick healthy stand is achieved.

More information on alfalfa establishment, production, harvesting, utilizing and marketing is available on our Forage Website at www.uky.edu/Ag/Forages.