Growing High Yielding Alfalfa

• The outcomes of yield, quality, and stand longevity may carry different values for different alfalfa operations; however, yield is the factor which has the most influence on profitability.

• For successful alfalfa stand establishment, consider these factors: field selection, product selection, best management planting practices, fertility requirements, weed management, and disease and insect control.

• Proper harvest management of alfalfa can have a huge influence on yield, quality, and stand persistence.

Various outcomes can help measure the success of an alfalfa forage operation. Alfalfa producers may each place slightly different values on the outcomes of yield, quality, and stand longevity. However, yield is the factor which has the most influence on profitability. Whether an operation is harvesting 3 tons per acre or 6, the costs of land, machinery, and most other things stay the same. The ability to produce more per acre can therefore have a major influence on the bottom line.

Establishment of an Alfalfa Stand

Proper alfalfa stand establishment helps achieve the dense, healthy growth necessary to make alfalfa profitable. Several factors play a part in successful alfalfa stand establishment: field selection and fertility, alfalfa product selection, planting practices, and control of weeds, diseases, and insects.

Alfalfa grows best in a well-drained soil with adequate water-holding capacity. Alfalfa roots can provide good drought tolerance because of their ability to penetrate over 20 ft deep. An ideal location for alfalfa establishment should also be free of perennial weeds and herbicide carryover and be free of autotoxic compounds produced by a previous alfalfa crop. Alfalfa plants have a unique characteristic known as autotoxicity; they produce toxins that impair the development of new seedling root systems, thus limiting their uptake ability and increasing their susceptibility to other stresses. If alfalfa is to be planted into a field previously inhabited by alfalfa, a wait period should be observed to provide time for the toxins to move out of the root zone. It is recommended to grow a different crop for a year after terminating an alfalfa stand.

Another important component of stand establishment and early growth is proper fertility. In order to achieve high yield and quality, winterhardiness, and stand persistence, balanced nutrition is required. It is recommended to fertilize for high yield and not specifically for forage quality, as higher yield will help compensate for slight deduction in forage quality. Soil testing should be done prior to seeding in order to determine fertility needs for each particular field.

Liming is the primary fertility concern for alfalfa yield and quality. Liming to an appropriate soil pH of 6.5-6.9 helps to promote good plant growth and the Rhizobium bacterial function necessary for adequate nitrogen (N) fixation. Lime should be applied 12 or more months before seeding because it reacts very slowly to increase soil pH.

Phosphorus (P) and potassium (K) are also important fertility concerns. For each ton of alfalfa harvested, around 14 lbs phosphate (P₂O₅) and 58 lbs potash (K₂O) are removed from the soil. P is needed to encourage root growth and, while K has little influence on stand establishment, it is essential to stand survival and yield. Test for and apply both of these macronutrients before seeding. P should be broadcast and incorporated prior to planting; however, additional P needed for established stands can be broadcast because the fine alfalfa roots near the surface can access it. Application timing and method for K is similar to that of P.

N-fixing Rhizobium bacteria in plant nodules are responsible for producing a majority of the N needed by alfalfa. However, until N-fixing begins, alfalfa seedlings must rely on soil available N or a pre-plant application of 15-20 lbs/acre. Regardless of whether or not a field has supported alfalfa in the past, inoculation of alfalfa seed is beneficial in order to ensure adequate N production by nodules. If using preinoculated seed, make sure the seed was inoculated within the last 6 months.

Remember that yield and quality are influenced by both genetic and environmental factors — selection should not be made based on one desirable trait alone. The purchase of alfalfa seed should be seen as a multi-year investment; therefore, the decision should involve some planning. Some of the primary things to consider when choosing which alfalfa product to use:

• Yield potential – consider high-yielding products from a similar soil type and climate. Be sure to consult yield data that encompasses multiple years.

• Persistence – in northern areas, this depends on winterhardiness and in southern areas, disease resistance

• Winterhardiness – measure of the plant’s ability to survive winter without injury

• Fall dormancy – determined by how tall alfalfa grows in the month following a September 1 cutting. Choose less dormant alfalfa products that meet your winter survival requirement as these plants will green up earlier in the spring and recover more quickly between cuttings for higher season-long yields.

• Disease resistance – determine the potential for specific diseases on your farm: bacterial wilt, leaf and stem diseases, and crown rots. Knowing what has been a problem in the past will help you choose appropriate alfalfa products. Product resistance is the most important disease control because there are few economical options available once a disease has been confirmed in a field.
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- Insect resistance – some products can provide resistance to some aphids.\(^3\)
- Weed control – conventional alfalfa products have limited weed control options, which can hinder stand establishment and persistence. A Genuity® Roundup Ready® Alfalfa system gives farmers the advantage of broad-spectrum weed control and application flexibility with Roundup® brand agricultural herbicides.

Crucial decisions need to be made both before and at planting to help ensure the success of the alfalfa crop throughout successive seasons. In order to get the crop off to a good start, the seedbed should be free of perennial weeds, properly fertilized and prepared, and ready to plant during the ideal timeframe for the geography. Seed inoculation is recommended and should be completed prior to planting. A fungicide seed treatment such as metalaxyl should be considered to help protect plants from Pythium and Phytophthora.\(^2\) Diseases of alfalfa seedlings can be devastating and are more likely to be a problem in fields that have previously hosted alfalfa.

Maintaining a Stand for High Yields

In order to maintain a desired level of production, continued stand maintenance is necessary in the years following establishment. Fertility, harvest management, and weed, disease, and insect pest management are all factors to consider. Of these, harvest management can have a tremendous influence on alfalfa yield, quality, and stand persistence. Harvest management involves planning for the number of cuts per season, date of cut, stage of maturity, interval between cuts, and cutting height. An alfalfa field’s stage of maturity is linked to yield, quality, and persistence; therefore, it is often used to determine when to harvest alfalfa.

Obtaining high yields requires cutting at late-maturity stages, whereas cutting early maximizes quality; however, focusing on just one or the other can reduce stand persistence and shorten the life of the stand. In order to preserve the stand and permit it to reach its potential, some degree of balance is needed. The first two cuttings are critical for maximizing yield of high quality forage because forage quality changes rapidly during this time period and delays can reduce the quality. For high yield and high quality, the first cutting should be taken at bud stage; generally mid- to late-May in northern areas and earlier farther south.\(^2\) The second cutting should be taken 28-33 days after the first cut, or at mid-bud stage, whichever is earlier. After that, a subsequent cutting should take place 38-55 days later at 10-25% bloom.\(^2\) Letting the stand mature a bit longer before the third cutting can build up root reserves and boost stand persistence. These later cuttings may help maintain forage quality to later maturity stages.

Alfalfa stands need a break from harvest during the 6 to 8 weeks prior to the first killing frost in the fall. In northern areas, this timeframe is roughly the first of September through mid-October and later in more southern regions.\(^1\) This rest period permits plants to build adequate reserves of carbohydrates in the roots before the onset of winter. Cutting alfalfa plants during this rest period will not only reduce the speed of regrowth the next season, but can reduce the yield of the first cutting and can even cause stand thinning. Waiting and making a final cutting after the first hard freeze (24 °F or lower) will not hurt alfalfa and may help reduce pest problems.\(^4\) Minnesota researchers found that the highest yields came from three cuttings during the growing season with a late-fall cutting.\(^1\)

Farmers may be tempted to harvest alfalfa during the rest period if significant growth has occurred, but doing this would initiate regrowth and reduce root reserves during a critical time. If cutting during the fall rest period becomes necessary, there are a few things to consider. The risk of stand damage is somewhat reduced under the following conditions: in areas with less severe winters,\(^1\) if the stand is in bloom at the time of the fall cutting, it has been at least 45 days since the last harvest, and if the stand is old and at the end of its longevity.\(^4\) Conditions where a harvest during the fall rest period are especially risky include: stands less than one year old, stressed fields, fields with inadequate fertility, and where the alfalfa product does not carry multi-pest resistance.\(^4\) In general, it is better to cut an older stand as compared to a newer stand because an older stand has already had time to recover establishment costs. The decision to cut during the fall rest period is an individual one and should only be made after careful consideration of the risk factors as compared with the need for additional forage.

![Figure 1. Example cutting schedules for different management goals. Adapted from Alfalfa Management Guide, American Society of Agronomy.](image)

Sources


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