Kansas Rural Center
SUSTAINABLE AGRICULTURE
MANAGEMENT GUIDES

ALFALFA

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Alfalfa has been heralded as having the highest feeding value of all commonly grown hay crops, producing more protein per acre than any other crop for livestock (Duke and James, 1981). It is believed that alfalfa originated in southwestern Asia and was first cultivated in Persia. Spaniards introduced alfalfa to South America in the sixteenth century. In 1850, alfalfa was transported from Chile to San Francisco where it became established with irrigation ("How to Grow Alfalfa," 1922).

Soil Requirements

Alfalfa is a perennial legume that thrives on rich, friable, well-drained loamy soil with loose topsoil supplied with lime. Alfalfa will not tolerate waterlogging and acid soils. Good surface drainage is necessary for alfalfa to survive. The soil pH should be between 6.5 and 7.5. Generally, alfalfa and alfalfa/grass mixtures do not respond markedly to nitrogen fertilization, but it will respond well to phosphorus and potassium fertilization when needed. Adequate soil phosphorus levels are important for good germination. Alfalfa does not survive well on soils with an impervious subsoil, hardpan, or bedrock near the surface (Duke and James, 1981). Each ton of alfalfa hay removes 10 pounds of phosphorus and 60 pounds of potassium per acre.

Nitrogen Credits

Kansas State University research gives 100-140 pounds of nitrogen credits per acre for an 80% stand. This is reduced to 60-100 pounds per acre for a 60-80% stand. This was on older stands of alfalfa and little difference was observed between haying the last crop of alfalfa or plowing it under as green manure ("Using Legumes in Crop Rotations," 1988). In Pennsylvania research, nitrogen credits for a three-year stand were estimated to be 167 pounds per acre with the proportion nitrogen contributed each year to be 70% for the first year, 20% the second, and 10% the third year (Fox and Piekielek, 1988).

Soil moisture

Alfalfa roots can penetrate the soil 20-30 feet, allowing it to be very drought tolerant. Nebraska research showed that an alfalfa green manure plowdown resulted in a flush of early corn growth due to rapid mineralization of the organic matter. Such a rapid growth resulted in more water uptake by the corn plants. The risk of crop stress due to late season drought is subsequently increased (Walters, 1987).

Establishment

Alfalfa establishment is enhanced with a cultipacker-type seeder or grain drill that increases the soil-seed contact. Depending on soil types and moisture conditions, the seeding rate should be 8-15 pounds per acre in the spring or late summer at a depth of ½-¾ inches. The goal is to have 8-10 established plants per square foot. Generally the late summer planting will have less weed pressure but will be more prone to inadequate moisture conditions and winter kill. The seed should be inoculated with a proper strain of bacteria. Attempts to reseed patchy stands usually are not successful except in a newly seeded stand. It is best to rotate out of alfalfa with another crop before reseeding back to alfalfa ("Alfalfa Production Handbook," 1987). The risk of winter kill increased when alfalfa was planted into earlier plowed ground (Walters, 1987). Fresh seeds do not germinate as well as those two to three years old (Duke and James, 1981).

Research by Kansas State University in the first decade of this century found manure applied to wheat ground previous to the establishment of alfalfa doubled the alfalfa yield the first year of production and increased the yield by a third the second year. Manure was often a deciding factor in the success or failure of alfalfa establishment at that time ("Alfalfa in Kansas," 1914).

On fields with a hardpan subsoil, red clover can help prepare the soil for alfalfa establishment. Red clover is

more vigorous than young alfalfa. The clover roots will grow down into the hardpan under conditions that would kill young alfalfa. Decaying clover roots will improve drainage and furnish nitrogen for the following young alfalfa ("Growing Alfalfa in Kansas," 1902).

If a mixed stand of grass and alfalfa is desired, the inclusion of grasses should be delayed until the alfalfa is well established so that the alfalfa can establish a good deep root system (McKenzie, 1991). Orchard grass and meadow fescue are better suited for sowing with alfalfa than timothy, as they mature more simultaneously with it. It is advisable to avoid mowing a young stand of alfalfa till the alfalfa has reached bloom in order to protect the vitality of the young plants. Alfalfa also should not be closely grazed the first year in order to protect the stand ("How to Grow Alfalfa," 1922). Alfalfa tolerates rotational grazing, but weakens under continuous grazing. Precautions must be taken to prevent bloating when grazing alfalfa (Duke and James, 1981).

Alfalfa should have sufficient regrowth (8-12 inches of foliage) in the fall before dormancy to rebuild root reserves for the following year ("Alfalfa Production Handbook," 1987).

Soil Moisture Use

Alfalfa uses practically all the moisture available during its own growth. When other crops are planted on alfalfa sod, the stimulated growth early in the season and dry conditions of the subsoil can cause the crop to burn without sufficient rainfall. Research in 1907 showed alfalfa sod in January to have 17.1 inches of water within the top six feet of soil. Adjacent wheat and corn fields at the same time had 23 inches of water. This same difference in moisture between the crops held out through the year. The alfalfa ground had four to six inches less soil water than the other two crops. The alfalfa ground dipped to its lowest soil water levels of around 12 inches in May, October, and December of 1907 ("Alfalfa in Kansas," 1914).

Crop Rotation Management

Sorghums are usually the best crop to follow alfalfa, because of sorghum's drought-resistance, except in bottomland or in higher rainfall areas of Kansas. Sorghums do better in the second and third year following alfalfa, but corn may be a more profitable crop depending on the region of the state. Wheat or oats later in the rotation help prepare the seedbed again for alfalfa. A farmer can grow a crop of wheat or oats and establish a stand of alfalfa the same year according to research at Kansas State University in 1907 ("Growing Alfalfa in Kansas," 1914). During the first decade of this century, a recommended rotation using alfalfa was four years of alfalfa, three years of corn with manure application, and small grains before rotating back to alfalfa ("Alfalfa," 1908). Alfalfa was attributed to ranker wheat growth as long as 14 years after alfalfa was in the rotation ("Alfalfa," 1908). Modern tillage equipment and planters enable more satisfactory moisture conservation and stand establishment today to make such a rotation work even better.

Grazing

Cattle vary in their susceptibility to bloating on alfalfa. To reduce the chance of bloat, fill the animals with a dry roughage before moving them onto alfalfa. Move animals on a new paddock of alfalfa later in the day after all the morning dew is gone. Avoid grazing alfalfa covered with frost. To adjust the rumen to alfalfa, briefly introduce the animals to alfalfa by walking them around the paddock and pull them off within an hour. Observe for bloat and reintroduce the animals back to alfalfa. Maintain a close observation of the animals. Use temporary electric fencing to force graze the entire alfalfa plant in a short period of time. Mixing alfalfa with grasses will help prevent bloat. While expensive, bloat prevention dietary supplements can be purchased to prevent bloat.

Sheep are about as vulnerable to bloat grazing alfalfa as cattle. According to old Kansas State University Agricultural Experiment Station literature, lambs pastured on alfalfa had little danger of bloat and produced excellent gains. Swine grazed on alfalfa produced highly desirable carcasses with significantly less internal parasites ("Alfalfa," 1908).

Pests

Alfalfa weevil is a major insect pest in Kansas. An excellent KSU Cooperative Extension Service publication for cultural controls is "Alfalfa Weevil Management in Kansas: Non-chemical controls," MF 918, 1989.

Publications

Kansas State University Extension has a useful publication titled "Alfalfa Production Handbook," C-683, 1987. For information on diseases, see the North Central Regional Extension publication "Alfalfa Diseases in the Midwest," No. 184, 1984.

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CREDITS

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