

FERTILIZING ALFALFA FOR PROFIT

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Alfalfa has a high yield potential in relation to most other forages. However, this potential can only be realized on a long-term basis if the nutrient needs of the plant are adequately provided for. In addition, the ability of alfalfa plants to survive the heat and drought of summer and the cold of winter depends on an abundant supply of plant nutrients.

If alfalfa is harvested from a field as hay – which is true for most Kentucky grown alfalfa – large amounts of nutrients are removed along with it. For example, good quality alfalfa hay contains about 15 pounds of phosphate and 60 pounds of potash per ton. A good crop of alfalfa producing five tons of hay per acre would then remove 75 pounds of phosphate and 300 pounds of potash per acre. With a five year stand life, this adds up to a total removal of 375 pounds of phosphate and 1500 pounds of potash. The value of these nutrients at today's prices amounts to about \$320 total or \$12.80 per ton of hay.

This is the value of nutrients removed from the soil. Logically, these will need to be replaced at some time in the future in order to maintain long-term soil fertility. We do have some buffer capacity for nutrient supply in our soils. It is in the form of stored nutrients from prior fertilizer applications (in the case of phosphorus) and nutrients released from soil minerals (as is the case with potassium). Therefore, a more realistic approach to cost of fertilizer alfalfa fields may be to look at a “normal” fertilizer program. Based on my experience and the current UK soil test recommendations, a “normal” alfalfa fertility program for Kentucky would consist of 50 pounds of phosphate, 150 pounds of potash, one pound of boron and one ton of lime per acre per year to produce a five ton per acre yield. This would cost \$52.60 or \$10.52 per ton of alfalfa hay produced.

If it is available, manure can be used to supply much of the nutrients needed by an alfalfa crop. The ideal time to apply manure on alfalfa land would be to a corn crop in rotation between alfalfa stands. The corn crop would benefit from nitrogen in the manure and residue from the old alfalfa stand. It would also provide the break between alfalfa crops that is recommended to avoid autotoxicity problems and concerns with carryover of pest problems from one alfalfa stand to the next. Manures can be applied to existing stands of alfalfa as well. We discussed in more detail the potential for manure use on alfalfa at the 17th Kentucky Alfalfa Conference in 1997.

At this point, I want to calculate the value of nutrients available from manure and estimate how much the cost of fertilizing alfalfa over a five year period can be reduced through the use of manure. Based on average nutrient

content of manures as reported in UK Extension publication AGR-1 “Lime and Nutrient Recommendations”, a ton of fresh dairy cattle manure contains nine pounds of phosphate and 12 pounds of potash while broiler litter has 55 pounds of phosphate and 45 pounds of potash. The value of these nutrients as compared to fertilizer would be \$4.20 for dairy and \$21.70 for broiler manure. If 20 tons of dairy or five tons of broiler litter per acre were applied before planting a rotational corn crop (a rate that should supply the nitrogen needs of the corn crop), it would replace \$84 and \$108.50 worth of phosphate and potash fertilizer over the five year life of the alfalfa stand. If we add the value of nitrogen in manure to the corn crop and boron for the alfalfa, manure can be shown to be a valuable resource.

The response of alfalfa to proper soil fertility in terms of yields was discussed at the 20th Kentucky Alfalfa Conference in February, 2000. Certainly, good fertility is necessary to obtain economic yields of alfalfa. There are two consequences other than low yields that can occur if fertility needs are not taken care of. The first is the cost of reestablishment.

Establishing a stand of alfalfa is expensive – averaging about \$250 per acre. Only about \$75 of this cost is fertility related. A stand failure related to low soil pH or low phosphorus – the most common causes – represents a cash loss of at least \$200 per acre. There is also a loss of production for at least one growing season. It is obviously too much to risk in order to save a few dollars on lime and fertilizer. That is why our recommendations stress the need to take care of soil fertility needs well in advance of seeding alfalfa.

Another potential consequence if fertility needs of the crop are not adequately met is early stand failure. The ability of alfalfa plants to resist stresses such as drought, cold injury, insects and diseases depends on an adequate supply of plant nutrients. Stand life can easily be reduced one or two years if fertility needs are not met. If establishment costs are spread out over five years of a stand producing five tons per acre, they amount to about \$50 per acre per year or \$10 per ton of alfalfa. If the stand only lasts four years and yields are reduced to four tons per acre, annual establishment costs become \$62.50 per acre and \$15.60 per ton of alfalfa produced.

Hopefully, these comparisons illustrate how important lime and fertilizer are to producing alfalfa for profit. Planning for alfalfa establishment should start a year ahead of seeding time with a soil test to assess lime and fertilizer needs. This will allow adequate time to get soil pH and fertility where it needs to be before seed is placed in the ground.