## **Fundamentals of Profitable Forage Production**

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Tith cuttings complete and fieldwork wrapped up, winter is a great time to review what worked and what didn't on your alfalfa acres so you can make changes and tweak plans for next season. Every year there are new challenges, and this year offered plenty of new management opportunities. Let's review some agronomic fundamentals to help you stay on track to meet or exceed your production goals and make confident planning decisions.

Soil testing. Soil variation within a field can be significant. Regular testing provides a detailed nutrient inventory. Accurate tests allow you to see specific needs throughout a field to ensure fertilizer will be applied where needed. For the most accurate placement, consider using variable-rate technology for fertilizer and lime applications.

When conducting a soil test, it's important to know your goals for the crop and crop removal rates. Below are some benchmarks for good alfalfa field fertility. Keep in mind, excessive fertility may not show any yield response.

pH: 6.8-7.2 Phosphorus (P): 15-20 ppm Potassium (K): 150-200 ppm Boron (B): 1-2 lbs/ac annually Sulfur (S): 20-30 lbs/ac annually Table 1. Alfalfa legume credits.

Stand Density	<b>Regrowth After Last Cutting</b>			
	Medium/Fine Soils		Sandy Soils	
	>8"	<8"	>8"	<8"
	Ibs N/ac			
Good, >4 plants/ft <sup>2</sup>	180	150	140	100
Fair, 1.5-4 plants/ft <sup>2</sup>	160	120	110	700
Poor, <1.5 plants/ft <sup>2</sup>	130	90	80	40

Table 2. Pounds of nutrient removed

DM Removed

(lbs/ton)

6

14

48

58

30

6

6

0.08

0.12

0.33

0.05

0.01

0.002

per ton of alfalfa produced, DM basis.

Source: UWEX, Dan Undersander, Agronomy 2005.

Nutrient

Phosphorus (P)

Potassium (K)

Calcium (Ca)

Sulfur (S)

Boron (B)

Iron (Fe)

Zinc (Zn)

Copper (Cu)

Potash (K<sub>2</sub>0)

Magnesium (Mg)

Manganese (Mn)

Molybdenum (Mo)

Source: Alfalfa Management Guide by American Society of Agronomy.

Phosphate (P<sub>2</sub>O<sub>5</sub>)

Fall applications of K, P, and S. Fall is a perfect time to "winterize and fertilize" your alfalfa. Fall applications of K, P, and S are important for high yield and high quality. First-crop alfalfa growth is often difficult to fertilize during wet soil in the spring, and wheel tracks can cause stand damage. Plus, fertilizer prices will likely be higher in spring.

Manure applied prior to alfalfa seeding is an excellent supplement to fertilizer. It provides several recycled nutrients, especially P. While manure can be a good long-term P source, it does not provide adequate K long term for high-yield alfalfa. K must be replaced at a rate of 50 lbs/ton of dry matter (DM) harvested. Manure on established alfalfa often reduces yield and is not recommended.

Sulfur should be applied in the fall as gypsum or elemental S at a rate of 5-6 lbs/ton of expected forage yield. It is one of the most important nutrients alfalfa needs to make protein.

Lime. Ideally, lime should be applied one year before seeding alfalfa, and fall is a great time to apply it. Using lime to neutralize pH levels helps ensure higher rhizobium activity, more nutrient availability, and higher alfalfa yields.

Nitrogen (N). Including alfalfa in your crop rotations allows you to "grow" your own N. Aside from producing several years and tons of forage, alfalfa leaves a substantial amount of N in the soil when fields are rotated to another crop. The second year following an alfalfa crop can supply up to an additional 40-50 units of N. Alfalfa must be established for at least two years to produce the N credits. If you do the math, the N from alfalfa in rotation is worth big money. Depending on costs next year, N could exceed \$1.00/unit in 2022, so even a modest credit from alfalfa could equate to \$100/ac N credit from alfalfa. No other legume crop comes close to producing and leaving this much "salvage value" behind for following crops like corn or wheat.

Replace nutrients based on actual yield. Along with soil testing, know your actual alfalfa yield and replace the nutrients at crop removal rate.

Comparing the ratio of fertilizer prices to the cost of purchased DM is also important. Purchased hay, corn, or soybean meal is expensive. Likewise, fixed costs like land, machinery, and labor are expensive and remain the same regardless of yield. Cutting back on fertility will only cause yield reductions. Stay focused – start with good soil tests and develop a plan for applying the right amount of fertilizer.

As spring nears, pay attention to insect and disease pressure early so you have time to respond and can better protect yields you've worked so hard to produce. Growing a successful alfalfa crop requires careful management, but if you follow these guidelines, you'll be on a strong track for success in 2022.

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