

An Alfalfa Management Program for Optimum Yields and Quality

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Research in Maryland is showing that alfalfa responds to precision management. Reaching higher yield goals requires a commitment to alfalfa management for 12 months of the year.

ALFALFA is well adapted to a wide range of climatic and soil conditions throughout Maryland. Today, average yields across the state are in the range of 3 to 4 tons/A. Yields double or triple these average values are consistently produced in research trials and by top growers.

The genetic potential for high yields is found in many of the available varieties. (Table 1).

Generally, alfalfa producers are aware of the many management decisions which must be considered in growing alfalfa. Producer meetings, farm magazines, dealer contacts, and the Maryland Cooperative Extension Service are main sources of information. But the producer's ability to package this information into a high yielding system specific for Maryland conditions frequently needs to be improved.

The four most common limiting factors in Maryland alfalfa production are:

| Management Factor | Most Common Error |
|--------------------------|---|
| Fertilization practices | Underestimate potassium (K) requirements. |
| Harvest schedule | Late first cut. |
| Insect control | Not scouting and controlling leaf-hopper. |
| Timeliness | Not planning ahead to assure precision. |

Fertilization Practices

The success or failure of high yield alfalfa depends to a large extent on fertilizer management. Alfalfa fertility research in Maryland over the past 6 to 8 years has confirmed the need to increase fertilizer rates over the practices being used by most producers in the state. Typical fertilizer practices today are to top-dress alfalfa annually with 100 to 200 lb/A K_2O . Considering average K_2O removal is 65 lb/ton, more for 8 to 10 ton yields, it follows that average alfalfa yields in Maryland correspond to typical fertilization practices—many farmers are only fertilizing for 3 to 4 ton yields. This

Table 1. Maryland alfalfa variety trial yield summary, 6-year average (1984-1989).

| Location | Yield, tons/A (12% moisture) | | | Number of varieties in test |
|-----------------------------|-------------------------------------|------------------------------|----------------------|------------------------------------|
| | Top five varieties | Bottom five varieties | All varieties | |
| Forage Research Farm | 9.0 | 7.8 | 8.5 | 31 |
| Wye Research Center | 8.5 | 7.6 | 8.1 | 18 |

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Table 2. Alfalfa and alfalfa-grass mixtures respond to fertilizer treatments in Maryland (4-year avg. yields).

| Total lb/A applied, 4-years | | Yield, tons/A (12% moisture) | | | |
|-------------------------------|------------------|------------------------------|----------------------|-----------------|----------------|
| P ₂ O ₅ | K ₂ O | Alfalfa alone | Alfalfa/orchardgrass | Alfalfa/timothy | Alfalfa/fescue |
| 60 | 460 | 6.3 | 6.3 | 7.0 | 7.2 |
| 80 | 1,087 | 7.6 | 8.2 | 8.0 | 8.0 |
| 243 | 2,197 | 8.6 | 9.0 | 8.8 | 9.8 |

Soil test levels: P₂O₅ = high; K₂O = med-high, at seeding.

Table 3. The relationship between K₂O applied and removed for a high yield alfalfa/orchardgrass mixture (4-year totals).

| | Soil fertility levels | | |
|---|-----------------------|--------|---------|
| | Lowest | Medium | Highest |
| Total 4-year yields, tons/A | 25.2 | 32.8 | 36.0 |
| K ₂ O, lb/ton removed ¹ | 55 | 60 | 65 |
| K ₂ O removed, lb/A ¹ | 1,386 | 1,968 | 2,340 |
| K ₂ O applied, total lb/A | 460 | 1,087 | 2,197 |
| K ₂ O drawdown, lb/A | 926 | 881 | 143 |
| K soil test: | | | |
| Fall 1984 (establishment year) | 131 | 236 | 433 |
| Spring 1990 (final harvest 1989) | 52 | 114 | 450+ |

¹Estimated from past research and Pennsylvania Alfalfa Growers Program.

high fertility demand of alfalfa was confirmed in a study completed in 1990. Four-year average yields are shown for pure alfalfa and three alfalfa-grass mixtures grown at three fertility levels (Table 2).

The amount of K₂O removed by the alfalfa-grass mixtures was estimated in this study. Table 3 shows the tremendous soil K drawdown associated with alfalfa production. One reason that relatively good yields were maintained at the lower K₂O application rates is the high K release characteristics of this soil as indicated by soil test trends.

Maryland recommendations call for alfalfa to be grown in rotation. The benefits of maintaining alfalfa in a rotation with corn, especially when it is managed for top production, is shown in Table 4. No nitrogen (N), phosphorus (P) or K fertilizers were applied in this study during a 5th-year of forage harvest or to the following corn crop. The yield and economic benefits from the tremendous N carry-over and for maintaining high P and K fertility are apparent. Assuming a pound of N for a bushel of corn, the amount of N supplied by the previous alfalfa was over 190 lb/A from the high fertility plots. This

is a higher figure than is usually credited for alfalfa in fertilizer recommendations for corn and represents an additional economic advantage of managing alfalfa for optimum production.

Table 4. Alfalfa and fertility residual effects on corn yields.

| Fertility level | Alfalfa alone | Alfalfa/orchardgrass | Alfalfa/timothy | Alfalfa/fescue |
|-----------------|------------------|----------------------|-----------------|----------------|
| | ----- bu/A ----- | | | |
| Highest | 193 | 194 | 183 | 179 |
| Medium | 197 | 173 | 176 | 174 |
| Lowest | 136 | 132 | 141 | 131 |

Based on these research results, a recommended alfalfa soil fertility program for yield potential of 8 to 10 tons/A in Maryland is:

- Soil test: Apply lime 12 to 18 months in advance of seeding so that soil pH is 6.8 to 7.0 at seeding. Soil test regularly throughout the life of the stand and maintain soil pH at 6.5 to 7.0.
- Broadcast P and K to bring soil test levels into the high range for the crop preceding alfalfa in rotation.
- Apply 15 lb P₂O₅, 65 lb K₂O, and 0.5 lb boron per ton of expected hay yield.

- Split topdressing applications, with half applied after the first harvest in May and half applied after the 4th harvest in August or early September.
- Monitor the fertilizer program with soil and plant analyses each year. Keep alert for possible sulphur (S) deficiencies.

Harvest Schedule

The date of first harvest sets the stage for the rest of the growing season. For top yields and quality, the first harvest of established alfalfa should be finished by May 20 in most areas of Maryland (Table 5). This means starting the first harvest at the early bud stage. Subsequent harvests should be approximately every 32 to 35 days. The last harvest period should be longer to allow food reserves to be stored in roots and crowns for nourishment of the plant over winter and a vigorous regrowth the next spring. Many of the alfalfa varieties available today can persist with a 5-cut system and produce 8 to 10 tons/A over the life of the stand, providing they are well-fertilized and protected from insect damage.

Maryland Alfalfa Management Project

To help Maryland alfalfa producers adopt management skills necessary for top alfalfa yields and quality, an Alfalfa Management Project is being initiated in Garrett County in western Maryland. There is no better way to get growers to accept a new management practice than to show them how it works on their own

farms. Encouraging a respected local farmer to successfully use a new practice is a good way to get it adopted in the community. These two observations are basic to the formation of this first Alfalfa Management Project. The Project will provide a forum for a small group (20 members) of growers to meet periodically to learn precision alfalfa management from specialists, to put these practices into use on their own farms, and to learn from each other about the challenges of growing higher yielding, better quality, and more profitable alfalfa. Primary benefits to the project members are the personal satisfaction gained from being a better alfalfa producer...and the higher profitability of better yields and better quality.

Maryland Alfalfa Management Calendar

To help overcome a major limiting factor in good alfalfa production (planning ahead or timeliness), a 12-month Alfalfa Management Calendar has been developed for use with the Garrett County Alfalfa Management Project. This Calendar alerts farmers to the management decisions and actions which must be taken each month for both new seedings and established stands. The Calendar details the recommended production practice, or gives reference where the recommendation can be found. The Calendar will be updated each year to reflect new recommendations and Alfalfa Management Project activities for that year. An abbreviated August Calendar is shown as an example. ■

Table 5. Harvest schedule for established alfalfa-orchardgrass stands in Maryland.

| Harvest number | Harvest dates, Piedmont and Coastal Plain | Days to next harvest | Harvest dates, Mountains | Days to next harvest |
|----------------|---|----------------------|--------------------------|----------------------|
| 1st | May 5 to May 20 | 35 | May 15 to May 30 | 42 |
| 2nd | Jun 9 to Jun 24 | 35 | Jun 26 to Jul 11 | 42 |
| 3rd | Jul 14 to Jul 29 | 35 | Aug 7 to Aug 22 | 64+ to 54+ |
| 4th | Aug 18 to Sep 2 | 63+ to 48+ | After Oct 10-15 | |
| 5th | After Oct 20 | | | |