

Alfalfa: Established Stand Management

Proper fertilization and cutting is necessary to maintain high yields and long-lived stands of alfalfa.

Fertilization

High levels of phosphorus and potassium must be maintained in the soil for high crop yields and long-lived alfalfa stands. Determine lime and fertilizer needs by soil test. High alfalfa yields can reduce plant nutrient levels in soil rapidly. Thus, for top production and stand persistence, annual soil testing is recommended.

When a soil test indicates the need for fertilizer, topdress after first and/or last cutting. Split applications, one-half in the fall and one-half after the first cutting, may result in more efficient use of fertilizer, especially potash. Recent research suggests that, based on nutrient removal, a 0-1-4 ratio of N-P₂O₅-K₂O is best when high yields are anticipated. If the soil test shows 1 part per million (ppm) or less of boron (B), or if plant tissue has 25 ppm or less B, then topdress with a fertilizer containing at least 2 pounds of B per acre.

At present, no evidence indicates a general need for other fertilizer nutrients. Recent research does suggest that in certain isolated cases small responses from sulfur may be obtained.

A soil test is the best guide to alfalfa fertilization. In the absence of a soil test, refer to the typical plant nutrient recommendations listed in [Table: "Nitrogen Recommendations for Agronomic Crops"](#). For more information about forage fertilization, refer to the Agronomy Facts series *Soil Fertility for Forages* ([31A, Pre-Establishment](#); [31B, Establishment](#); and [31C, Maintenance](#)) available from your local Penn State Cooperative Extension office.

Cutting Management

Cutting management is an important tool in achieving high quality, high yields, and stand persistence. It also can be effective in reducing the impact of weed, insect, and disease pests.

Harvest schedules depend somewhat on the quality goals of the producer. Progressive dairy farmers have recognized the economic importance of producing high-quality forage, and often cut early in order to obtain greater than 20 percent crude protein, less than 30 percent acid detergent fiber, and less than 40 percent neutral detergent fiber. Such high-quality forage has the potential to increase forage dry matter intake and milk production while decreasing the requirement for grain (Table: "Chemical composition of legumes and legume-grass mixtures at advancing stages of maturity").

Table: Chemical composition of legumes and legume-grass mixtures at advancing stages of maturity.

Brief description	Chemical composition			
	DM basis (percent)			Relative feed value
	CP	ADF	NDF	
CP = crude protein, ADF = acid detergent fiber, NDF = neutral detergent fiber				
Legume, prebloom	>19	<31	<40	>151
Legume, early bloom <20% grass, vegetative	17–19	31–35	40–46	125–151
Legume, mid-bloom <30% grass, early head	14–16	36–40	47–53	103–124
Legume, full bloom <40% grass, head	11–13	41–42	54–60	87–102

Brief description	Chemical composition			
	DM basis (percent)			Relative feed value
	CP	ADF	NDF	
Legume, full bloom <50% grass, head	8–10	43–45	61–65	75–86
Mostly grass, head	<8	>45	>61	<75

For additional information, refer to [*Agronomy Facts 30: Forage Quality in Perspective*](#), and [*Agronomy Facts 44: Forage Quality Testing: Why, How, and Where?*](#) available from your local Penn State Cooperative Extension office.

For high-quality alfalfa, make the first cutting at mid- to full-bud stage, *as long as*

- better adapted varieties with multiple pest resistance have been used,
- adequate levels of lime, phosphorus, and potassium have been maintained, and
- insect pests have been monitored and controlled.

Cutting pre- or early bud alfalfa is not recommended because there is a higher risk of losing the stand. Also, fiber levels may be undesirably low when alfalfa is cut extremely early. If an alfalfa stand has been weakened by winter stress, make the first cutting at early to midbloom. For a description of forage growth stages, refer to Table: "Developmental stages of legumes and grasses".

Table: Developmental stages of legumes and grasses.

Stage of maturity	Definition*
*Randomly select 100 stems from the field and determine the percentage of stems at the most mature stage of development.	
Legumes	
Late vegetative	No visible buds, flowers, or seed pods. Stem at least 12 inches tall.
Early bud	Visible flower buds on at least one stem (1%).
Mid-bud	50% of the stems have at least one bud.
Late bud	75% of the stems have at least one bud, no visible flowers.
First bloom	Flowers on at least one stem (1%).
1/10 bloom	10% of the stems have at least one flower.
Mid-bloom	50% of the stems have at least one flower.
Full bloom	75% of the stems have at least one flower, no visible seed pods.
Grasses	
Vegetative	Leaves only, stems not elongated (specify height).
Stem elongation	Stems elongating. Specify early or late jointing.
Boot	Flower head is enclosed in flag leaf sheath and not showing.
Heading	Flower head emerging or emerged from flag leaf sheath but not shedding pollen.
Anthesis	Flowering stage, anthers shedding pollen.
Milk stage	Seed immature, endosperm milky.
Dough stage	Well-developed seed, endosperm doughy.
Ripe seed	Seed ripe, leaves green to yellow brown.

Generally, summer cuttings are permitted to reach early bloom (approximately 35 days between cuttings). In Pennsylvania, the average cutting intervals between first and second cuts and second and third cuts, for producers who make four or more cuts per year, are 37 and 33 days, respectively.

In the past, it has been recommended that producers avoid cutting alfalfa during the critical 6-week period prior to the average hard frost date (generally between early September and mid-October). This still should be considered if the stand is weak from factors such as low soil fertility, disease, or extreme climatic conditions (such as water-

saturated soils). More recently, however, it has been recognized that alfalfa can be cut even during this critical period *as long as*

- better adapted varieties with multiple pest resistance have been used,
- adequate levels of lime, phosphorus, and potassium have been maintained, and
- there are at least 45 days of regrowth before cutting.

If harvests are delayed until mid-October, leave a 4- to 6-inch stubble to protect the crown and to catch snow for added insulation over winter.

Harvest schedules for alfalfa-grass mixtures should be based on the growth stage of the alfalfa as it relates to the species of grass used in the mix. Because orchardgrass, perennial ryegrass, reed canarygrass, and tall fescue can tolerate more frequent cuttings without jeopardizing the grass stand, they may be harvested along with alfalfa that is cut four or more times per year.

Stands of timothy or smooth bromegrass mixed with alfalfa should not be cut until the grass is in the early head-emergence stage, and cannot tolerate frequently cut alfalfa; therefore, they are more compatible with less intensely managed alfalfa (three cuts or less per year). For information on alfalfa for pasture, see "[Pastures](#)." For additional information, refer to [Agronomy Facts 7: Cutting Management of Alfalfa, Red Clover, and Birdsfoot Trefoil](#), available from your local Penn State Cooperative Extension office.

Reference: The Agronomy Guide - Section 8: Forages
Table 1.8-1 and Table 1.8-2 from the Agronomy Guide