

Effect of Drought on Alfalfa and Managing for Next Growing Season

Dr. Dan Undersander, Agronomy, University of Wisconsin

Drought can significantly reduce alfalfa yield. Timing of drought can be critical. First cutting may be reduced in the case of a dry March. Alfalfa root systems die back to some extent over winter. The root system requires good soil moisture in the early spring to regrow. If a strong root system forms then high yields will occur on first cutting. If the root system growth is restricted by dry soil, then the top growth will be reduced, even if good rain occurs in the later part of the first cutting growth period (during April and May).

Dry periods during summer reduce alfalfa growth. Severe drought may affect entire fields while lesser drought stress creates some field areas of very short alfalfa with some areas of better growth due to subsoils with higher water hold capacity. Our recommendation is to harvest what is economic and to leave very short field or short portions of fields.

Moisture stress has the following effects on the alfalfa plant:

- Cell enlargement is inhibited.
- The number of basal buds and the number of shoots or stems/plant is reduced when moisture stress occurs in the first 14 days after a harvest.
- The stem internode length is reduced; thus, the flowering is seen at reduced plant height.
- Leaf area/leaf size and leaf growth rate is reduced, although to a lesser degree than stem growth. Therefore, leaf to stem ratio is higher under moisture stress.
- Stem nitrogen percentage is increased while leaf nitrogen percentage is decreased, therefore whole plant nitrogen (CP) may be reduced though effect varies with severity/timing of moisture stress.
- NDF is generally decreased, though effect varies with severity/timing of moisture stress.

Thus, forage from drought stress fields is often lower yielding but of higher forage quality. This is the opposite of drought stressed grass fields.

Recommendations for managing drought stress alfalfa during growing season:

1. Established stands

- If stand is over 10 inches tall and flowering, harvest if economic to do so.** Moisture stressed alfalfa should be mowed at the normal cutting height. There is no advantage to raising the cutting height. Alfalfa can regrow from axillary buds on the stubble but these shoots are smaller and produce lower yield than stems growing from the crown buds. Since quality is not declining as rapidly with advancing maturity as under normal growing conditions, let the plants approach 100% bloom before harvest to allow the plant to build nonstructural carbohydrate reserves. You can harvest only the taller portion of disuniform fields.
- If stand is 10 inches or less tall and flowering, do not cut.** Let regrowth come through existing growth. Mowing will not increase regrowth.
- Make sure that soil fertility is at optimum levels.
- Scout and control potato leaf hopper, army worm and other insects.

2. **New seedlings should not be harvested during drought stress** but an early season cutting, when moisture was adequate could often be taken. New seedlings may also be harvested in late fall if adequate growth is present to harvest. The key is to time fall harvests so that alfalfa either has no regrowth or more than 8 inches of regrowth at frost.

New seedlings may have had poorer stands if a dry period followed seeding. Further, these plants may not have developed as extensive root systems as fields that were seeded and had adequate moisture. The result of the reduced root systems will be reduced yield from these new seeding in the following year.

The higher than average temperatures, often accompanying drought, result in increased water need, earlier flowering and lower than average fiber digestibility. In addition, fields with *Aphanomyces* which reduces root growth, suffer more yield loss due to the drought than healthy stands.

The drought in late summer and early fall certainly reduces the carbohydrates stored in the roots for winter survival and spring growth. Whether this will be significant will depends on the winter: if the stands encounter warm periods so that they begin to green up and are frozen back, this pattern will be more detrimental than if plants are healthy. Thus, good snow cover will minimize the weak stand effects and a warm, open winter will exacerbate the weakness of the stands.

Dry soils going into the winter enhance alfalfa survival since dry soils insulate the crown better from air temperatures and result in less disease in the alfalfa roots.

One the other hand, we need to hope that soil moisture increases by March so that good root growth and high yields can occur in the following growing season.

Many farmers will need forage early in the following year. The best recommendations to get both early season yield and high total season yield are:

- Evaluate alfalfa stands and replant if necessary for top yield
- Plant alfalfa with oat or ryegrass cover crop to increase early season yield
- Prepare to fertilize alfalfa after first cutting (in early spring if potassium and sulfur are low).
- Maximize pasture use.
 - Fertilize
 - Allocate forage (small paddocks).