

Managing Frost Damage in Kentucky's Alfalfa Stands

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First, it is important to understand that determining the temperature that alfalfa stands were exposed to during a frost event is less than exact science. Air temperature reported by local news stations likely use data logged at a weather station that was installed according to National Weather Service guidelines. These guidelines state that sensors should be installed on level terrain, away from paved or concrete surfaces and upright structures, four to six feet above the soil surface, and in a radiation shield. Most pastures and hayfields do not meet these criteria. In fact, most alfalfa plants never reach a height of four to six feet. In contrast, the height of alfalfa exposed to spring frosts is likely to be in the six to 10 inch range. In addition, conditions at the soil surface in a vegetated field can be quite different compared to the air temperature at five feet above the soil. Couple all this with variations in topography and you can have many "microclimates" within a single field.

In the real world there is considerable variability in everything that we work with. So please interpret the following information with the realization that the temperatures that alfalfa plants were exposed to within a single field can vary greatly. In the remainder of this article we will discuss the impact of light, moderate, and heavy frost on spring growth of alfalfa stands in the Commonwealth.

Established Alfalfa Stands

Light Frost: temperatures that the alfalfa plant experienced were in the range of 27 to 31° F. Alfalfa leaves may be impacted when temperatures drop below 28° F. This will present itself as the loss of some trifoliolate leaves and twisting of stem ends near the top of the canopy. In this temperature range, alfalfa buds and growing points will not likely be damaged and will continue to grow as normal. Alfalfa will normally outgrow this damage and no changes in management practices are warranted.

Moderate frost: temperatures that the alfalfa plant experienced were in the range of 26 to 27° F. Freezing causes significant injury in the terminal growing point near the end of the stem, however the entire stem is not killed. Axillary buds at each leaf position lower on the stem and crown buds will begin to develop into new stems. Stems lower in the canopy that were not impacted by the frost will continue to grow normally. The net result is a mixture of mature and vegetative growth that can make harvest decisions difficult. If high quality forage is the number one priority, then harvest based on the maturity of the undamaged stems. If a lower feed quality can be tolerated, then you may want to delay harvest for a week or so to allow maximum accumulation of carbohydrates in the taproot. It is important to avoid cutting moderately frosted alfalfa early. This decreases both yield and regrowth rate of the stand due to the stress of early cutting.

Severe frost: temperatures that the alfalfa plant experienced were below 26° F. Stems that were growing at the time of the frost will not regrow. Regrowth will come from crown buds at the base of the plant. Alfalfa stands with sufficient growth to justify harvest should be cut immediately after the severe frost. This will help to maintain forage quality and allow regrowth to occur from the crown buds. If stands do not have enough growth to warrant harvest, frost damaged plant material can be left in place. However, leaving damaged or killed plant material in place may delay regrowth. If alfalfa fields are fenced, frost damaged plants could be grazed off. However, grazing should be carefully managed to reduce the chance of bloat. Waiting for frosted alfalfa to begin to dry will significantly reduce the

chances of bloat. Animals should never be turned into alfalfa hungry and should have free access to a high quality dry hay at all times. Flash grazing damaged stands with a high livestock density for a short period of time is highly recommended. Since severe frost has the same effect on the alfalfa plant as early harvest, regrowth will likely be slower. If possible delay the second harvest a week or so to allow the plant to recover its stored carbohydrates.

New Alfalfa Seedlings

Immediately after emergence, alfalfa seedlings have fair to good tolerance to cold injury. However, once they reach the 2nd trifoliate leaf stage, tolerance to cold injury decreases markedly. Four or more hours of exposure to 26° F can kill seedlings at this growth stage. Before reseeding, the extent of damage in new stands should be assessed. Normally alfalfa is seeded at rates much higher than the final stand density needed for optimal yields. This results in a high initial number of seedlings per unit area. During establishment and the first growing season alfalfa stands self-thin. The ideal stand density at the end of the first production year is 12-20 plants per square foot. If this number of healthy seedling per square foot is present following frost damage, then no reseeding is needed. If stands do not consistently have 12-20 healthy plants per square foot, then thickening stands with a no-till seeding may be the best option. In most cases, seeding rates in the range of 10-12 lb/A should be sufficient for thickening frost damaged stands.

For a more information on alfalfa and forage management, contact your local extension agent or visit <http://www.uky.edu/Ag/Forage/>.

The following sources were used in the preparation of this article:

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