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Frost injury to alfalfa

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Frost injury to alfalfa

Abstract

The questions of frost injury on alfalfa (and other forage species) normally come in the fall, with the first or second frost of the fall/winter. What about the impacts of a late spring frost? Low temperatures, whether visible frost is present or not, will influence the growth of established forage plants as well as newly emerged seedlings.

Keywords

Agronomy

Disciplines

Agricultural Science | Agriculture | Agronomy and Crop Sciences | Meteorology

INTEGRATED CROP MANAGEMENT

A photograph of a person in a field, possibly a farmer or researcher, with large, stylized text overlaid. The text reads 'INTEGRATED CROP MANAGEMENT'. The background shows a field of crops, likely alfalfa, with a person visible in the distance.

Frost injury to alfalfa

The questions of frost injury on alfalfa (and other forage species) normally come in the fall, with the first or second frost of the fall/winter. What about the impacts of a late spring frost? Low temperatures, whether visible frost is present or not, will influence the growth of established forage plants as well as newly emerged seedlings.

To complicate the discussion, the temperatures are not uniform in and around the forage plants. Air temperature, a few feet above a bare or grass-covered soil surface, is what is measured and reported. Plant tissue temperature is influenced by leaf surface color, density of plant canopy, air movement within the canopy, the temperature of the soil, and likely more subtle conditions. The air within the forage canopy is likely 'layered', meaning the temperature at the top of the canopy is colder than the temperature at the soil surface. So simple statements about the influence of the reported temperature are misleading.

Established Stands

Well established forage plants have lost their winter cold hardiness by now. They are susceptible to cold temperature injury. Several hours of 24 to 25°F will damage leaf tissue and may seriously damage buds and growing points. Plants experiencing cold temperatures of 28 to 30°F may look wilted for a few hours. Alfalfa plants experiencing this 'light frost' often show frost damage on one to several sets of trifoliate leaves that were exposed at the top of the canopy. The buds and growing stem tips are more protected and normally continue to grow as usual.

New Forage Seedlings

At emergence, alfalfa and most winter hardy forage grass and legume seedlings are extremely tolerant to cold. But, frost can hurt new seedlings too. I tend to agree with the article from Oregon that states: "For alfalfa, at second trifoliate leaf stage (and older) seedlings become more susceptible to cold injury and may be killed by four or more hours at 26°F or lower temperatures. Alfalfa seeded with a companion crop survives lower temperatures and longer exposure times before showing frost damage."

Where does that leave us? There will likely be permanent damage at tissue temperatures lower than 25 to 26°F for several hours but, uncertainty for both established stands and new seedlings in the 27 to 32°F range. Slope position, soil temperature, companion crop of oats, wind, all will influence what has occurred in a particular field or part of a field.

Management Suggestions

The only management suggestion at the moment is to wait a week or so to see what the damage is. The 'light frost' damage assessment and management recommendations are the toughest to make.

If new seedlings were permanently damaged, consider re-seeding as soon as possible. Keep the good areas and drill into thin or damaged areas. Tillage may not be necessary. If you think that a cereal grain companion crop, still present, will be too competitive or will impede the reseeded, then tillage may be required.

If frost injury to established stands was 'light', only affecting a few trifoliate leaf clusters, and the stem tips are recovering normally, follow your normal harvest plans. If the stem tips are permanently damaged, you have two choices: let the plant produce more branches and harvest a week or so later than normal, now relative to the development of the new branches; or harvest the damaged plants a few weeks earlier, with the understanding that it will be a physiological stress to the plant. These early cut plants will likely recover more slowly than normally, and should be given an extra week or two during one of the early summer regrowth cycles, to recover their physiological vigor.

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