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Technical Bulletin

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Alfalfa Winter Injury

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For much of the Midwest, this has been one of the coldest winters in several decades. Chicago hasn't seen a winter this frigid in the past 30 years, and ranks as the 8th coldest average winter temperature since 1871. They have also recorded nearly 60 inches of snow through the first week of February. Fortunately, spring is less than a month away and temperatures warmed up to levels above freezing over the past week. As we start preparing for spring planting, there have been concerns about the potential for winter injury to alfalfa stands. This technical bulletin will review the current situation, discuss steps to evaluate your stands this spring and provide management suggestions for damaged stands.

Last winter, over a million acres of alfalfa were impacted by winterkill. Several environmental factors were attributed to stressing the plants and causing damage to these stands:

- Fall dormancy is a critical part in preparing alfalfa plants for winter survival. Fall 2012 was very dry and winter came early, which may have prevented accumulation of adequate root reserves for winter conditions that lasted into May.
- Snow cover is an excellent insulator and can protect alfalfa from drastic temperature fluctuations that can injure the crown if too cold. There were periods during last winter without snow cover that exposed plants to critical temperature levels.
- Snow melting along with rainfall last January and February resulted in ice sheeting directly on the soil and alfalfa crowns. Ice sheeting can smother the plant and increases the risk of injury the longer it is covered.

So far, this winter has presented a different set of circumstances to evaluate:

- While air temperatures have been extremely cold, most of the Midwest has maintained snow cover during most of the extreme cold spells. Six inches or more is preferred but as little as four inches of snow can contribute to a 10-15°F difference in temperature. The crown is also insulated by the soil, so the critical temperature is at 2-4 inches below the soil surface. At this level, Dr. Dan Undersander from the University of Wisconsin shows temperatures still in the 26-28°F, well above the area of concern.
- Unless located in an area that has not had snow cover, ice sheeting does not appear to be an issue at this time. Most of the ice has remained on top of the snow up to this point and has not affected the alfalfa crown and roots.
- Currently we shouldn't expect the amount of winterkill experienced last year; however several environmental and management factors play critical roles in the plants ability to survive through the winter. Older stands are more likely to sustain winter injury than newer stands. Varieties with high winter hardiness and disease resistance ratings are less likely to experience winter injury. Maintaining recommended soil pH and fertility also helps limit injury; keep pH levels above 6.6 and potassium at high levels.

At this time we can only speculate if there will be winter injury to alfalfa. It is recommended to evaluate stands early in the spring to determine further management actions. Once the frost is out of the soil, determining if plants are alive can be done by digging 4 to 6 inches deep and examining the roots. Healthy roots should be firm and white in color with little to no root rot. If roots are browned, dehydrated and stringy then they are most likely winter killed. If over 50% of the root is infected with root rot then the plant will likely die later in the spring. This process can be completed until green up and stand assessments can be utilized.

Uneven growth is a sign of winter injury to alfalfa. Plants form buds in the fall for spring growth, during winter some buds on a plant can be killed while others will survive. If these buds are killed during the winter then the plant must form new buds in the spring which can delay growth and yield. This can result in shoots of different height on the same plant. If this scenario is observed, it is recommended to alter management practices in the future such as more balanced soil fertility and/or more winterhardy varieties.

If winter injury has occurred and there is concern about whether to keep the existing stand, there are stem density guidelines developed by the University of Wisconsin to aid in the decision. A healthy stand should have at least 55 stems/ft² (Fig 1.). Stem counts fewer than 40 per ft² is severely limiting yield and should be considered for removal.

| Density (stems/ft ²) | Action |
|----------------------------------|--|
| Over 55 | Stem density not limiting yield |
| 40-55 | Stem density limiting yield potential |
| Under 40 | Stem density severely limiting yield Consider replacing |

Table 1. Using Stem Density to Evaluate Alfalfa Stands

If the decision is to remove the stand due to winter injury, it is recommended to take caution when seeding alfalfa into a field where alfalfa was previously grown. Alfalfa produces toxins that are released when the plants are killed from plowing, spraying or winterkill. These toxins can reduce germination and growth of new alfalfa seeding. This occurrence is known as autotoxicity. A variety of factors determine how long it will take for the toxins to degrade and move out of the root zone so its suggested to grow a different crop for at least one growing season after killing an older alfalfa stand. Generally the autotoxin compounds are removed from sandy and lighter textured soils quicker than from heavier soils. Weather also plays a factor in the rate of toxin removal, as warm and moist soil conditions helps increase the speed of removal. Autotoxins are more concentrated in stems and leaves than in roots of plants so removal of top growth before plowing can help reduce, but not eliminate its presence. The University of Wisconsin has developed an autotoxicity risk spreadsheet to help growers make more informed decisions about their alfalfa seeding. This spreadsheet is available on their Forage Resources Website.

Each year alfalfa stands are at risk of being injured or killed from harsh winter conditions. Taking time to evaluate injury early in the spring allows growers more options to make the best decision for their crop and will be helpful in accurately making crop rotation decisions. If you have questions or need assistance in making the right decision for your crop, contact your LG Seeds Resource Manager or Agronomist.

Sources

http://www.huffingtonpost.com/2014/02/07/chicago-winter-coldest-30-years_n_4747929.html
<http://www.uwex.edu/ces/crops/uforage/StandEvaluationFOF.htm>
<http://blog.lib.umn.edu/efans/cropnews/2013/03/establishing-a-better-understa.html>
http://www.uwex.edu/ces/forage/pubs/assessing_alfalfa_in_spring.pdf
<http://ipcm.wisc.edu/blog/2014/01/the-cold-temperatures-and-alfalfa/>

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