

ALFALFA WINTERKILL/WINTER INJURY? WHAT TO LOOK FOR THIS SPRING

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The winter of 2018-2019 has been quite severe in many parts of the country with some states seeing record snowfall and cold temperatures. With these extreme winter conditions, many alfalfa producers are asking the question, will my alfalfa fields winterkill or have significant winter injury?

Alfalfa under most conditions is a very durable crop. However, under the right conditions it can suffer significant winter damage. Often the damage is due to the severity of the winter. But in some cases, our management decisions and/or harvest schedules can be a contributing factor.

When we look at what factors contribute to alfalfa winterkill, there are several things that come to mind. The following are some of those factors:

Contributing Factors to Winterkill

- 1) Variety Choice (Fall Dormancy and Winter Survival Index):** First, having a variety with the appropriate Fall Dormancy (FD) and Winter Survival Index (WSI) for your location is critical in minimizing the chance of winterkill. Over the years there has been a trend to plant a higher dormancy (i.e., an FD=5 vs. FD=4) to gain yield. However, to avoid winter injury, these varieties must also have a WSI value in the 2s or lower to give some assurance of adequate winter survival.
- 2) Age of Field and/or Plant Health:** The initial varietal selection of an alfalfa with a good disease and pest package can enhance winter survival. Older fields are more prone to winterkill, in part due to their higher incidence of root disease. Diseased plants have a lower survival rate in severe winters.
- 3) Soil Fertility:** Adequate soil fertility is needed for plant health. Potassium is especially important for winter survival.
- 4) Aggressive Cutting Schedules:** After each harvest the alfalfa plant must have a long enough regrowth period to generate enough top growth to replenish its root food reserves. Full recovery is reached at flowering. Frequent short harvest intervals during the growing season without a period of full recovery, especially on the last cut before winter, can be detrimental to the alfalfa field's winter survival.
- 5) Timing of the Last Cut:** The last cut date can greatly influence how well an alfalfa field can survive the winter. The last cut must be made to ensure the plants have optimal root reserves going into the winter and are not under stress. We want the field to either be cut early enough in the fall to regrow and replenish root reserves or late enough so it does not regrow and waste its root reserves on short growth that doesn't replenish the root reserves.
- 6) Cutting Height:** The practice of leaving 4-6" of alfalfa stubble after the last cut can be very beneficial in collecting adequate snow cover to provide insulation to the alfalfa plant from cold winter temperatures.

Winter Conditions Favorable for Winterkill

- 1) Warm Mid-Winter Periods Followed by Sudden Cold Temperatures:** If an alfalfa plant breaks dormancy during an extended warm period during the winter, it loses its tolerance to subsequent cold weather and may winterkill.
- 2) Poor Snow Cover:** Open winters without snow cover can result in very low soil temperatures that can result in root and crown damage and possible plant death.
- 3) Soil Moisture:** Winterkill occurs more often in wet soils.

Types of Winterkill Damage

- 1) Cold Injury of Crown and Roots:** Plants that have gone dormant can tolerate temperatures as low as 5°F without damage. However, plants can lose their ability to survive cold temperatures if there is a mid-winter warm period where plants break dormancy. A sudden change back to cold temperatures can result in winter injury. Plants generally winterkill if soil temperatures (at 2-4") reach in the range of 12-13°F or lower.
- 2) Ice Sheeting:** This condition occurs when melting snow or rain refreezes during the winter, completely covering plants. This type of winterkill can be quite severe, especially if the ice covers the alfalfa for more than 30 days. Plant death is attributed to the lack of oxygen under the ice. Plant death may occur more often in low-lying areas of fields where water can pool and freeze.



- 3) **Heaving:** Repeated freezing and thawing conditions in an alfalfa field can result in the pushing of a portion of the alfalfa root out of the ground. In severe cases, the top 2-4" of the crown and root may be exposed above the soil surface. These exposed crowns are often cut off during the first harvest resulting in plant death.



An example of heaving.



Freezing damage to the crown.

How and When Do I Check for Winterkill?

- 1) **Evaluate Field Damage After 3-4" of Top Growth:** It is best to wait until the alfalfa starts to break dormancy and has developed 3-4" of top growth before you evaluate the stand. Determination of which plants actually have died or have significant damage is much easier once the plants start to grow. Once you see top growth, walk the field and look for damage. Damaged fields will display an abnormally slow green-up in the spring with uneven plant growth.
- 2) **Dig Plants:** For the most accurate estimate of the health of the field, you should dig up 20-30 plants in several parts of the field and check the crown and roots for damage. If the top inch or two of the crown and root are soft and brown, it is a good indication that the plant is dead or severely damaged. It should be noted that the lower part of the tap root may still look healthy and firm, but if the crown or top of the root are soft, the plant will not recover.
- 3) **Check Extent of Crown Damage:** Often you see a range of root/crown damage in the field. Plant damage may range from none to complete plant death. Healthy plants will have crown bud growth on all sides of the crown area. Damaged plants may have asymmetrical bud growth on one side of the crown with dead buds and tissue on the other side. Healthy undamaged crowns and roots should be firm and white on the inside if cut open. Brown discoloration in the crown and taproot are symptoms of winter injury and/or root disease. Severely damaged plants with 50% of the crown showing winter injury will most likely die early in the season.

If a large percentage of the plants evaluated are dead or showing significant winter injury, rotating into another crop may be the best option.

- 4) **Optimal Stand Count:** Depending on the age of the stand, the optimal stand density can vary. In new stands, the optimal beginning stand count is 20-25 plants per ft². In older stands (3-4 years), the minimum number of plants is 6 plants per ft². In evaluating stands with significant winter injury, a better estimate of the stand is the number of stems per ft². A productive field will have an optimal stem number of 55 stems per ft² or greater. Fields with stem counts below 40 stems per ft² are less productive and rotation into another crop may be the best option.

What Are My Options If I Have Significant Winterkill?

- 1) **Rotate Out of Alfalfa:** If the winterkill is severe, your best option is probably to rotate out of alfalfa and take advantage of the nitrogen credit. The field will need to be out of alfalfa for one year to avoid autotoxicity in new alfalfa plantings.
- 2) **Interseed with Alfalfa:** Autotoxicity is not a concern if you want to replant fall-planted alfalfa the following spring. Fields less than a year old can be replanted without autotoxicity concerns. Attempting to thicken older fields (2-4 years) with new alfalfa seed is generally not a good option due to autotoxicity concerns.
- 3) **Interseeding with Grass:** Adding a highly productive grass into the alfalfa field for one season can significantly boost the field's yield and provide an emergency forage to compensate for lost forage production.

Options for Salvaging a Field with Moderate Winter Injury

If your stand evaluation indicates that you have a weakened stand, but you want to salvage the field for one more season, you have several options. Below are a few management practices that will minimize further plant death by reducing plant stress:

- 1) **Delay First Spring Cut:** This will allow the injured plants more time to recover and replenish root food reserves before the first cut, minimizing harvest stress.
- 2) **Relaxing the Harvest Interval Between Cuts:** A longer growth period that allows the early cut to flower will significantly reduce harvest stress.
- 3) **Optimize Soil Fertility Before First Cut.**
- 4) **Control Weeds:** Weed pressure needs to be minimal.
- 5) **Raise the Cutter Bar an Inch or Two Higher on the First Cut.**

Need More Forage? Consider Direct Seeding A New Alfalfa Field.

If your operation needs more alfalfa acres this year to compensate for lost production, make sure you have selected the best alfalfa variety to fit your needs. If your current fields suffered severe winterkill and you are reseeding less-than-a-year-old stand or rotating to new acres, be sure to pick a new variety that has an adequate Winter Survival Index (WSI) in the 2 or lower range.

Don't limit your profit potential in 2019 or the next 4 years with an inferior alfalfa variety that doesn't fit your production needs even if it may save you a few dollars during the initial seeding year. The initial cost of alfalfa seed with new technology is generally recouped early during the first production year with increased yield and/or forage quality. Make sure you select the right variety for your operation and herd. Things to consider in variety selection include:

- 1) Fall dormancy and winter survival rating
- 2) Yield versus quality
- 3) Persistence and disease rating index
- 4) Non-transgenic versus GMO options
- 5) Variety versus brands/blends
- 6) Harvest cutting schedule.

Also be sure to take advantage of the latest coating and seed treatments for fast stand establishment and early season growth. Once you have made your variety selection, get it on order to ensure you have the variety you want when you are ready to plant.

Here are two university publications that can be found on the Internet that can help you evaluate your established stands following green-up this spring:

(a) **Alfalfa Stand Assessment: Is this Stand Good Enough to Keep?** *UW Extension Bulletin A3620*

(b) **Evaluating and Managing Alfalfa Stands for Winter Injury.** Dennis Cosgrove, Dan Undersander, *Focus on Forage* - Vol. 5: No. 8

For additional information on alfalfa, go to: www.alforexseeds.com.