

Alfalfa Stand Evaluation

2012/2013 Winter Conditions

Extreme cold temperatures without snow cover can lead to cold soil temperatures that contribute to winterkill in alfalfa (Figure 1). This situation occurred in 2013 during the nights of January 19-20 in the upper Midwest, and may have caused damage to alfalfa stands from the Dakotas through Minnesota and Wisconsin.

Snow cover, or the lack of it, was a major factor in soil temperatures that were reported at 0 °F under bare soil, and 8 to 17 °F under alfalfa and sod cover. These temperatures are cause for winterkill concern, since 15 to 17 °F soil temperatures at the 4-inch depth will often lead to winterkill. Additional factors include plant health going into fall dormancy, the amount and condition of fall growth left in the field to provide soil cover, soil potassium status, and continuing stress from freeze/thaw cycles this spring.

Grass mixtures are at risk too, since some grasses such as orchardgrass and tall fescue may not have as much winter survival potential as alfalfa. Consequently, growers should be prepared to evaluate the status of current alfalfa or alfalfa-grass fields as soon as possible after a soil thaw.

Diagnosing Winter Injury after Soil Thaws

Slow green-up - One of the most evident results of winter injury is slow green-up. If other fields in the area are starting to grow and yours are still brown, it is time to check those stands for injury.

Asymmetrical growth - Buds for spring growth are formed during the previous fall. If parts of an alfalfa root are killed and others are not, only the living portion of the crown will give rise to new shoots, resulting in a crown with shoots on only one side—or asymmetrical growth.

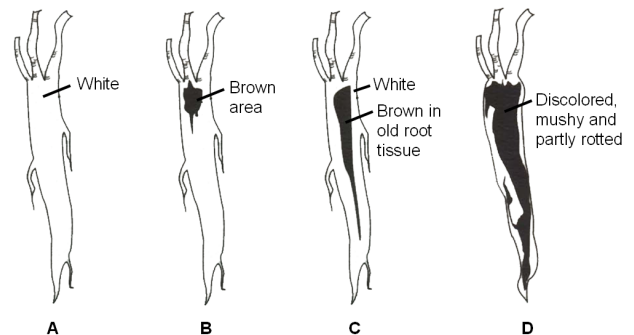
Uneven growth - During winter, some buds on a plant crown may be killed and others may not. The uninjured buds will start growth early while the injured buds must be replaced by new buds formed in spring. This results in the shoots from buds formed in spring several inches shorter than the shoots arising from fall buds.

Root issues - The best way to diagnose alfalfa winter injury is by digging up plants at several areas of the field and examining roots. The following table illustrates degree of root and crown injury to plants and discusses their chances for survival (Table 1).



Figure 1. Alfalfa field with large winterkilled area.

Table 1. Alfalfa root symptoms and diagnosis.



- A. No injury.** Roots are solid white internally. Tillers are beginning to green and are solidly attached to the root.
- B. Moderate injury.** Roots are solid and white but brown damaged areas occur in old tissue of the crown down to 1 to 2 inches. Growth beginning. With favorable growing conditions and a delayed first cutting, many of these plants may survive.
- C. Severe injury.** Roots white on outside. Brown discoloration carries down in center of the root. The chances are not very good these plants will survive.
- D. Dead plants.** Roots are discolored, mushy and partly rotted. Top growth can be readily pulled from the crown.

Source: Rohweder and Smith, 1978.

Table 2 below shows another method of rating alfalfa crown and root condition and survival potential.

Table 2. Alfalfa root health effects on winter survival (ratings pertain to crown and roots).		
Rating	Condition	Winter Survival
0	Healthy	Excellent
1	Some discoloration	Excellent
2	Moderate discoloration	Good
3	Significant discoloration	Good in mild winter Poor in hard winter
4	> 50% discoloration	Good in mild winter Poor in hard winter
5	Dead	-----

Source: Undersander, et al. 2011.

Healthy roots should be firm and white with little evidence of root rot; winter-injured roots have a gray, water-soaked appearance and/or a brown discoloration. If the root is soft and water can be easily squeezed from the root, it is most likely winterkilled. If the root is firm but showing signs of rot, it may still produce. If over 50% of the root is damaged, the plant will most likely die that year. If less than 50% is injured, the plant will likely survive for one or two years.

Diagnosing Alfalfa Stand at Spring Green-up

Spring green-up will provide a second opportunity to evaluate alfalfa and forage stands. Look for alfalfa crown buds to grow, and for stems to begin elongating. Healthy crowns are large, symmetrical and have many shoots. Weakened plants may grow but have only one or a few stems. Watch for delayed green-up, lopsided crowns, and uneven growth of shoots. If any of these characteristics exist, investigate further by checking for root rots and broken roots.

Plant and stem counts can be very useful to determine the yield potential of a field. When alfalfa growth is 4 to 6 inches in height, use stem counts (stems per square foot) as the preferred density measure. Count only the stems expected to be tall enough to mow. A stem density of 55 per square foot has good yield potential. Expect some yield loss with stem counts between 40 and 50. Consider replacing the stand if there are less than 40 stems per square foot, and the crown and root health is poor. Stem counts are an effective evaluation tool for stands of all ages. Older stands have fewer plants per square foot, but older plants produce more stems than younger plants.

University of Wisconsin research found that 55 stems per square foot will provide full yield potential. Consider rotating out of fields that don't have this many elongating stems per square foot, and won't provide full yield potential (Figure 2).

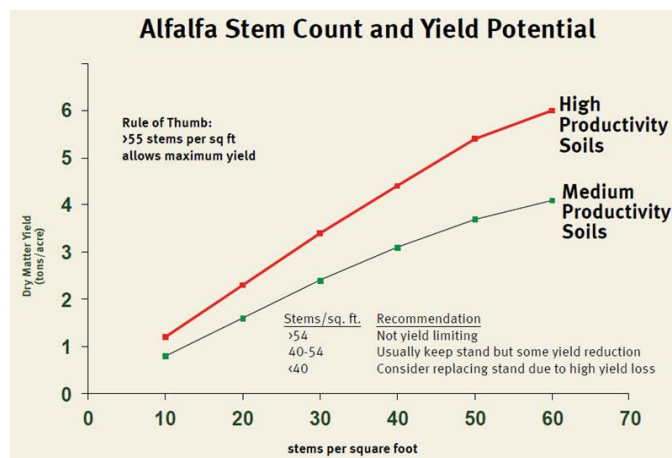


Figure 2. Alfalfa stem count and yield potential. Adapted from Undersander, et al. 2011.

Make an Early Decision to Rotate

If an alfalfa field shows early signs of winterkill, such as mushy plant crowns and roots, growers could plan to rotate directly to corn without waiting and fretting over slow or sparse spring green-up. Making an early decision to rotate allows you to take advantage of the nitrogen savings in corn. Fields that had a good stand of alfalfa going into winter should provide the entire nitrogen requirement for a following corn crop if rotated this spring.

An early rotation decision also allows you to designate and plant a new field of alfalfa in time to capture the full-season yield potential in a newly planted stand. First year alfalfa stands typically yield less than a robust established stand, so the key is to get newly seeded alfalfa off to a strong start in order to minimize the slow early growth period of newly seeded alfalfa. Figure on 7 to 10 weeks from planting to first cutting.

To help maximize the tonnage in the first cutting of a seedling stand consider a variety with Genuity® Roundup Ready® technology such as Pioneer® brand 54QR041. Weed control is a major factor in stand establishment, and in varieties with this technology, seeding year yields have been shown to average a half ton more alfalfa² when controlling weeds with Roundup® versus other widely used herbicides for alfalfa. Furthermore, the yield gain with any labeled herbicide beats no herbicide use at all.

References

Undersander, D., C.Grau, D. Cosgrove, J.Doll, and N.Martin. 2011. Alfalfa stand assessment: Is this stand good enough to keep? University of Wisconsin Extension Publication A3620. Madison, Wisconsin. <http://learningstore.uwex.edu/assets/pdfs/a3620.pdf>

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