

Alfalfa Stand Assessment

- Spring assessment of alfalfa stands can help determine management actions to help achieve yield potential.
- Plant counts have the most utility when used to evaluate new stands.
- The most accurate method to assess established alfalfa stands and estimate yield potential is to count stems.

After alfalfa breaks dormancy and begins to grow, assessment of the condition of alfalfa stands and yield potential in the spring is important to help determine management actions. Assessment should include three components:

- **Individual plant damage** - Evaluate the turgidity of the taproot. Look for brown, dehydrated, and ropey roots (Figure 1).
- **Plant injury** - Alfalfa buds may be killed during the winter. Consequently, bud regrowth in the spring can be delayed, causing uneven growth and reduced yield potential of the first cut.
- **Areas with thin stands** - A high yield potential field, seeded last year, should have 20 plants/ft². Stands seeded last fall or spring should be destroyed and reseeded if there are less than 12 plants/ft².¹ A healthy, established stand should have 55 stems/ft². As an alfalfa stand ages, the number of plants/ft² declines but the plant compensates by producing multiple stems/plant.



Figure 1. Healthy alfalfa crown and root (left) and alfalfa roots with symptoms of winter injury and poor root health (center and right). Photo courtesy of Dan Undersander, University of Wisconsin.

Diagnosing Winter Injury

Winter conditions can injure or kill alfalfa plants due to cold temperatures, ice sheeting, and heaving. Planting a variety with a good winter hardiness rating can reduce cold temperature damage but does not help prevent ice sheeting damage. If fields are slower to green-up than surrounding fields it's a signal to evaluate stands for injury. If parts of an alfalfa root are killed along with damaging the buds for spring growth, then only the living part of the crown will sprout new shoots (asymmetrical growth). Some buds on a plant may be killed while others remain undamaged. Uninjured buds will initiate early spring growth, while killed buds must be replaced by new buds formed in the spring. Uneven shoot height on the same plant will occur.

The best way to diagnose winter injury is digging up plants, 4 to 6 inches deep, to examine roots. Dig plant samples in three to four representative locations in a field. Healthy roots will be firm and white (Figure 1). Winter injured roots will have a gray, water-soaked appearance, just after thaw. Plants with only minor rot may produce this year, but if more than half the root is damaged it is likely that the plant will die. The most cold-tolerant underground structures of alfalfa are the crown buds. Crowns should be examined for size, symmetry, and the number of shoots present. If these appear gray, water-soaked, or withered, the plant may be dead.² Washing roots in a bucket of water can make it easier to better assess root color.

Buds for spring growth are formed in the fall. If a portion of the crown is killed, then only buds from the living section of the

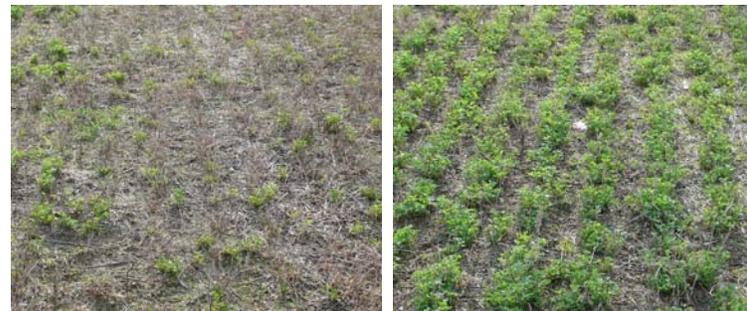


Figure 2. Poor stand (left) and good stand (right).

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plant will give rise to new shoots in the spring. Buds that are killed during the winter may be replaced by new buds in the spring. Growth of these buds will lag behind growth of the uninjured buds. Delayed growth results in shoots of different heights on the same plant with taller shoots from buds formed in the fall. Shorter shoots from buds formed in the spring can lead to reduced yield during the first cutting.

Later roots will be brown, dehydrated and stringy. If 50% or more of the root is black from root rot, it will most likely die during green-up or later in the season.

Evaluating New Stands

Plant counts have the most utility when used to evaluate new stands. Before stems are visible, a sampling frame of one square foot can be tossed in the field at random to take counts. Plan on taking 10 to 20 samples per 10 acres. The more variability in your field, the more samples you should take. High-yielding alfalfa stands seeded last year should ideally have 20 plants per square foot, but may still yield well with as few as 12 plants. The minimum number of healthy plants per square foot for a desirable alfalfa stand ranges from 5 to 12 (Table 1).

Evaluating Established Stands

Because alfalfa has the ability to yield well over a range of plant stand densities, a more accurate method to assess established alfalfa stands and estimate yield potential is to count stems. This can be done once stems have begun to grow. Older stands tend to have fewer individual plants, but more stems per plant. For this method, use a sampling frame 17 inches by 17 inches or about 2 square feet². Count the stems within the frame at four to five random locations in the field. Divide this number by 2 to get average stems per square foot. Use this number to estimate the yield potential of the stand (Table 2). A rating system to characterize the health of crowns and roots has been developed to aid decision-making. (Table 3).

Management Considerations

Consider allowing alfalfa plants to mature longer before cutting if stands have symptoms of winter injury. This can help plants restore carbohydrates for future production. Because the first cutting is generally the highest yielding, stands with mild winter injury could be cut at 10 to 25% bloom at the second or third cutting³. Increasing cutting height is an important management consideration when plants are allowed to flower before cutting. In order to avoid further weakening plants, it is important not to remove the new shoots forming at the base of plants during this time.

If stands are thin and estimated yield potential is below a desirable level, a decision needs to be made as to whether to keep the stand or not (Figure 2). Autotoxicity is a problem in alfalfa stands that are two or more years old. Autotoxic compounds produced by alfalfa may reduce the stand or negatively impact future yield potential. In cases where alfalfa stands are thin, but it is not practical to destroy the stand,

consider interseeding grasses or clover to meet forage needs.

A damaged stand can be harvested at first cutting, removed followed by planting corn for silage or high moisture corn. This method offers a way to maximize forage quality by utilizing the alfalfa and planting another quality forage crop in the same season.

Sources: ¹Undersander, D. Assessing alfalfa stand condition in the spring. <http://www.uwex.edu> (verified 03/10/2014). University of Wisconsin Extension. ²Cosgrove, D. and D. Undersander. Evaluating and managing alfalfa stands for winter injury. Focus on Forage vol. 5 no. 8. University of Wisconsin.

Table 1. Suggested alfalfa plants per square foot.

Production Year	Plants per ft ²
1	>12
2	>8
3	>5

Source: Morrison, J. 2009. Assessing alfalfa stands. University of Illinois Extension.

Table 2. Average stem count and estimated yield potential per square foot.

Stems/ft ²	Estimated yield potential
>56	100%
50	90%
45	81%
40	72%
35	62%
30	53%
25	44%

Source: Undersander, D. et al. 2011. Alfalfa stand assessment: Is this stand good enough to keep? A3620. University of Wisconsin Cooperative Extension.

Table 3. Rating alfalfa crown and roots winter survival condition.

Rating	Condition	Winter survival
0	Healthy	Excellent
1	Some discoloration	Excellent
2	Moderate discoloration/rot	Good
3	Significant discoloration/rot	Good for mild winter; poor for hard winter
4	Greater than 50% discoloration	poor
5	Dead	NA

Source: Undersander, D. et al. 1991. Alfalfa stand assessment: is it good enough to keep? A3620. University of Wisconsin Extension.

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