

Illinois Grazing Manual Fact Sheet ESTABLISHMENT/RENOVATION

Alfalfa Autotoxicity



What is it?

For this topic, knowing the definition of two terms is important. Allelopathy is the effect of one plant on another as a result of the plant producing chemical compound(s). Autotoxicity is a form of allelopathy where a plant species releases chemical compound(s) that inhibit germination and growth of the same plant species.

Alfalfa contains water-soluble inhibitory substances that are autotoxic.

Where are Autotoxic Substances Located?

The greatest concentration is found in the alfalfa leaves and seed.

What Does Autotoxicity Cause?

Autotoxicity causes a negative effect on seed germination and seedling growth, especially reducing the growth of the radicle or the young developing taproot. Reduced seedling growth is seen as stunting in the field. This effect may be apparent for at least 3 years.

The autotoxic substance(s) can move with water, and thus will leach out of the root zone faster in a sandy soil than in a clay soil. Amount of rainfall is also an influencing factor.

What's the Impact of Autotoxicity?

Research has shown a "zone of influence" where older alfalfa plants release the autotoxic substance(s) that affects new seedlings in a "wagon wheel" pattern radiating outward from the older plants. New plants established within 8 inches of the old plant rarely survive and yield 30% of maximum, new plants established 8 to 16 inches away from the old plant yield 75% of maximum, and new plants 16 to 24 inches away from the old plant achieve maximum growth and yield.

When to Interseed with Alfalfa?

Using this "zone of influence", one could successfully interseed with a plant density of 0.2 old plants per square foot. At 0.4 old plants per square foot new seedlings can be established but will be low yielding. If there are greater than 1.3 old plants per square foot reseeding will not be successful due to "zone overlap."

The practice of interseeding alfalfa into alfalfa to thicken a stand usually fails due to this "zone of influence" and competition from existing plants.

Reseeding Guideline

If the alfalfa stand is greater than a year of age, the Illinois recommendation would be to plant a grass crop (corn is best) for one year and the following year reestablish alfalfa. If the alfalfa stand is less than a year of age, one could reestablish or reseed alfalfa.



Other Factors to Consider

Research has shown that high rates of fungicide on alfalfa seed interseeded into old alfalfa stands had no impact on emergence and establishment, and stands were not successfully interseeded. Grazing-tolerant varieties produce autotoxicity.

Studies suggest that there may be genetic differences in varieties to the autotoxic substance(s). Alfalfa seed companies are exploring the development of genetic resistance.

Options to Thicken a Stand

Thickening old stands of alfalfa can be done with red clover (medium type) and/or good quality cool-season grasses.

Optimum Alfalfa Plant Density

Optimum stand of alfalfa grown for hay is 55 stems per square foot and if less than 39 stems per square consider replacing the stand. Excellent gains on pasture have been obtained with alfalfa plant density less than the optimum for hay production.



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