

## Alfalfa Stem Nematodes

### Introduction

Alfalfa Stem Nematode (ASN), *Ditylenchus dipsaci*, is a nearly microscopic round worm that lives in the soil and in plants or plant debris. It belongs to a diverse species of nematode often referred to as stem and bulb nematodes. The alfalfa stem nematodes are plant parasites that can reduce crop yield and quality by feeding on the above-ground portions of the alfalfa plant (crown, stems, leaves). Under ideal conditions (wet weather in late winter or early spring, 59-70°F), ASN can complete its life cycle from egg to reproducing adult in 19-23 days. A single ASN female, after mating with a male, can produce 200-500 eggs during its reproductive life. ASN can parasitize and persist on a number of host plant species, but can only reproduce in alfalfa and sainfoin. ASN can undergo anhydrobiosis, a state of drying to near death, and persist in plant debris, on seeds, or in dry soil for years.

### Symptoms

Symptoms are easily recognized in the early spring during cool, wet weather. Damage is most often seen in flood-irrigated fields with increased damage observed near the headwater ends of infected fields. Infestations can be patchy due to water movement (nematodes spread with water). Newly established alfalfa on ASN-infested ground often declines rapidly with poor seedling stand, increased weed pressure and poor forage yield. Alfalfa production with moderate to severe ASN pressure rapidly becomes unprofitable within a year or two after planting.



Figure 1. Typical stem nematode pattern in field showing lost and stunted plants in the affected area

The most recognizable symptom is patches of stunted plants (figure 1) with twisted and deformed leaves with a crinkled appearance. Damage includes shortened internodes and swollen stems with small, deformed yellowing or even a few white leaves. This symptom is called “white flagging” and alone is not an indicator of the presence of ASN (figures 2 and 3). Infected stems are brittle and tend to break off from the crown. Crowns of infected plants are not firm and may even appear spongy in consistency. Infected areas of the field are 2-3 weeks slower to green up in the spring compared to non-infected areas and may have appeared to winterkill. Severely infected plants eventually die with decreasing plant stands and increasing weed pressure.

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Figure 2. Single plant infected with stem nematode shows shortened and thickened internodes and buds

Figure 3. ASN-infected plants often exhibit ‘white-flagging’ in leaves. By itself, however, this symptom is not diagnostic of ASN.



### Disease Cycle

Stem nematodes are microscopic roundworms with a hollow, needle-shaped stylet used to puncture plant tissue for feeding (figure 4). After hatching, the infective juvenile nematode can



Figure 4. Needle-like stylets in the heads of alfalfa stem nematodes (Photo courtesy Utah State University Extension)

withstand long periods by persisting in or on the surface of hay or plant debris and/or seed. (figures 5 and 6), or in the crowns of plants when survival conditions are adverse. When there is sufficient moisture and favorable temperatures, the infective juveniles become active and enter the alfalfa plants by colonizing seedlings as

they germinate or by swimming up on the surface and enter through the plant’s stomata. The nematodes are small enough to move within the plant’s internal open spaces between cells. The nematodes secrete enzymes and plant-affecting hormones as they feed. The hormones stunt and swell plant tissue. Nematodes escape to the soil when living conditions within the plant become adverse and heavily infected plants can no longer support the nematode’s growing population, or when plants are dying.

## Diagnosis

To verify ASN is causing the symptoms in alfalfa, stems and leaves of symptomatic plants can be sampled and checked for the nematodes quickly and accurately with the aid of a microscope. If confirmation is desired, then the sample may be sent to a diagnostic laboratory. To do this, collect stems with leaves from several plants exhibiting symptoms of infection. Care should be taken not to expose the sample and nematodes to excessive heat or cold so the specimen and nematodes remain alive until the sample is received.

## Highly Resistant (HR) Varieties

Plant alfalfa varieties rated highly resistant (HR) to alfalfa stem nematode by the independent North American Alfalfa Improvement Conference (NAAIC) [www.naaic.org](http://www.naaic.org). Avoid planting lower quality seed that is claimed to be resistant to ASN. It is an unnecessary risk and there are no assurances of seed purity or germination percentage. In addition, the seed may already be contaminated with the nematodes (figures 5 and 6).



**Distribution and Severity of Stem Nematode in the U.S.**

Source: NAAIC

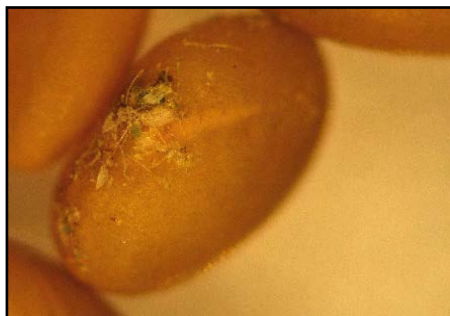


Figure 5.  
Hair-like, dried nematodes (still living) on the surface of alfalfa seed from a non-certified seed source (Photo courtesy Utah State University Extension)

Figure 6.  
Dried, but still living nematodes on the surface of leaf debris in a non-certified bag of alfalfa seed (Photo courtesy Utah State University Extension)



## Management

Chemical nematicides for controlling ASN are generally ineffective, hazardous, and expensive. The decision to turn under a field should be based on plant stand and current forage yield estimations. Crop rotation is one of the most effective means to control ASN. Planting non-host crops such as small grains (barley or wheat), sorghum, or corn for two or more years will reduce stem nematode populations. Prevent nematode reintroduction into a clean alfalfa field by harvesting clean fields first when the topsoil is dry. Do not cut the alfalfa when the top 2-3 inches of soil surface is wet, as nematodes will exit the plants and return to the soil once they sense the plant is dying. Clean the equipment before moving from field to field. Avoid using tail water from a known ASN contaminated field. Avoid the use of manure from cattle where infected hay has been fed.

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