

Nematodes In Alfalfa

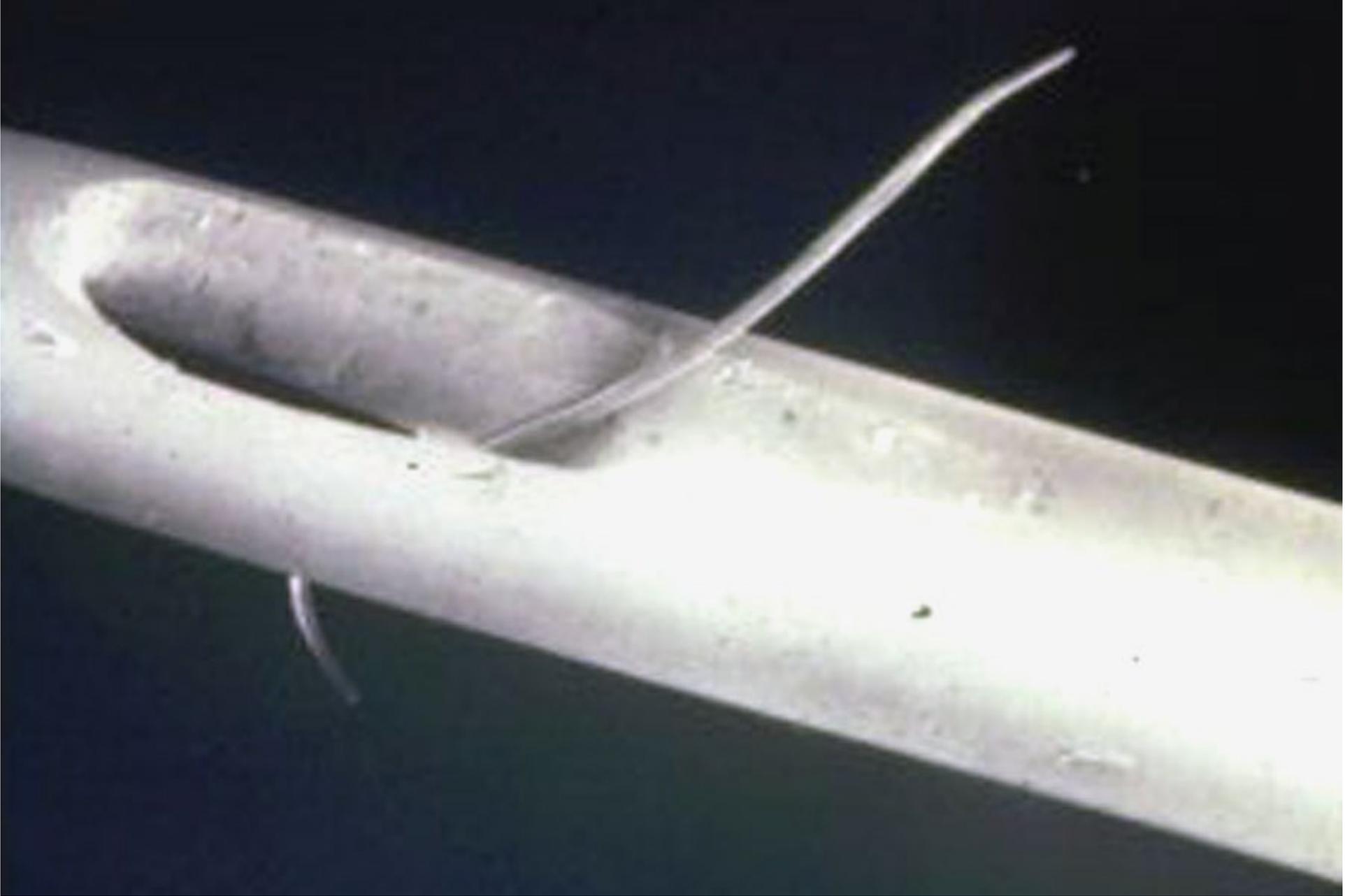
**Donald Miller PhD
Alfalfa Breeder**



Nematodes

Microscopic worm-like animals that cause yield or stand loss





Nematode in eye of needle

Plant Parasitic Nematode



Stylet



Circular Stunted Areas



Spread by Water, And Harvest machinery & Soil Cultivation

Typical Nematode Field Symptoms

What Nematodes Damage Alfalfa?

- 1. Stem Nematode** * *
- 2. Northern Root Knot Nematode** *
- 3. Southern Root Knot Nematode**
- 4. Columbia Root Knot Nematode**
- 5. Root Lesion Nematode**

Identify The Pests On Your Farm:

**Genetic resistance to
one nematode
doesn't mean you have
resistance to other nematodes**



Lab Test (Soil & Plants) To Confirm Type Of Nematode And Number.



“Stem Nematode Identification in Alfalfa”



Dr. Donald Miller

Uneven Plant Growth

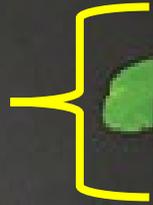


Stem Nematode Stunting Of Alfalfa Top-growth

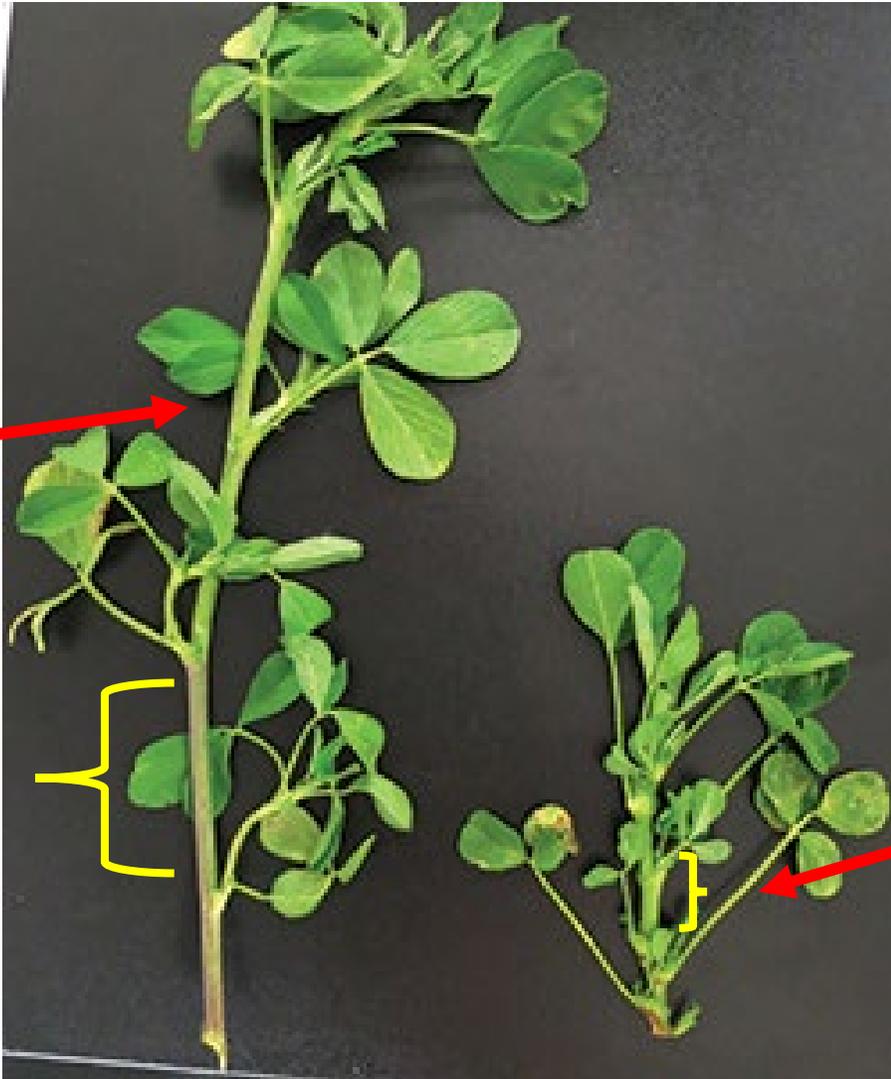
Normal growth



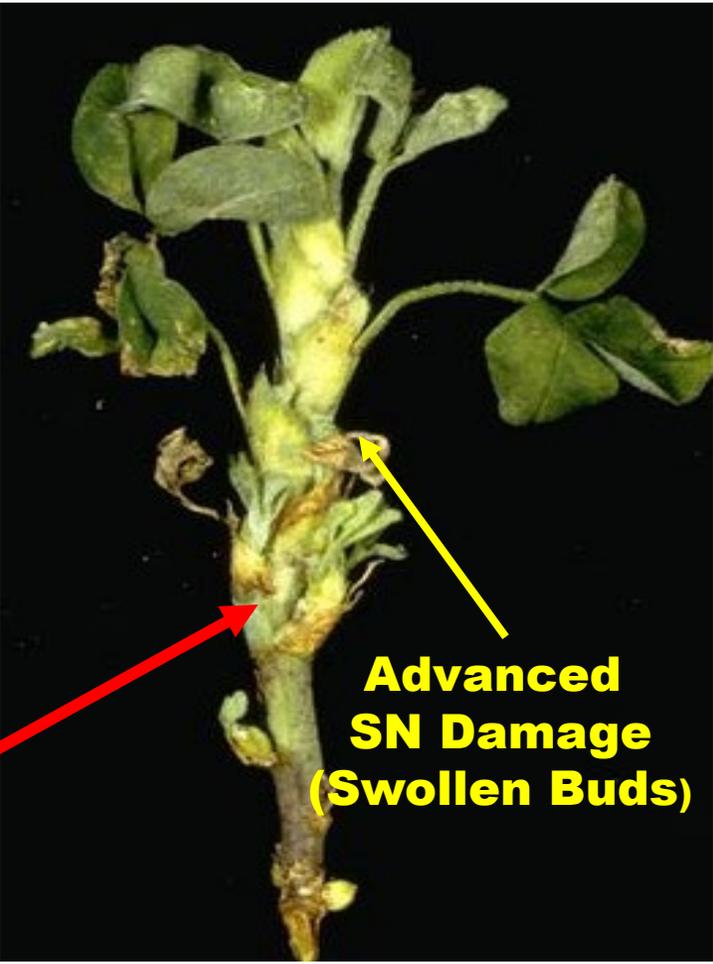
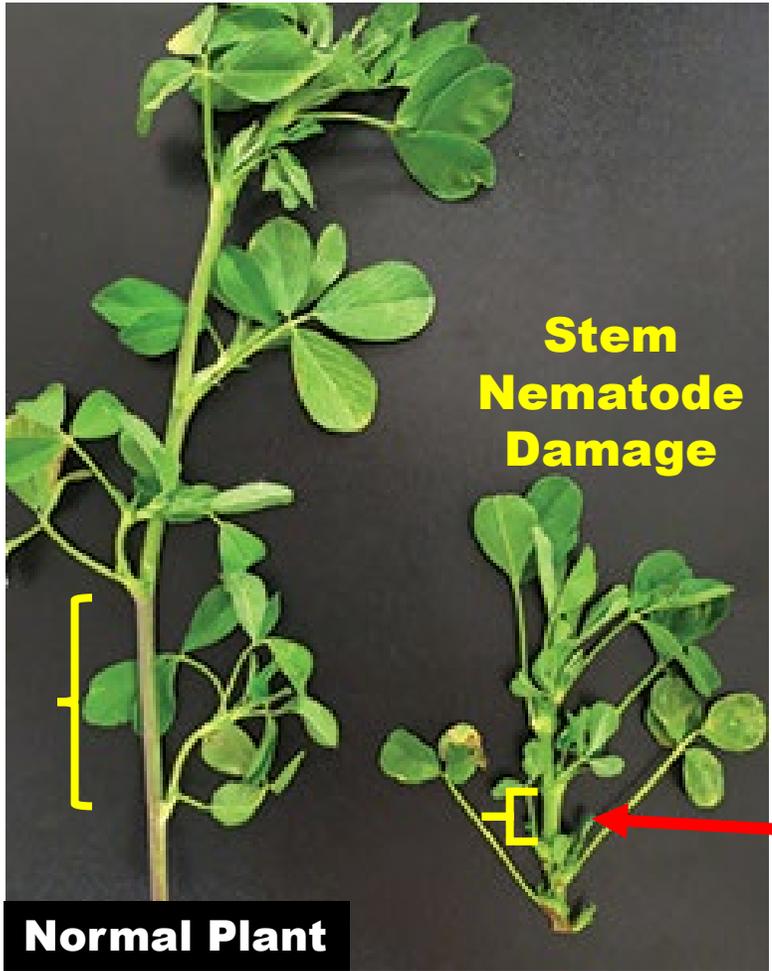
Stem internode



**Stunted growth:
Shortened
internodes**

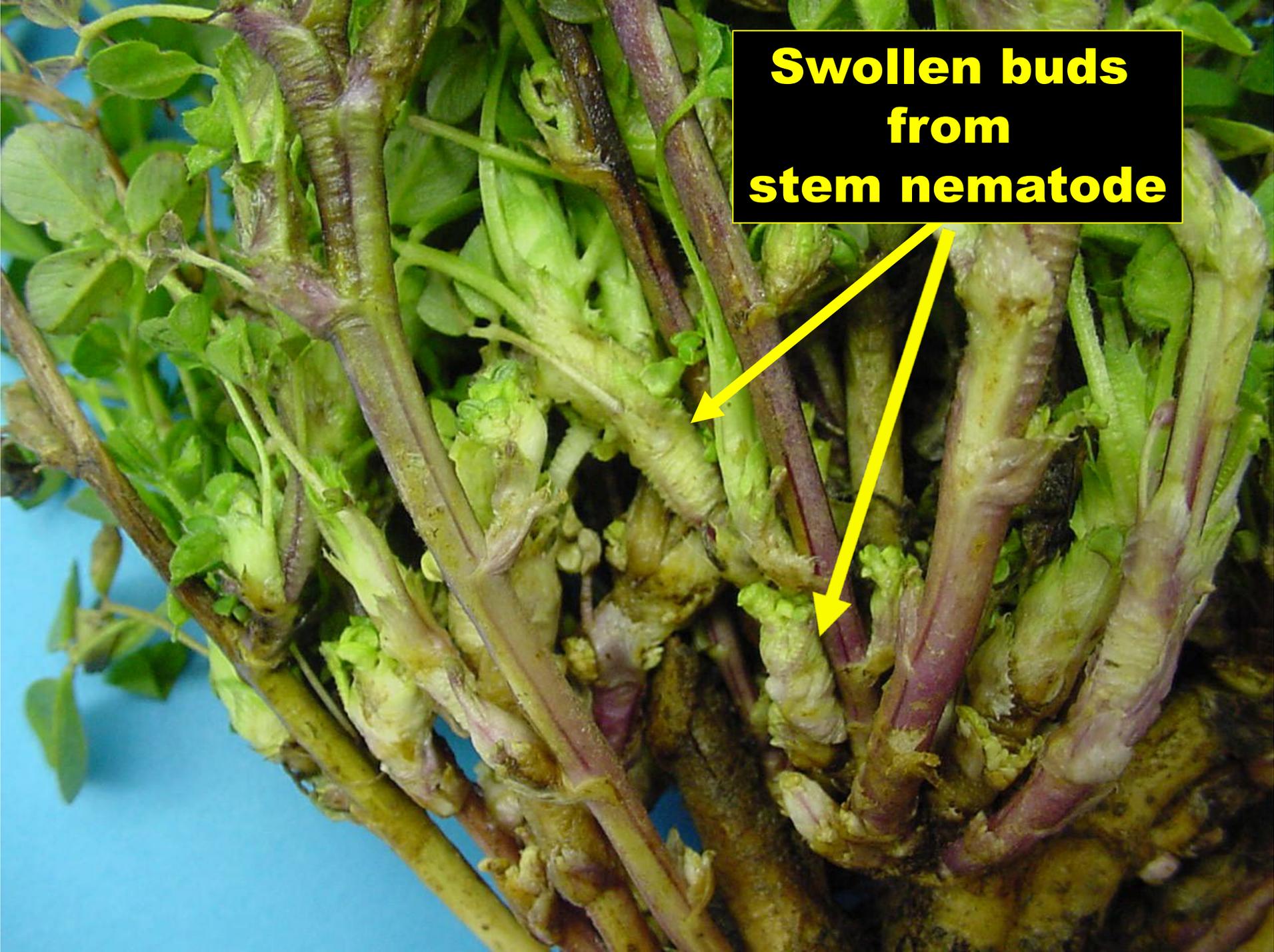


Stem Nematode Stunting Of Alfalfa Top-growth



**SHORT/
COMPRESSED
STEM
(STUNTING)**

**Swollen buds
from
stem nematode**



**Symptom
of Stem
Nematode:
Swollen
Buds**



Advanced damage from SN



**SWOLLEN
BUDS
AND
DEAD CROWN
TISSUE
FROM
STEM
NEMATODE
DAMAGE**





**Swollen buds were chopped into small pieces and water added:
Stem nematodes will come out of tissue and swim in water
Positive test for Stem Nematode**



White Flag symptoms in alfalfa field due to Stem Nematode

Note: Only a small portion of Stem nematode infected plants will display “white flags”.

HOWEVER IT IS A GOOD INDICATOR OF STEM NEMATODE



White Flagging (Stem Nematode)

Stem Nematode (*Ditylenches dipsaci*)

- ◆ **Symptoms most common during cool and moist periods of the year or under sprinkler irrigation.**
- ◆ **Swollen crown buds with shortened internodes**
- ◆ **“White Flags” stems may be present on some plants in field**



Stem Nematode Damage



Root Knot Nematode



Susceptible

Resistant



Northern Root Knot
(*M. hapla*)
Found in
Cooler Environments

Southern Root Knot
(*M. incognita*)
Found in
Warmer Environments

Root Knot Nematode: Alfalfa



RKN **VS** N₂-Fixation Bacteria



Root knot nematode galls



Rhizobium nodule

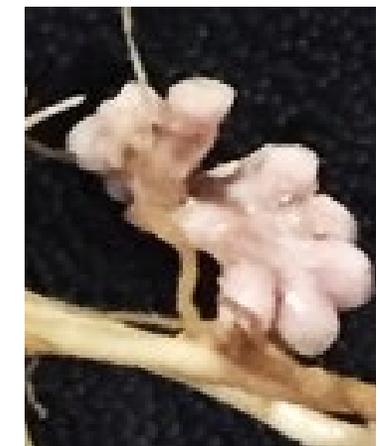
RKN VS N₂-Fixation Rhizobia

RKN GALL



N₂-Fixation Rhizobia

Rhizobium Nodules are white to pink in color and can be easily removed from root



Columbia Root Knot Nematode (*Meloidogyne chitwoodi*)



**Alternate Host
Potato**

Root-Lesion Nematode (*Pratylenchus* species)



Resistant

Susceptible



Resistant

Susceptible

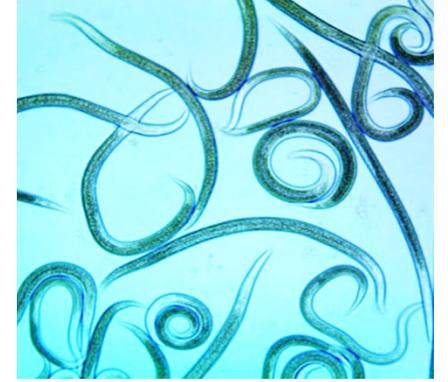


Lesion Nematode

Alternate Host Crop: CORN



Nematodes In Your Alfalfa: What Are Your Options?



Nematode Control: Integrated Approach

- **No Chemical Control
Once Alfalfa Planted
(soil or plant)**



Nematode Control: Integrated Approach

- **CULTURAL PRACTICES**
 - **Prevention**



**What
caused
this
damage?**



**Avoid moving
nematodes
on your
equipment
from infested
fields to new
alfalfa fields:**

**Clean plant
debris and
soil off
equipment**



Swather Moved Stem Nematodes To New Field

Don't Reuse Tailwater From Infested Fields



Nematode Control: Integrated Approach

• CULTURAL PRACTICE

- **Limit build-up & Severity (use non host crop rotations)**



Stem Nematode (*Ditylenches dipsaci*)

◆ **Non Host**
Rotation crops:
Sorghum, small
grain , or corn
for 2-4 yrs



Root Knot Nematode (*Meloidogyne* species)

Non-Host Crops (varies by species)

RKN Difficult to control with non host rotation:

Wide Range of Host Crops: (550 crop & weed species)



Nematode Control: Integrated Approach

• **CULTURAL PRACTICES**

- **- Fallow ground**
- **- Biofumigant crop in crop rotation to kill nematodes**



Nematode Control Options

Fallow Ground

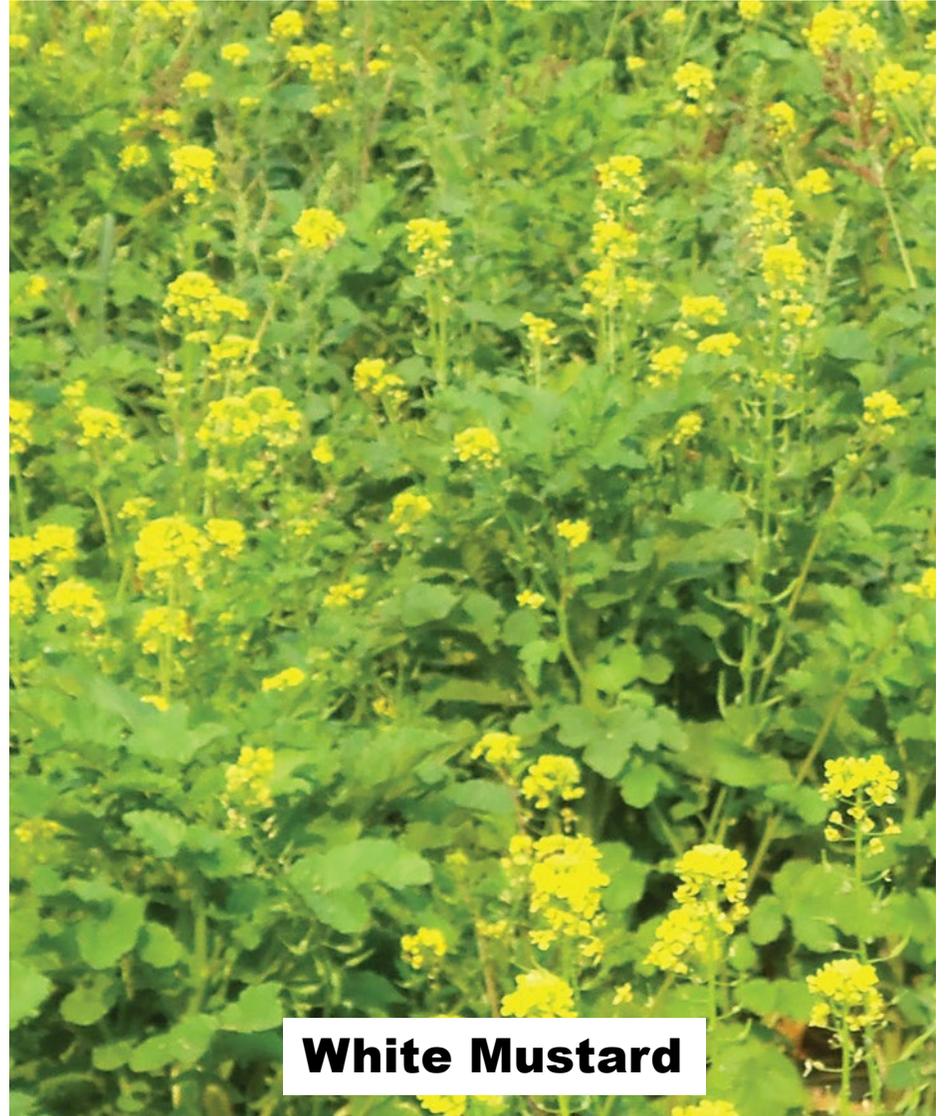
(eliminates nematode food source)



Biofumigant Crop

Alternative To Chemical Fumigation

Biofumigant crops contain Isothiocyanates that have nematicidal properties when the topgrowth is mowed and incorporated into the soil.



White Mustard

Biofumigant Crop

Alternative To Chemical Fumigation



White Mustard

1) Use a flail or rotary mower to chop the plant tissue while the mustard is at peak bloom (45 days growth).

2) Immediately incorporate the residue with a chisel plow, rototiller, or heavy disc.

3) Seal the soil surface immediately after incorporation with a heavy board, roller, or culti-packer

Nematode Summary

**Resistant Varieties:
Best Control Measure!!**



Rotation For Stem Nematode Control

**Alfalfa > 2yrs small grain >
Bio-fumigant crop > Plant
Alfalfa Variety with High
Resistance (HR) for Stem
Nematode**



Rotation for Root Knot Nematode Control

**Alfalfa > fallow > Bio-fumigant
crop > Plant Alfalfa Variety with
High Resistance (HR) to Root
Knot Nematode**



Summary: Minimizing Nematode Damage

- **Genetic: (Plant Nematode Resistant Alfalfa Varieties)**
- **Cultural Practices**
 - **Prevention (clean equipment between fields)**
 - **Limit build-up & Severity (use non host rotations)**
 - **Use Bio Fumigate crops in crop rotation to kill nematodes**

Questions

An aerial photograph of a lush green field, likely alfalfa, with a distinct, irregular path of bare, light-colored soil running through the center. The path starts near the top center and extends towards the bottom center, with some branching. The surrounding vegetation is dense and vibrant green.

Don Miller PhD
alfafadoc@outlook.com
1-208-250-0376