


## Stem and Bulb
(and seeds and leaves……)
## Nematode

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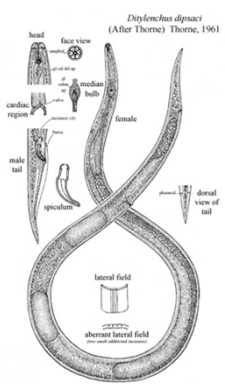



Common names

Stem nematode
Stem & bulb nematode
Bloat nematode

Anguinidae

Ditylenchus
Anguina
Subanguina
Pseudhalenchus
Pterotylenchus
Chitinotylenchus
Sychnotylenchus

- more than 80 species
- difficult to distinguish morphologically
- many host races
- host range of many “races” overlap

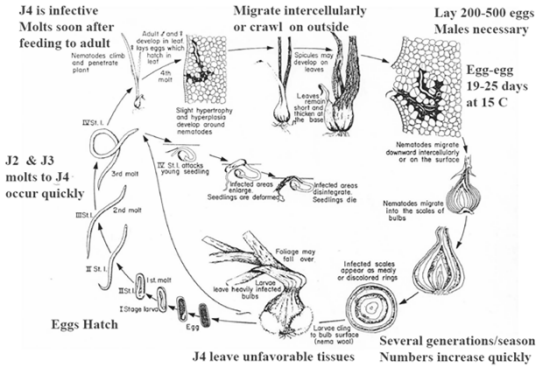
Table 1. Host range of the two tested *Ditylenchus dipsaci* populations

| | Onion | Garlic | Leek | Spinach | Chicory |
|---|---|---|---|---|---|
| Population from chicory | 0 | 1 | 0 | 1 | 2 |
| Population from garlic | 2 | 2 | 0 | 0 | 1 |

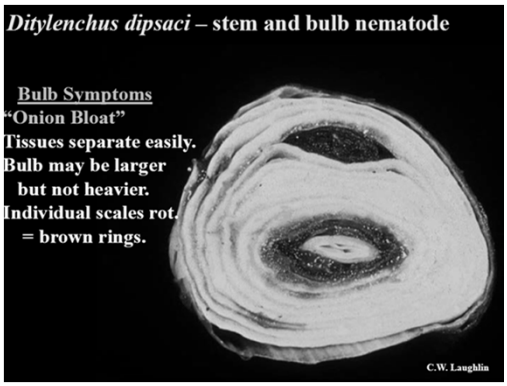
0 – no nematodes survived; 1 – only single adult individuals survived; 2 – life cycle of the parasite completed

*DOUDA O. (2005): Host range and growth of Stem and Bulb Nematode (Ditylenchus dipsaci) populations isolated from garlic and chicory. Plant Protect. Sci., 41: 104–108.*

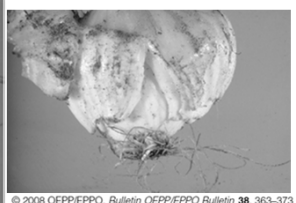
***Ditylenchus dipsaci* – stem and bulb nematode**




***Ditylenchus dipsaci* – stem and bulb nematode**




Oregon State

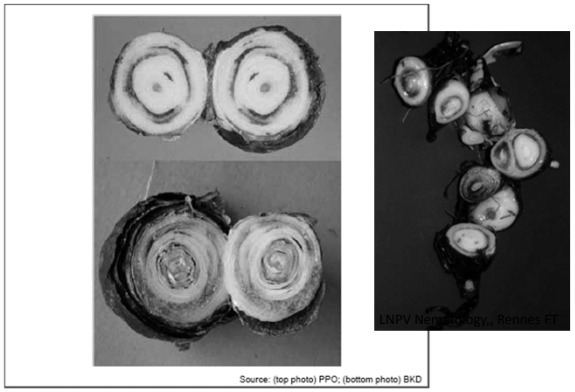
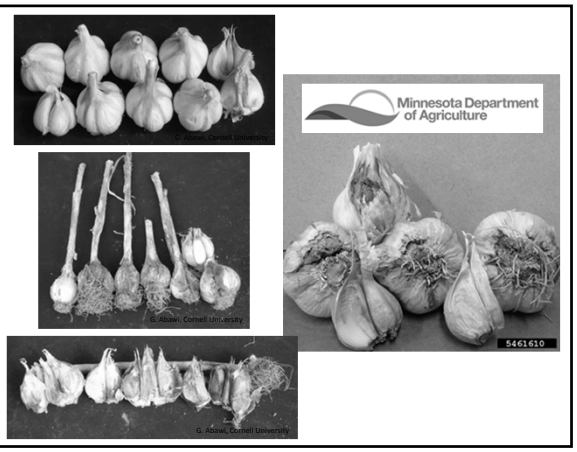



Figure 5-39 Cross Section of *Hyacinthus* Bulbs Showing Discolored Leaf Scales Caused by Infection of *Ditylenchus dipsaci*



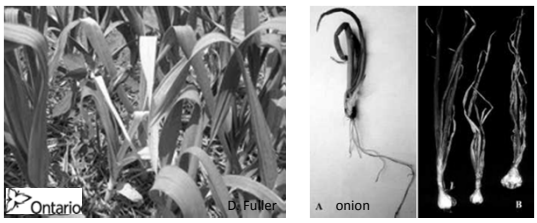


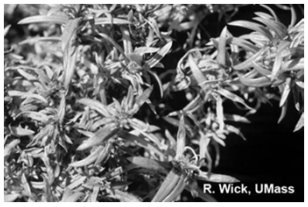
absence of roots on the basal plate

swollen deformed bulbs

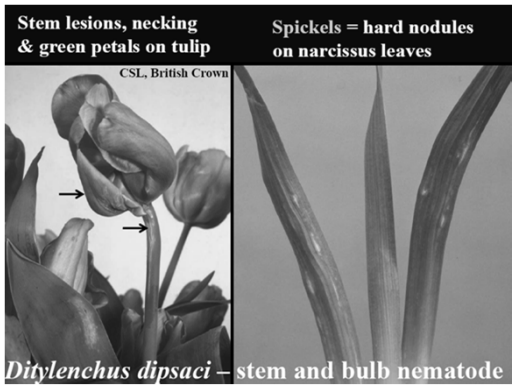
chlorosis

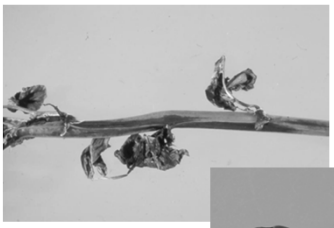
twisting



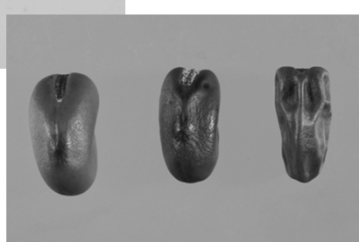




*D. dipsaci* on phlox showing necrotic leaves and twisted stems.





stems



seeds



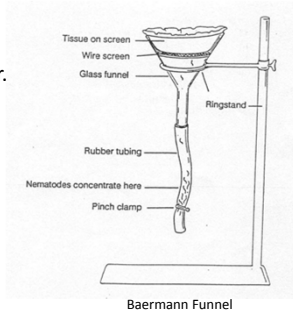
**Cultural practices:**
- plant clean, uninfested cloves
- grow nonhost crops
- do not bring infested soil into fields

**Chemical control:**
- pre-plant fumigation
- oxymyl

## Recovery and Identification

Incubation Basics

Cover plant tissues with water. To obtain a clean prep, place plant tissues on Kleenex - nematodes will crawl through the tissue and collect in the water reservoir.




Baermann Funnel

**Table 1** Key to distinguish *Ditylenchus* spp. from other tylenchid genera (modified from Brzeski, 1998)

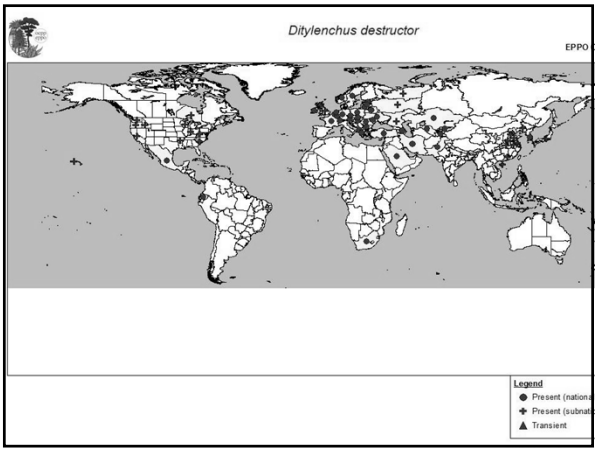
| | | |
|---|---|---|
| 1 | Females mobile | 2 |
| | Females swollen, globose or lemon-shaped | Other genera |
| 2 | Female gonads prodelphic and outstretched | 3 |
| | Female gonads paired or reflex when prodelphic | Other genera |
| 3 | Pharyngeal glands offset from intestine or slightly overlapping it | 4 |
| | Pharyngeal glands distinctly overlapping intestine | Other genera |
| 4 | Metacorpus offset from procorpus, metacorporeal plates short or absent | 5 |
| | Procorpus gradually expands into large metacorpus, metacorporeal plates long | Other genera |
| 5 | Sperm large, head usually low, spermatheca not off-set. | *Ditylenchus* |
| | Sperm small, head usually high, spermatheca off-set in most genera | Other genera |

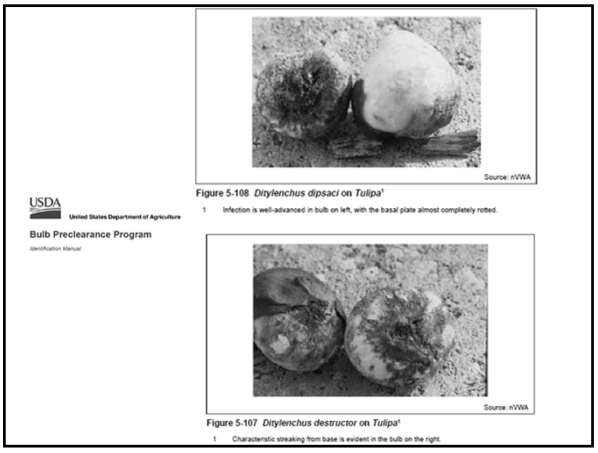
**Table 2** Discriminating morphological characteristics of *D. destructor*, *D. dipsaci*, *D. convallariae* and *D. myceliophagus* (after Decker, 1969)

| | *D. destructor* | *D. dipsaci* | *D. convallariae* | *D. myceliophagus* |
|---|---|---|---|---|
| A ratio ♀ | 32 (18–41) | 37 (36–40) | 42 (32–54) | 30 (23–44) |
| Body length ♀ (mm) | 1.0 (0.8–1.4) | 1.1 (0.9–1.3)* | 1.1 (0.9–1.3) | 0.9 (0.6–1.0) |
| Stylet length (µm) | 10–12 | 11–13 | 11–13 | 7–10 |
| Posterior bulb | short, dorsally overlapping | not overlapping | not overlapping | short, dorsally overlapping |
| Number of lateral lines | 6 | 4 | 6 | 6 |
| Vulva position (%) | 80 (78–83) | 82 (79–82) | 77 (74–79) | 82.5 (74–90) |
| Post-vulval sac length | 2/3–3/4 of vulva-anus distance | 1/2 of vulva-anus distance | 1/4–1/2 of vulva-anus distance | 2–2 1/4 vulva-anus distance |
| Vulva-anus length | 1 3/4–2 1/3 tail length | 1 3/4–2 1/4 tail length | 2–2 1/4 tail length | 2–2 1/4 tail length |
| Tail shape | conoid, usually slightly bent to ventral side in posterior part | conoid | conoid | broadly conoid |
| Tail tip | finely rounded | sharply pointed | sharply pointed | finely rounded |
| Spiculum length (µm) | 9–12 | 10–12 | 8–11 | 9 |
| Length of cone/total stylet length | About 50% | About 50% | << 50% | << 50% |

*The 'giant' race of *D. dipsaci* in *Faba* bean can be up to 2.0 mm long.





*Ditylenchus dipsaci* vs *D. destructor*

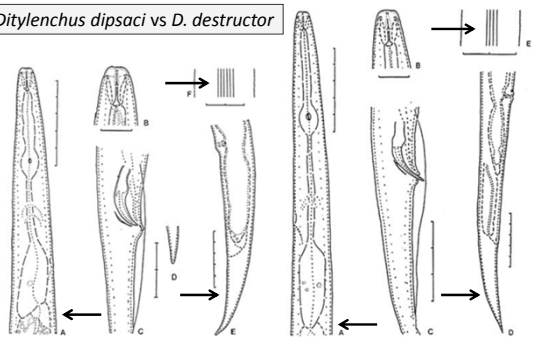
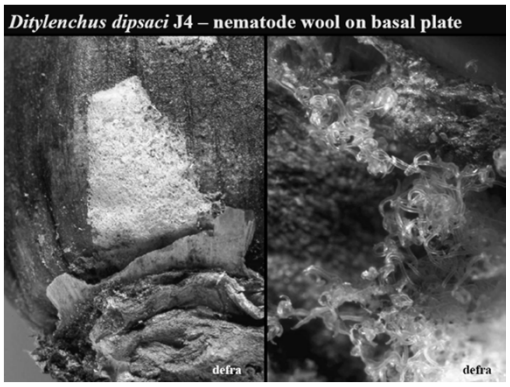


Fig. 12 *Ditylenchus destructor* (A) Female, pharyngeal region. (B) Head of female. (C) Male, spicule region. (D) End of female tail. (E) Posterior portion of female. (F) Lateral field at midbody. Each unit on bars = 10 µm (After Sturhan & Brzeski, 1991).



Fig. 13 *Ditylenchus dipsaci*. (A) Female, pharyngeal region. (B) Head of female. (C) Male, spicule region. (D) Posterior portion of female. (E) Lateral field at midbody. Each unit on bars = 10 µm (After Sturhan & Brzeski, 1991).




**Appendix 1 ITS-RFLP analysis according to Wendt *et al.* (1993)**

**Appendix 2 Specific SCAR-PCR according to Esquibet *et al.* (2003)**

**Appendix 3 Specific PCR according to Subbotin *et al.* (2005)**

**Appendix 4 Specific PCR according to Marek *et al.* (2005)**

**Appendix 5 Specific PCR according to Kerkoud *et al.* (2007)**



*Madani et al., 2015*
*Can. J. Plant Pathol., 2015*
*Vol. 37, 212 - 220*

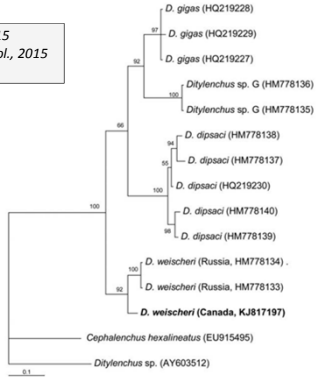
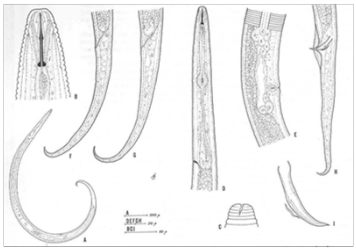
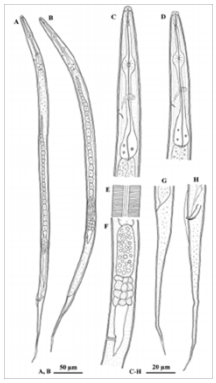



Fig. 2 Phylogenetic relationships of *D. weischeri* with other species of the genus *Ditylenchus* as inferred from the Bayesian analysis of the *hsp*90 gene sequences under the GTR+I + G model. Posterior probabilities are given on appropriate clades.

Don't confuse these genera with *Ditylenchus*.....



*Tylenchus*



*Filenchus*

The genus *Aphelenchoides* resembles *Ditylenchus* for some features – but not from the median bulb.