



Validating a thermotherapy seed-treatment against *Ditylenchus dipsaci* associated with alfalfa seeds

E. Mangwende

Supervisors: T.A.S Aveling and Q. Kritzinger

Coordinators: V. Grimault, I. Sérandat, G. Orgeur and M. Avrillon



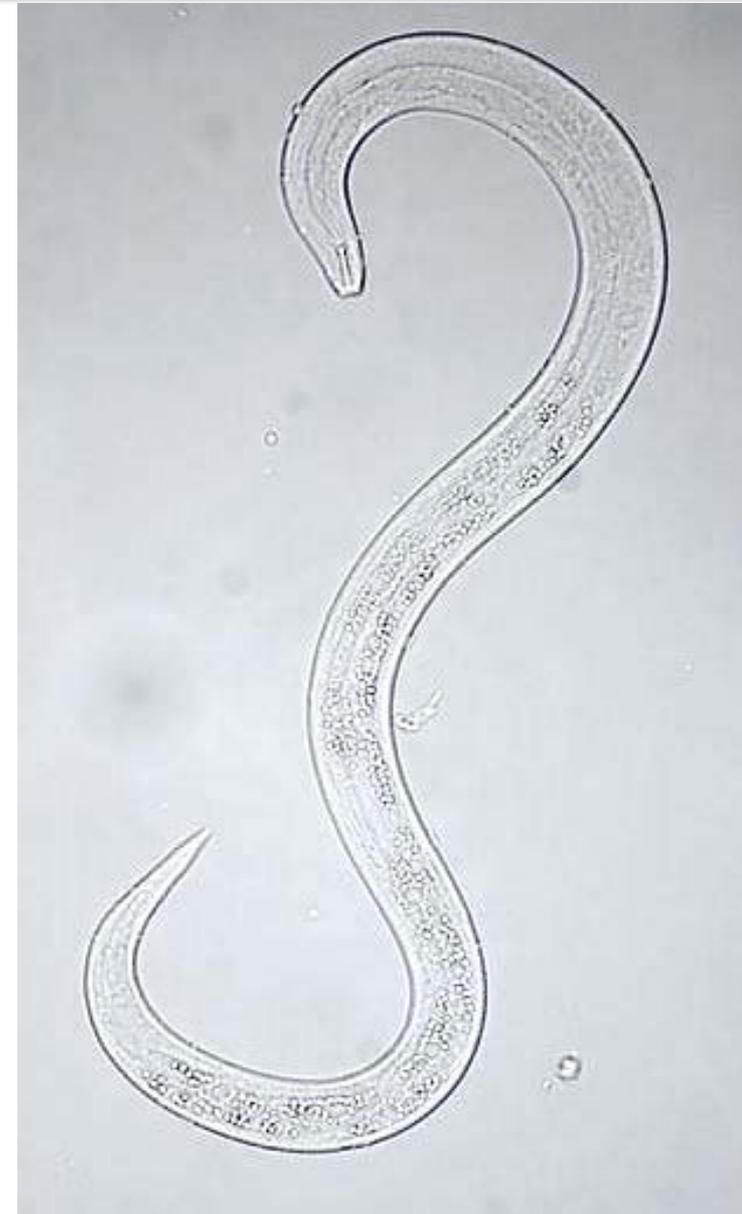
Medicago sativa

- Plant Description
- Importance of the crop
- Limiting factors



Ditylenchus dipsaci

- ❑ Pest status
- ❑ Transmission and distribution
- ❑ Disease symptoms:
 - ✓ shortening of internodes
 - ✓ stunting of the stem and leaf curling





Disease management

- ❑ Ensure planting material is free of nematodes
- ❑ Synthetic chemicals
 - ✓ highly effective yet toxic and hazardous on the environment
- ❑ Alternative non-chemical methods
 - ✓ Potential of steam thermotherapy



Harris et al. (2001); Mouttet et al. (2014); Sérandat et al. (2014)





Aim

- Validate steam thermotherapy seed-treatment as a standard non-chemical control method of disinfecting alfalfa seed lots contaminated with *Ditylenchus dipsaci*



**Obtain treated and non-treated alfalfa seed lots;
variety A, B and C**



**Set up experiment under greenhouse conditions:
For 1 000 seedling/treatment: 20 sub-replicates of 50
seeds/pot
For 6 000 seedling/treatment: 6 replicates of 1 000/
seedling tray
✓ Arranged in a CRBD**



**Harvest half of the experimental units 1 month after
sowing, grind and count nematodes**



**Harvest the remaining experimental units 3
months after sowing, grind and count nematodes**



**Table 1: Transmission of nematodes into seedlings**

		Number of nematodes detected from seedlings							
		After 1 month				After 3 months			
		<i>Ditylenchus</i>		Saprophage		<i>Ditylenchus</i>		Saprophage	
Variety	Treatment condition	Alive	Dead	Alive	Dead	Alive	Dead	Alive	Dead
A	untreated	4 ab	1a	1 b	4a	10a	1a	16a	0a
A	1	0 b	0 b	3a	0 b	2 b	0 b	1 b	0a
A	2	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
A	3	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
A	4	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
B	untreated	0 b	0 b	1 b	0 b	0 c	0 b	0 b	0a
B	1	10a	1a	2 ab	0 b	0 c	0 b	10a	0a
B	3	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
B	4	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
C	untreated	1 b	0 b	0 b	1 b	0 c	0 b	1 b	0a
C	1	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
C	2	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
C	3	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
C	4	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
Healthy	uncontaminated	0 b	0 b	0 b	0 b	0 c	0 b	0 b	0a
LSD		6.92	0.54	1.85	2.9	6.17	0.15	10.11	0
CV%		1.98	1.98	1.98	1.98	1.98	1.98	1.98	1.98



Seedling transmission of nematodes determined by crushing 1 000 seedlings/treatment.

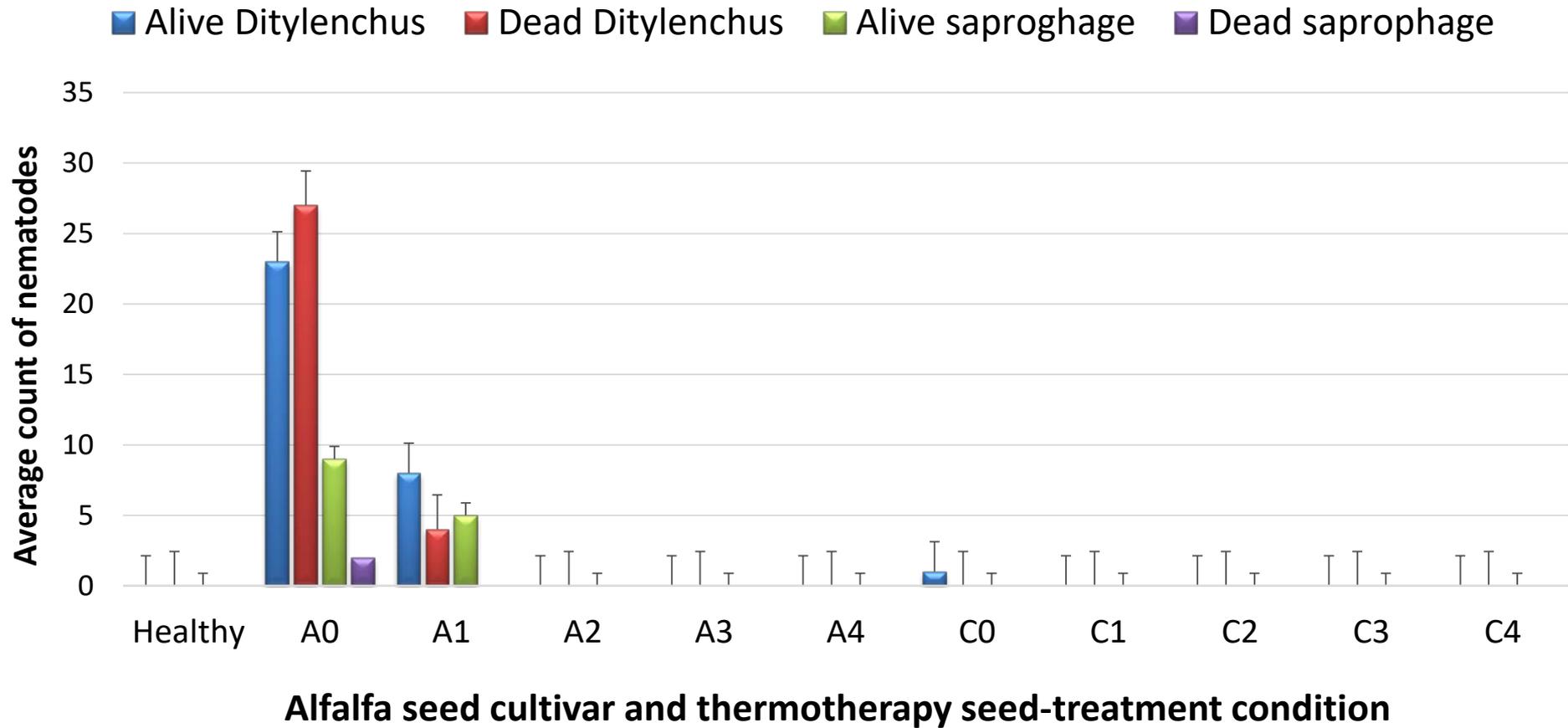


Figure 1: Efficacy of thermotherapy seed-treatments against seedling transmission of nematodes determined by crushing 6 000 seedlings for each treatment after 3 months.





□ Transmission of nematodes to seedlings

- ✓ Low seed transmission of nematodes was recorded
- ✓ 8 and 1 live *D. dipsaci* per 1 000 seeds of A and C, respectively
- ✓ Low nematode inoculum loads on alfalfa seed recorded by Hooper (1971)





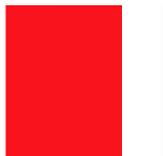
□ Efficacy of steam thermotherapy

- ✓ All seed-treatment conditions, except condition 1, effectively reduced transmission of nematodes from seed to seedlings
- ✓ Conditions 2, 3 and 4 can be approved as alternative ways of controlling *D. dipsaci* associated with alfalfa seed lots





Acknowledgements



UNIVERSITEIT VAN PRETORIA
UNIVERSITY OF PRETORIA
YUNIBESITHI YA PRETORIA

Denkleiers • Leading Minds • Dikgopolo tša Dihalefi

