

Investigating Onion Diseases: New and Old

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Research Update

Foliar diseases

Pink root



Bacterial Leaf Blight and Bulb Rot

(Pantoea agglomerans)







Bacterial Diseases Control

- **Rotation out of onion for 3 years.**
- **Use less susceptible cultivars.**
- **Plant spacing.**
- **Avoid sprinkler irrigation.**
- **Control of insect pests , esp. thrips.**

Purple Blotch

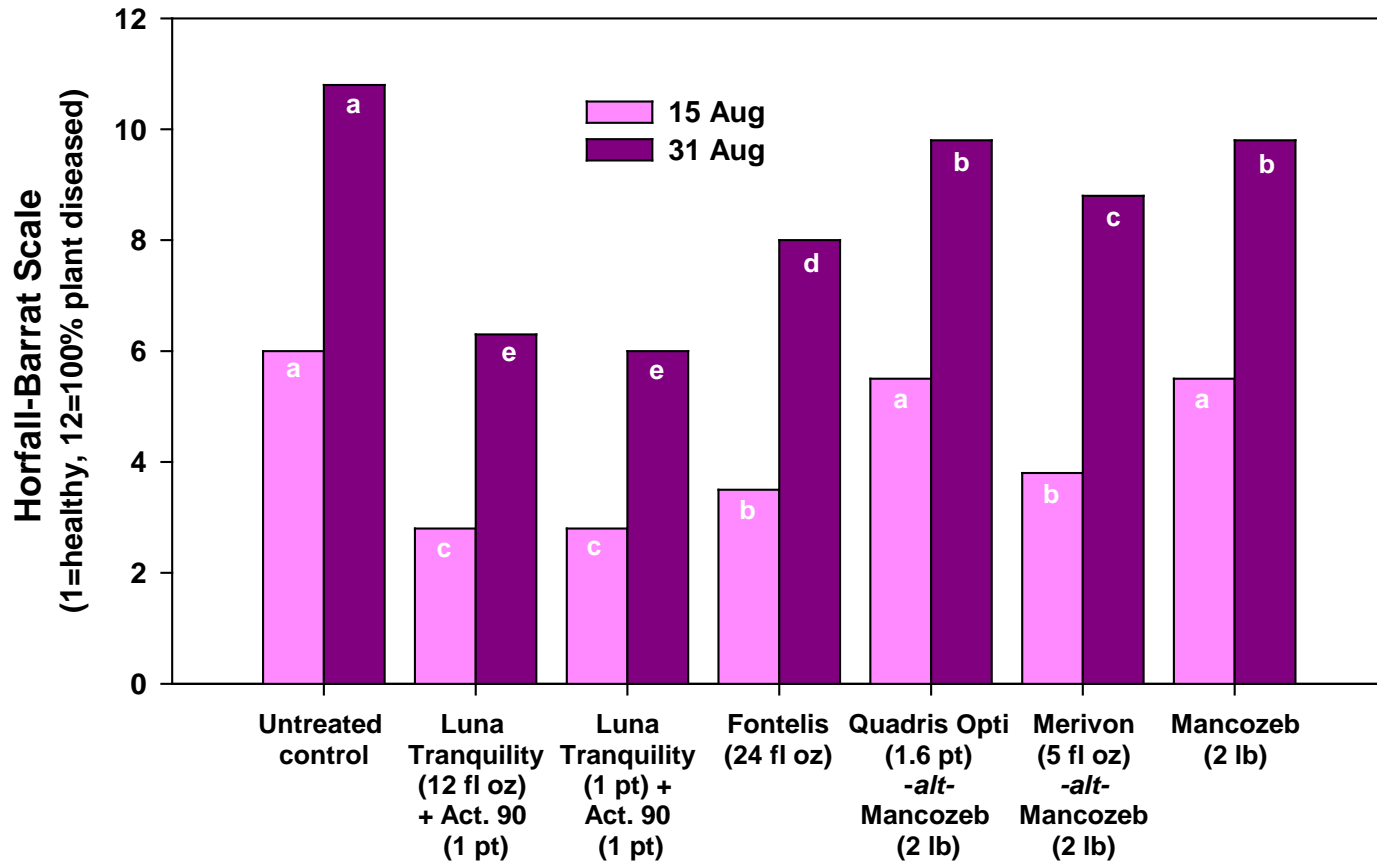
(Alternaria porri)



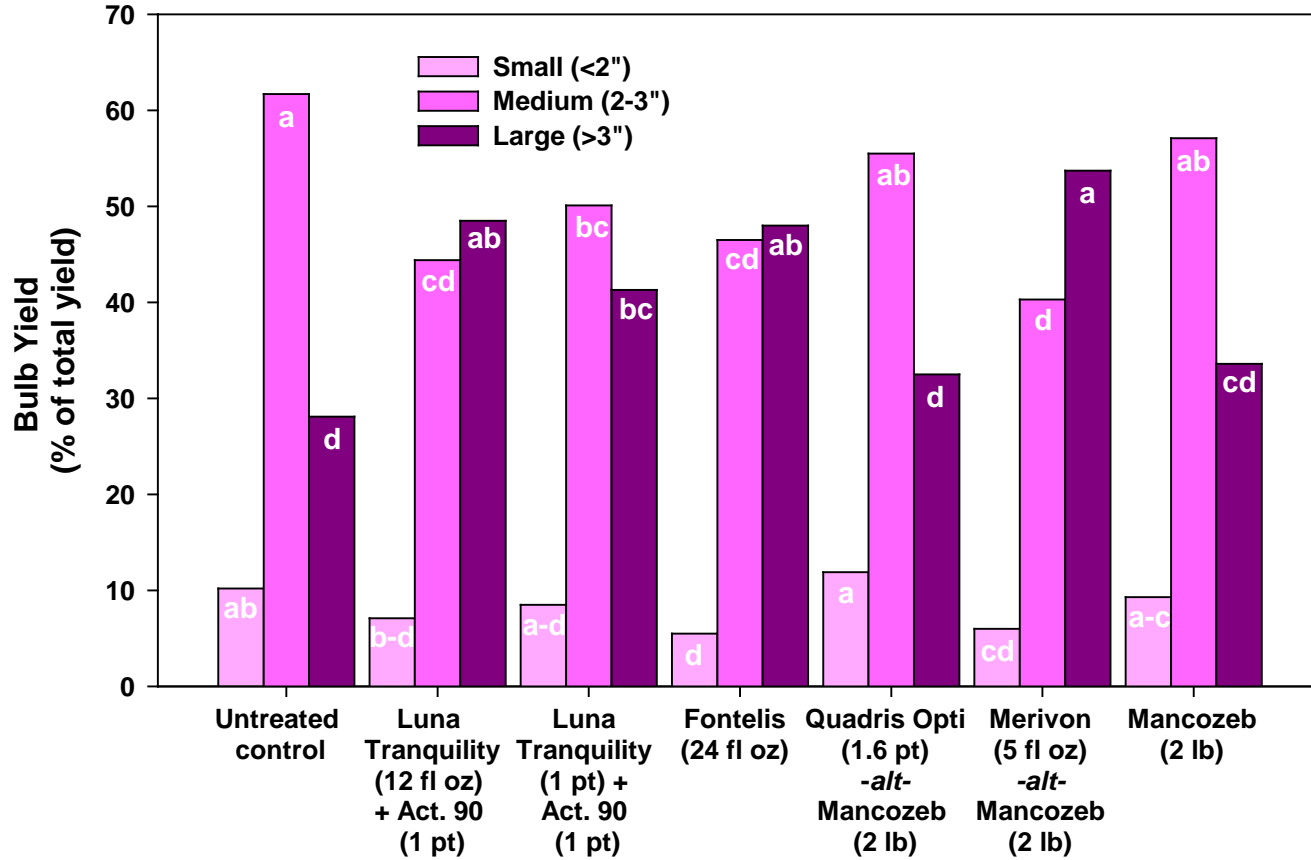
Products tested

Product	Active ingredient	FRAC Code	Labelled for onions
Luna Tranquility SC	Fluopyram,	7	Y
	Pyrimethanil	9	
Fontelis SC	Penthiopyrad	7	Y
Quadris Opti SC	Chlorothalonil,	M5	Y
	Azoxystrobin	11	
Mancozeb DF	Mancozeb	M3	Y
Merivon SC	Pyraclostrobin, Fluxapyroxad	11 7	Y

Foliar Disease Severity



Bulb Yield (lb/5 ft row)



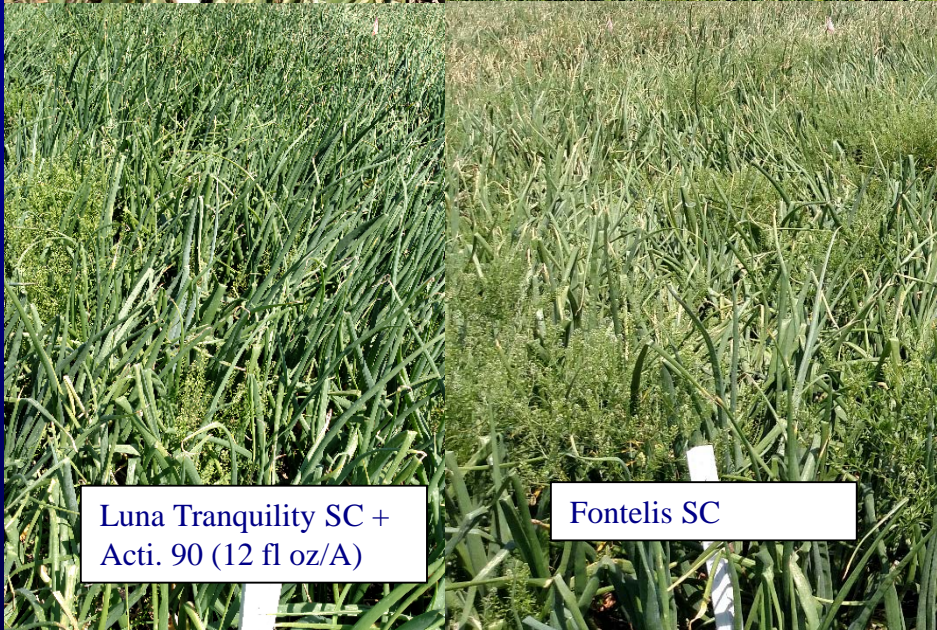
Treatment and rate/A, application schedule, applied at 7-day intervals	Necrotic tissue severity*					
	8/15		8/25		8/31	
Untreated Control	6.0	a**	7.0	a	10.8	a
Luna Traquility SC 12 fl oz + Act.90 1 pt, apps A-J	2.8	c	3.3	d	6.3	e
Luna Traquility 1 pt + Act.90 1 pt, apps A-J	2.8	c	3.8	cd	6.0	e
Fontelis SC 24 fl oz, apps A-J	3.5	b	4.3	bc	8.0	d
Quadris Opti SC 1.6 pt, apps A,C,E,G,I -alt- Mancozeb DF 2 lb, apps B,D,F,H,J	5.5	a	6.5	a	9.8	b
Merivon SC 5 fl oz, apps A,C,E,G,I -alt- Mancozeb DF 2lb, apps B,D,F,H,I	3.8	b	4.8	b	8.8	c
Mancozeb DF 2lb, apps A-J	5.5	a	6.5	a	9.8	b

Treatment and rate/A, application schedule, applied at 7-day intervals	Bulb yield (lb/5 ft row)									
	Small (<2")		Med (2-3")				Large (>3")		Total	
	lb	%	lb	%	lb	%	lb	%	lb	%
Untreated Control	3.6	10.2 ab	21.8 a	61.7 a	10.0 d	28.1 d	35.4 bc			
Luna Traquility SC 12 fl oz + Act.90 1 pt, apps A-J	2.7	7.1 b-d	17.1 c	44.4 cd	18.7 b	48.5 ab	38.4 ab			
Luna Traquility 1 pt + Act.90 1 pt, apps A-J	3.2	8.5 a-d	19.4 a-c	50.1 bc	16.1 bc	41.3 bc	38.7 ab			
Fontelis SC 24 fl oz, apps A-J	2.2	5.5 d	18.6 bc	46.5 cd	19.2 ab	48.0 ab	40.0 ab			
Quadris Opti SC 1.6 pt, apps A,C,E,G,I -alt- Mancozeb DF 2 lb, apps B,D,F,H,J	3.9	11.9 a	18.0 bc	55.5 ab	10.6 d	32.5 d	32.4 c			
Merivon SC 5 fl oz, apps A,C,E,G,I -alt- Mancozeb DF 2lb, apps B,D,F,H,I	2.6	6.0 cd	17.4 bc	40.3 d	23.2 a	53.7 a	43.2 a			
Mancozeb DF 2lb, apps A-J	3.3	9.3 a-c	20.1 ab	57.1 ab	12.3 cd	33.6 cd	35.6 bc			



Untreated Control

Luna Tranquility SC
+ Acti. 90 (1pt/A)



Luna Tranquility SC +
Acti. 90 (12 fl oz/A)

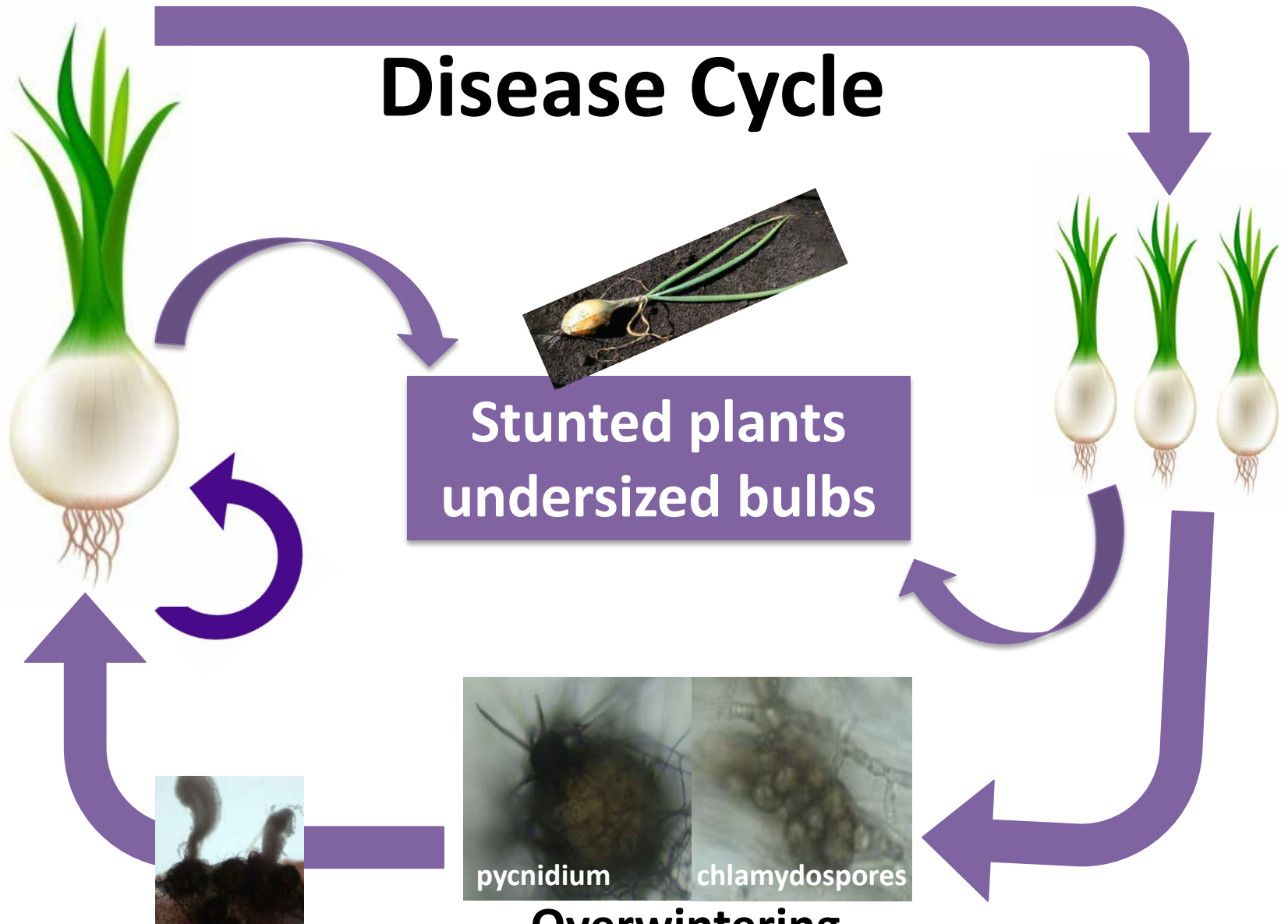
Fontelis SC

Pink Root

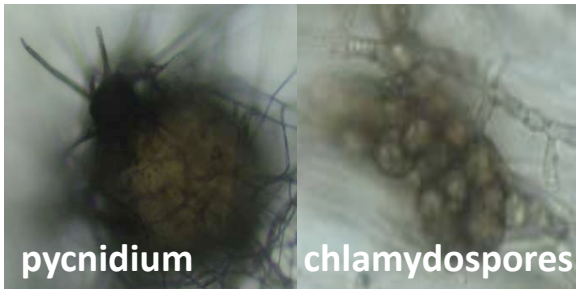
- Caused by *Setophoma terrestris*.
- Common in soils.
- Favored by warm weather.
- Below ground symptoms: Pink colored roots (light-dark red/purple), shriveled, disintegrated.
- Above ground symptoms: nutrient deficiency, drought stress.



Disease Cycle



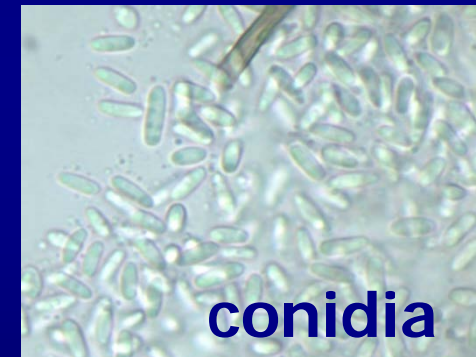
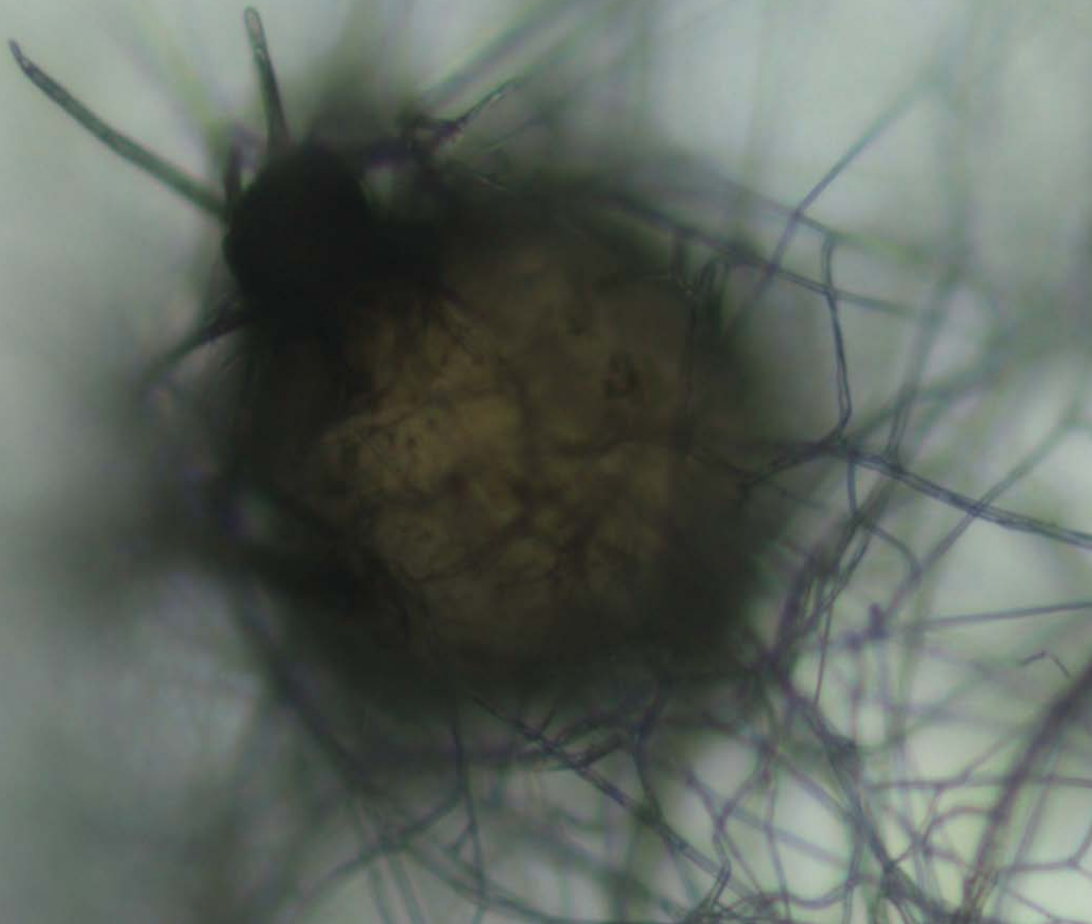
Stunted plants
undersized bulbs



Overwintering
fruiting structures in soil,
debris, volunteers, cull piles

Morphology

setose pycnidia



conidia



chlamydospores

Disease Management

- Expand rotational period with nonhost crops.
- Select resistant/tolerant cultivars.
- Soil fumigation.
- Soil solarization.

Onion Cultivars Tested for Pink Root Susceptibility

- None of the cultivars tested was resistant to pink root.

Low	Medium-low	Medium-high	High
Hendrix	Infinity	Hamlet	Madras
Sedona	Bradley	Stanley	Sherman
Redwing	Prince	Safrane	Livingston
	Marco	Talon	Highlander
	Polo	Vespucci	
		Milestone	

Objective

- Determine if plant age influences the ability of *S. terrestris* to colonize onion root cells of two onion cultivars representing a high and low level of pink root susceptibility.

Materials and Methods

- **Onion cultivars:**

- Hendrix, Highlander

- **Age groups:**

- 3, 5, 7, 9 weeks old.

- **24 plants per age per cultivar**

- 12 inoculated

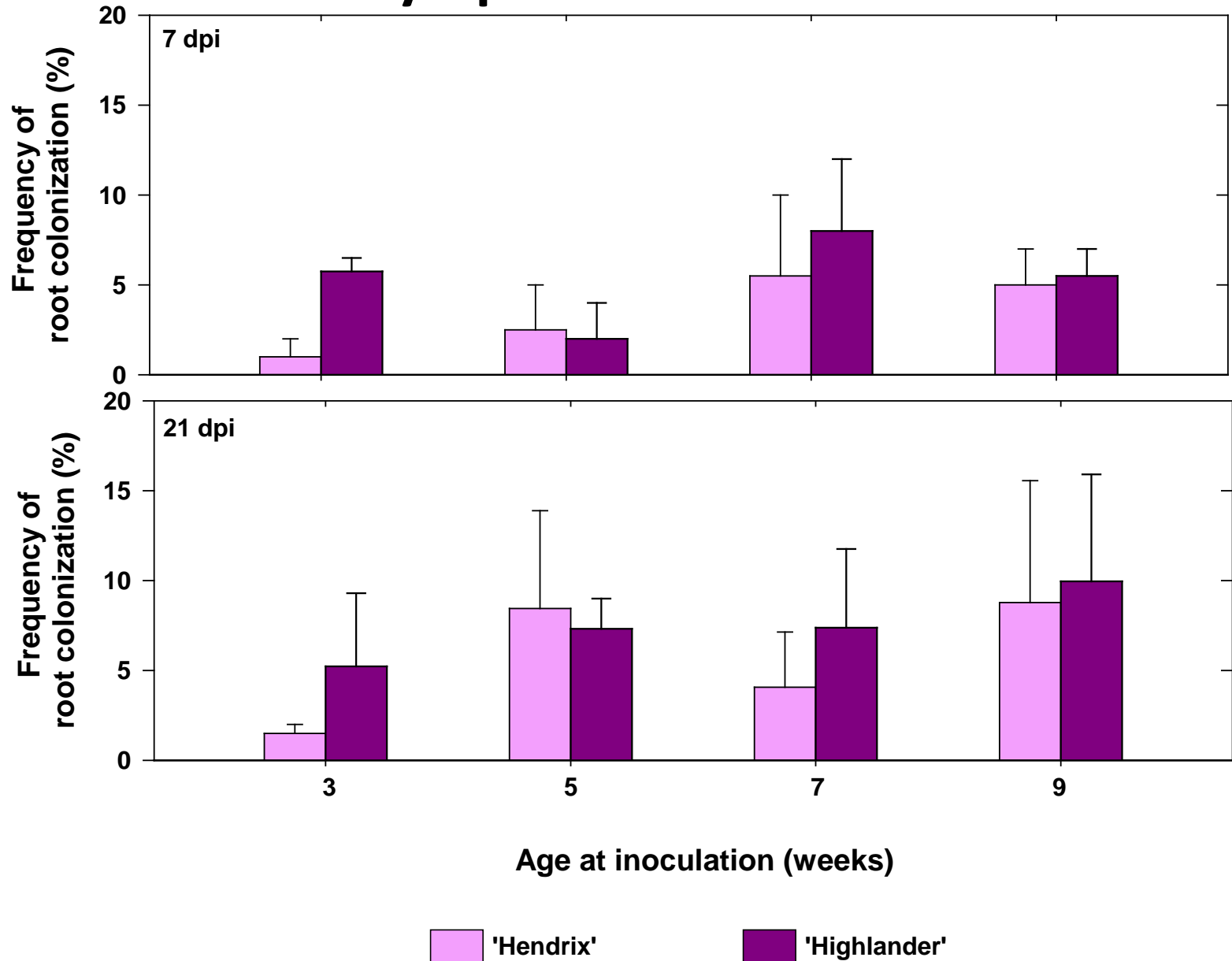
- 12 non-inoculated

- **Inoculum: Millet seeds infested with *S. terrestris*.**

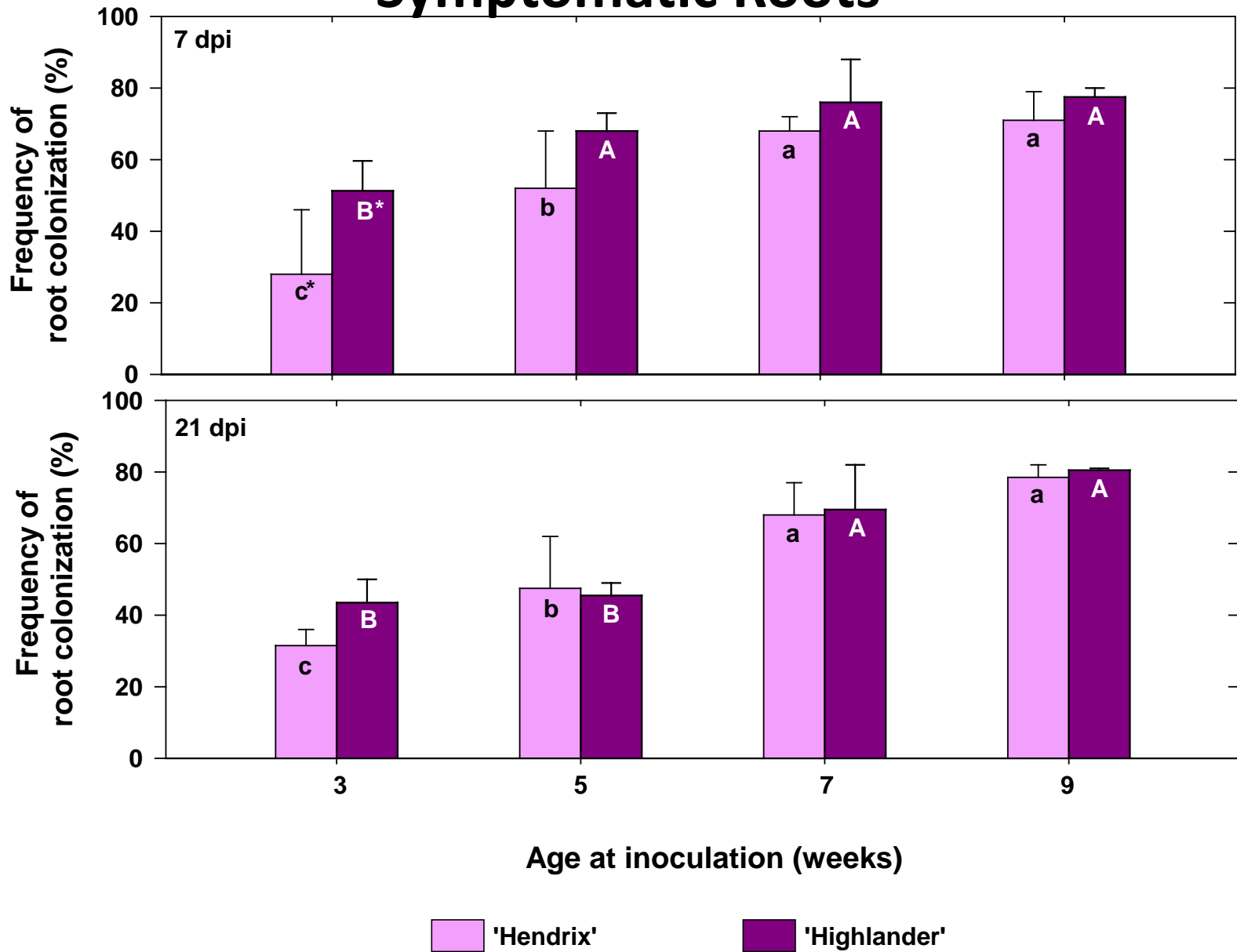
Materials and Methods

- **Sampling:** 6 inoculated and 6 non-inoculated plants sampled at 7, 21 days
- **Root staining:** Cut 1.5 cm from root tips, stained with trypan blue.
 - Collected 5 asymptomatic roots + 5 symptomatic roots from each plant
 - Observed 25 roots per treatment
- **Estimation of frequency (%) of mycelium in the root cells:** Absent = 0. Present = 1.

Frequency (%) of Root Colonization on Asymptomatic Roots

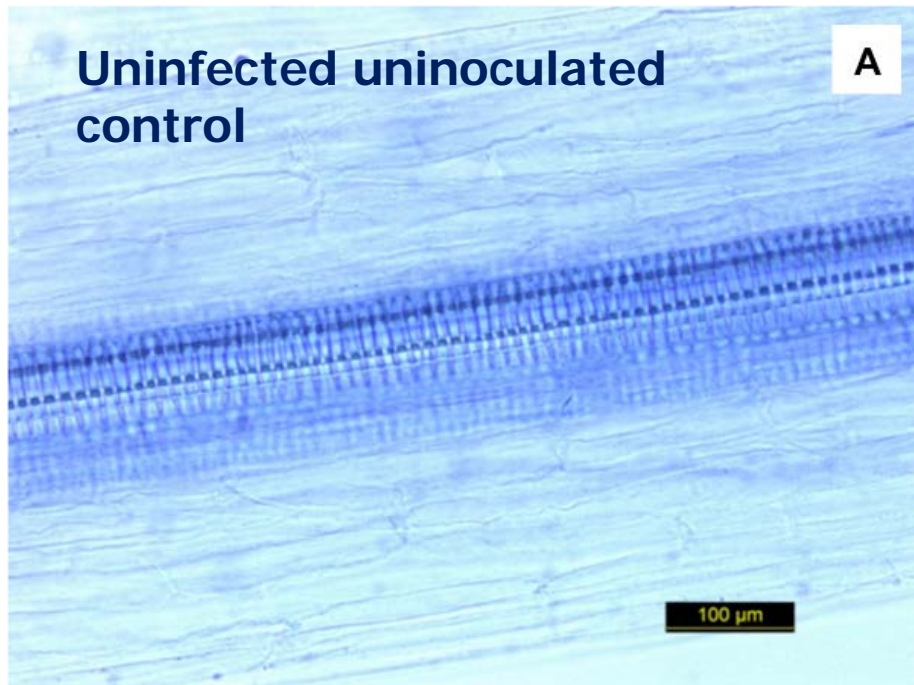


Frequency (%) of Root Colonization on Symptomatic Roots



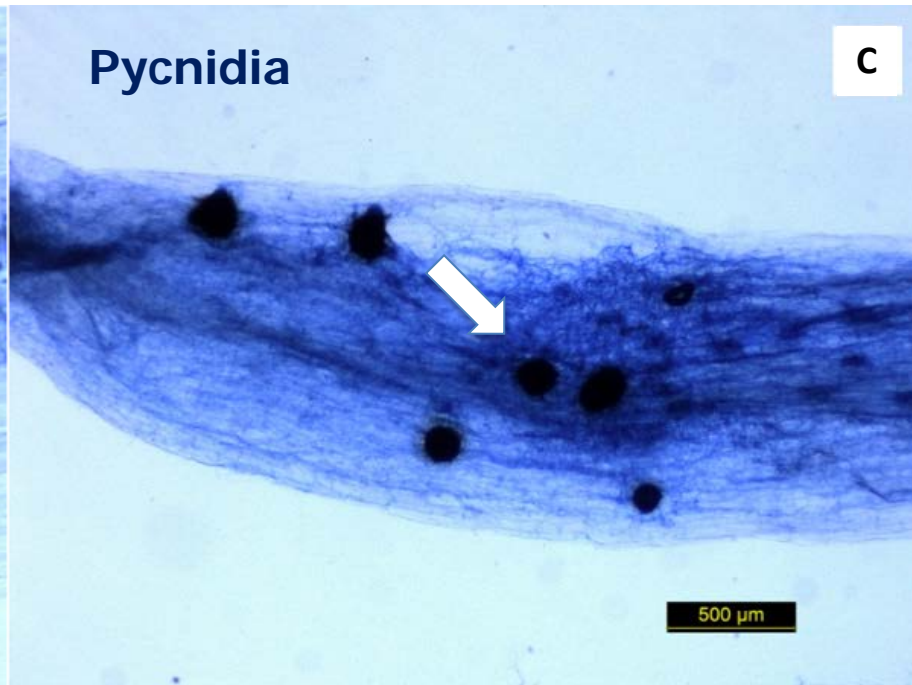
Uninfected uninoculated control

A



Pycnidia

C



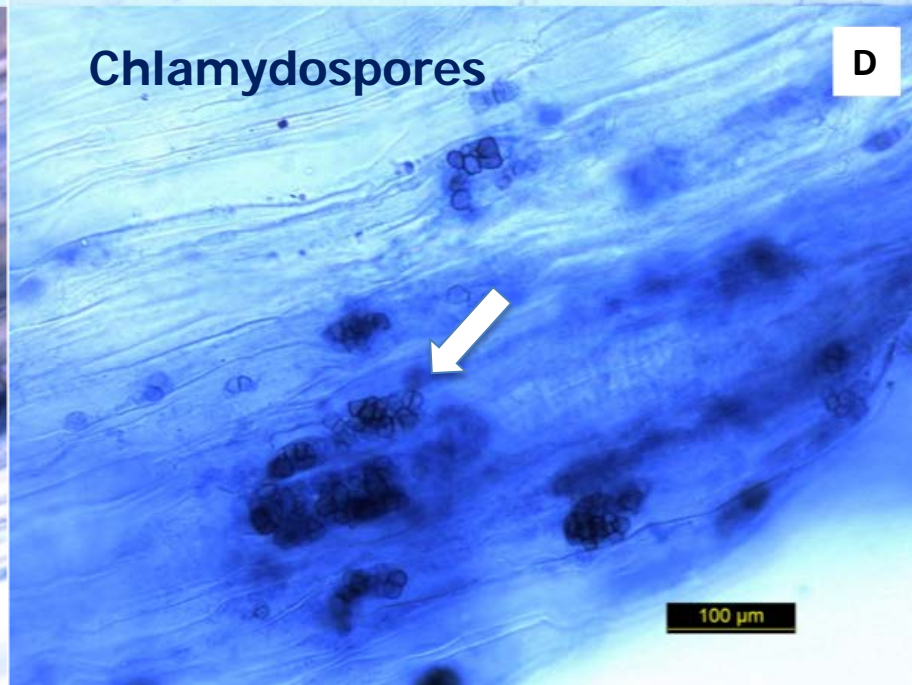
Colonized root cells
– *S. terrestris* mycelia

B



Chlamydospores

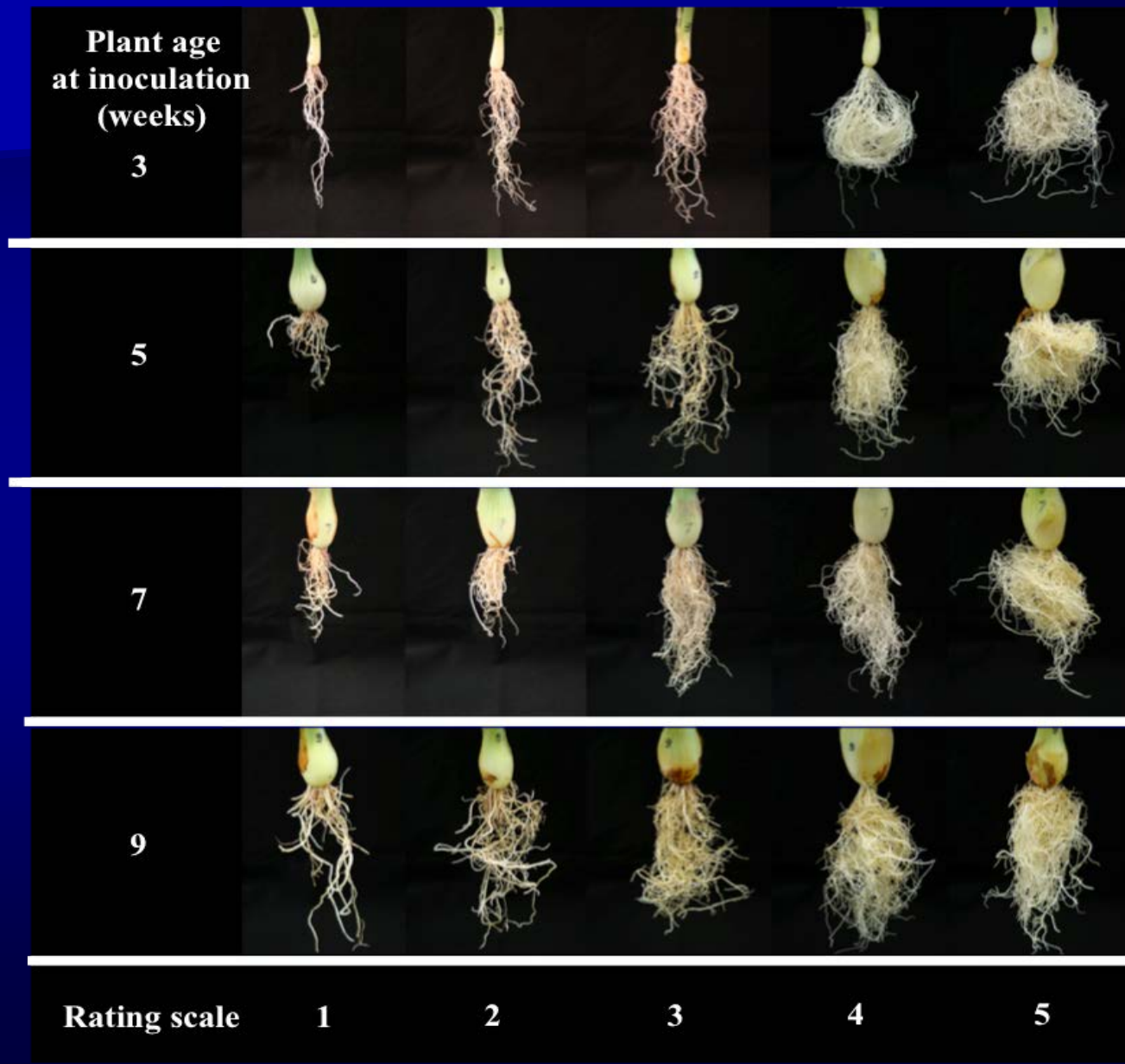
D



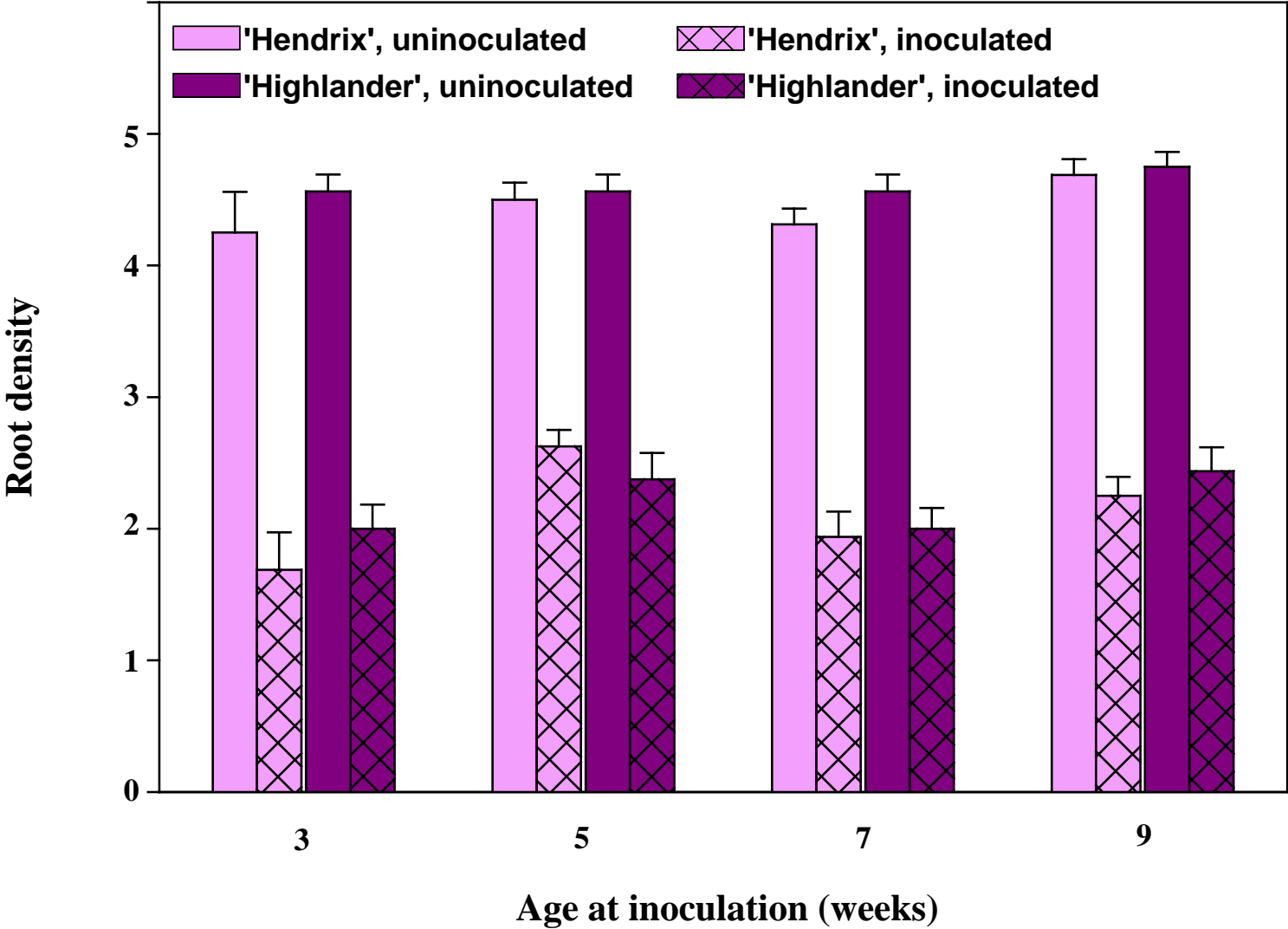
Materials and Methods

- **Onion cultivars:**
 - Hendrix,
Highlander
- **Age groups:**
 - 3, 5, 7, 9 weeks old.
- **8 plants per age per cultivar.**
- **Inoculum: Millet seeds infested with *S. terrestris*.**
- **Sampling: 42 days.**
- **Plant growth measurements:**
 - Root density, height, fresh weight, total leaves/plant, bulb circumference.

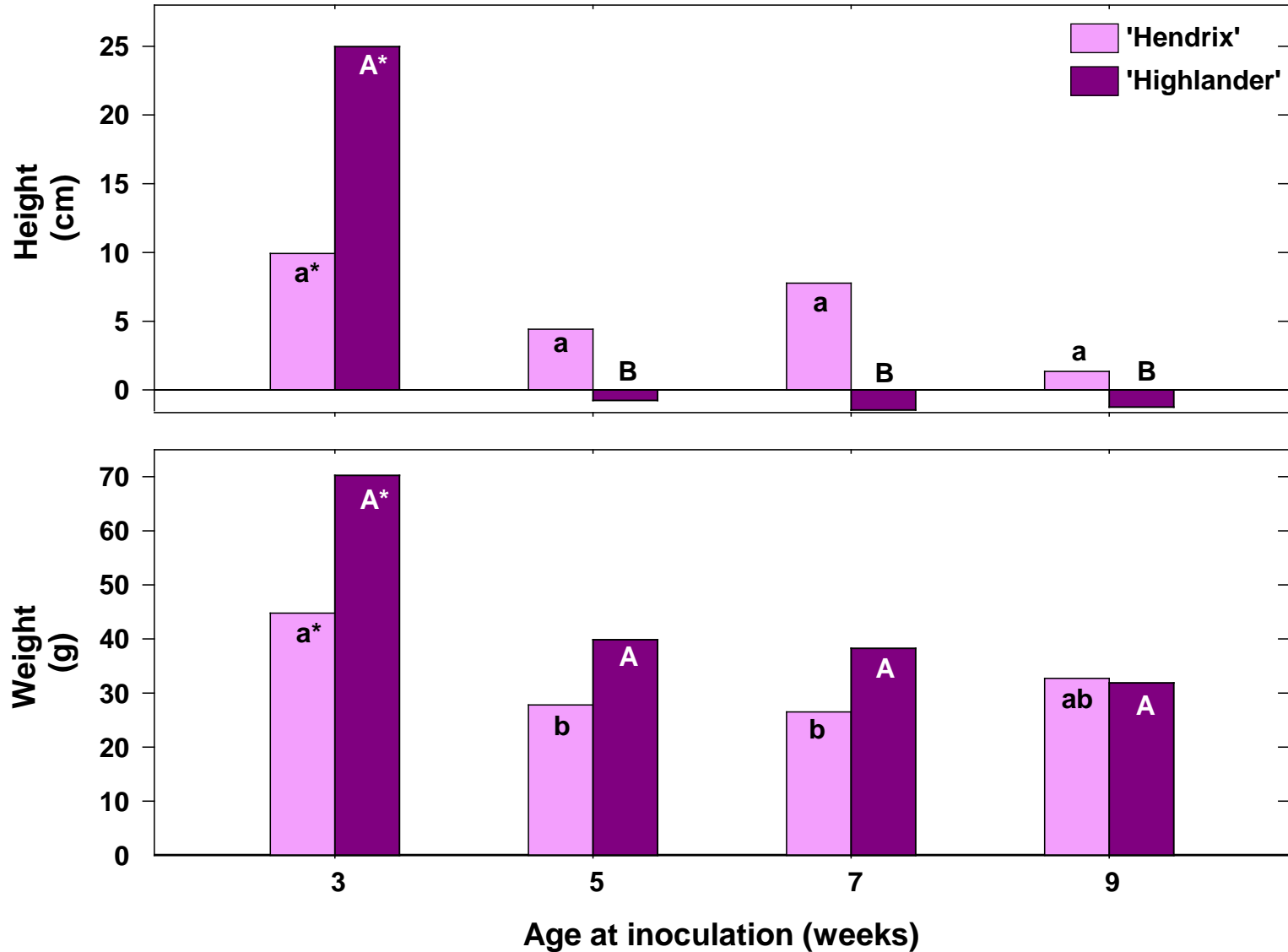
Root Density Visual Scale



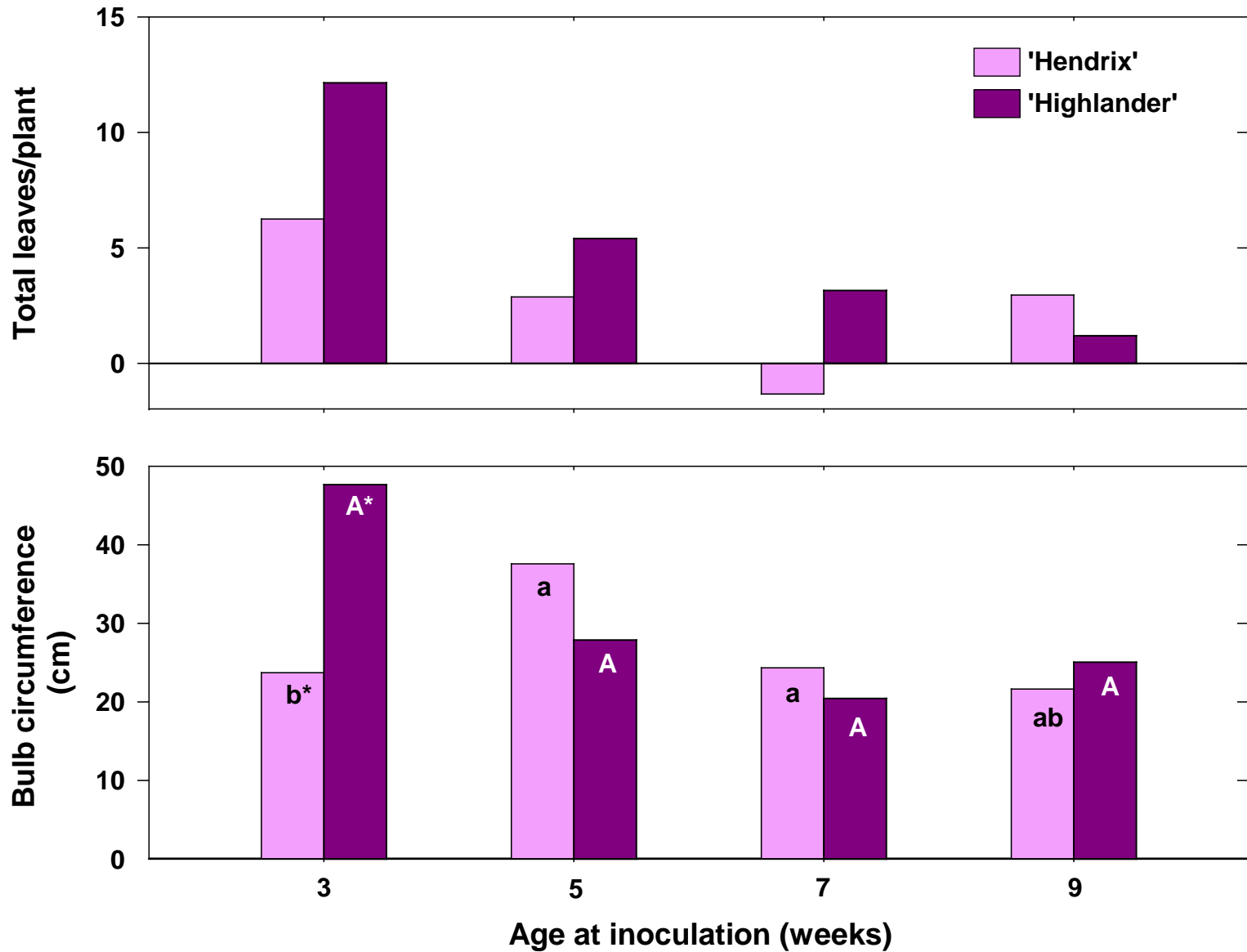
Effect of Onion Age and Cultivar on Reduction in Root Density Compared to Uninoculated Plants



Effect of Onion Age and Cultivar on Reduction (%) in Plant Growth Compared to Uninoculated Plants



Effect of Onion Age and Cultivar on Reduction (%) in Plant Growth Compared to Uninoculated Plants



Summary

- Both asymptomatic and symptomatic roots were colonized by *S. terrestris*.
- High frequency of root colonization was detected in older plants
- Approximately 50% root density of all plant ages was reduced; there was no difference between the cultivars and plant age.
- When infection occurred at young growth stage, disease was more severe.

Conclusions

■ Influence of age:

- Growth was reduced greatly when onions were infected at a young stage.

Acknowledgments

- Michigan Onion Committee, Inc.
- MSU GREEN GR15-057

Thank you.

MICHIGAN STATE

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Questions?

