

Response of Soybean Cyst Nematode and Plant Growth to Combinations of Purple Deadnettle, Annual Ryegrass, and Soybeans

Valerie A. Mock, J. Earl Creech, and William G. Johnson



Introduction

Six winter annual weeds have been documented as alternative hosts for soybean cyst nematode (*Heterodera glycines*; SCN). Purple deadnettle (*Lamium purpureum*) appears to be the most compatible alternative host. SCN is found in most soybean producing regions of the United States, and is ranked as one of the most economically important pathogens in soybeans. Annual ryegrass (*Lolium multiflorum*) and SCN-resistant soybeans (*Glycine max*) have been shown to reduce SCN population densities. Since many fields contain combinations of SCN hosts and non-hosts growing together, it will be important to know how these combinations of plants influence SCN population densities and early-season soybean growth.

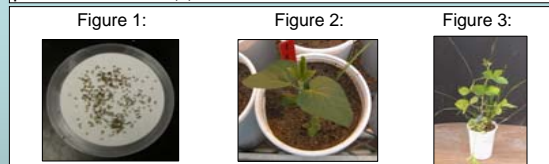
Objective

The objective of this greenhouse experiment was to determine if combinations of SCN host and non-host plants influence soybean growth, and SCN population density.

Materials and Methods

- Purple deadnettle was germinated with 0.2% KNO₃ (Figure 1).
- Purple deadnettle, SCN susceptible soybean ('Williams 82'), SCN-resistant soybean ('PI437654'), and annual ryegrass were planted in pots (11 cm by 14.5 cm) at two densities, zero or one per pot.
- Pots were inoculated two weeks after planting with 10,000 SCN eggs (HG type 2.5.7) (Figure 2).
- Eight weeks after inoculation plant heights, number of nodes, number of leaves, number of tillers or stems, leaf area, and dry weights were collected (Figure 3).
- Dry weights and cyst and egg counts will be presented.
- All data were log₁₀ transformed prior to analysis and Tukey's adjustment for multiple pairwise comparisons of means was used to separate means at P=0.05.
- Backtransformed means will be presented for clarity

Figures 1, 2, 3: Purple deadnettle seed prior to germination (1), plants two weeks after planting (2), and plants at harvest (3).



Results and Discussion

Plant Biomass

- Annual ryegrass and SCN-susceptible soybean interference reduced purple deadnettle dry weight (Table 1).
- Annual ryegrass and purple deadnettle reduced SCN-resistant soybean dry weight (Table 2).
- Annual ryegrass was the most competitive species in this experiment.

Table 1: Influence of annual ryegrass and SCN-susceptible soybean on purple deadnettle dry weight

Annual ryegrass	SCN-susceptible soybean	Purple deadnettle weight*
plants pot ⁻¹		grams
0	0	1.1 a
0	1	0.8 b
1	1	0.6 b
1	0	0.5 b

* Means with the same letter within a column were not different at P=0.05

Table 2: Influence of annual ryegrass and purple deadnettle soybean on purple deadnettle on SCN-resistant soybean dry weight

Annual ryegrass	Purple deadnettle	SCN – resistant soybean weight*
plants pot ⁻¹		grams
0	0	3.1 a
0	1	1.8 b
1	0	1.4 c
1	1	1.1 c

* Means with the same letter within a column were not different at P=0.05

Soybean Cyst Nematode

- When there were two susceptible plants in a pot, cyst and egg counts pot⁻¹ were higher than if there was one susceptible plant pot⁻¹ (Table 3).
- When there was one susceptible and one resistant plant pot⁻¹ it reduced cyst and egg numbers in comparison to a pot with two susceptible plants.
- The number of cysts gram⁻¹ of dry root indicates that purple deadnettle was a more compatible host to SCN than the SCN-susceptible soybean or pots with both purple deadnettle and SCN-susceptible soybean.

Table 3: Influence of purple deadnettle and soybean on SCN

Purple deadnettle	SCN-resistant soybean	SCN-susceptible soybean	Cysts*	Eggs
plants pot ⁻¹			no. pot ⁻¹	no. (g) root ⁻¹
1	1	1	152 b	36 bc
1	1	0	81 c	21 cd
0	1	1	92 c	17 d
1	0	1	213 a	46 b
1	0	0	147 b	120 a
0	0	1	122 b	29 bcd
0	1	0	0 d	0 e
0	0	0	0 d	0 e

* Means with the same letter within a column were not different at P=0.05

Conclusions

- Purple deadnettle should be controlled prior to soybean planting in the spring, because it can be competitive with soybeans, and can be a more compatible host than SCN-susceptible soybean.
- Fall-seeded annual ryegrass may be useful in reducing weed biomass, and SCN population density when SCN-susceptible hosts are present. However, it should be controlled in the spring prior to planting to avoid suppression of soybean growth.
- SCN population densities can be reduced when a host is grown in combination with a non-host.
- Use of annual ryegrass and SCN-resistant soybeans would aid in reducing SCN population density.

Acknowledgements

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