SOYBEAN CYST NEMATODE HATCHING BEHAVIOR

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Background

The soybean cyst nematode (SCN, *Heterodera glycines*), is a principal target for soybean pest management. It is an endo-parasite to the soybean plant. Ensuring its survival, this parasite has co-evolved with its host. SCN has become dependent on the soybean, ensuring hatching when suitable hosts are available. The mechanisms regulating soybean-induced hatching are unclear (Niblack, et al. 2006). One way SCN combats against regulatory management practices is the egg's ability to lay dormant within a cyst for up to 11 years. Research of SCN hatching will improve our understanding of SCN biology and will uncover new mechanisms for their control.

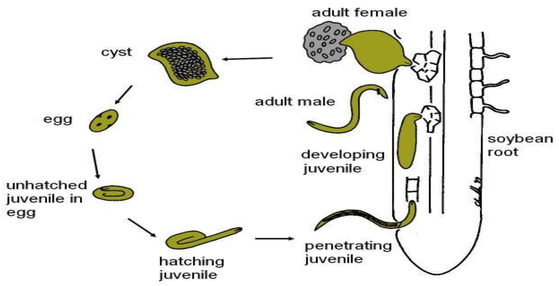


Figure 1: Life Cycle of Heterodera glyines. *Eggs will develop until their second juvenile stage (J2) Figure 2 (d), where they will then go on to infect the soybean root. After penetration of the soybean root, the J2 nematode will establish a feeding site, where they will continue further development. Females grow in size, become 'lemon shaped', while males will remain in a vermiform shape. The female will stay attached to the root for the rest of her life, while the male is free to unattach itself from the rootAfter fertilization, the female cyst will begin producing eggs that will be encased within her soon-to-be dead carcass.* ***Iowa State University.***

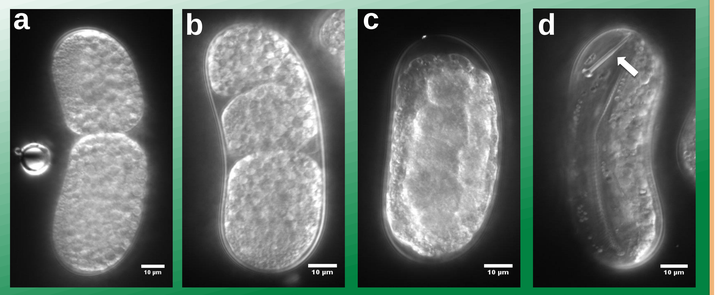
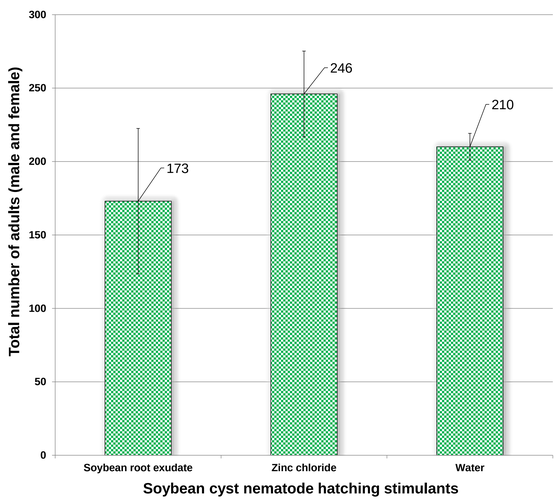


Figure 2: Stages of SCN Egg Development (from 2-celled egg to second stage juvenile). *Within the female cyst, many different developmental stages of eggs are present. Starting as one-celled eggs (not pictured above), eggs will develop until a J2 with a fully formed stylet (**d**). The nematode will use this stylet to penetrate the eggshell to escape.* ***a*** *2-celled egg;* ***b*** *3-celled egg;* ***c*** *gastrula;* ***d*** *J2 with fully formed stylet (arrow).*

Experiment A: Hatching Stimulant Effect on Post Infection Development

Purpose: To find out if our known hatching stimulants, soybean root exudate (SRE) or zinc chloride, effect post-hatch development.

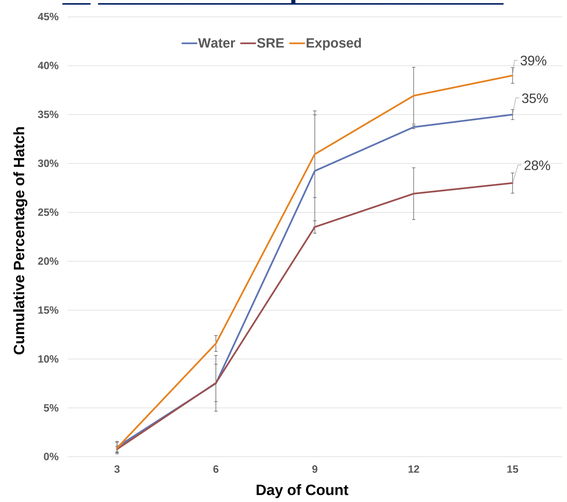
Experiment A Results: Zinc Chloride does not affect post infection development



Experiment B: The Effect of Brief Exposure to Soybean Root Exudate (SRE) on SCN hatching

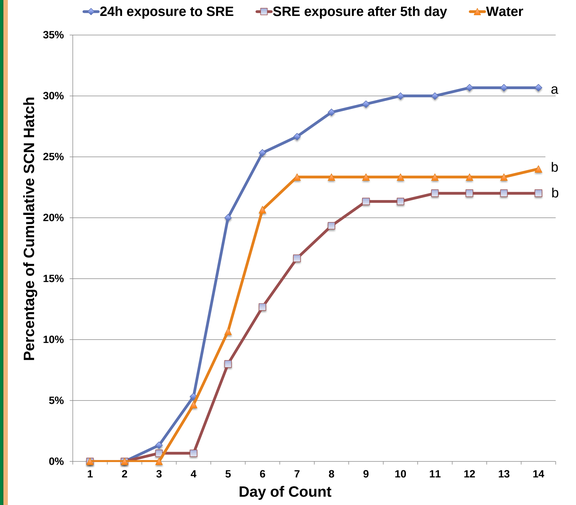
Purpose: Inspired by a similar experiment done by Roland Perry (3), we are testing to see if brief exposure of SRE increases SCN hatching rate.

Experiment B Results: Hatching rate of eggs are unaffected when exposed to SRE for brief periods of time



Experiment C: Does soybean root exudate have a greater impact on hatching rate earlier in an eggs development, or later?

Experiment C Results: SRE has a greater effect in early stages of egg development than in later stages



Conclusions

Experiment A suggest that the hatching stimulant, zinc chloride, does not affect the post-hatch development of the SCN J2. Repeating this experiment in the future may provide conclusive data. Experiment B shows that SCN hatching rate is unaffected when exposed to SRE for brief periods of time. However, our data is inconclusive. Experiment B's results contradict with past experiments that have confirmed we are to get more eggs to hatch using SRE, rather than using water (Thapa, et al. 2017). Experiment B needs to be performed again for more conclusive data. Experiment C shows that SCN eggs exposed to SRE at earlier stages of egg development have a significantly higher hatching rate than those exposed later in their developmental. Future research, like finding out the molecular makeup of SRE, should be done to figure out how SRE affects early stage eggs development.

References

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Acknowledgments

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