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Evaluation of herbivore-induced plant volatiles for monitoring green lacewings in Washington apple orchards

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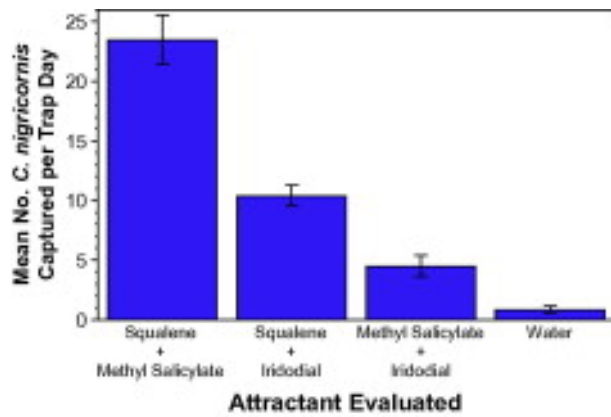
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Abstract

We evaluated five herbivore-induced plant volatiles plus a male-produced pheromone as attractants for adult green lacewings in Washington apple orchards in 2008. We found at least five attractants or combinations of attractants were attractive to the three most abundant green lacewing species in our trials. *Chrysopa nigricornis* and *Chrysopa oculata* were attracted to the combination of methyl salicylate and iridodial with iridodial alone being the second best attractant. *Chrysoperla plorabunda* was found in lower numbers than *C. nigricornis* and *C. oculata*, but did exhibit a significant attraction to benzaldehyde. In mid-summer, we added the herbivore-induced plant volatile squalene to the study and found it to be exceedingly attractive, but only to male *C. nigricornis*. Whether alone or in combination, squalene attracted 4–5-fold more *C. nigricornis*

than any other compound tested. Our data have revealed *C. nigricornis* to be an abundant orchard predator that can be readily monitored with squalene-baited traps. Despite the obvious promise of HIPVs in biological control programs, we urge caution in their deployment as large-scale attractants, at least until further studies have investigated potential disruption of natural enemy population dynamics.

Graphical abstract



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Research highlights

- The HIPV squalene was found to be highly attractive to male *Chrysopa nigricornis*.
- *Chrysopa oculata* was highly attracted to a lure of iridodial + methyl salicylate.
- Squalene lures showed *C. nigricornis* was a key natural enemy in apple orchards.
- Methyl salicylate by itself was unattractive, but synergized other attractants.



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Keywords

HIPV; Squalene; Methyl salicylate; Iridodial; *Chrysopa nigricornis*; *Chrysopa oculata*; *Chrysoperla plorabunda*

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