

Using UV-C light to control aphids in strawberry

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Introduction

- Aphids are a big problem for greenhouse-grown strawberries (Fig. 1). These tiny insects cause damage by feeding on the sap of the plants, resulting in stunted growth, leaf curling, and reduced fruit production. Additionally, aphids can transmit viruses, further damaging the plants and reducing yield.
- Growers currently depend on chemical pesticides and biological controls to manage aphids, but these options can be environmentally harmful or costly, respectively. Therefore, exploring alternative tools is imperative and UV-C is one of these.



Figure 1. Strawberry var. Albion leaves infested with aphids.

Objectives

To determine the optimal dose and frequency of UV-C treatment (254 nm) to control aphids in greenhouse-grown strawberries and its impacts on plants and beneficial predators.

Materials and Methods

Two trials were conducted in the lab to investigate if UV-C exposure affects the mortality and fecundity of strawberry aphids on detached leaves of strawberry var. Albion. In Trial I, UV-C treatments were applied twice a week, whereas in Trial II, they were applied three times a week using the setup illustrated in Fig. 2.



Figure 2. Setup to give UV-C treatment in the laboratory.



Figure 3. Containers with two Albion strawberry leaves in each.

UV-C radiation treatment

Leaves, each inoculated with one aphid, were exposed to UV-C radiation for different durations to achieve three levels of exposure:

There were six replicates, two leaves in each replicate, per treatment. The stem of each leaf was inserted into a water pick filled with a nutrient solution, which kept the leaves alive and fresh (Figs 3, 4). All leaves were inoculated with aphids of similar age and size (Fig. 3).

Control (no UV-C exposure), Low UV-C (90 mJ/cm²), and High UV-C (110 mJ/cm²).



Figure 4. One leaf of strawberry var. Albion was inserted into a water pick filled with a nutrient solution to keep the leaves fresh. There are two leaves in each replicate (container).

Results

When UV-C treatments were applied twice per week at doses of 90 mJ/cm² and 110 mJ/cm², aphids exposed to 90 mJ/cm² produced the highest number of nymphs overall, while those exposed to 110 mJ/cm² produced the fewest (Fig. 5).

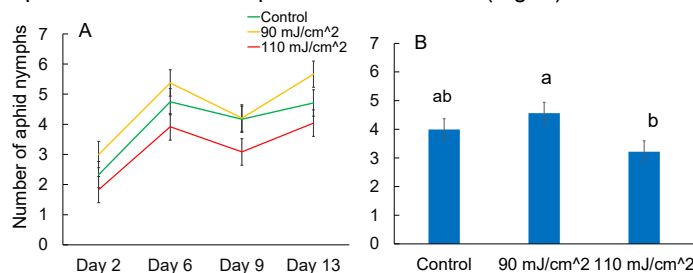


Figure 5. The number of nymphs produced by strawberry aphids over time (A) and the total number of nymphs produced over two weeks (B), when exposed to UV-C radiation twice per week in trial 1.

UV-C treatment applied three times per week significantly reduced aphid fecundity, with nymph numbers decreasing by approximately 50% compared to the control; the differences between the 90 mJ/cm² and 110 mJ/cm² treatments were not statistically significant (Fig. 6).

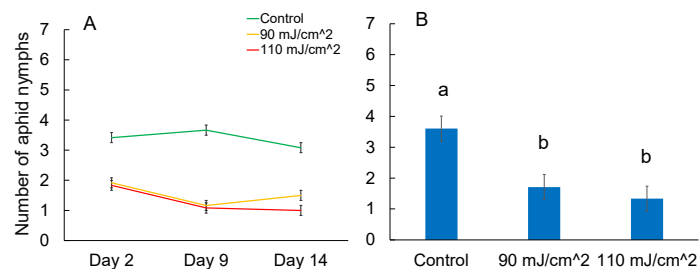


Figure 6. The number of nymphs produced by strawberry aphids over time (A) and the total number of nymphs produced over two weeks (B), when exposed to UV-C radiation three times per week in trial 2.

Acknowledgments

We thank the Weston Family Foundation, Home Grown Challenge MITACS, KPU, & industry partners for their contribution and support.