



Bertha armyworms feed more on canola plants with diamondback moth eggs

CATEGORY [insects](#) | June 30, 2022

Bertha armyworm larvae caused over twice as much feeding damage on plants with diamondback moth eggs than plants without. However, bertha armyworm egg laying was not affected when canola plants had diamondback moth eggs.

Diamondback moth adults migrate to the Prairies on winds from the southern United States and Mexico, and are specialist feeders on Brassica crops. They can go through up to four generations per year on the Prairies. Females lay about 160 eggs during their life stage. Larvae feeding can damage any green tissue of a host plant but prefer to feed mostly on leaves. Larvae also feeds on buds and flowers.

Bertha armyworm female moths lay about 2,150 eggs during canola flowering in June and July. The hatched larvae pass through growth stages, and feed on canola leaves, stems and pods. It is a generalist insect that feeds on the foliage of several crops including canola, alfalfa, flax and field pea. Both diamondback moth and bertha armyworm larvae feeding can cause economic losses.

On the Canadian Prairie Provinces, diamondback moths colonize canola plants prior to bertha armyworm colonization but subsequently bertha armyworm larvae feed simultaneously with diamondback moth. This research was conducted to see if egg-laying by diamondback moth would affect subsequent egg-laying and larvae feeding by bertha armyworm on canola.

A pilot experiment was also conducted to see if diamondback moth egg-laying triggered canola defenses. Canola defenses were measured through analysis of plant defensive hormones; salicylic acid, and jasmonic acid and its conjugates. These hormones are released by the plants as defense mechanisms in response to egg laying or larval feeding by an insect.

All experiments were conducted in growth rooms under control conditions. No-choice and choice egg-laying experiments were conducted on bertha armyworm egg-laying and larvae feeding.

No-choice and choice egg-laying experiments

In the no-choice experiment, diamondback moth females laid eggs on the flowering canola plants, and then the females were removed from the cage. This experiment was to see if the presence of diamondback moth eggs influenced bertha armyworm egg laying. Mated female bertha armyworm moths were introduced into cages with a single canola plant with diamondback moth eggs. Control plants did not have diamondback moth eggs present. After 4 days, the total number of bertha armyworm eggs were counted. Results showed that bertha armyworm females had a small preference for un-infested canola, laying slightly fewer eggs on plants with diamondback moth eggs.

The choice experiment was conducted to see if bertha armyworm females preferred canola plants with or without diamondback moth eggs. First, canola plants were exposed to diamondback moth egg-laying females and then mated female bertha armyworm moths were then released into a cage containing one canola plant with diamondback moth eggs, and one without. After two nights, bertha armyworm eggs were counted. In this experiment, bertha armyworm did not show a preference for plants infested or un-infested with diamondback moth eggs.

No-choice and choice larval feeding experiments

Five, early fourth instar bertha armyworm larvae were introduced to canola plants with and without diamondback moth eggs. This experiment was to see if the presence of diamondback moth eggs influenced bertha armyworm feeding. Leaf damage was assessed 36 hours after bertha armyworm introduction. On canola plants with diamondback moth eggs, there was significantly greater bertha armyworm larval feeding than on those without diamondback moth eggs.

In the choice larval experiment, three third instar bertha armyworm larvae were introduced to canola leaves with and without diamondback moth eggs to see if bertha armyworm had a feeding preference. Leaf feeding damage was assessed after 48 hours. Similar to the no-choice larvae feeding experiment, bertha armyworm larvae preferred canola leaves from plants with diamondback moth eggs resulting in more than double the feeding damage.

Phytohormone analyses

Diamondback moth were allowed to lay eggs on flowering canola plants. Another set of canola plants were set without diamondback moths as a control. Leaves were sampled and then analyzed for salicylic acid, and jasmonic acid and its conjugates to test the impact of diamondback moth egg-laying on plant defense signalling pathways. The analysis of salicylic acid found no difference in the hormone level between plants with or without diamondback moth eggs. Jasmonic acid was detected in very small amounts, but could not be statistically analyzed.

Overall, the research suggests that egg laying by diamondback moth did not deter bertha armyworm egg laying, and actually resulted in increased feeding by bertha armyworm larvae. This study provides important information on sequence of arrival of herbivores in canola agroecosystems.

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Chaminda De Silva Weeraddana, Maya L Evenden, Oviposition by a specialist herbivore increases susceptibility of canola to herbivory by a generalist herbivore, *Environmental Entomology*, Volume 51, Issue 3, June 2022, Pages 605–612, <https://doi.org/10.1093/ee/nvac028>

Photo by Chaminda Weeraddana: Diamondback moth eggs on canola leaves