

Question:

Will the length of time between DiPel application and monarch exposure increase the time till mortality and will watering the sprayed plants from above or below affect the insecticide's potency?

Hypotheses:

- 1.) The earlier the larvae are applied to the plant the faster the time till mortality.
- 2.) Plants watered from above will have a slower rate of mortality than those that are watered from above.
- 3.) Watering and time of larva application to the milkweed have no affect on the rate of larva mortality.

Methods:

- 1.) Sprayed 8 milkweed plants with DiPel Insecticide and separated them into 2 groups, one group that would be watered from above and one would be watered from below.
- 2.) From the 2 groups separated into 4 variable times when larva were applied:
 - applied before plant was sprayed
 - applied immediately after sprayed
 - applied 24 hours after plant sprayed
 - applied 48 hours after plant sprayed
 - control group not sprayed with DiPel
- 3.) 10 larvae were placed in a container with the previous milkweed varieties and observed at least once a day
- 4.) The plants were watered from above or below according to their specific group daily.

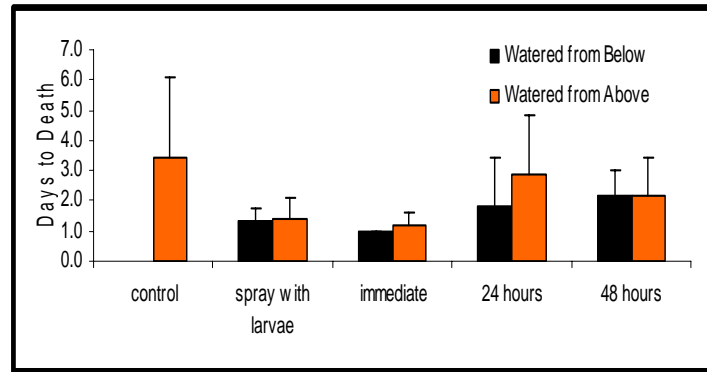
DiPel's Effect on Monarch Larvae

Katharine Plowman, FW 1901

Background:

DiPel is an insecticide that contains *Bacillus thuringiensis*. The strain of DiPel I used—DF—was intended to kill the larvae and was applied in a liquid form to the milkweed.

Data:



Results:

The results were all the larva, excluding the control group, died as a result of being exposed to DiPel insecticide. There was not a significant difference of watering the plants above the milkweed *leaves* sprayed with DiPel or watering them from below. The amount of time from when they were exposed to the DiPel affected their survival but only minimally.

Note: There was only one control group which was not sprayed and was watered from above.

References:

"Monarch larvae sensitivity to *Bacillus thuringiensis*-purified proteins and pollen."

Richard L. Hellmich, Blair D. Siegfried, Mark K. Sears, Diane E. Stanley-Horn, Michael J. Daniels, Heather R. Mattila, Terrence Spencer, Keith G. Bidne, and Leslie C. Lewis. *Proceedings of the National Academy of Sciences of the United States of America*, 10/9/2001, Vol. 98 Issue 21, p11925

"Impact of Bt corn pollen on monarch butterfly populations: A risk assessment" Mark K. Sears, Richard L. Hellmich, Diane E. Stanley-Horn, Karen S. Oberhauser, John M. Pleasants, Heather R. Mattila, Blair D. Siegfried, and Galen P. *Proceedings of the National Academy of Sciences of the United States of America*, 10/9/2001, Vol. 98 Issue 21, p11937

"[Effects of exposure to event 176 *Bacillus thuringiensis* corn pollen on monarch and blackswallowtail caterpillars under field conditions.](#)" Zangerl, A.R.; McKenna, D.; Wraight, C.L.; Carroll, M.; Ficarello, P.; Warner, R.; Berenbaum, M.R.. *Proceedings of the National Academy of Sciences of the United States of America*, 10/9/2001, Vol. 98 Issue 21, p11908

Conclusions:

The experiment showed there was not a correlation between the time when the larva were applied and whether the plant was watered from above or below the leaves supporting the null hypothesis. The pesticides potency remained even after two 24 hour periods and daily watering.

Errors that occurred in the experiment were some of the larva disappeared and were recorded as dead. There was also an OE outbreak, a disease that kills monarchs, in the Monarch Lab which could have increased the mortality rate.

Improvements that could better the experiment would be making sure each plant is sprayed evenly with the insecticide, and continuing the experiment for a longer period of time. Increasing the length of the experiment would include seeing if 72 hour, 96 hour, etc., intervals would provide information of when the strength of the insecticide would begin to decrease. Creating a watering system that evenly distributes the water could also improve results.