

Diamondback Moth – A Winter Canola Pest

Cody Daft¹ and Chuck Bremer²

Introduction

The diamondback moth, *Plutella xylostella*, has historically been a widely dispersed pest in the United States and Canada with elevated populations concentrated in areas where cruciferous crops and weeds such as turnips, broccoli, and mustard species are found. Significant increases of winter canola acreage in several areas, including the Southern Great Plains in the United States, have proven to be a preferred host crop for diamondback moth. Egg-laying and economic damage from larval feeding are not uncommon.

Identification and Lifecycle

The diamondback moth, believed to be a native species to Europe, is now found worldwide. Its life cycle consists of a complete metamorphosis including adult, egg, larva and pupa.



Figure 1. Diamondback moth on leaf. Photo courtesy of Lyle Buss, University of Florida.

The adults are very small, grayish-brown moths approximately ½ inch in length. When folded, the moth’s wings appear to wrap around the body with the posterior end of the wings upswept (Figure 1). The male moth contains diamond-shaped markings on its wings, resulting in the name “diamondback”.

The adult female lays small (1/64 inch) oval to round flattened eggs, yellowish white in color, normally in groups of three to eight. Female moths can lay an average of 150 eggs. Eggs hatch in five to six days depending on temperature.

Newly hatched larvae pass through four growth stages, or instars. Larvae first appear light green and darken as they mature. Fully grown larvae reach approximately 1/3- to 1/2-inch in length, and are pointed at both ends. Large larvae appear similar to a looper type worm, and aggressively thrash back and forth when disturbed, dropping from the plant on a silken strand. They pupate within a loosely spun cocoon attached to leaves or stems of the plant.

Adults can emerge in 6 to 12 days, and a lifecycle can be completed in about 32 days, depending upon temperatures. It is not uncommon to find all life stages at the same time in a field.

Canola Plant Damage

Larvae of the diamondback moth cause the most plant damage. Upon hatching, young larvae first burrow between the upper and lower leaf surfaces creating “mines”. These result in “windowpane” tunnels and scars upon the leaves as pictured (Figure 2). As larvae grow, they begin to feed through larger areas of the leaf creating small irregular holes. Usually leaf damage by larval feeding is cosmetic and only results in minor yield reductions. Occasionally, high populations can lead to entire leaves being eaten, total plant defoliation, and possibly loss of plant stand.



Figure 2. Plant damage from diamondback moth larval feeding. Note “window pane” type feeding scars.



Figure 3. Inspecting leaf for diamondback moth larvae. Red arrow points to a larva.

Larvae feeding of greater concern is damage to the crown or growing point of the canola plant in the fall, or damage to flowers and pods in the spring. Larvae that overwinter in the crown of the plant may damage the crown sufficiently to cause plant death, which is often misidentified as winter kill. Crown damage to the canola may also result in irregular growth and development in the spring following fall dormancy.

Larval feeding during the reproductive stages of canola is detrimental to yield. During this stage, larvae may feed on flowers, which can ultimately lead to flower abortion and a potential delay in plant maturity. When immature pods are damaged, failure to produce seed or quality damage to seed may occur.

Monitoring and Management

Diamondback moth larvae are normally detected very early in the canola lifecycle and development, up until fall dormancy occurs. Overwintering larvae may be present if control measures in the fall were not adequate, resulting in populations the following spring. Winter canola fields must be monitored closely after planting until dormancy, and can require extensive scouting procedures to accurately determine the presence of larvae and levels of damage that may result.

Scouting should be performed by examining numerous areas of the field and examining individual plants very closely. Digging plants and shaking them within a white bucket assists in visual evaluation of population levels. While no standard thresholds have been established for overwintering larvae, it is recommended that treatments be made if significant defoliation has occurred, or if two to three larvae per foot of row are found. Control recommendations should be based upon larval counts and canola growth stage.

Treatment Threshold Guidelines	
Seedling to Pre-Dormancy	2-3 larvae per foot of row or significant defoliation
Early Flowering	10-15 larvae per sq. ft
Pod Development	20-30 larvae per sq. ft.

Diamondback moth populations can increase rapidly under some environmental conditions. Heavy infestations may result in multiple generations of the pest in a single cropping season.

The ability of this pest to reproduce rapidly has allowed it to develop resistance to specific insecticides, especially the pyrethroids class of chemistries. At this time, pyrethroids comprise the majority of labeled insecticides for winter canola. It is recommended that a rotation of chemical classes be used to control this pest, and that extensive field scouting be performed following treatment to determine the level of control that was achieved.

Additional References:

Andaloro, J.T. and P.B. Baker. Insects of crucifers: diamondback moth. New York State Extension Service, Cornell University, Ithaca, NY.

<http://nysipm.cornell.edu/factsheets/vegetables/cruc/dm.pdf>

Royer, T.A. and K.L. Giles. Caterpillars in canola. Oklahoma Cooperative Extension Fact Sheet EPP-7089. Oklahoma State University, Stillwater, OK.

<http://pods.dasnr.okstate.edu/docushare/dsweb/Get/Document-7837/EPP-7089.pdf>

Capinera, J.L. and L. Buss. Featured creatures: diamondback moth. Entomology and Nematology Department, University of Florida, Gainesville, FL.

http://entnemdept.ufl.edu/creatures/veg/leaf/diamondback_moth.htm

¹ DuPont Pioneer Field Agronomist, Piedmont, Oklahoma.

² DuPont Pioneer Agronomy E-Business Information Manager, Johnston, Iowa.