FACT SHEET Lincoln University Cooperative Extension • Integrated Pest Management Program

The Pest Caterpillars of Cole Crops in Missouri II: Management

This document is a compliment to Part I and focuses on management options for the three most important pest caterpillars associated with cole crops in the Midwest: Diamondback moth, *Plutella xylostella* (Lepidoptera: Plutellidae), imported cabbageworm, *Pieris rapae* (Pieridae), and cabbage looper, *Trichoplusia ni* (Noctuidae).

For more information on identification (including pictures of the various life stages) and life cycles see "The Pest Caterpillars of Cole Crops in Missouri I: Identification and Life Cycle" LUCE FS-19-F-2015

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For effective management of pest caterpillars, it is important to implement Integrated Pest Management (IPM) by combining available control methods discussed below. However, the first step is to identify the pest caterpillars and their beneficial insects (refer to LUCE FS-19-F-2015). In addition, regular scouting for pests and beneficials is another important step to decide the time to implement any given pest control option.

Cultural control

A useful definition of cultural control is the manipulation of the physical environment so as to reduce the survivorship of a given pest. In essence, any changing of the environment or habitat which makes it difficult for a pest to survive and reproduce falls in this category. Crop rotation and sanitation are two key cultural practices that can reduce pests. Crop rotation is a systematic approach to deciding which crop to plant from one year to the next to reduce some pest problems. Sanitation is the practice of destroying crop residue immediately after harvest to destroy pests that otherwise would overwinter and re-infest subsequent crops in the field.

Biological control

In most cases, a variety of natural enemies are present in the cole crop field, each helping to reduce pest populations. All life stages of pest caterpillars are attacked by natural enemies, including parasitic wasps, predators, and entomopathogens (microbes that can cause disease in insects). In fact, pest outbreaks are often attributed to lack of effective natural enemies in a specific region and/or to the disruption of these natural enemies by the regular use of insecticides. Thus, conserving naturally-occurring beneficial insects by planting flowering plants within or near the field and avoiding the use of broad-spectrum insecticides on the crops is important to enhance biological control of the pest caterpillars.

Larval parasitoids are predominant and the most effective in attacking caterpillars of cole crops. *Diadegma insulare* and *Cotesia glomerata* provide high rates of mortality of diamondback moth and imported cabbageworm, respectively, in the North America. Predatory insects include, but are not limited to, ladybugs, lacewings, spiders and wasps. Several entomopathogens (bacteria, viruses, fungi and nematodes) can be effective biological control agents of pest caterpillars in cole crops. The formulation of a bacterium, *Bacillus thuringiensis* subsp. *kurstaki* is the most widely used biopesticide for control of pest caterpillars in cole crops. Commercial formulations of entomopathogenic fungi (e.g., *Beauveria bassiana* and *Metarhizium anisopliae*) and nematodes (*Steinernema carpocapsae*) have been made available to aid in the control of caterpillar pests in cole crops.

Physical controls

Spunbonded row covers or netting can be placed over plants to prevent egg-laying by the adults of pest catepillars. If a decision is made to use row covers, then they need to be set up before the adults are seen fluttering around the field.

Diamondback moth and cabbage looper have become resistant to some insecticides. Resistance management techniques should be followed in all farms, whether organic or traditional, to preserve the efficacy of important pest control methods. Techniques include alternating among the classes of insecticides, applying them at correct doses, and spraying based on sampling results. Consult pest management guides for more detailed recommendations for application rates and insecticide resistance management

Chemical control

Several chemical insecticides are recommended for the control of the pest caterpillars in cole crops (e.g., pyrethroids). Only a few organic insecticides are available (e.g., Spinosad, *Bacillus thruringiensis* products) (Table 1).

Table 1: Selected list of reduced-risk insecticides and biopesticides recommended for the control of pest caterpillars in the Midwest. The complete list of insecticides is available in Midwest Vegetable Production Guide for Commercial Growers available online at http://www.btny.purdue.edu/pubs/ID/ID-56.

Trade Name	Active Ingredients	Rate	Comments	Pre-harvest interval
Avaunt 30 WDG®	Indoxacarb	2.5-3.5 oz. per acre	Do not exceed 14 oz. per acre per season	3-day
Confirm 2F®	Tebufenozide	6.0-8.0 fl. oz. per acre	Do not exceed 56 fl. oz. per acre per season	7-day
Coragen®	Chlorantraniliprole	3.5-5.0 fl. oz. per acre	Do not exceed 15.4 fl. oz. per acre per season	3-day
Intrepid 2F®	Methoxyfenozide	4-10 fl. oz. per acre		1-day
Radiant SC®	Spinetoram	5-10 fl. oz. per acre	Do not exceed 34 fl. oz. per acre per season	1-day
Entrust®	Spinosad OMRI LISTED For Organic Use	1.0-2.0 oz. per acre	Do not exceed 9 oz. per acre per season. Observe resistance management restrictions.	1-day
Agree®, Dipel®, Javelin®, XenTari®	All *Bacillus thuringiensis* products, listed are OMRI LISTED For Organic Use	See label for each product	Begin applications when worms are small.	0-day

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