The Pest Caterpillars of Cole Crops in Missouri II: Management

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 caterpillars. 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.

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 thuringiensis* 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](http://www.btny.purdue.edu/pubs/ID/ID-56).

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

References:


