



CABBAGE SEEDPOD WEEVIL MANAGEMENT IN CANOLA

Washington Oilseed Cropping Systems Series

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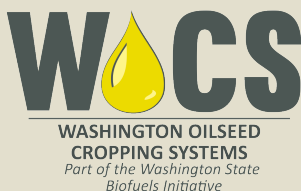
Abstract

The Washington State Oilseed Cropping Systems Research and Extension Project (WOCS) is funded by the Washington State Legislature to meet expanding biofuel, food, and feed demands with diversified rotations in wheat based cropping systems. The WOCS fact sheet series provides practical oilseed production information based on research findings in eastern Washington. More information can be found at: <http://css.wsu.edu/biofuels/>.

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Introduction

Winter canola acreage in central and eastern Washington continues to increase as more producers learn about the rotational benefits and potential profitability of canola in predominantly cereal-based rotations. With more acres in production, insect pests common in other canola-growing regions of the US and Canada are now being observed in the Pacific Northwest (PNW). While many of the pests are not at thresholds to warrant control measures, the cabbage seedpod weevil, *Ceutorhynchus obstrictus* (Marsham), is becoming a problem in some areas of Washington State.

The cabbage seedpod weevil (CSPW) is an introduced insect pest from Europe and causes damage to members of the Brassicaceae or mustard family, including cultivated crops such as canola and brown mustard. This tiny weevil can also utilize flaxweed (*Descurainia Sophia* L. Webb ex Prantl), tansy mustard (*Descurainia* spp.), and hoary cress or whitetop (*Cardaria draba* L. Desv.) as food hosts (Dosdall et al. 2014).

These two common weed species are abundant throughout eastern Washington. When left unmanaged, the CSPW can cause significant damage to ripening canola seeds and impact overall yields by as much as 50%.

CSPW at a Glance

Host plants: Canola (including volunteer canola), brown mustard, flaxweed, and hoary cress (i.e., whitetop).

Where to look for CSPW:

- Adults: newly developing floral buds through pod development.
- Larvae: inside the pods.

Pest thresholds: 20 adults from 10 sweeps at 10–20% bloom (Canola Council of Canada 2014), control measures needed to prevent from reaching damage levels equal to the cost of control (i.e., the economic injury level).

Pesticide treatment: Registered in-crop product examples: Besiege (chlorantraniliprole + lambda-cyhalothrin), Declare (gamma-cyhalothrin), Warrior II (lambda-cyhalothrin), and Mustang Maxx (zeta-cypermethrin). Seed treatment: Gaucho 600F and Gaucho 480 (imidacloprid).

- Note: The above listed products are highly toxic to bees. Please pay particular attention to the information on Bee Precautions listed in the Chemical section of this publication. Refer to the online version of the [Pacific Northwest Insect Management Handbook](#) for up-to-date information on application rates and products. The entire pesticide label for each product is available at the [Crop Data Management Systems website](#).

Description and Lifecycle

Like many weevil species, adults have a prominent, curved snout with elbowed antennae. The insects measure 3 to 4 mm long and are ash-grey in color (Figure 1). CSPW adults emerge in the spring from their overwintering sites (i.e., leaf litter or roadside ditches) where they have remained burrowed in the soil protected from freezing temperatures (Brodeur et al. 2001). Once emerged, they will begin to seek out favorable plant hosts (Figure 2).

CSPW adults can be found concentrated on newly developing flower buds of winter canola. Mating occurs in the spring until early pod development. When the small pods begin to develop (1–2 cm), the females chew a small hole into the pod wall and



Figure 1. Adult CSPW. Photo by Josef Dvořák.

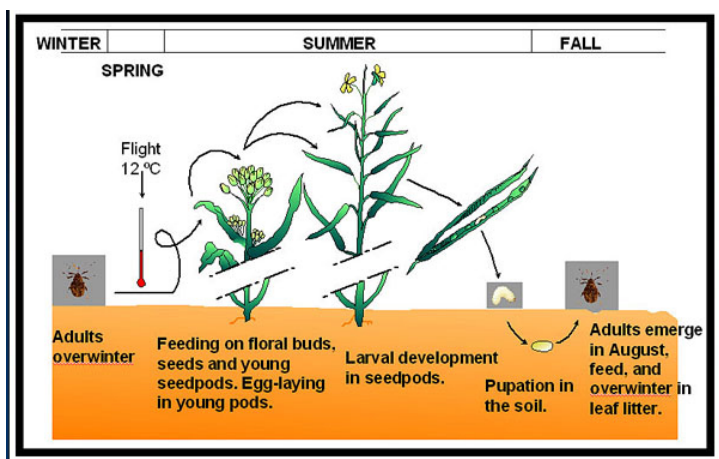


Figure 2. CSPW lifecycle. Source: Dosdall et al. (2001).

deposit an egg in the hole. Generally, only one egg is deposited per pod; however, two or more eggs may be found within a pod during insect outbreaks (Cárcamo et al. 2001).

Newly-hatched larvae are white, grub-like, and have a darkened, round head. Once hatched, larvae immediately begin feeding on the pod wall and developing seeds (Figure 3). Individual larva eat and destroy about five seeds before reaching maturity (Dosdall et al. 2014). During CSPW outbreaks, pods can become completely void of any viable seed.

Mature larvae will chew a hole through the pod wall and drop to the ground where they begin to pupate (transform from larvae to adults). After about 10 to 14 days, the newly emerged adults begin feeding on the green pods of canola or other cruciferous plants. On canola, adults will again chew into the green pods and feed on any developing seeds either missed or not completely destroyed from larval feeding. The entire lifecycle takes about eight weeks from egg to adult and will vary depending on climatic conditions, especially temperature. The CSPW has one generation per year (Cárcamo et al. 2001).



Figure 3. CSPW larval feeding damage. Photo by Green Thumb Photography.

“The cabbage seedpod weevil will also attack spring canola. However, action is not recommended against those insects found in mid-July as the CSPW won’t lay eggs until the following spring, and therefore won’t cause any damage in the current crop” (Jim Davis, personal communication).

Damage

Crop damage from CSPW can occur in a number of ways:

- Adult feeding on developing flower buds can cause them to abort, also known as “bud-blasting” (Dosdall et al. 2014).
- Holes chewed by the adults can provide entryways and lead to increased pathogen levels within the field.
- Larval feeding can destroy several, if not all, of the seeds within an individual pod. Undamaged seeds will continue to ripen and mature. With the combination of damaged and developing seeds during pod-fill, pods will become misshapen or distorted and are subject to premature shattering.

Severe infestations of the CSPW can reduce yields by as much as 50% (Dosdall and Cárcamo 2011).

Sampling and Thresholds

Field observations show that CSPW most commonly enter fields from the borders, where they do the most damage; then they work towards the middle of the field where they continue their destructive path. Therefore, it is important to pay particular attention to field borders, scouting twice a week when plants reach 10–20% bloom. At this stage of plant development, it is recommended to take a minimum of ten

180-degree (side-to-side) sweeps at different locations throughout the field (Figure 4), using a canvas-type sweep net (Figure 5). Control measures need to be taken if 20 or more adults are collected from ten sweeps (Canola Council of Canada 2014). If action is not taken, the damage caused by this pest can become equal to or surpass the cost of control measures, reaching what is called the “economic injury level.” If CSPW populations are only being detected at the field edges, an insecticide spray of the outside perimeter may be sufficient to stop further movement into the field.

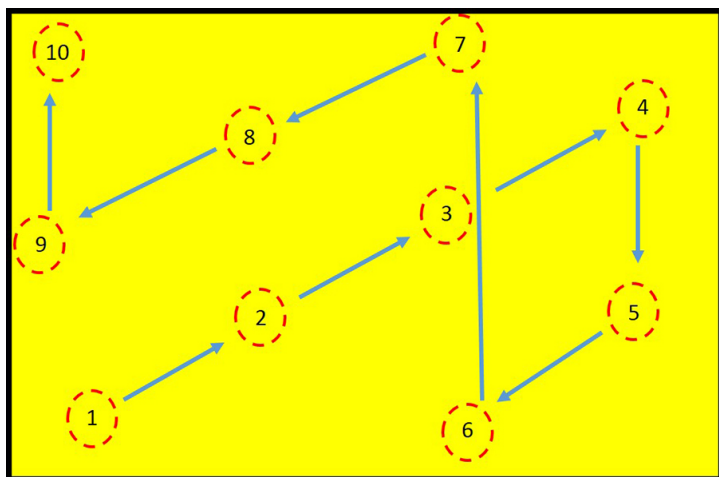


Figure 4. Random sampling example (ten sweeps at each numbered point).



Figure 5. Traditional heavy canvas sweep net. Photo by Dale Whaley.

Survey Results for North Central Washington

Nineteen sites were surveyed in Douglas and Okanogan Counties in north central Washington on May 12, 2014 to determine CSPW populations (Figure 6). Many of the fields surveyed were in canola production for the first time in the history of the farms, resulting in very low numbers of CSPW present. Fields 16, 18, and 19 have had canola in rotation much longer, and the high number of insects encountered is likely due to a longer period of time for the CSPW populations to accumulate. “We have had winter canola longer than most growers in this area, and our main reason is to get the rotational benefits for our winter wheat. We saw these bugs in the canola early on but didn’t give it much attention as we didn’t know what they were. We now know they are CSPW thanks to WSU Extension, and we also know to scout the borders early and watch where their numbers are. If you are not scouting your canola, you should be! These guys can hurt your bottom line” (Dan Cavadinni, personal communication).

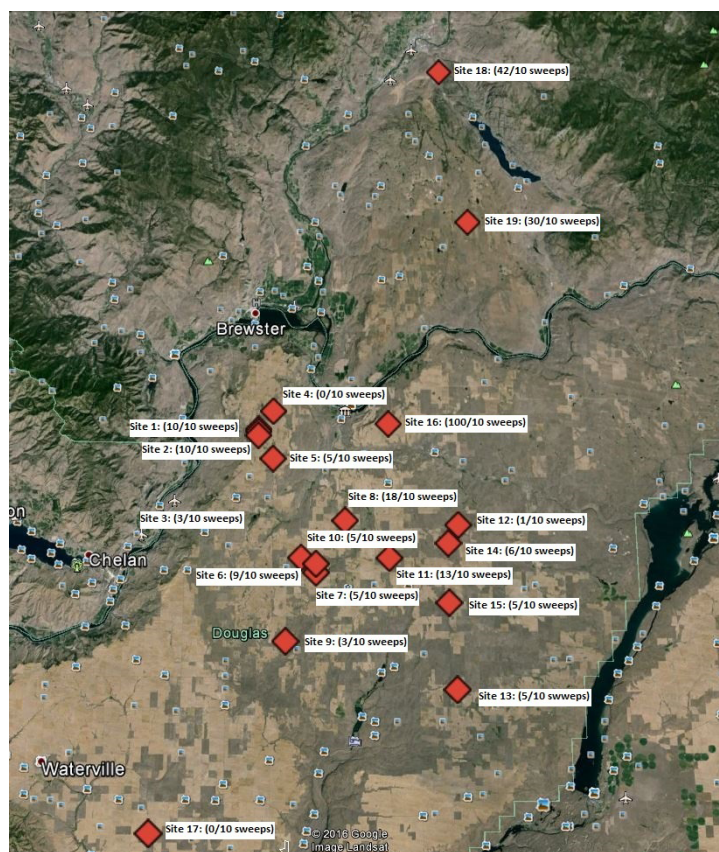


Figure 6. CSPW survey results. Numbers in parentheses indicate how many CSPW were collected in ten sweeps.

Management

Cultural

Since adult CSPW like to cluster on newly formed buds, researchers in other canola production areas have explored the idea of using “trap crops” as a management strategy. While this strategy has not been widely used in the PNW, the concept may aid producers in managing CSPW populations. As the name implies, trap crops are plants that are used to concentrate or attract insect pests away from the desired crop. This can be achieved by using two different cultivars, such as planting a field border of *Brassica rapa* around a field of *Brassica napus*. The *B. rapa* flowers about one week earlier than *B. napus* and effectively concentrates CSPW adults on those plants. An insecticide application can then be made to target only infested plants instead of treating the entire field (Buntin 1998; Dosdall and Cárcamo 2011).

If only one variety is being planted, a field border or strip can be seeded seven to ten days earlier than the rest of the field to serve as the trap crop. This type of control strategy works well on large fields but is less effective on small or narrow fields. Producers and field managers need to carefully monitor the trap crop to ensure proper timing of insecticide treatment and avoid the chance of adults dispersing into the main crop. Trap cropping has the potential to save the producer both time and money that would have otherwise been used on full field chemical and application costs. Additionally, there is a reduced chance that beneficial insects will be harmed when insecticides are applied to only a fraction of the field.

Several observations have been made in Douglas County where volunteer canola in fallow, or in wheat, have resulted in high numbers of weevils. These plants have the ability to sustain weevil populations in an area and should be controlled (Figure 7). “I was really surprised to see the number of CSPW adults when I scouted the volunteer canola in my winter wheat. By killing these plants, I know that I am successfully stopping future weevil generations” (Wade Troutman, personal communication).

Biological

Biological control can be thought of as the intentional use of a pest’s natural enemies or predators to bring the population of the pest down to a more manageable level. Four parasitic wasps that attack both the egg and larval stages of CSPW have been identified. Egg parasitoids include two tiny wasps in the Mymaridae family and larval parasitoids in the Pteromalidae and Braconidae families. Of these, *Trichomalus perfectus* is the most widespread across Canada, the UK, and the US (Dosdall et al. 2014). It is not yet known what level of control any of these wasps are having on CSPW populations in Washington State east of the Cascades.

Chemical

Timing of insecticide applications is important when managing CSPW. Begin sampling for CSPW adults when plants reach 10–20% bloom (Figure 8). It is important to try to target adults before too many eggs are laid within the newly developing seedpods. Refer to the Sampling and Thresholds section



Figure 7. Volunteer winter canola in winter wheat can often be a host to CSPW (Douglas County, WA). Photo by Karen Sowers.



Figure 8. CSPW in winter canola in Douglas County, WA. Photo by Karen Sowers.

for action and treatment levels. There are several chemical control options for CSPW that can be made as an in-crop application. Examples of insecticides that can be sprayed on canola are: Besiege (chlorantraniliprole + lambda-cyhalothrin) Declare (gamma-cyhalothrin), Warrior II (lambda-cyhalothrin), and Mustang Maxx (zeta-cypermethrin). Gaucho 600F and Gaucho 480 can be applied as a seed treatment. Seed treatment products provide suppression only. Refer to the online version of the [Pacific Northwest Insect Management Handbook](#) for specific insecticide recommendations and application rates for CSPW. The handbook is also available at Extension offices in Washington, Oregon, and Idaho.

Bee Precautions

It is important to note that the products listed in the Chemical section are highly toxic to bees. If commercial beekeepers have boxes placed in or near canola fields, it is critical to have timely communication between the beekeeper, canola grower, and the chemical applicator, particularly when a decision to apply insecticide is made on short notice. It may be advisable to remove bee shelters during, and for 2–3 days following,

application. Avoid direct application to bee shelters. Even if bee shelters are not present, do not apply these products or allow them to drift to blooming crops or weeds if bees are visiting in or adjacent to the treatment area. Avoid application when bees are actively foraging by applying during early morning or evening hours.

Seed treatments containing Imidacloprid are also highly toxic to bees. Ensure that planting equipment is functioning properly in accordance with manufacturer specifications to minimize seed coat abrasion during planting to reduce dust which can drift to blooming crops or weeds and subsequently poison foraging bees. Refer to [How to Reduce Bee Poisoning from Pesticides](#) by Hooven et al. (2013) for more information on the toxicity of pesticides to bees.

Summary

- CSPW numbers are on the rise in north central Washington and can even show up in first-time plantings of canola.
- Learn how to successfully identify and sample for CSPW.
- Be ready to use necessary control measures when sampling numbers reach 20 or more adults.
- Check volunteer canola for CSPW populations.

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Use pesticides with care. Apply them only to plants, animals, or sites as listed on the label. When mixing and applying pesticides, follow all label precautions to protect yourself and others around you. It is a violation of the law to disregard label directions. If pesticides are spilled on skin or clothing, remove clothing and wash skin thoroughly. Store pesticides in their original containers and keep them out of the reach of children, pets, and livestock.

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