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Cabbage Seedpod Weevil Control in Winter Rapeseed

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Many species of insects are commonly found on winter rapeseed in the Pacific Northwest, but few are pests that require control. The cabbage seedpod weevil (CSPW), *Ceutorhynchus assimilis* Paykull, is by far the most important insect pest. Larvae of this insect feed on the seeds within the seedpod, and if not controlled, can reduce rapeseed yields by 35 percent.

Appearance

The adult is small, ash-grey and slightly less than 1/8 inch long (Fig. 1). It has a curved snout typical of the weevil family of insects. The white eggs are small, cylindrical, broadly rounded at the ends and are often covered with a mucus-like material. Larvae are white, legless grubs (about 1/5 inch long) with light brown heads (Fig. 2). Pupae are initially white but change to a yellow color with age. The pupae are usually found in earthen cells in the soil.

Fig. 1. Adult cabbage seedpod weevil.

Life History

The CSPW has a single generation each year, and it overwinters as a sexually immature adult. Hibernation occurs in protected places in the duff at or just below the soil surface. Weevils fly from hibernation sites to nearby cruciferous plants on sunny warm spring days and eventually move to rape when it flowers. Peak numbers of adults are found in fields at full bloom. Mating begins in early spring. Females will lay a few eggs as soon as pods are formed during early to mid-May depending on elevation. The female first forms a feeding puncture in the pod; she then may lay a single egg. Not all feeding punctures will contain an egg. Each female weevil can lay 25 to 60 eggs during its lifetime.

Fig. 2. Immature CSPW larva and damaged winter rapeseed.

Fig. 3. (A) Internal feeding by larvae (left) in the winter rapeseed pod causes much damage. (B) Full-grown CSPW larvae leave exit holes (right) when they leave winter rapeseed pods to pupate in the soil.

The early season egg-laying occurs when cool temperatures prevail and does not contribute significantly to yield loss. The cool weather which restricts egg-laying activity also delays egg hatch and larval development. When temperatures are warmer in early June (at higher elevations), weevil activity is accelerated. Egg-laying and larval development during warmer periods can result in significantly more damage and control of the weevils at this time is most effective.

The eggs hatch in 5 to 30 days (depending on temperature accumulation), and the larvae feed on developing seeds (Fig. 3A) and pith material in the pods. Each larva will consume or destroy 5 or 6 seeds to complete its development. The three larval molts take from 14 to 40 days (again, depending on temperature accumulation). Mature larvae cut a small, circular hole in the pod (Fig. 3B) and crawl or drop to the soil surface where they burrow in the soil and construct an earthen cell to pupate. The pupation period ranges from 11 to 28 days.

New adults emerge from the soil and move to host plants where they commonly feed on pods or stems that are still green. Little damage is caused by this adult feeding. When rape plants have fully matured, the new adult weevil generation flies to hibernation sites for the winter. These flights will generally occur during mid-July to early August (see Fig. 5).

Host Plants

In the Pacific Northwest, CSPW larvae have been found in white mustard, cabbage, kale, black mustard, Indian mustard, turnip, broccoli, cauliflower, brussels sprouts, radish and wild radish. The insect also infests tumble mustard, Jim Hill mustard and many other wild relatives of these plants.

Damage

Larval feeding on developing seeds of winter rape causes reduced yields. The potential for yield loss in northern Idaho generally averages from 15 to 35 percent in unsprayed winter rape. Areas that are isolated and have not had winter rape or related crops grown previously will usually exhibit lower levels of damage until weevil populations build-up; and they will build up over time.

Larval feeding may start during May, but damage is usually negligible at this time. The majority of larval feeding and subsequent damage at higher elevations occurs from mid to late June most years. At this time, all pods, regardless of age, are suitable sites for insect development. As noted earlier, the activity and development of the weevils is temperature dependent; therefore, activity and development in lower elevation areas will usually be earlier and faster than in higher elevation areas.

Although adult flight activity continues throughout the bloom and early pod-set period, weevil movement into the field declines dramatically with the reduction of flowering. This relates to the fact that the weevils are attracted to the crop by the yellow flower color (Fig. 4).

Fig. 4. CSPW adults are attracted to winter rapeseed fields by yellow rape flowers.

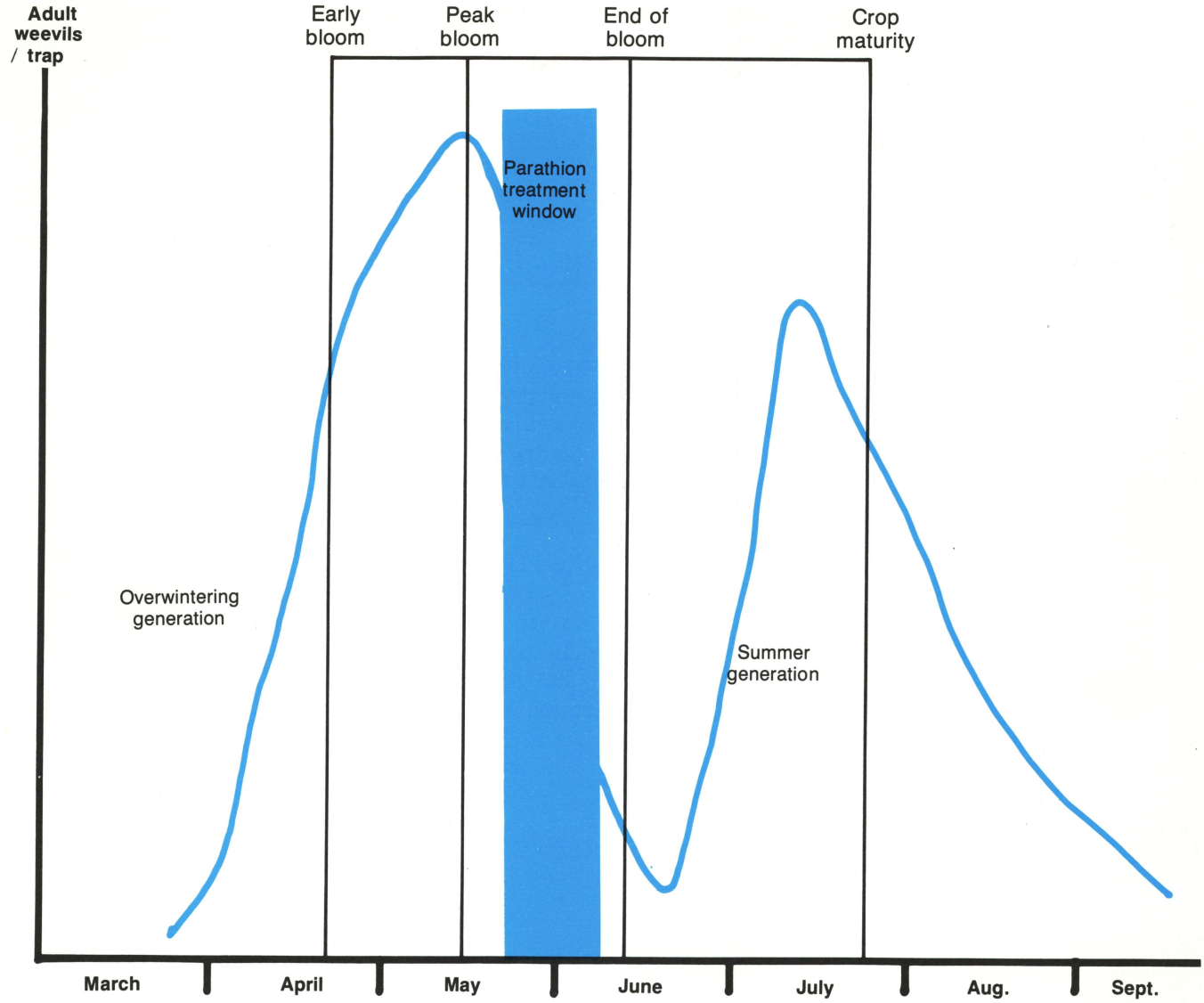

Fig. 5. Generalized seasonal flight activity of cabbage seedpod weevils in winter rapeseed in northern Idaho.

Sweeping with an insect net has been used to assess adult populations. While economic thresholds have not been established, preliminary studies have indicated that populations as low as 3 to 6 adult weevils per sweep when temperatures are warm can cause economic losses. Studies are currently underway to evaluate other monitoring techniques such as yellow sticky traps because of the problems of trying to use a sweep net in dense rape fields. Control action guidelines will be established based on insect capture with these traps or by other means, the cost of control and the price expected to be received for the crop.

Control

Several parasitic wasps attack the CSPW and provide some control. Effective controls rely on the proper timing of insecticide sprays to kill adults, eggs and larvae. The seasonal flight patterns of the adult weevil, as monitored by yellow sticky traps, is depicted in Fig. 5. The first peak of adult flight occurs when rape is at full-bloom (late May through early June).

The proper time to apply parathion, at the rate of 0.5 lb/acre ai, is near the end of bloom when temperatures during the day of application will be at least 70°F. These higher temperatures are important for the effective penetration of parathion into the plant canopy and seedpods. Also, these higher temperatures stimulate weevil flight activity and help to assure that most beetles will be in the field when the spray is applied. If parathion is applied under these conditions, a single spray is often effective, but the field should be checked 5 to 7 days later. If 2 or 3 weevils per sweep are found, then a second spray should be considered.

If parathion is applied when the temperatures are not appropriate (less than 70°F or greater than 85°F) or too early relative to the weevils' entry into the field, then additional sprays may be necessary to prevent yield loss. Besides killing the adult weevils, parathion when applied properly, also kills the eggs and young larvae in the pods before they can cause damage to seeds. This is why parathion is effective even when some egg-laying and hatch has already taken place.

Another important consideration is that if parathion is applied early, for example at full bloom, substantial wild and domestic bee kills can occur. **Because of the susceptibility of honey bees to parathion, bee keepers should be given warning so that they can move their bees before a spray is applied.**

Endosulfan, at the rate of 1.0 lb/acre ai, is also registered for CSPW control in Idaho, but it does not affect the larvae and is only effective against the adults; therefore, more than one spray would probably be needed for adequate control. For this reason, endosulfan is not recommended for CSPW control.

Note that the second peak in adult flight activity during the summer represents movement of new weevils out of the field to overwintering sites. No controls are applied at this time.

Pesticide Residues

These outlines for use are based on the best information currently available for each chemical listed. If followed carefully, residues should not exceed the tolerance established for any particular chemical. To avoid excessive residues, follow the label directions carefully with respect to dosage levels, number of applications and minimum interval between application and reentry or harvest.

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