

# Integrated Pest Management for Raspberry Beetle

**Order:** Coleoptera

**Family:** Byturidae

**Species:** *Byturus unicolor*



Figure 1: Adult raspberry beetle on a raspberry bud

The raspberry beetle, also known as the raspberry fruitworm, is a product contaminant pest found in raspberry fields in Washington. The larvae, or fruitworm, may fall off with the fruit during machine harvest. This pest has often been controlled by a diazinon treatment at 5% bloom, before pollinators are brought into the field. The United States Environmental Protection Agency is seeking to reduce the use of organophosphates, such as diazinon, through higher restrictions and cancellations.

New monitoring tools for the raspberry beetle have been developed and tested in Whatcom County. The Rebell® Bianco white sticky trap can be used to detect raspberry beetle levels in a field. This may help in determining what treatment, if any, is required for control of the pest.



Figure 2: Raspberry beetle feeding damage on a leaf.

**Biology:** The adult raspberry beetle is between 0.15 and 0.2" in length, a reddish brown color with short hairs covering its whole body (see figure 1). Overwintering in the soil, the adult emerges in the spring between mid-April and mid-May depending on soil temperatures. The adults feed on leaves, often on the new primocane leaves, but in areas of high populations they will also feed on upper floricanes leaves. Adults are then attracted to flower buds and blooms where mating and, subsequently, ovipositing occurs.

Larvae (or fruitworm) emerge from the eggs on the flower or immature fruit and begin feeding on the receptacle. The larvae are between 0.1" and 0.25" in length depending on the time of season. They are a light cream color with darker bands across its body. The larvae will remain in the receptacle until the fruit is harvested or falls to the ground at fruit maturity in late summer. Pupae are present in the soil in late summer to early autumn. Adult beetles emerge from the pupae in late autumn and remain in the soil until the spring.



Figure 3: Larva feeding on receptacle of thimbleberry.



Figure 4: Adult raspberry beetles mating on raspberry flower.



Figure 5: Raspberry beetle larvae feeding on receptacle of raspberry fruit.

**Host Species:** The most common host species for the raspberry beetle is the cultivated raspberry (*Rubus idaeus*), but it will also inhabit other native *Rubus* species. Raspberry beetle larvae have been observed on salmonberry (*R. spectabilis*), thimbleberry (*R. parviflorus*), black raspberry (*R. leucodermis*), trailing blackberry (*R. ursinus*), Himalayan blackberry (*R. discolor*), and evergreen blackberry (*R. laciniatus*). Thimbleberry appears to be the most attractive alternate host to the raspberry beetle, which may be due to its similar flowering dates to the cultivated red raspberry. Figure 3 shows a larva feeding on a thimbleberry receptacle

**Management:** Three steps are involved in integrated management of the raspberry beetle: scouting, establishing tolerance levels, and deciding on a treatment, if required.

**Scouting:** Scouting can be done visually by selecting areas of the field to investigate. There are several times to determine the presence of the raspberry beetle in your field either through feeding damage to your plants or by finding the adult or larval stages of the raspberry beetle in your field.

In mid-spring, the raspberry beetle will feed on new leaves in an interveinal pattern (figure 2). The amount of leaf damage may be related to the population of raspberry beetle in your field. The timing of adult emergence from the soil appears to depend on soil temperatures with emergence dates ranging from mid-April to mid-May in Whatcom County.

Shortly after emergence, the adults will be attracted to the flowers and you may find one adult or a mating pair on a flower, depending on beetle population in the field (figure 4).

Once the fruit has formed and is close to being ripe, when removing the fruit, you may find larvae of the raspberry beetle feeding on the receptacle, or you may see feeding damage on the receptacle, seen as eaten out holes or tunnels in the receptacle (figure 5).

The Rebell® Bianco sticky trap can also be used to assist in scouting for the raspberry beetle. It is a special non-uv reflective white sticky trap and is very attractive to the adult raspberry beetle (figure 6). It can be used to announce presence of the pest and estimate raspberry beetle populations in a field.

To use the Rebell® Bianco trap, first decide on where to place the traps. Draw a map of your field and note where native *Rubus* species border the field. Traps should be placed every 20 to 40 rows around the perimeter of the field. Attach the trap to the top wire approximately one post in from the perimeter. Locations where native *Rubus* species are present along the border of the

field often have higher levels of raspberry beetle, so more traps may be placed here. Make a note on your map of the placement of each of the traps. Traps should be placed in the field by early April to get an accurate count of beetles present.



Figure 6: Rebell® Bianco trap with raspberry beetles.

Traps should be monitored weekly or at least once when you are close to making a decision on how to treat for the raspberry beetle. See figure 7 for a picture of a trapped beetle. Record the date and the number of beetles caught at each trap on your map. Monitoring at the same time each year relative to the progress of the crop will allow comparison of beetle counts over the years.

**Establishing tolerance levels:** Tolerance levels for the raspberry beetle larva in harvested fruit range from zero for IQF berries to moderate counts for juice and puree grade. Tolerance levels may also differ between buyers or processors.

The number of trapped beetles in a field generally relates to the number of larvae infesting fruit receptacles. However, a field with more than zero, but low numbers of trapped adult raspberry beetle may have zero larval contaminants in harvested fruit. In most conventional fields studied in 2004 (both those using diazinon and not using diazinon), less than 0.1% of the fruit was observed with any larval damage to the receptacle, which indicates larval presence. Low numbers of beetles in the traps at 5% bloom indicate a low likelihood of contaminant larval pest in harvested fruit.



Figure 7: Trapped raspberry beetle with other insects.

**Treatment decision:** Beetle counts are often spotty within a field with some beetles trapped in one are of the field and none in another. Some growers have made decisions to apply a pesticide treatment to only the part of the field with higher numbers of trapped beetles. These growers have had success in controlling raspberry beetle counts, with decreases in adult counts and less than 0.15% receptacles with evidence of larval feeding.

Based on your tolerance levels for the raspberry beetle, consider the table on the following page to make a decision on treatment. You may decide to not apply a pesticide for raspberry beetle, to treat only part of your field, or to treat the entire field.

In research done by WSU Whatcom County Extension, it has been found that the number of beetles present and evidence of larvae in receptacles is significantly similar between conventional farms that applied diazinon at 5% bloom and conventional farms that did not. Control of the raspberry beetle may be coming from other sources, such as the use of the clean-up spray before harvest or by primocane burning.

**Table 1:** Thresholds of trapped beetle counts for decision making in the pesticide treatment for raspberry beetle.

<b>You may want to apply a pesticide treatment for raspberry beetle if the average trapped beetle count is:</b>	<b>For :</b>
Above 2 beetles per trap on average*	Machine harvested IQF berries
Above 5 beetles per trap on average	Machine harvested fruit going to straight pack, juice, puree
Above 15 beetles per trap on average*	Hand harvested fruit

\*The presence of adult raspberry beetle does not necessarily equate to larvae as harvest contaminants.

\*\* This pest is usually not a contaminant in hand harvested fruit. The raspberry beetle stays attached to the receptacle when the fruit is removed.

*Note: Organic growers concerned about raspberry beetle counts may want to consider applying an organic pesticide which may help to control the raspberry beetle.*

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