Section V
Soil Arthropods

POTENTIAL MONITORING STRATEGIES FOR IMPROVING ROOT WEEVIL MANAGEMENT IN NURSERY AND SMALL FRUIT CROPS

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Root weevil (Coleoptera: Curculionidae genus *Otiorhynchus*) damage to nursery and small fruit crops is a chronic problem and a high priority concern to manage effectively. Resources are often futilely expended to control the pests but necessary to attempt to reach the elusive zero-tolerance level enforced on host plant shipment and sales. Efforts to improve timing of spray programs to optimize control by curtailing fecundity of adults have been limited in success, and further refinement of degree-day modeling and weevil biology is appreciated. Monitoring development by digging larvae and trapping of adults with novel equipment is the focus of a multi-year research effort at different sites and situations in the north to mid-Willamette Valley, where much of the production occurs.

Weekly visits to various nurseries and strawberry fields were necessary in the critical spring and summer seasons to count adults, monitor development (by digging), maintain traps, and download soil and air temperatures from data loggers. Results of stage and abundance were often given to managers anxious to adjust their spray programs accordingly.

Two types of traps were implemented for relative comparison. Both traps involved sticky plastic substrates, to detain the adults, and bait consisting of small dried apple chips. One trap, called the Exotior™ Black Vine Weevil Trap, by Exosect (UK), had been used in a limited area the previous season with some success. The second trap, tested for the first time, was a circular cover (1 ft diameter or 60 cm) with many openings, with two sticky plastic circles facing parallel 5 cm apart under the lid with a central circular spacer and secured to the ground by a spike. Fifty traps of each type were set among containers or susceptible in-ground plants at 6 separate sites (3 nurseries, 2 strawberry fields, 1 university campus). Two HOBO™ data loggers at each site were used, each with 3 probes, 2 for soil temperatures (3-5 cm deep) and 1 for air (1 meter height).

Downloading of data occurred weekly. Root zones of plants and surrounding media in containers or field soil ground were examined for larvae, pupae and adults. Transformation of data was employed, using a 10°C baseline to obtain cumulative degree days, both hourly and daily from a high-low averaging. Stages, species, and numbers of weevils were tabulated and proportioned to get developmental curves for each site, and matched to the cumulative degree days at the corresponding dates (Figure 1). Comparisons of models and development curves were established for a yew field, where a nearby site was monitored in 2003 (Figure 2).

Results of trapping showed an obvious superiority of the Exotior™ trap to retain weevils (Figure 3), accounting for almost 95% of the weevils captured. A modification of the lid trap is warranted to be of any practical use for further monitoring. Differences of relative abundance by species and site/host plant were notable during the season. The two strawberry fields differed in species composition. Black vine weevil, *Otiorhynchus sulcatus*, generally eclosed two weeks earlier than the strawberry root weevil, *Otiorhynchus ovatus*. The incidence of rough strawberry root weevil, *Otiorhynchus rugosostriatus,* was less patterned and could be bimodal as previously reported by L. Tanigoshi. Traps in the strawberry fields were pulled earlier (late June), to allow for renovation, so collections of data were not conducted later in the summer. One site, the yew field, accounted for almost half of the total weevils caught, and one trap was responsible for almost 40% of the total (Exotior™) for the site (19% of total weevils caught), while a few (3 of ten) had less than 5 weevils for the season. Trapping needs to be explored further to be an effective and accurate index of weevil abundance and movement for practical timing of spray programs.

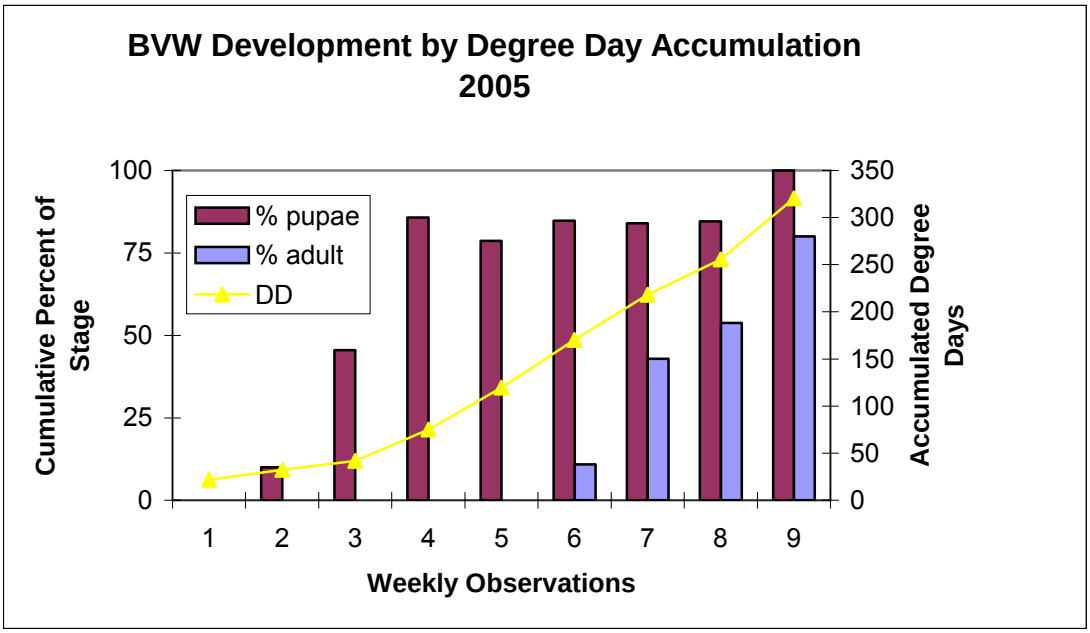

Figure 1

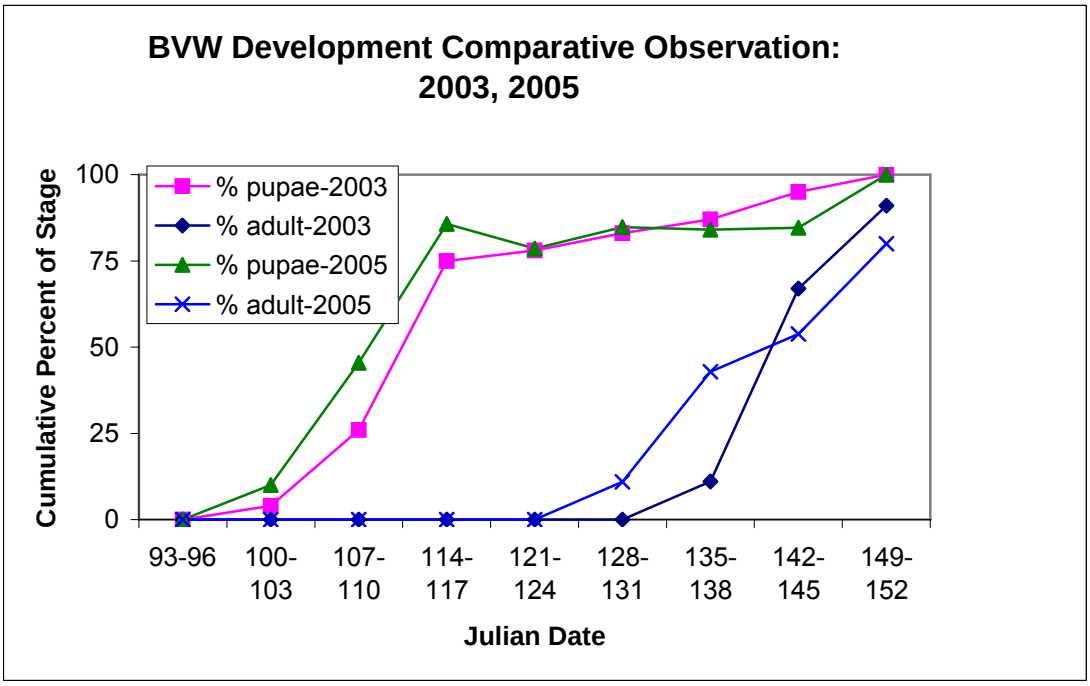

Figure 2

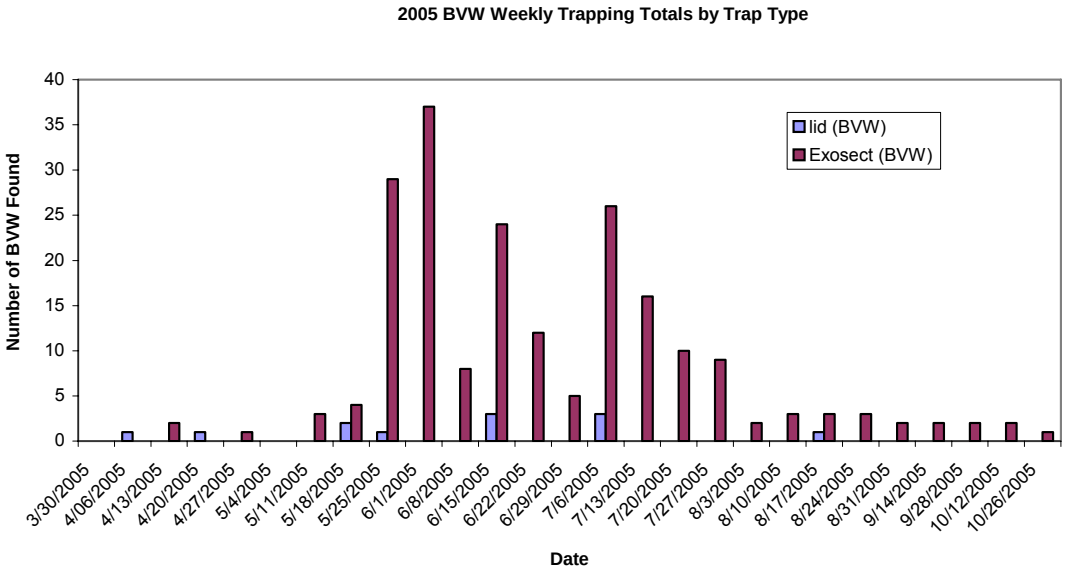

Figure 3