

Biology/Phenology

Plum Curculio Biology and Monitoring in Utah

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The plum curculio (PC), *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae), directly attacks the fruit of a wide range of stone and pome fruits. It is native to North America, east of the Rocky Mountains, and presumably fed on native wild *Prunus* and rosaceous hosts before the availability of cultivated fruits. However, a small isolated population occurs in the Brigham City area of Box Elder County in northern Utah and is the only confirmed population in the West. It was first identified in Utah from sweet cherry and plum in the early 1980s. In the eastern U.S., PC is an annual threat to commercial orchards (especially a problem in apple), causing significant economic loss if not controlled. In Utah and the West, PC is a quarantine insect and a threat to the region's fruit industry.

Biology

The Box Elder County, UT, population of PC appears to be similar to the northern strain in the East. It is univoltine and with an obligate diapause during the adult stage from approximately late September through April. The first trap catch of an overwintered adult PC was on 27 April 1998 (home yard sweet cherry) and on 20 April 1999 (roadside wild plum). The major emergence period of adults was from early May to early June (Fig. 1A and B), and peak emergence occurred at late petal fall for cherry and plum. Adults were in host trees, ready to feed and oviposit before green fruit was available. The majority of eggs in sweet cherry occurred from late May to late June, while peak larva densities were found from June to mid-July (Fig. 1A). The phenology of PC eggs and larvae in fruit overlapped substantially with the fruiting period of plum, cherry, peach, and apple, but not with apricot (phenology of apricot was earlier than PC). A second, smaller peak of adults occurred during August and September (Fig. 1A and B), which was summer generation adults feeding in trees before moving to overwintering sites.

The sex ratio of adult PC caught in traps was skewed toward males during the fruiting period at most sites (female proportion 0.29-0.45). Trap collections with a higher proportion of females (female proportion >0.5) tended to be later in the season after fruit were present and when PC adult densities were lower. A high proportion of female PC collected in the early spring was already mated with mature eggs. Summer generation females entered diapause unmated and with immature ovaries. Therefore, mating appears to occur during the early spring as PC emerges from overwintering sites or shortly after dispersal to host trees.

Fruit Hosts and Infested Sites

PC oviposition scars on fruit and eggs and/or larvae in fruit were found in sweet cherry, tart cherry, wild plum (*Prunus americana*), cultivated plum, apple, and apricot. No PC injury was found in peach or pear. Peach is a likely host, but evidently not a common one in Box Elder Co. Pear is likely a poor or non-host. Sweet cherry and wild plum are the most common fruit hosts in Box Elder Co. PC has primarily been found in neglected sites that do not receive

insecticide sprays, pruning, etc. These sites are home yards (predominantly sweet cherry), roadside wild plum, and neglected orchards (predominantly tart cherry). Based on a survey of over 300 sites, the residential areas of Brigham City have the most infested sites and these are predominantly sweet cherries in home yards. To date, PC infested fruit has been found at 75 host tree sites in Box Elder Co. The phenology of cherry and plum seems to be most closely aligned with that of overwintered adults emerging in the spring and seeking green fruit for feeding and oviposition. PC phenology does not overlap as well with apricot (earlier) and apple (later).

Adult Monitoring

Pyramid and circle traps were both effective in trapping PC adults (Fig. 2A and B). Limb jarring, twig-mimic traps, and sticky trunk bands were not effective (Fig. 2A). No statistically significant enhancement in trap catch was found by adding attractants to traps (1998: mechanically injured green fruit; 1999: PC aggregation pheromone, fruit essence [cherry and plum] and plum extract), although some stimulation of catch was observed with a combination of tart cherry essence and pheromone in tart cherry sites and with plum extract in a wild plum site. Circle traps are attached directly to the tree trunk, whereas pyramid traps are placed on the ground adjacent to the trunk. The circle trap is less expensive to make and easier to use, especially in home yard sites.

Fig. 1A. Density and Timing of Plum Curculio Adults, Eggs and Larvae in Sweet Cherry - 1998

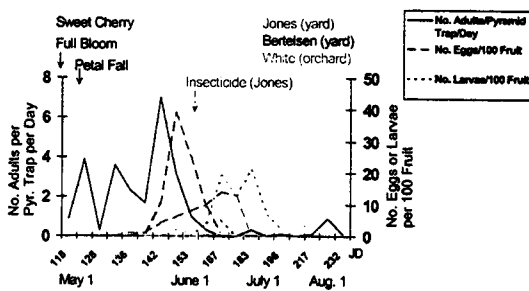


Fig. 1B. Density and Phenology of Plum Curculio Adults in Sweet Cherry and Wild Plum - 1999

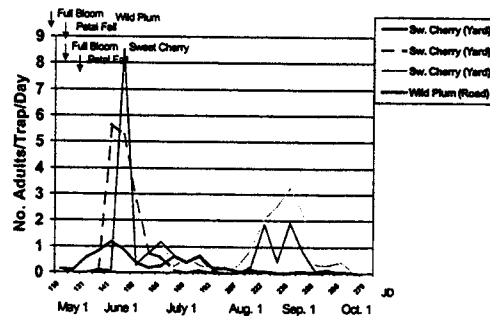
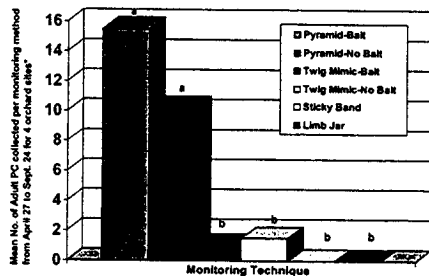
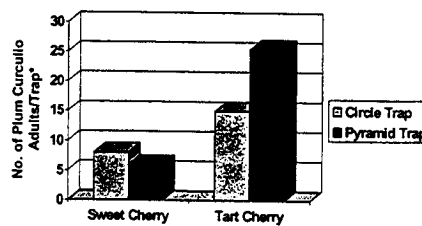


Fig. 2A. Adult PC Monitoring Techniques - 1998
Effectiveness of Traps & Green Fruit Bait



*4 orchard sites = 3 tart cherry orchards & 1 sweet cherry orchard
P = 0.0228; Tukey's studentized range test used to separate means

Fig. 2B. Adult PC Monitoring Techniques - 1999
Comparison of Effectiveness of Circle Trap vs. Pyramid Trap



*For one sweet cherry and two tart cherry orchards from first catch to Oct. 6