

Chapter 1

Introduction

Apple and peach production in Virginia is a \$36.2 million industry. Integrated pest management (IPM) practices are being implemented for many orchard pests (e.g. apple maggot, *Rhagoletis pomonella* (Walsh), codling moth, *Cydia pomonella* (Linn.), and oriental fruit moth, *Grapholita molesta* (Busck)). These practices rely on scouting, effective trapping systems, pheromone-mediated mating disruption, reduced spray schedule, degree-day models, precisely timed spraying of chemicals, and alternate chemical controls, such as insect growth regulators. Many of the traditional chemicals (e.g. organophosphates (OPs)) are becoming more restricted in their use or are now unavailable to orchardists because of new legislation, i.e. the 1996 Food Quality Protection Act.

Plum curculio, *Conotrachelus nenuphar* (Herbst) (Coleoptera: Curculionidae) is a major pest of stone and pome fruits. Currently plum curculio is not amenable to IPM practices in an orchard. Plum curculio is effectively managed by two sprays of OPs in Virginia: one spray at petal fall and the other at first cover. With orchardists being legislated toward reduced use of OPs, management of plum curculio will become more difficult. At present, there are no effective trapping systems, no pheromone-mating disruption, no working degree-day models for Virginia, and few alternative chemical controls.

Compounding the problem is the presence of univoltine and multivoltine strains of plum curculio. Historically, the univoltine and multivoltine strains have been considered northern and southern strains, respectively. However, there is evidence in New Jersey that the multivoltine strain is becoming established in areas where previously only the univoltine strain was found (Dr. Peter Shearer, Rutgers, personal communication).

Chapman (1938) determined that the multivoltine strain was present in Virginia. Trade barriers have been imposed upon the export of Virginia's apples and peaches due to the possibility of plum curculio larvae in the fruit at harvest. The two strains appear to

be morphologically identical, so a reliable and efficient method is needed to differentiate the two strains.

My research examines the potential for the development of an effective trapping system using host plant volatiles and a pheromone in the orchard, and involves the development of a reliable biochemical assay to differentiate between univoltine and multivoltine strains.