

**1. Project Title:** Evaluation and Implementation of a Degree-Day Model for Management of Plum Curculio in Alabama Peach Orchards

**2. Is this a new proposal or a request for renewal?:** New proposal

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**5. Brief Description of Problem:**

The peach industry has a long history in Alabama of over 70 years. Annual gross returns are estimated at \$10 to \$12 million. Family farms make up the industry with over 370 farms growing and marketing peaches according to the 2002 U.S. Census of Agriculture - State Data. The greatest concentration of production is in central Alabama in the Chilton County area. In addition, 265 farms produce apples that would be impacted by this research.

Economically, the peach industry is in the same situation that most other agricultural commodities are facing, flat price receipts and ever increasing costs associated with production. Cost of production rises every year while prices received by growers have changed very little over the past 20 years. The Food Quality Protection Act of 1996 has and will change the availability of cheaper broad-spectrum insecticides. Without changes in the approach to insect management the negative economic impact to the grower will be grow even greater.

While many cultural practices have changed, pest management in peaches has changed very little. Insect control in peaches centers on control of plum curculio (*Conotrachelus nenuphar*) and tolerance of damage from this pest is extremely low, basically zero percent for fresh market sales. To avoid the potential loss of sales and repeat customers, growers will make insecticide applications every 7-14 days beginning at petal fall and continuing to allowable pre-harvest interval. The total number of applications can number 3 to 16 depending on the variety. Prior research (unpublished) has suggested possible modifications in the calendar pest management program for early season peach varieties can reduce the number of necessary insecticide applications. However, modifications to the calendar program have not been satisfactory for mid and late season peach varieties.

Another problem for growers has been the poor detection reliability of traps within orchards for monitoring *C. nenuphar* and developing any thresholds. Sensitivity of traps in orchards receiving calendar insecticide treatments has been a major problem. The use of small non-sprayed orchards has helped in gaining data but, more specific information is need by the grower to alter present pest management decisions.

Loss of insecticides, label restrictions and cost of pesticides are necessitating that changes and improvements are made in how growers approach *C. nenuphar* control in the future. Near zero tolerance and protracted over-winter emergence will dictate the need for highly reliable and accurate degree-day model and control strategy for peaches.

## **6. Project Objectives:**

The overall objective of this project is to develop a mathematical model and control strategy for *C. nenuphar* (plum curculio) that protects the producer from economic losses and at the same time enhances the judicious use of pesticide products in the peach production scheme.

- 1) Utilize multiple years trap data of *C. nenuphar* in central Alabama to develop a highly correlated degree-day model for seasonal *C. nenuphar* activity including oviposition, larvae to pupa development, and infield adult emergence.
- 2) To evaluate the model with field data throughout the different climatic growing areas of Alabama for goodness of fit.
- 3) To evaluate and implement targeted chemical control measures based on use of the model in order to reduce non-discriminate insecticide applications while maintaining minimal fruit infestation.

The ultimate future goal would be to foster the adoption of the model based action program to growers in Alabama and neighboring states.

## **7. Project Description:**

The proposed study will be conducted over three peach growing seasons in Alabama.

### **Objective 1. Development of a preliminary degree-day model from existing adult *C. nenuphar* seasonal trap data.**

Data previously collected on adult *C. nenuphar* activity at the Chilton Research and Extension Center in central Alabama will be analyzed to develop a model based on degree days. Various thresholds will be employed to determine best fit for the number of years that adult activity data is available. Adult activity within a non-treated orchard has been conducted from 1994 through 2004 at the Chilton Research and Extension Center.

### **Objective 2. Establishment of regional peach pest monitoring orchards.**

Small orchards will be identified in three geographical regions within Alabama for pest data collection. These areas will not receive any insecticide treatments that might hinder insect activity and monitoring efforts. Black pyramid traps will be set up in these orchards and scouted once per week for *C. nenuphar*. Collection of 20 fruit per week will be used to determine incidence of feeding, oviposition, and larva development. Exclusion traps, 1m x 1m, will be set up to determine emerging adult occurrence and duration.

### **Objective 3. Evaluate accuracy of degree-day model (Objective 1.) in monitored orchards and potential sources of forecasted weather data for predictive uses.**

Degree-day model developed in Objective 1 will be evaluated throughout the season for accuracy in determining insect activity as reported by scouting, trapping and fruit sampling. Model(s) will be run using accrued temperature data and also 7 day and 14 day forecasted temperatures from National Oceanic and Atmospheric Administration (NOAA, National Weather Service) and Agricultural Weather Information Service (AWIS), a fee based company located in Alabama. Small portable weather stations will

be used during the entire growing season to collect site specific weather data from each regional location. This data will be utilized to further develop the model within Alabama.

**8. Expected Outcomes:**

We expect to better understand the biology of the southern strain of plum curculio and to incorporate that knowledge into a reliable degree-day model for assisting in the control and judicious use of pesticides in peach production. We also expect to extend this knowledge and experience to growers to eliminate or greatly reduce reliance of a calendar based spray program and to facilitate as close as possible an "as needed" approach.

**9. Budget (March 1, 2006 – February 28, 2007):**

	Budget requested (\$)
Personnel (Wages for 1 Field Assistant)	2,500
Supplies (traps, petri dishes, sampling supplies, etc)	500
Travel (in-state)	500
<b>Total</b>	<b>\$3,500</b>