

## **Quarterly Report to the Virginia Vineyard Association**

In Reference To:

### **Toward the Identification of Behaviorally Active Compounds from Grape Roots that Attract Grape Root Borer Larvae**

Submitted by Chris Bergh on January 14, 2008

#### **Collaboration with North Carolina State University**

Dr. John Meyer, North Carolina State University, collected and shipped three separate lots of grape root bore eggs from North Carolina during August and September, 2008. In addition, we supplemented the supply of eggs by collecting and mating virgin female moths from vineyards in northern Virginia.

#### **Collaboration with USDA, Beltsville MD**

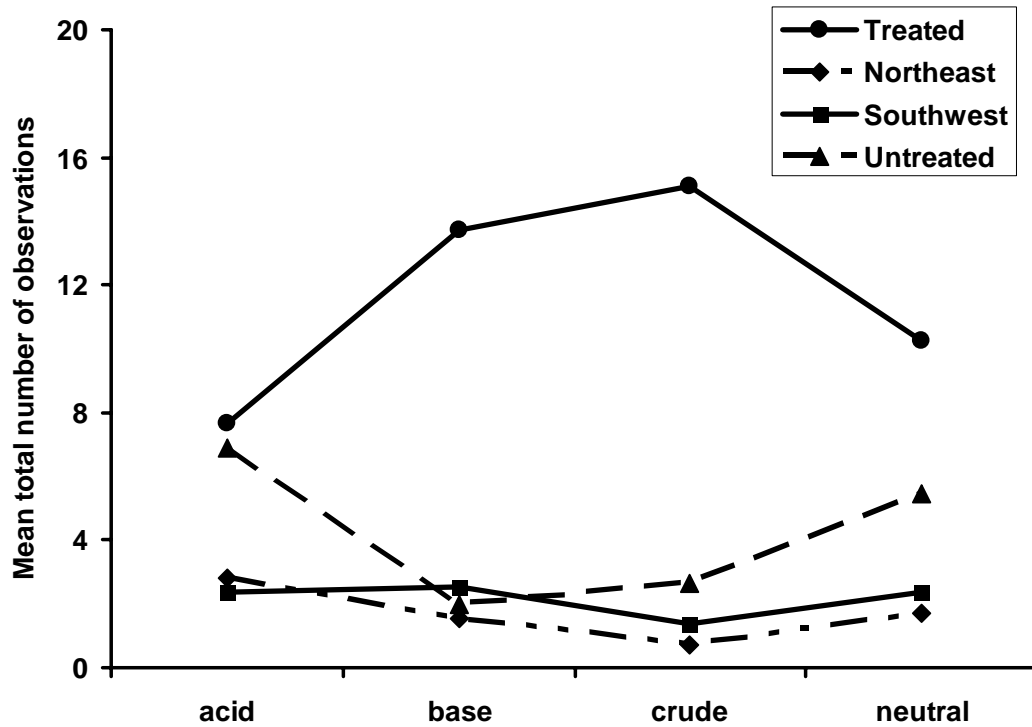
Dr. Aijun Zhang provided the facilities, equipment and technical expertise to do the concentration and acid-base fractionation of extracts from 420-A roots. Two separate collections and fractionations were conducted (August 13 and September 18).

#### **Objective: Bioassay of acid-base fractions of 420-A root extracts**

Eleven replicates of bioassays of the acid, base, neutral fractions and of the crude, unfractionated extract were conducted between August 22 and September 10. Those bioassays revealed that the activity appeared to reside primarily in the base fraction, although there were indications that of a lesser response by larvae to the neutral fraction. There was not a significant response to the acid fraction. Dr. Zhang felt that the response to the neutral fraction could have been due to some contamination from the base fraction during the fractionation process, and this prompted the second root collection, extraction and fractionation in September. Seven replicates of bioassays of each fraction and the crude extract were conducted between September 20 and October 2. Data are presented in Figure 1. To interpret this graph, compare the distance between the "treated" line and the "untreated" line for each fraction shown on the x-axis. Larger distances represent a greater response of larvae to the treated disc compared with the untreated disc. The largest distance between the treated and untreated lines was for the crude extract. The distance between the lines for the base fraction was nearly identical to that for the crude extract, again suggesting that the compounds that elicit the attraction response of grape root borer larvae appear to be contained primarily in the base fraction. The distance between the lines for the acid fraction was minimal, indicating no activity of that fraction, while the distance between the lines for neutral fraction was intermediate between the

base and the acid fractions, suggesting that the neutral fraction may contain some activity.

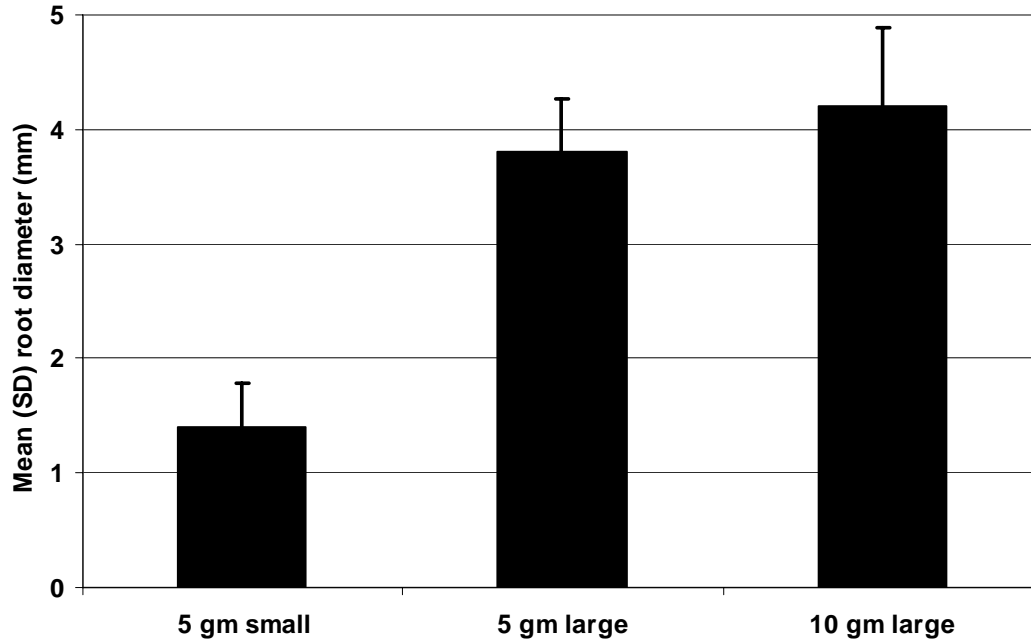
Figure 1. The response of grape root borer larvae to fractions of extract from 420-A roots. From bioassays conducted in September, 2008.



**Objective: Compare the response of grape root borer larvae to extracts from 420-A roots of different sizes**

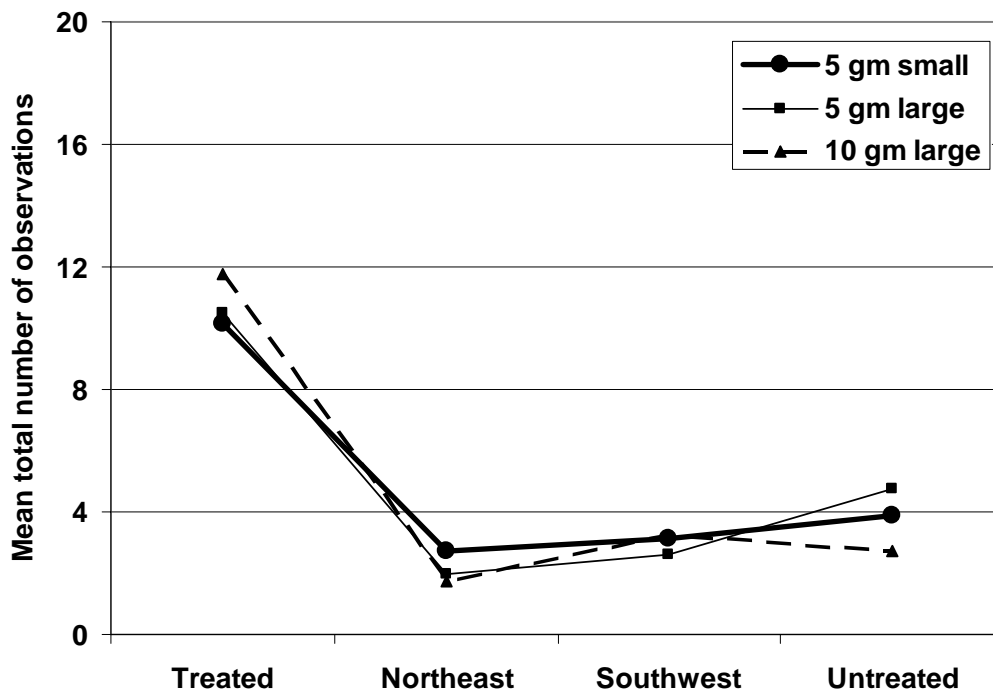
To compare the behavioral response of grape root borer larvae to extracts from 420-A roots of different sizes or from different amounts of root tissue, separate samples of 5 gm of small roots, 5 gm of larger roots and 10 gm of larger roots were collected from 420-A roots on August 13. These samples were extracted for 30 in alcohol, filtered and concentrated. The diameter of each root section was measured after extraction. Ten replicates of bioassays of extracts from each sample were conducted from September 4-17. Figure 2 shows the mean root diameter from the 3 samples.

Figure 2. Mean diameter of 420-A root samples



The response of larvae to extracts of the three root samples did not differ statistically. Figure 3 shows the response of larvae to the three extracts.

Figure 3. The response of grape root borer larvae to extracts of 420-A roots of different sizes.



## **Summary**

We have demonstrated that the behaviorally active compounds associated with alcohol extracts of 420-A roots are likely associated primarily with the base fraction. This will be very useful in subsequent steps intended to further isolate, characterize and identify them. Our data have also shown that this activity is not isolated to the surface of small feeder roots of grape, but is also associated with larger diameter roots. I presented these data and data from the research conducted in 2006 at an invited Entomology Colloquium at the University of Maryland in November and as a poster presentation at the National Meeting of the Entomological Society of America meeting in San Diego, CA in December.