Chemically-mediated host colonization behavior of the peach bark beetle, *Phloeotribus liminaris*

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INTRODUCTION

- Little is known of the colonization and mating behavior of bark beetles that attack hardwood trees.
- Peach bark beetle (PBB), *Phloeotribus liminaris* (Harris) (Fig.1), is a pest of black cherry.
- PBB attacks induce gummosis in trees
- (Fig. 2), leaving gum spots in the wood and reducing its value by up to 90%.
- Conventional control methods are ineffective because the beetles feed underneath the bark and are physically protected from sprayed insecticides.
- Information on the colonization behavior of PBB will aid in establishing effective management programs, such as improving detection methods and optimizing survey strategies.

Fig. 1: *Phloeotribus liminaris*

Fig. 2: Gummosis in black cherry

OBJECTIVE

Test the hypothesis that host colonization in the peach bark beetle is chemically mediated.

METHODS:

- Measured walking response of PBB beetles (*n*= 60-80) in a straight- tube glass olfactometer (3 cm dia. x 30 cm length) divided into five 2.5 cm sectors (Fig. 3) to the following odor sources:
  - Blank
  - Cherry bolt
  - Male-infested bolt
  - Female-infested bolt
- Ten holes (0.4 cm) were drilled through the bark of black cherry bolts used in bioassays.
- In the male- and female-infested bolts, individual beetles were placed in the holes and allowed to feed for 24 hours before being used in bioassays.
- Filtered air was drawn through a glass jar containing the odor source before entering the olfactometer.
- Beetles (5/trial) were placed at the down-wind end of the olfactometer (sector 0).
- Location of beetles within the olfactometer was recorded after ten minutes.
- Attractivity index (D) was calculated per Zagatti et al. 1987 [1]. This index has been used to assess the colonization behavior of *Phloeotribus scarabaeiodes* [2]:

$$D = X/D_{max} * 100, \text{ where } X = \sum_{i=10}^{4} i n_i$$

n_i is the number of beetles in sector i at 10 minutes
$D_{max}= 4n$ (the value if all beetles were in sector 4 at the end of the assay)

Fig. 3: Olfactometer used for bioassays

RESULTS:

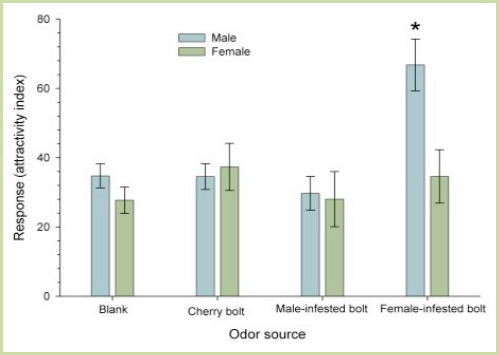

Fig. 4: Attraction of male and female PBB to uninfested and infested bolts of black cherry. (ANOVA $F_{7,114}$=4.3, (P)< 0.0003). Bar marked with (*) is significantly different when compared to control (LSD, P<.0.05).

CONCLUSIONS

- Males were significantly attracted to female infested cherry, suggesting that females release a sex pheromone.

FUTURE DIRECTIONS

- Identify female produced pheromone.
- Test response of males and females against volatile pheromone in field.
- Investigate water stress and susceptibility of colonization of black cherry by peach bark beetles.

REFERENCES

1. Zagatti et al. 1987. J. Chem. Ecol. 13:1561-73.
2. Pena et al. 1992. Entomol. Exp. Appl. 63:81-86.

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