

APPENDIX D

Summary of Tested Insecticides and Repellents for CBB Control in Coffee – 2016

Below are research summaries of coffee-approved insecticides and repellents tested by the University of Hawai'i College of Tropical Agriculture and Human Resources (UH CTAHR) for control of coffee berry borer (CBB). All products listed are registered for use on coffee in Hawai'i. Do not use or attempt to use pesticide products on coffee that are not registered for use on coffee and in Hawai'i.

As new research information is forthcoming, there may be new products tested and added to the lists below for CBB control.

PESTICIDE PRECAUTIONS

- All chemicals and products should be used in accordance with directions on the manufacturer's label.
- Use pesticides safely.
- Read and follow directions on the manufacturer's label.

If you have questions about pesticides or repellents, please contact your local Hawai'i Department of Agriculture (HDOA) Pesticides Branch or UH CTAHR Cooperative Extension Service. Contact information can be found at

- HDOA Pesticides Branch: <http://hdoa.hawaii.gov/pi/pest/pesticide-branch-contacts/>
- UH CTAHR Cooperative Extension Service: <http://www.ctahr.hawaii.edu/Site/Locations.aspx>

In case of an emergency, contact your physician or call 911.

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1. Insecticides Tested in Laboratory Bioassays for CBB Control in Coffee, Various

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All products were tested using maximum labeled rates, assuming a spray volume of 100 gallons per acre. Widespread[®] Max was added to all spray solutions at the rate of 8 fl. oz. per 100 gallons of spray volume.

Product Name	Active Ingredient	EPA Reg. No.	Direct-Contact CBB Control ¹	Indirect-Contact CBB Control ²
Admire Pro[®] Systemic Protectant	Imidacloprid	264-827	No	No
Applaud[®] Insecticide	Buprofenin	71711-21	No	No
EverGreen[®] Crop Protection EC 60-6	Pyrethrins + PBO	1021-1770	Yes	No
Movento[®]	Spirotetramat	264-1050	No	No
M-Pede[®]	Potassium salts of fatty acids	10163-324	No	No
Neemix[®] 4.5	Azadirachtin	70051-9	No	No
Prev-Am Ultra	Sodium tetraborohydrate decahydrate	72662-3	No	No
Provado[®]	Imidacloprid	264-763	No	Moderate
PyGanic[®] Crop Protection EC 5.0³	Pyrethrins	1021-1772	No	No
Trilogy[®]	Clarified hydrophobic extract of neem oil	70051-2	No	No

¹ **Direct Contact: Spray applied directly to CBB female adults.**

² **Indirect Contact: Coffee berries dipped in spray solution and allowed to dry; CBB female adults then immediately exposed to treated coffee berries.**

³ **Preliminary Results: Repeat bioassay to be conducted in 2016**

2. Products Tested In-Field for Repellency and CBB Control in Coffee

Elsie Greco

Formerly with UH-Mānoa/CTAHR/Plant & Environmental Protection Sciences

In 2012, Garlic Barrier® AG+ was tested at a rate of 5 fl. oz. per gallon of water plus ¼ teaspoon Silwet®. This spray was applied for 2 days in a row and retained repellency for about 1 week.

In 2013, two products and a combination thereof were tested for CBB repellency and control on coffee. 1) Garlic Barrier® AG+ was tested at a rate of 3 fl. oz. per gallon of water plus 0.08 fl. oz. of Widespread® Max. 2) BotaniGard® ES was tested at a rate of 32 fl. oz. plus 8 fl. oz. of Widespread® Max per acre. Testing was also done on 3) a combination of Garlic Barrier® AG+ (3 fl. oz. per gallon of water plus 0.08 fl. oz. of Widespread® Max) and BotaniGard® ES (32 fl. oz. plus 8 fl. oz. of Widespread® Max per acre). Sprays were applied 3 days in a row and then anywhere from 10 to 44 days after the initial 3 sprays.

Repellency was determined by counting newly infested cherry.

Product Name	Active Ingredient	EPA Reg. No.	Repellency*
Garlic Barrier® AG+ (insect repellent)	Garlic juice	Exempt	Yes
BotaniGard® ES	<i>Beauveria bassiana</i> strain GHA	82074-1	No
Garlic Barrier® AG+ and BotaniGard® ES	Garlic juice, <i>Beauveria bassiana</i> strain GHA	Exempt; 82074-1	Yes

* As compared to control (untreated berries)

Results showed that Garlic Barrier® has potential as a repellent to reduce CBB attack if used frequently, and it can be used as a component of an integrated program to control CBB. Garlic Barrier®, used alone, did not have an effect on the mortality of CBB. Good coverage and frequent spraying of Garlic Barrier® and other treatments examined are necessary to reduce CBB attack, especially during the rainy season.

Further research is recommended.

3. Products Tested In-Field for Repellency and CBB Control in Coffee

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Surround[®] WP was sprayed at a rate of 50 g of Surround[®] WP + 3 ml of Nu Film per 1 liter water every 2 weeks.

- Year 1 (2011) results (kaolin vs. no kaolin) were inconclusive due to the lack of treatment or improper treatment applications.
- Year 2 (2012) results showed promising repellency with Surround[®] WP (kaolin) treatments; however, CBB infestation rates ranged from 5.8% to 53%.
- Only one farm sprayed a combination of Mycotrol[®] O and Surround[®] WP. Compared to the other farms, this farm had the lowest CBB infestation for both years. This combination was most effective at keeping the CBB infestation below 2%. This treatment has the highest cost per application. Mycotrol[®] O was sprayed at a rate of 8 fl. oz. Mycotrol + 4 fl. oz. spreader per 100 gallons water per acre.

CBB mortality was observed and was the result of *Beauveria* infection only.

Product Name	Active Ingredient	EPA Reg. No.	Reduction in CBB Infestation
Surround [®] WP (crop protectant)	Kaolin clay	70060-14	Yes
Mycotrol [®] O	<i>Beauveria bassiana</i> strain GHA	82074-1	Yes
Surround [®] WP and Mycotrol [®] O	Kaolin clay; <i>Beauveria bassiana</i> strain GHA	Exempt; 82074-1	Yes

Results showed that Surround[®] WP has potential as a repellent to reduce CBB attack if used properly and frequently and can be used as a component of an integrated program to control CBB. Good coverage and frequent spraying of Surround[®] WP and other treatments examined are necessary to reduce CBB attack, especially during the rainy season.

Further research is recommended.