

Tips for CBB

Integrated Pest Management

Updated 1/2014

Coffee Berry Borer (La Broca) damage can be very serious, or it can be reduced to 2-5% of your crop. With a multi-pronged approach to control, you can greatly minimize loss. It is important to "be your own scientist" when it comes to your farm. Inspect your coffee often. As young cherry matures, the CBB will often wait at the end of the bean. When the bean begins to harden, the beetle will begin to drill. Even if your cherry is green, inspect it regularly. If you see CBB on the cherry, consider spraying the fungus. Don't wait for damage to occur. This is a short list of recommended practices. The best practice? Harvest your coffee; 75% of CBB will be removed.

Thirty Trees Method for Determining Infestation

In order to make informed decisions about CBB, it is imperative that each farm do a simple evaluation every month when cherry is present. See attached sheet. The Thirty Trees count will help determine fungus spray times and will save you time and money.

Field Sanitation

Simple sanitation is vital, and can be cost-effective with a few preventative measures. Many CBB experts consider it the most effective form of control. The beetle can live and breed in raisin for up to 5 months without feeding.

- **Do a "final round" strip pick of the field to break the life cycle. Remove everything. *This is the single most important practice!***
- Try to complete the strip before flowering. Consider doing so when 5-10% remains on the tree and it is still economical to harvest and pay for picking. It may be necessary to pay an hourly wage. Mauka farms may have to determine a harvest cutoff point, even though cherry remains on the tree.
- Remove any remaining raisins before pruning each tree. One bean can host multiple generations.
- All CBB-infested beans or floaters should be placed in black buckets/ bags and left in the sun for two weeks. The heat will kill the beetle. Freezing two weeks will also work. Or they can be buried 6 inches underground.
- Harvest your first round of cherry, no matter how small. Experience shows this is highly infested, and removing the round will reduce beetle populations. The cost to remove this round will be paid back with better cherry in future rounds.

Spray the *bassiana* Fungus (commercial Botanigard/Mycotrol)

After 20 years of research around the globe, the fungus is the most recommended pesticide for CBB. It is not a silver bullet, but it will significantly reduce populations. *Direct spray-contact with the beetle is required. We see more beetle movement in the mid-day to afternoon so consider spraying then.*

New recommendations key points

- Research in Hawaii shows at least 21 oz fungus per acre kills effectively for 4 weeks or more. Because of this **CTAHR is now recommending 1 quart (32 oz) per acre.**
- Use the Thirty Trees method or trap populations to determine best times to spray.
- If you have a bad infestation or hot spot, spraying this area every 2 weeks may be necessary

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to bring under control.

The following are Best Management Practices for spraying

- Consider spraying downed raisin immediately at end of harvest.
- Begin foliar spraying when you note beetle on green cherry (as soon as 60 days after flowering). Continue foliar as needed through end of harvest.
- Shake the bottle very well. It may require a stirring stick to get spores settled on the bottom.
- The current recommendation is **32 oz of fungus plus 3oz Silwet or Widespread Max surfactant per acre** to cover both trees and soil. The silicone surfactant is vital to push the fungus into the boreholes. Depending on your tree density and soil, it may take 30-100 gallons of water for coverage.
- Using a 4-gallon backpack, mix approximately **4 oz fungus plus 1 tablespoon surfactant** with water (for 30 gal/acre coverage).
 - Some farmers have noted that increasing the surfactant gets an immediate beetle kill due to suffocation. Use according to the label.
- Foliar-spray cherries on the tree and the underside of the leaves to the point of runoff. Also spray mulched trees or pulp piles.
- Fungus can be mixed with soap/oil, some pyrethrins, Surround clay, neem, EM, some foliar fertilizers, Bt, as well as some herbicides (for soil application only). Roundup/glyphosate can be mixed but may limit fungal growth. Check the compatibility chart on the product website. Avoid foliar treatment using sprays that have contained herbicides.
- To protect bees, avoid spraying when open flowers are present on the tree.
- Afternoons are best as beetle are on the move
- Remember, spores are live, so use water mixture promptly and store bottle in cool location.
- Compared to a backpack sprayer, using a mist blower or motorized ultra-low-volume sprayer may increase kill rate by spreading the fungus deeper into the tree.
- **Monitor your cherry regularly and repeat as needed. There is no harm to multiple treatments and fungus will not affect taste of coffee.**

Pyrethrin Pesticides

CTAHR research as well as on-farm experiments show VERY good kill results with the EverGreen 6% or Pyronyl 6% (pyrethrin with PBO) products. There is no residual kill, but they are useful for knocking down hot spots or population spikes. There are organic versions (without the PBO exciter).

- Use 15oz per acre of coffee in a foliar spray. Can be mixed with fungus, foliar fertilizers, or Surround WP clay product. Use spray promptly.

Surround WP clay repellent

CTAHR research shows that the kaolin clay product, Surround WP is an effective repellent as well as potential yield increaser. To spray the clay evenly, best results come from using a tank with an agitator or pump. Best to continue spraying the fungus (can be sprayed together).

- Mix approx 15 lb clay plus a sticker/spreader agent (Bond, Nufilm, Widespread, etc) for each acre. Water requirement runs between 20-60 gallons per acre, depending on your rig.
- Inert, and can be mixed with foliar fertilizers as well as pyrethrin and fungus.
- Coat leaves and beans completely. Must have full bean coverage for best results.
- When properly applied, the trees will be off-white, with no gloss to leaves.
- Will withstand rains. Reapply as needed.
- Ideal for dry-season control or makai farms that have mixed results with fungus alone.

Worker Education and Harvest Practices

- Train your workers to spot *La Broca* (Spanish for CBB) so that they may report trouble areas.
- Train your workers not to discard green beans or raisin out of the picking bucket. Provide a separate bag for green and pay them for the weight.
- Using trash bags inside burlap, or mac nut bags, can effectively prevent CB from leaving the burlap and reinfesting cherry in the field.
- Do not move cherry bags from infested areas to clean areas within the farm.
- Consider using mesh "tents" treated with vegetable oil to cover bags. They will trap CBB leaving the cherry bags.

Maintain Traps

Traps will **not** greatly reduce pest populations, but will help identify trouble spots on your farm.

Traps are not effective as the sole means of control.

- Check traps at minimum of two weeks to track beetle movement.
- They may be most effective between harvest time and 60 days after first flower.
- Use around mills or processing areas where CBB may be migrating out of fruit.
- Contact CTAHR with questions about trapping specifics.

Small Processors

About 50% of the beetle will survive through processing and travel on to the parchment stage. That means care must be taken through all stages to prevent reinfestation.

- Use traps in mill and drying areas
- In India, they recommend that the trees closest to the mill be picked last. That ensures escaping beetles do not migrate too far into the fields looking for ripe coffee.
- Mesh tents/screens treated with vegetable oil should be placed over fermentation tanks to traps beetles leaving the tanks.
- Floaters should be sealed in bags or buckets and left in the sun or frozen to kill the beetles. Or, dipped in boiling water for two minutes to kill all stages of the beetle.
- If bringing coffee from other farms, return bags directly to farmer to prevent cross-contamination. Or, boil bags for 2 minutes or soak overnight in soapy water.
- Cover your pulp piles immediately after use to increase the heat and kill beetles passing through. Consider regularly spraying them with an approved pesticide or fungus.
- Consider additional fungus treatments on soil and trees near to the mill.
- Be sure to dry all green coffee to a maximum 10.5% moisture.
- Use Grainpro bags during storage to prevent moisture absorption and pest recontamination.
- **If you buy coffee, talk to your farmers about IPM and be sure they understand all the options.**

There are many small details in both beetle behavior and effective management that are not listed here due to space constraints. However, the techniques above will bring you the greatest reward for your time.

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Thirty Trees Method for monitoring and control

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It is important to understand what the beetle is doing on your farm. This simple sampling method will show you total infestation levels, but more importantly, it will show whether the beetle is vulnerable to being killed by spray.

Begin sampling about 90 days after your initial flowering and continue through the end of the harvest. Depending on your farm size and topography, a single lot of 30 trees might be sufficient, or you may need to subdivide into smaller lots (for example shaded areas versus sun).

Step One - Monitoring the CBB Infestation

- 1- Select the coffee lot and draw a map of the coffee lot.
- 2- Select a corner of the coffee lot and start sampling in a tree.
- 3- Select a single lateral coffee branch in the middle of the tree.
- 4- Count the total number of green cherries (berries more than 90 days old).
- 5- Count the number of green cherries infested by CBB.
- 6- Note how many CBB show white beauveria fungus (if any).
- 7- Record the information on the attached form as tree # 1.
- 8- Collect about 3 green berries infested by CBB (for evaluation of CBB positions below).
- 9- Then move for the next tree. (move in zig -zag about 15 to 20 yards and select tree # 2).
- 10- Again following the steps 4 to 8 in the tree #2.
- 11- Then move for the next tree (tree # 3).
- 12- Repeat those steps until complete for 30 coffee trees.

Now take the information collected and make calculations to obtain the percentage of infestation by CBB.

% infestation = Total green berries infested / Total green berries x 100

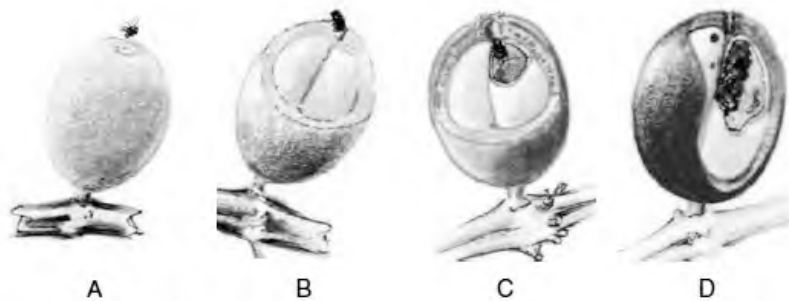
Example: In the 30 coffee trees sampled we have the following information:

Total green berries = 1500

Total green berries infested by CBB = 40

% infestation = $40 \div 1500 \times 100 = 2.66\%$

Step Two - Positions of CBB in cherries used to determine when to spray



After 100 green cherries infested by CBB have been collected, each single berry has to be cut open in order to determine its position (AB or CD). Be careful not to kill the beetle while opening the cherry as whether the beetle is live or dead is important.

In AB position the CBB is entering or boring the fruit but the endosperm (coffee seed) has not been affected. You can see the back part of the CBB body entering to the fruit. In this position the CBB is highly vulnerable to be killed by natural enemies, weather, or by application of *Beauveria bassiana*. **A high percentage of CBB alive in AB, means they are vulnerable and may be controlled by applications of the *B. bassiana*. Spray within a week. A high percentage of dead in AB means your spray is effective.**

In CD position, the CBB is completely safe. The endosperm (coffee seed) has been damaged by the female and by its progeny (larvae). Neither *B. bassiana* nor chemical insecticides can effectively control CBB in this position. In position CD (inside the endosperm or coffee seed) CBB may only be controlled by manual collection of ripe cherry.

Decision Making

Timing on when to spray the fungus may vary greatly from farm to farm. *However, it is better to contain early in the season than fight a larger infestation later.* Once CBB moves into CD, it is very difficult to kill.

In Colombia, the decision to spray is made when 5% of total cherry is infested in the AB position. However, at the value of the Kona crop, this infestation loss far exceeds the cost of spraying. It is more likely that a 2% infestation in the AB position should trigger a spray event.

How do we come to those numbers? Assume that the cherry price is \$1.50, the yield per acre is 6500 lbs and one female CBB will produce (on the low side) 20 offspring after one month. If you very roughly assume that your infestation means that the 2% cherry will be destroyed (true if you did not spray at all), then that cherry loss is \$195 per acre ($.02 \times$ cherry value of \$9750). If you wait another month, that potential loss increases by the 20 new offspring to \$3900. Two months from now, that will be 400 new offspring.

If you only sell cherry, maintaining your percent infestation under 20% would earn you approximately \$1200 per acre in additional income (at the price bonus the processors pay for good cherry). Not to mention the added weight of undamaged cherry. This would offset the price of at least 5 sprays, including labor.

Obviously, this is a gross simplification of a number that is difficult to quantify. But it is clear that whether you sell cherry or sell roasted, the lost weight as well as the quality damage justifies early spraying and then continued maintenance sprays.

Thirty Trees / Infestation by CBB (%)

Date
Lot #

Farm :
Evaluator:

Tree #	# Green Berries	# Berries Infested	<i>B. bassiana</i>
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
Total			

% infestation = $\frac{\text{Berries Infested} \times 100}{\text{Green Berries}}$ =

Second step - carefully cut open top of cherries

% Positions of CBB =

Live AB =
CD =

Dead AB =
Absent (empty) =

Observations: