

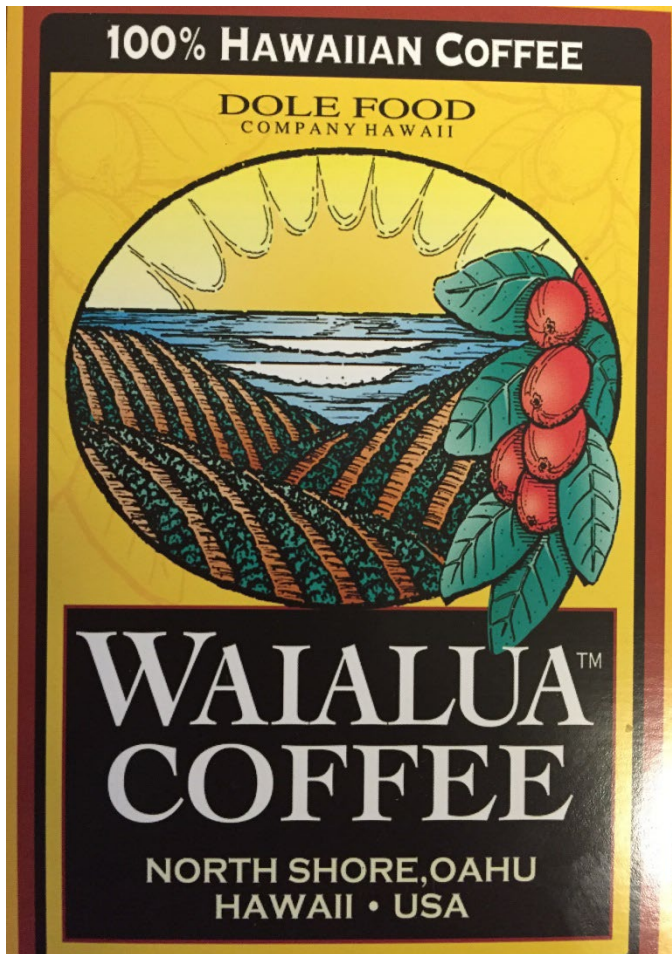


Managing CBB on a 155-acre Mechanized Farm

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Waialua Estate Coffee and Chocolate

Background



- Arabica Var. Typica planted in 1996
- North Shore, Oahu
- Prior sugar cane lands
- Elevation 450-750 ft
- CBB first found in 2014

Waialua CBB Overview

- Advantages
 - Isolated
 - No coffee neighbors
 - Full-time labor crew
 - Adequate equipment and implements
- Disadvantages
 - Size of farm
 - Strip pick
 - Hand pruning
 - Never enough labor
 - Mechanized harvest
 - Dry/Arid environment
 - Variety (Arabica typica)

CBB General Strategy

- Stump cutting
- Late season final harvest
- Orchard cleanliness
- Strip picking
- Sprays
- Traps
- Pruning



Stump Cutting



- First line of defense
- Break CBB life cycle
 - No berries in area for 18 months
- Trap counts confirm low CBB following stumping
- Expensive operation
- Stump as soon as harvest complete

Stump Cutting 20% of Acres Annually



Year 0



Year 1



Year 2

Costs of Stump Cutting

- Sickle bar pruning
- Hand stumping with chainsaws
- 4-6 rounds using flail shredder
- Hand raking beans
- Herbicide round
- New irrigation hose
- Loss of 1-year harvest
- Multiple thinning rounds

Look for ways to further mechanize operation



Very good yields beginning year 2

Mechanized Harvest



- Not able to remove all berries
- Lots of fallen berries
- Difficult to clean machine before moving to/from CBB areas
- Conducted a very late season final round to “clean trees” of berries
 - Also knocked off considerable buds

Strategies for Machine Harvesting with CBB

- Pruning to increase harvest recovery
- Limit berry droppage
- Consider movement of machine around farm
- Final Clean-up round
- Transition to new varieties more conducive to machine harvest



Pruning

- Very important to CBB management
- Poorly pruned areas hide berries
- Evaluating 2 verticals per tree to increase harvest removal %



Sprays

- Gearmore 500 gallon Venturi Air Sprayer
- Early season knockdown rounds
- Monthly Beauvaria sprays begin in May
- Dry hot summers not optimal for Beauvaria



Traps and Counts



Orchard Cleanliness

- Clean orchard floor
- Mulch prunings
- Keep weeds down
- Strip picking after harvest season
- Best time for clean-up is at stumping



Old Berries Left After Stumping



Sweeping and Raking

- Currently hand raking
- Edwards Equipment Brush Spider
- Front mounted with a flail mower on back
- Watch out for drip lines!



Uneven Flowering



Conclusions

- All operations have to be modified to CBB management
- Very difficult to control in large acres
- Hold out hope for a systemic pesticide
- Continue farm based R&D

