



Comparison of responses between 2013 and 2012 CBB surveys

'How are we doing in the war with CBB ?'

HC Bittenbender <hcbitt@hawaii.edu>, E. Burbano Greco <eburbano@hawaii.edu>, and A. Kawabata <andreak@hawaii.edu>, CTAHR, UHM.

Summary.

This 2013 survey covers the 2012-13 harvest and the growing season and CBB control tactics used in 2013 for the 2013-14 harvest. The Marketable Green Bean Recovery Ratio (MGBRR) for the 2012-13 crop as stated by farmers in Question 10 (Q10) of the 2013 survey was 6.3, equal to 20% loss of green bean same as in the 2011-12 crop. Farmers who sell cherry said processors who sampled for CCB damage estimated 26% for cherry loss (Q11) and green bean loss at 28%, MGBRR = 6.9 (Q70). Farmers who sell cherry saw CBB damage increase from 22% to 26% for cherry while their MGBRR increased from 22% to 28% damaged green bean. In 2013 60% percent of farmers thought CBB damage level was decreasing, compared to 50% in 2012. 79 farmers responded to the survey representing 720 acres of coffee. Survey was sent mid August 2013 and closed in mid September, reported November 15, 2013.

Sanitation.

The slogan "Contain and Kill" means managing all coffee cherry on your farm beginning with the harvest so that all CBB— adults, larvae, and eggs—in the cherries are destroyed during processing and after stripping all tress of remaining cherry of any age after harvest. Sanitation is the most effective strategy for reducing CBB damage in the current crop and in the following crop.

Improvements in intention to strip pick at the end of the harvest, screening wet mills and handling processing waste to kill CBB were noted in the 2013 survey. Less untreated processing waste is returned to coffee orchards. Otherwise growers and processors maintained about the same level of sanitation during the harvest of the 2012-13 crop as they did for the 2011-12. However there is little change in the percent who pulp everything harvested and who pulp floater cherries. CTAHR recommends pulping everything including floater cherry because there can still be 1 good bean in floater cherry.

Reports at the 2012 International Conference on Coffee Science stated that the greatest predictor of future CBB damage on a farm is the number of infested cherries per tree after harvest. CBB infestation on farms or in feral coffee has little effect on farms greater than ¼ mile away.

Trapping to determine CBB flying.

Trapping intensity has declined somewhat probably to due to the realization that it is not effective control tactic for CBB and when you have 10% CBB infestation or greater you the CBB if visible. In 2013 trap use declined to 65% of farms from 76% in 2012. On average in 2013 11 traps per acre is same as 2012. More (70%) farmers who trap year round. Most CBB were trapped in March and April followed by May. 78% of farmers who trap use traps with flaps so CBB cannot fly through. Commercial broca traps was used by 30%, an increase over 2012.

30 Tree Method of Sampling for CBB infestation in cherries.

The 30 Tree Method for detecting stage of infestation and evaluating the timing of the fungal sprays was introduced with workshops in 2012 and 13. 17% of farmers in 2013 say they used the method; and 33% of these felt it improved the timing of fungal sprays. 33% of farms said they will use it in 2014. 20% of said they were not aware of the method in 2013.

Spraying the fungus *Beauveria bassiana*.

80% of farmers spray the fungus in 2013, which is similar to 2012. While 13% spray year round, the majority begin in Feb to April. 75% of farmers said rated the effectiveness of the fungal sprays as good or very good .

Spraying other insecticides to control CBB

Farmers are evaluating other products. Products containing pyrethrins were rated most effective, followed by Surround (kaolin clay spray), then Admire Pro, then garlic barrier.

Are farmers leaving coffee due to CBB?

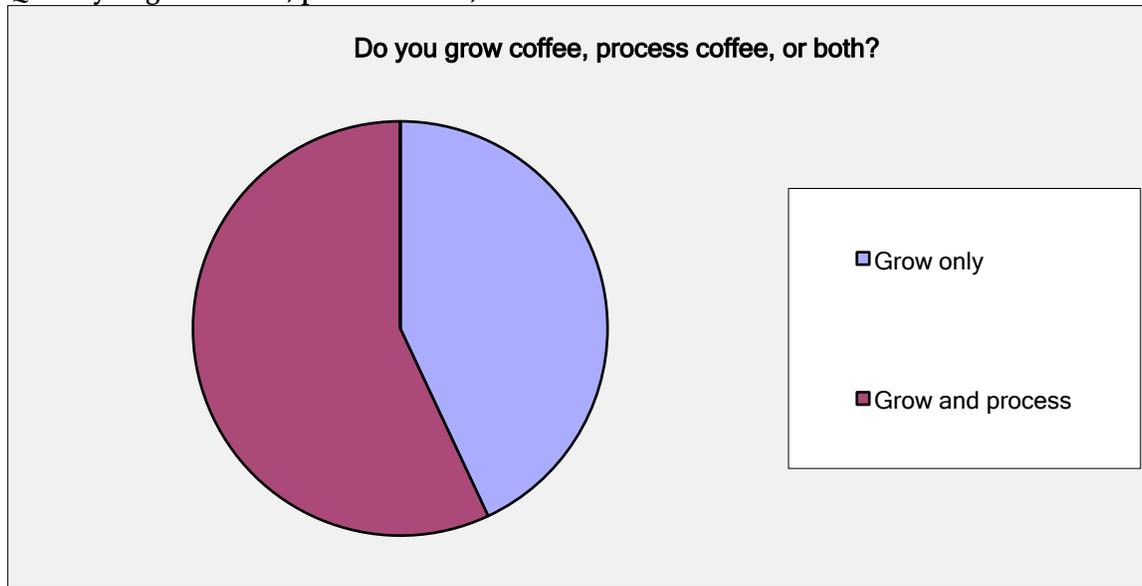
95% said no. 45% of farms report no one has stopped, 30% knew of 1 farm, 16% knew of 5 farms that getting out of coffee. 65% of farms border a farm that is not trying to control CBB. 60% of farms border wild, feral or abandoned coffee.

Where do you get CBB information?

Most important information for CBB control mentioned by at least 50% of farms is- talking with other farmers (80%), CTAHR workshops (61%), my coffee organization webpage (57%), CTAHR webpage (54%). Compared to 2012, CTAHR sourced information is increasing in importance.

Questions and responses, followed by Bittenbender’s comments.

Q1 Do you grow coffee, process coffee, or both?

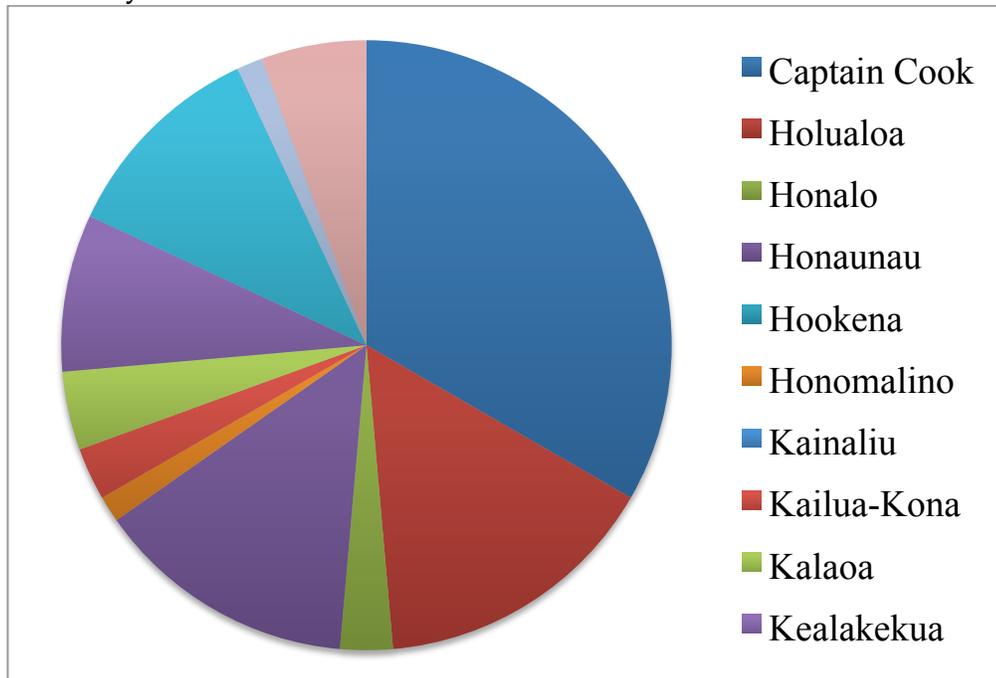


In 2013 34 respondents only farmed coffee and 45 both farmed and processed coffee (estate growers). In 2012, 18 only farmed coffee and 37 farmer / processors responded.

Q2 On which island are you farming and/or processing coffee ?

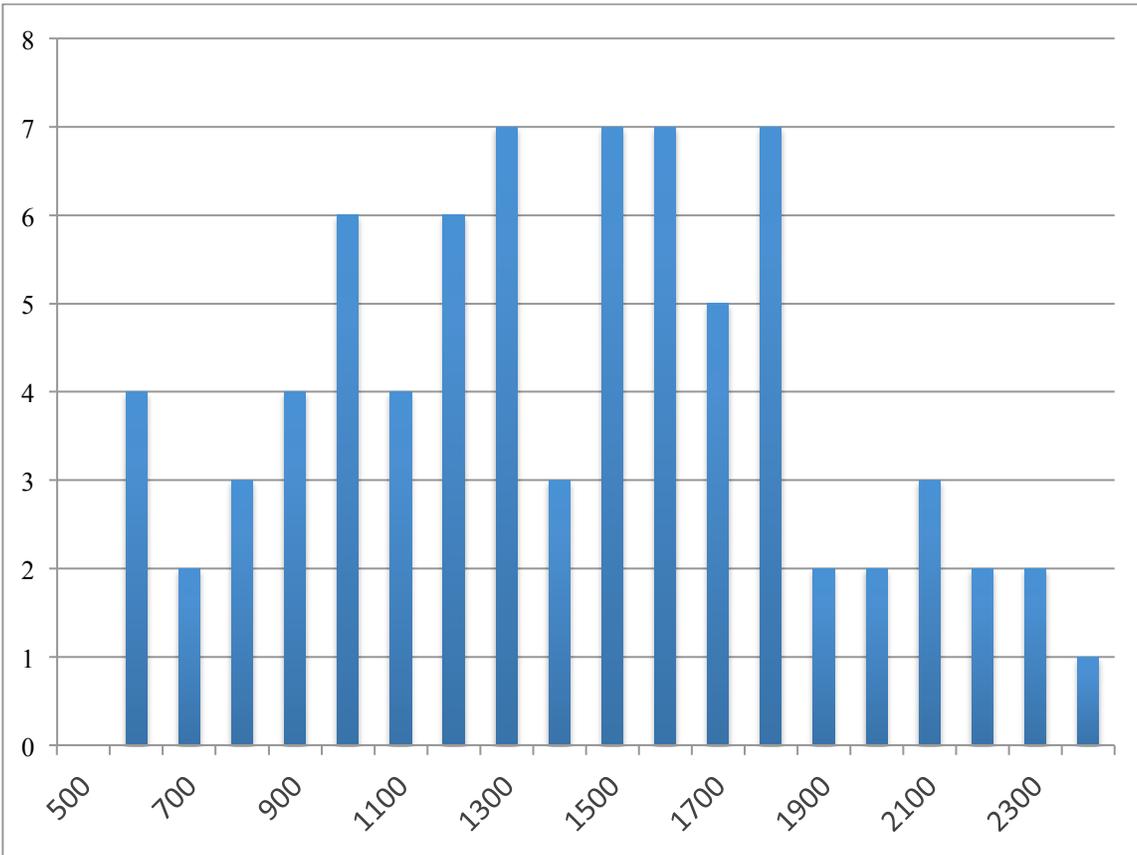
98% of respondents were only Hawaii island. In 2012, 94% of respondents were in Kona, in 2011 97% were in Kona.

Q3 If you are growing coffee in Kona, please select the name of the area from the drop down menu below that is closest to your farm.



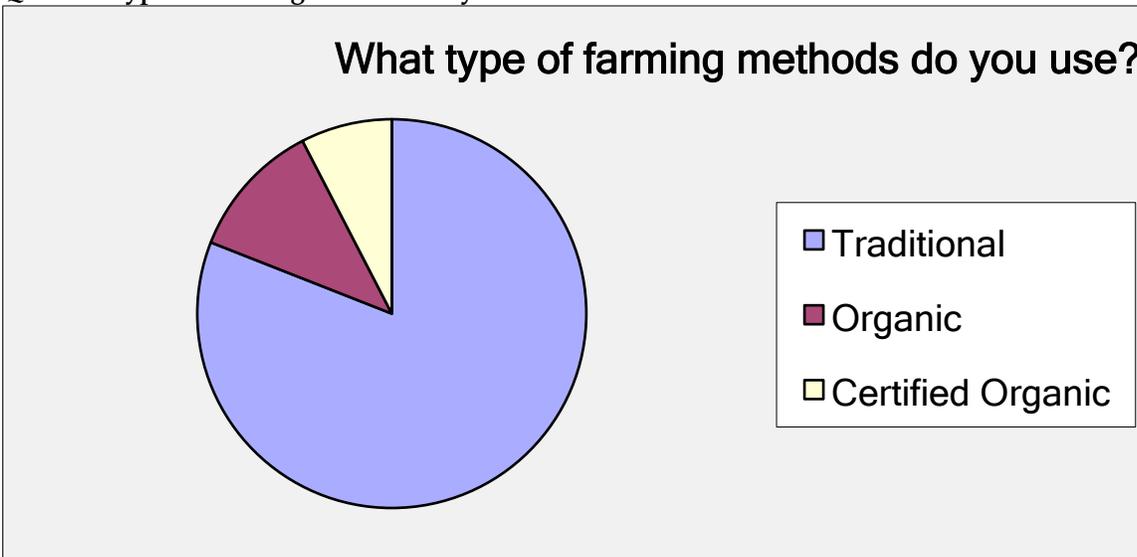
In 2013 Kona sites responding in order of largest number of farms were Captain Cook, Holualoa, Honaunau, Keahou, Kealakekua. In 2012, Kona respondents in order of number of farms were in Captain Cook, Honaunau, Holualoa

Q4 What is the elevation of your farm?



In 2013 Majority of responses are farms are between 1000 and 1800 ft elevation. In 2012, 13% respondents were at 800 ft elevation, 11% at 1400 ft, nearly 10 % at 1200 and 1800 ft, and 6% at 2400 ft or higher.

Q5 What type of farming methods do you use?



In 2013 80% were using traditional methods, 10% were certified Organic; in 2012 it was 72% traditional

Q6 Who picks your coffee?

In 2013 farmers not hiring pickers increased to 42% ; In 2012 30% of farmers did not hire pickers. This is likely a cost saving tactic.

Q7 How big is your coffee farm?

In 2013 the average size reported was 5.4 acres, average tree spacing was 7 x 8.4 ft (Q8).

Q9 Did you have CBB on your farm in the 2012-13 season?

94% reported yes, in 2012 it was 78% and in 2011 56% farmers had CBB.

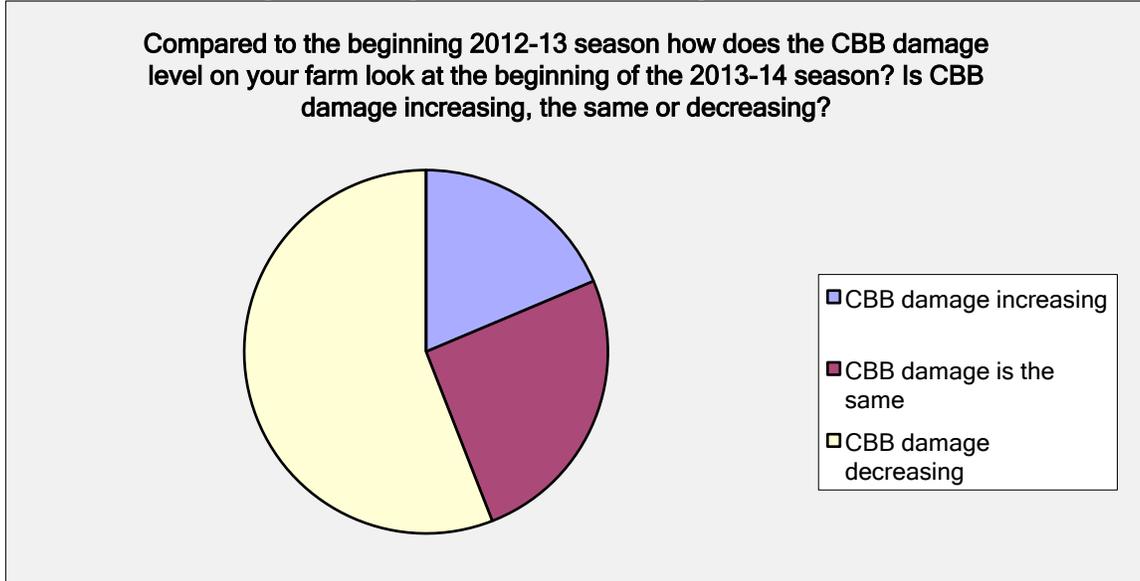
Q10 What was the 2012-13 season's marketable green bean recovery ratio (MGBRR); this is calculated as cherry weight divided by marketable green bean weight ?

Average MGBRR reported for 2012-13 and 2011-12 by 37 farmers was 6.3 or 20% green bean loss. The highest reported 9.0 in 2012 and 8.9 in 2011. Damage to green bean appears to have peaked at 20% damage.

Q11 If you sell only cherry but your buyer samples your cherry and tells you the percent CBB damage please list all the damage percents given to you for the 2012-2013 season.

Damage to farmers who sell cherry is still increasing. Their buyers found on average 26% cherry loss; versus 22% in 2011.

Q12 Compared to early 2012-13 season how does the CBB damage level on your farm look early in the 2013-14 season? Is CBB damage increasing, the same or decreasing?



56% of farmers felt it was decreasing, in 2012 I was 51%

Sanitation

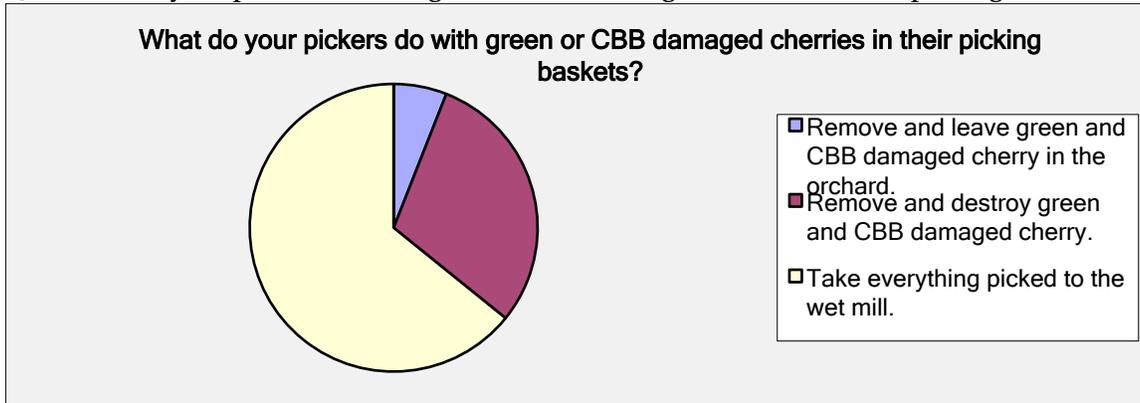
Q13 Do your pickers make an effort not to drop cherries on the ground when picking?

Probably no change. In 2013 78% said yes, in it was 2012 86% of farmers said their pickers made an effort not to drop cherries during harvest.

Q14 Do your pickers make an effort to pick up dropped cherries?

No change. In 2013 51% said yeas; in 2012, 54% said pickers make some effort to pick up dropped cherries.

Q15 What do your pickers do with green or CBB damaged cherries in their picking baskets?



No change unfortunately. In 2013 64% of farmers said everything in pickers' baskets goes to a wet mill. Only 6% said pickers leave infested and green cherry in the orchard. No cherry should be discarded in the orchard, this increases CBB damage.

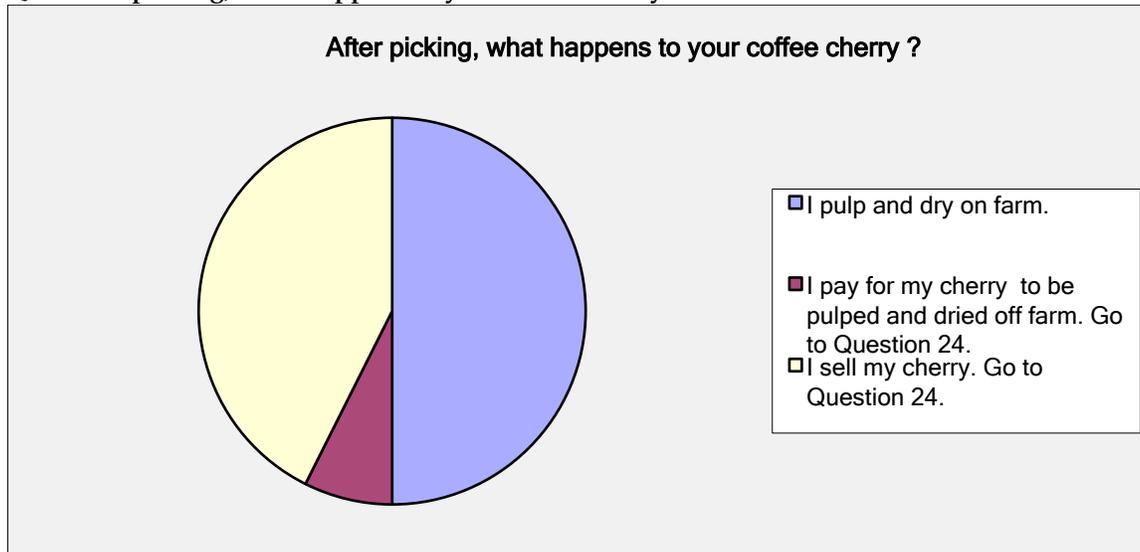
Q16 Do pickers tie or close the bags or containers to prevent CBB escaping before reaching the wet mill?

66% of farms report that picking containers are closed to prevent CBB escape.

Q17 Do you dump the picking baskets into bags or containers that prevent CBB escaping before reaching the wet mill?

In 2012 48% of farmers used closed (CBB proof) containers to hold and to transport cherry to wet mill.

Q17 After picking, what happens to your coffee cherry ?



In 2012-13 season selling cherry increased to 43% , while self processing was 50%. In 2011-12, 23% of farmers said they sold their cherry, 58% of farmers pulped and dried on farm.

Q18 When you pulp, what happens to the floater cherries?

In 2013 pulping everything declined to 30% and discard floater cherries increased to 70%. In 2012 42% of farmers pulped everything and 58% discard cherry floaters; versus 39% pulped everything and 60% discarded floating cherries in 2011. CTAHR recommends pulping everything, even floaters, as one bean may be undamaged.

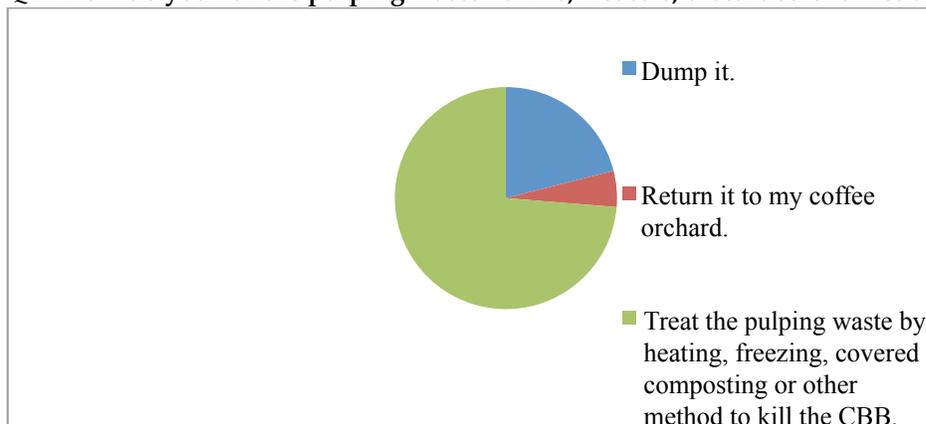
Q19 After pulping do you process all parchment coffee or do you discard floating parchment coffee without processing?

In 2013 90% of floater parchment was discarded . In 2012 81% discarded floating parchment coffee, versus 79% in 2011.

Q20 Are the pulping and fermentation areas at the wet mill completely screened in to prevent escape of CBB?

In 2013 7% of farms do screen in these areas. In 2012 no farmers screened in the wet mill, 8% screened the fermentation tank.

Q21 How do you handle pulping waste - skins, floaters, discarded cherries and parchment?



Farmers increased the treatment of pulping waste to 76%, only 5% returned untreated waste to the orchards. In 2012, 68% of farmers treated mill waste to kill CBB, but 18% returned it to the orchard presumably untreated, and 14% took it to the dump. There is less CBB-infested waste being returned to the orchard but this needs to be reduced to 0% untreated mill waste and water returning to coffee orchard.

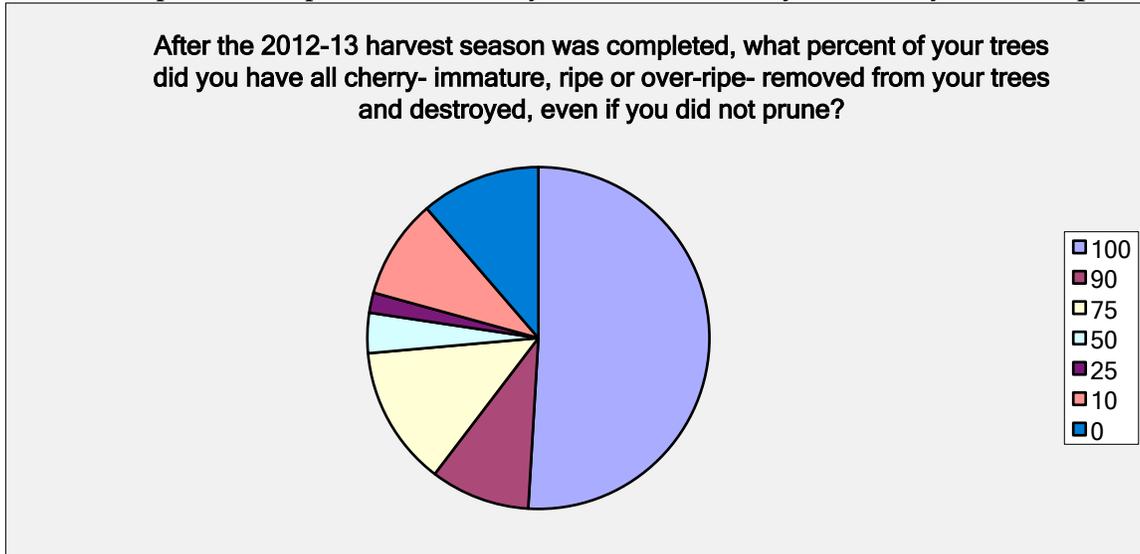
Q22 Is your drying area screened to prevent CBB escape?

Only 8% screen the screen the drying area to contain CBB same as in 2012. We need to encourage more screening. One grower reported placing a black tarp over his parchment coffee for 1 hr daily to kill CBB.

Q23 Do you attempt to contain and kill the CBB in the wet mill and drying areas, how are the CBB killed?

In 2013 slight increase to 67 % from 60% n 2012, farmers attempt to contain and kill CBB in the mill area. The most common method to contain and kill is a CBB trap (25%) followed by 24% spray *Beauveria* or another insecticide

Q24 After the 2012-13 harvest season was completed, what percent of your trees did you have all cherry-immature, ripe or over-ripe- removed from your trees and destroyed, even if you did not prune?



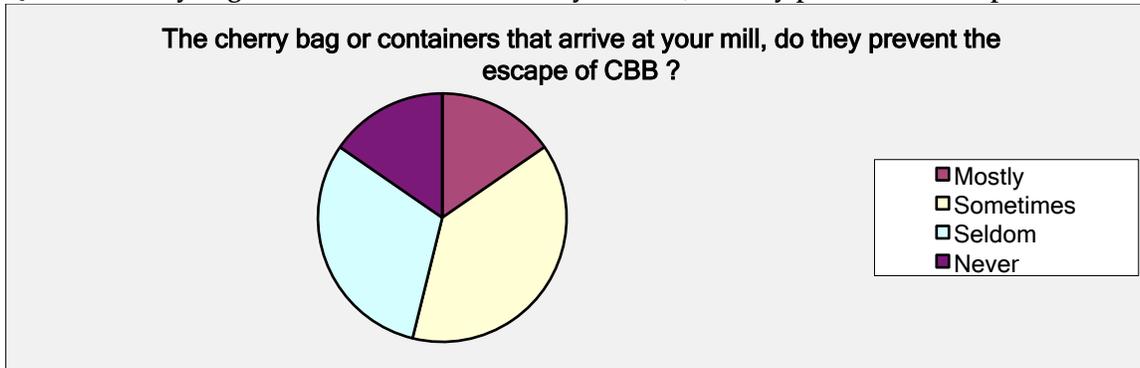
At the end of the 2012-13 season 50% of farmers stripped all remaining cherry on 100% of their trees, 75% said 75 % of their trees were striped, only 11 % did nothing. This less than was pledged. Q25 When asked their intentions at the end of the 2013-14 the 2013 survey 64% % indicated that they would strip all trees. This is great improvement! We must encourage farmers to strive for 100% of coffee trees stripped of all cherry at end of each harvest season. Studies in Costa Rica and El Salvador reported at the ASIC 2012 conference found that breaking the life cycle of the CBB by removing all cherry from all trees after harvest and before pruning and destroying those cherries is the most important cultural practice a farmer can do to prevent infestation on the next crop.

Q26 What is your most effective sanitation tactic for your farm?

Similar to the 2012 survey, farmers felt the sanitation tactics in order of effectiveness were stripping trees at the end of the harvest season, slight less effective was treating all mill waste to kill CBB, harvest more frequently and pulp all cherry picked.

Questions for wet millers.

Q27 The cherry bag or containers that arrive at your mill, do they prevent the escape of CBB ?



In 2013 millers said 15% of cherry bags were mostly closed to prevent CBB escape prior to the mill this is a decline from 25% in 2012 of wet millers mostly received cherry bags sealed to prevent CBB escape.

Q28 When you pulp, what happens to the floater cherries?

In 2013 pulping everything declined to 33% from 55% in 2012 This needs to be increased to 100% of floating cherry is pulped. This will save undamaged green bean.

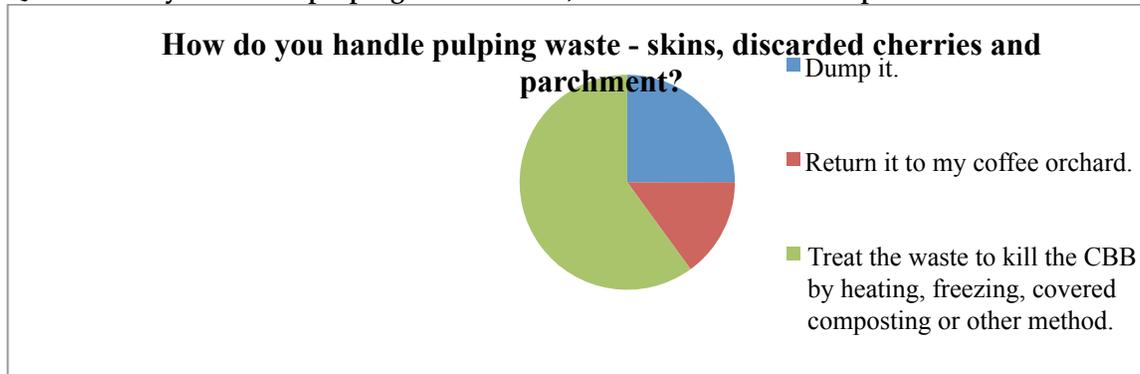
Q29 After pulping do you process all parchment coffee or do you discard floating parchment coffee without processing?

In 95% of floater parchment was discarded in 2012 86% of wet millers discard floating parchment.

Q30 Are the pulping and fermentation areas at the wet mill completely screened in to prevent escape of CBB?

In 2013 no wet mills were screened to prevent CBB escape, we need to screen wet mill areas to contain and kill CBB.

Q31 How do you handle pulping waste - skins, discarded cherries and parchment?



In 2013 63% vs, 71% of wet mills in 2012 treated waste to kill CBB, but only 16% returned it to their coffee orchard. Dumping increased 26%. All wet mill waste should be treated to kill CBB. Mill waste containers should be sealed to prevent CBB escape when transported to the dump. It is preferable to treat mill waste to kill CBB before it leaves the mill.

Q32 Is your drying area screened to prevent CBB escape?

In 2013 only 9% vs 15% in 2012, wet millers screened their drying area. This needs to be increased to contain and kill CBB emerging from drying parchment.

Q33 Do you attempt to contain and kill the CBB in the wet mill and drying areas, how are the CBB killed ?

In 2013 little improvement 22% do not attempt to contain and kill in mill area . In 2012, it was 27%, CBB trap in mill area is most popular, followed by 25% who used an insecticide. All mills need to use some method to contain and kill CBB.

Use of CBB Traps by Farmers

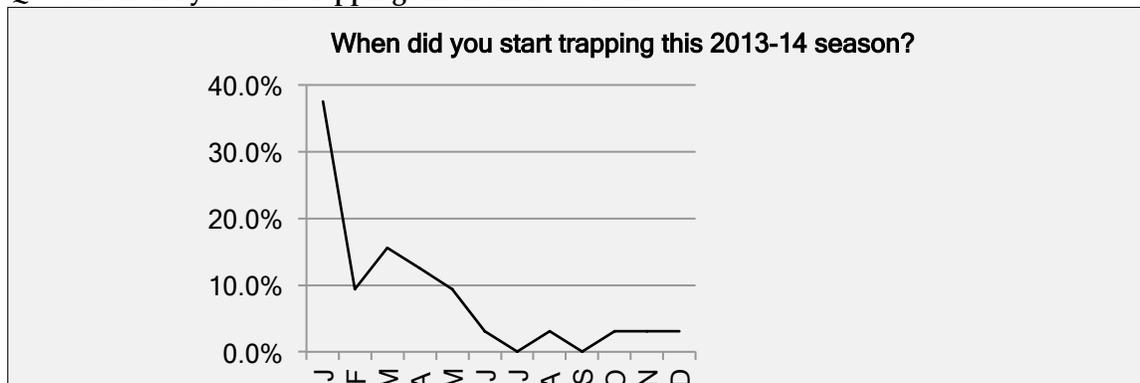
Q34 Will you use traps baited with methanol and ethanol to catch CBB this 2012-13 season?

In 2013 trap use declined to 65% from 76% in 2012.

Q35 How many traps per acre will you use in the 2012-13 season?

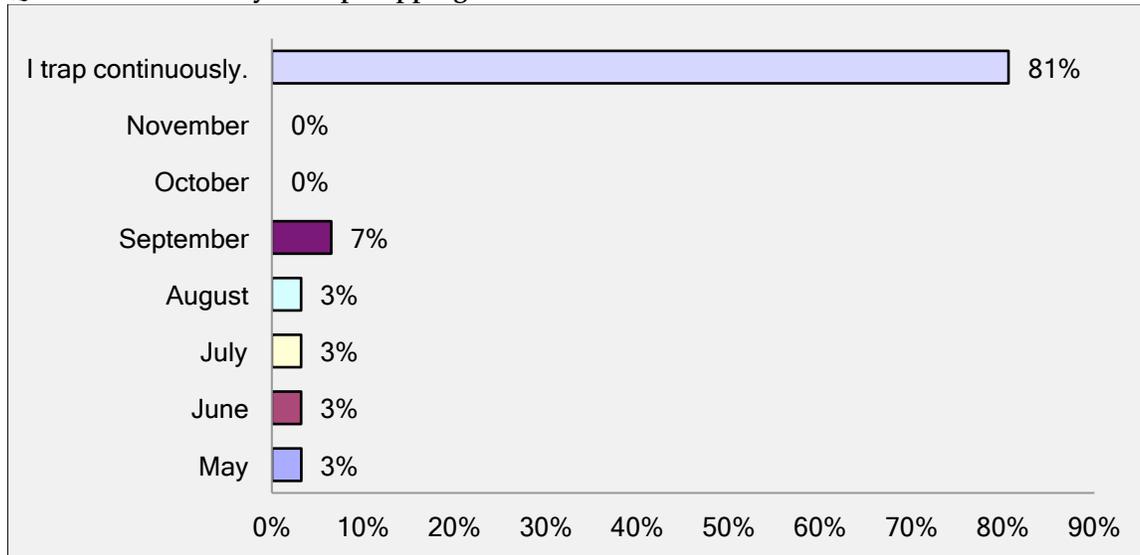
On average in 2013 11 traps per acre similar to 2012, 25% of farmers used 20 traps per acre. Trapping has declined probably to due to the realization that it is not effective when you know you have CBB.

Q36 When did you start trapping this 2012-13 season?



In 2013 the use pattern was similar to 2012 most farmers began trapping in January.

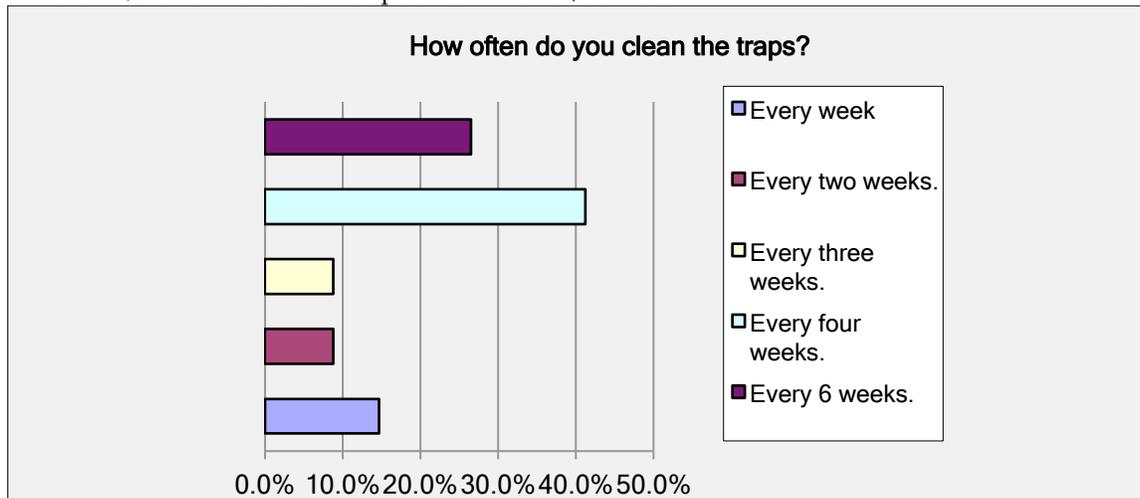
Q37 When did/ will you stop trapping in the 2012-13 season?



In 2013 81% of farmers will trap continuously.

Q38 How often do you clean the traps

In 2013 41% of farmers clean traps once a month, same as 2012.



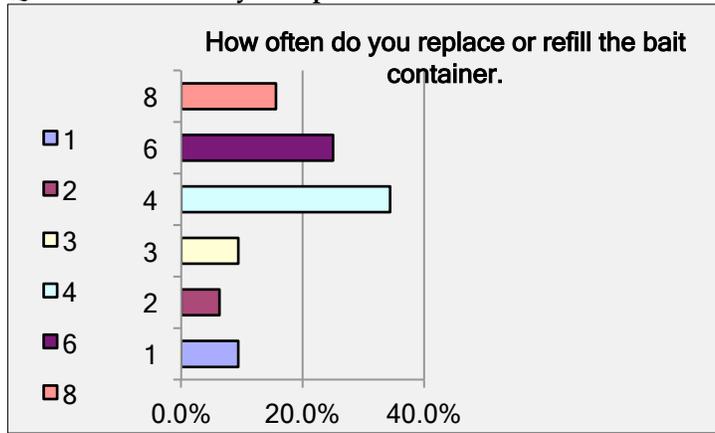
Q39 How do you kill the CBB in the collection cup?

In 2013, 94% of farmers use soapy water in traps, 6% used antifreeze; similar to 2012.

Q40 Research shows that 1:1 is as effective as 3:1 methanol to ethanol. What type of bait are you using?

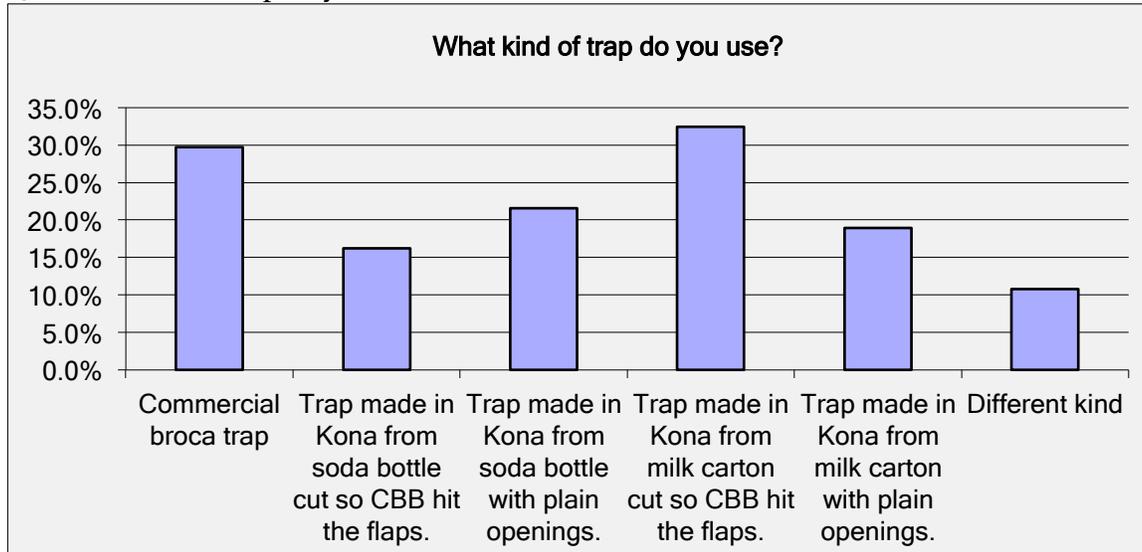
In 2013, 74% of farmers use 3:1 methanol: ethanol, 14% a 1:1 mix. Similar to 2012.

Q41 How often do you replace or refill the bait container



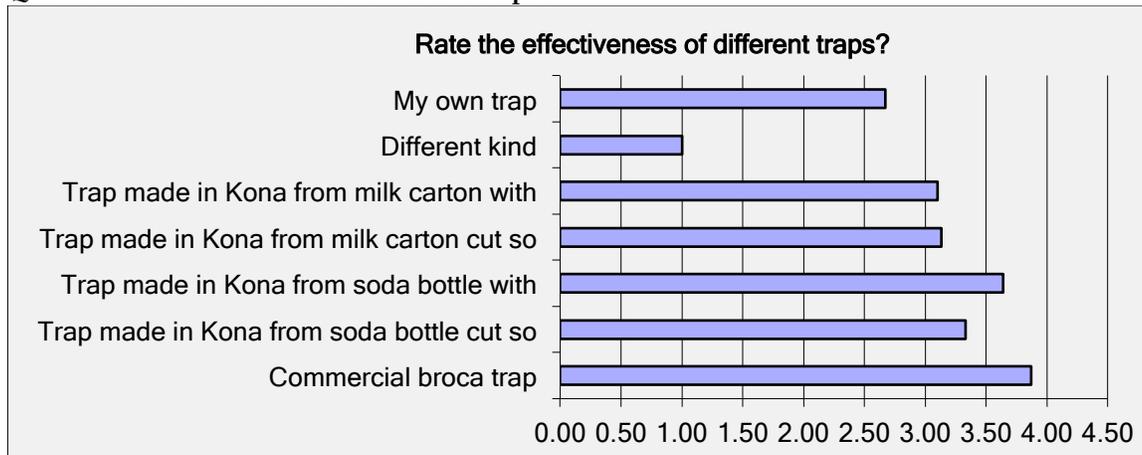
In 2013, 35% of farmers replaced bait in traps monthly, but the week intervals are increasing

Q42 What kind of trap do you use?



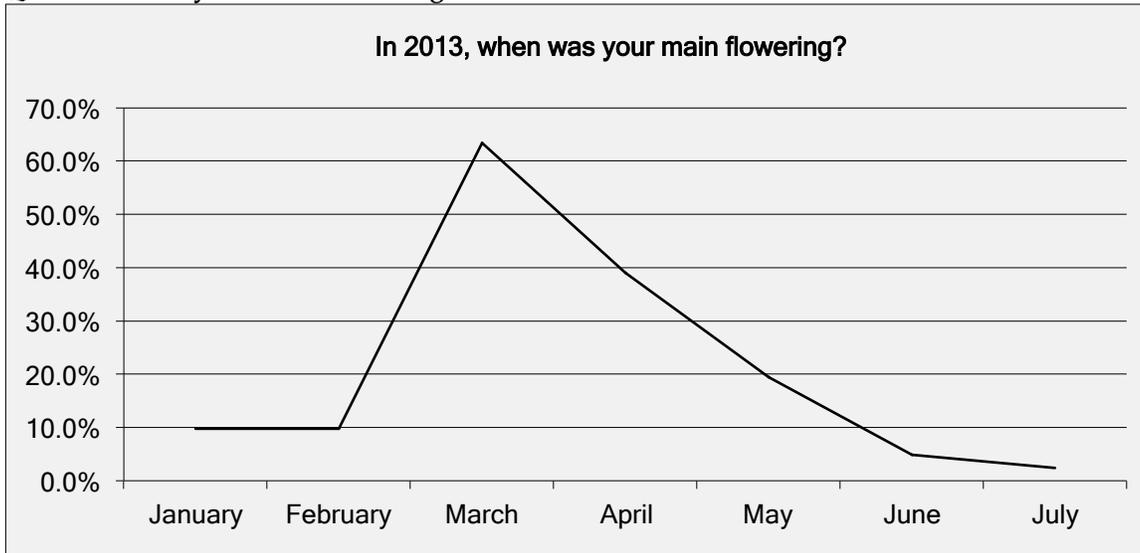
In 2013 80% of farmers use traps with flaps so CBB cannot fly through. Commercial broca traps was used by 30%, an increase over 2012.

Q43 Rate the effectiveness of different traps?



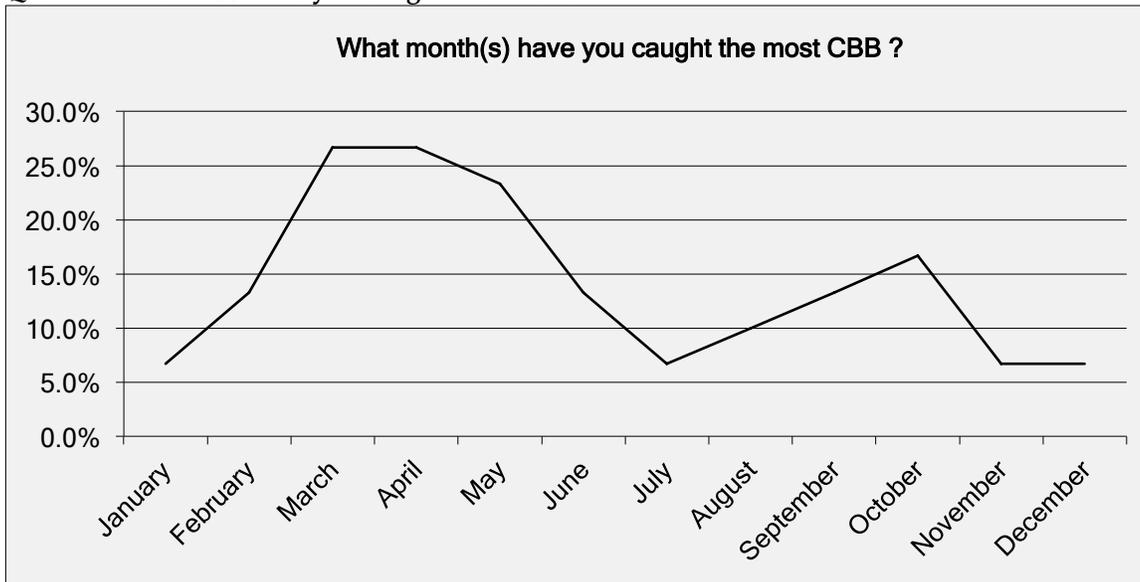
In 2013, the broca followed by the Kona soda bottle with flaps were considered the most effective.

Q44 When was your main flowering in 2013?



March

Q45 What month(s) have you caught the most CBB ?



In 2013 most CBB were trapped in March and April followed by May compared to 2012, 50% of farmers indicated most CBB are caught in March and April, followed by February and May at 25 % .

Q46 Are you using the 30 Trees Sampling Method for CBB monitoring ?

17% of farms report using the 30 Tree Sampling Method to monitor CBB infestation. This the first year.

Q47 If you are using the 30 Tree Sampling Method for CBB monitoring, when did you start?

Of those using it 44% of farms that use the 30 Tree Method started 2 months after the first flowering.

Q48 How often do you use the 30 Tree Sampling method?

Half of farms that use the 30 Tree Sampling method do it every 4 weeks, 33% do it every 3 weeks.

Q49 If you are using the 30 Trees sampling method, has it helped you to schedule your sprays for CBB control?

A third of farms feel the 30 Tree Sampling method has helped to schedule their sprays.

Q50 Will you use the 30 Trees sampling method in the 2014-15 harvest season?

One third of farms plan to use the 30 Tree sampling method in 2014-15 this is double the number who used it in 2013. 20% of those who are not using this method are unaware of it.

Spraying the fungus to control CBB

Q51 Are you spraying commercial insecticides that contain spores of the fungus *Beauveria bassiana*?

80% of farms are spraying Beauveria fungus, 10% are trying to increase the natural population; this is about the same as 2012.

Q52 When did you start spraying in the 2013-14 season?

28% of farms begin spraying in March, 13% spray year-round. In 2012, 48% of farmers began spraying in February or March; 10% spray year around.

Q53 How many weeks between sprays?

Two thirds of farms spray every 3-4 weeks, 8% spray based on 30 Tree Sampling method. The spray interval has been shortened. In 2012, 39% of farmers sprayed every 4 wks, 29% every 6 wks.

Q54 How much commercial product are you using per acre?

In 2013 40% of farms spray 16 oz / acre, 38% spray 32 oz / acre. This an increase compared to 2012, when 38% of farmers sprayed less than 16 oz of *Beauveria* per acre per application, 28 % used 16 oz, and 28% use 32 oz. CTAHR research found that 8, 24, and 32 oz per acre gave similar results. Save money spray 8 oz per acre !

Q55 Do you add a surfactant or wetting agent to the spray solution to better penetrate the CBB holes in the cherries?

Over 90% of farms use a spreader containing silicon such as Silwet, Widespread, or Ecosprea; 9 % do not use a surfactant. Same as 2012.

Q56 If you use a surfactant or wetting agent, how much surfactant do you use

Average amount of surfactant used is 0.6 oz / gallons of water; however it ranges from 5 to 0.1 oz / gallon.

Q57 How much spray solution do you apply (gallons per acre)?

Average amount of spray (gallons per acre) containing Beauveria is 32. However the range is 3 to 120 gallons / acre.

Q58 What type of sprayer do you use?

80% use a mist blower or motorized pump sprayers and 20% use a backpack lever pump sprayer. Similar to 2012.

Q59 s spraying Botanigard ES or Mycotrol O effective for you?

75% of farms report effectiveness of Beauveria sprays as good to very good. This is an improvement over 2012.

Q60 If you tried other insecticides, were they helpful in controlling the CBB?

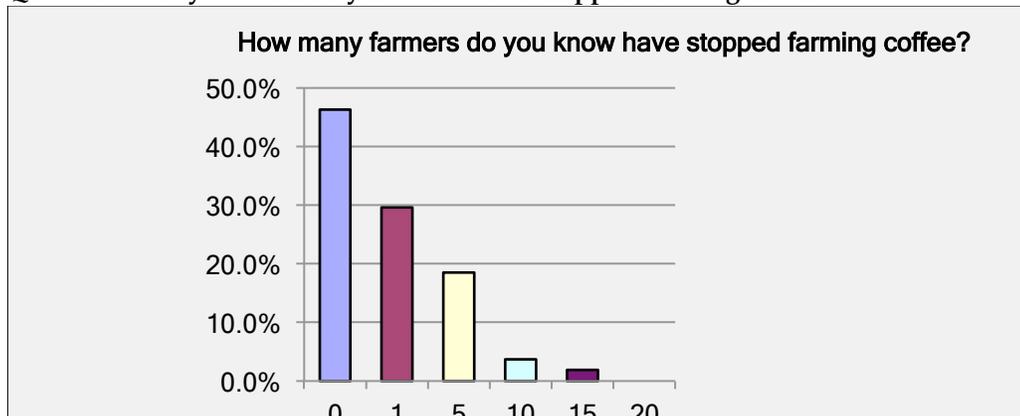
Products containing pyrethrins (Evergreen, proponyl) were rated most effective, followed by Surround (kaolin clay spray), then Admire Pro, then garlic barrier.

Questions about farmers leaving coffee due to CBB.

Q61 Are you planning to stop growing coffee because of CBB?

5% said yes in 2012 it was 3% of farmers responding are considering getting out of coffee.

Q64 How many farmers do you know have stopped farming coffee?



In 2013 45% of farms report no one has stopped, 30% knew of 1 farm, 16% knew of 5 farms that getting out of coffee. This is an increase from 2012 where 58% of farmers reported no one was quitting coffee, 10% knew 1 , 19% knew of five, and 10% knew of 10 farmers quitting

Questions about abandoned farms and feral coffee.

Q65 Does your farm border a farm that is not trying to control CBB?

In 2013 it was 65% vs 60% in 2012 of farmers have neighbors not trying to control CBB.

Q66 Does your farm border an area with wild, feral or abandoned coffee?

In 2013 60% vs 50% of farms in 2013 border areas with feral or abandoned coffee.

Q67 Do you or someone you know need information on how to kill unwanted coffee trees?

34% knew of someone who needed information to kill coffee trees.

Q68 Where do you get information to control CCB?

CTAHR webpage for CBB	54.1%
DOA webpage for CBB	4.9%
Your coffee organization webpage	57.4%
Other web based information	21.3%
Newsletter from your coffee organization	47.5%
CTAHR workshops	60.7%
Your coffee organization workshops	45.9%
Someone downloaded information for you	1.6%
Talking with other coffee growers	80.3%
Talking with millers	27.9%
Talking with CTAHR staff at extension offices and experiment stations	34.4%

Most important information for CBB control mentioned by at least 50% of farms is- talking with other farmers (80%), CTAHR workshops (61%), my coffee organization webpage (57%), CTAHR webpage (54%).

Q69 How will you measure CBB damage on cherry you purchase in 2012-13 season?

Most wet millers appear to use % damaged cherry (CBB hole) calculated by count or weight of damaged cherry. This can over estimate damage, if both seeds are not damaged.

Q70 Last season (2012-13) for the cherry I purchased I estimate the marketable green bean recovery ratio (cherry weight divided by marketable green bean weight was ...

Nine mills that purchase coffee cherry report the average MGBRR was 6.9 or 28% damage, note processor volume was not factored into the calculations. This is an increase from 22 % green bean loss in 2011.

Observations by farmers and millers.

Q61 Farmer/miller observations.

I heard about a farmer in Captain Cook. He would regularly have bbqs for his workers. The area around the bbq did not have CBB. He was thinking that the smoke was a possible inhibitor

Hard when abandoned farms are nearby

With no beans or only green beans, spray trap and tree trap is in weekly, not whole farm

When we have less rainfall, we notice that we have more live CBB

As a buyer of green bean I notice that the farms that are diligent have MUCH less CBB damage to the beans.

With Botanigard 1/2 qt per acre starting in April was not effective. using 1+ qt. starting in march has worked well this year.

Spraying late afternoon with a little breeze works well

Pyrenol seems to be doing well in dry, sunny weather (Jan, Feb, Mar) With the wet season Botanigard has better kill results as Pyrenol washes away with rain.

This year I've only sprayed Botanigard twice, but every damaged cherry I find has no live larvae. maybe timing is more important than quantity.

Unsprayed coffee mirrors fungal rate of sprayed coffee, indicating strong weather factor.

My 30 tree sample has declined every 6 weeks to less than .1% bean damage just using Mycotrol.

Spraying neighbors coffee has helped reduce infestation on boundaries. The last 2 seasons my boundaries were highly infested but not so much this year. I estimate damage reduced from 25% to 5%.

lower dose (16oz/acre) seems to be effective. That is what I used last year. The problem seems to be it is almost ineffective when it is too dry.

Sulfur seems to kill and control the CBB although not sure why this year one round spiked (34%) my first three rounds were 10%, 17%, 15%

More Botanigard per acre (36 oz) works well for us, not sure why I would want to try using less.

Cost is ruinous: Pyrethrin plus fungus plus spreader plus clay

Cherries with Surround WP 4 month ago are better protected than cherries sprayed with only Botanigard 2 weeks ago.

Checking every single bean on every single tree in April and May is very easy because the total number of beans in the farm is very small. One round in April in 2 acre can be done in 10 hours by one person. May 30 hours. It is the most effective method to keep the infestation level below 1% at the beginning of the picking season.

We need a systemic solution to the problem. None of the existing methods are satisfactory for small farms.

We are fortunate to be fairly isolated and have no other growers in our local.

Run a test with heavy soapy water on males and tell us the results, they are on the ground.

The survey is too long.

The power sprayer is much more effective than the hand pump sprayer.

Botanigard is effective-borer is dead inside infected beans.

I tried spraying in the 2011-2012 season and I was ill for 2 months with respiratory distress and kidney problems.

Not very effective to spray early in the morning when sunny

Q62 What research do you want done about the CBB problem?

Continue to find ways to eradicate, make female infertile,

See how effective the spreader is, how much to use. how far into the bean is the kill rate of the fungus with the spreader.

How to bring back our fungus

Find an economical solution

How long after spray Botanigard before ccb dies?

How do we improve fungal spore survival during dry periods, and how do we increase our fungal population in the field, without just spraying more

Role played by green beans from other global regions coming into HI for blending purposes, which is how I suspect CBB got here in the first place. Inspections of facilities that import green bean from outside each island and strong controls/fines for those found to contain CBB bean from other areas. What the larger coffee buyers are doing with the damaged/infested beans they buy (Mt. Thunder known to solicit Kona growers' CBB damaged beans...if they are buying it, they are surely selling it!)

I think whatever money is available should be used to defray farmer costs for Botanigard/spraying expenses; research should be secondary.

We need a reliable epidemiological survey of CBB distribution, damage, and effective control methods. Volunteer surveys with low response rates are not helpful

Some systemic tree treatment to make beans unpalatable to bugs

HOW TO RID OF IT - SOON

Wolbachia bacterium suppression in CBB with antibiotics.

Many studies of fungus application using different quantities, different frequencies, to find the least amount that is effective. it's costly to buy and costly to apply.

Best time to spray during current season, based on real time analysis.

Removing fallen beans on the ground is necessary but in some cases not possible. What other options do we have for ground treatment?

Try to measure the efficacy of Botanigard and other measures by frequency of application. for example, if I spray 3 times, what percentage of infected cherry will result? If I spray once a month, what percentage? so we can determine the cost effectiveness of spraying. It may be that for a low yield farm, spraying twice a year and accepting 15% less than the base price saves money over spraying every 3 weeks and getting a 25% premium. We have no way of knowing. All the research now is on how to eradicate cbb, not on the cost effectiveness of different approaches or schedules. Also, I suggest using bigger sample sizes. The kaolin research used only 6 trees per treatment. Since the field conditions are so variable, I think you need bigger samples to compensate and get convincing results.

Better understand the life cycle and how to interrupt it.

Other ,less expensive, treatments than Mycotrol.

Find out where they live during the off season.

- 1) can pyrethrins be mixed with Botanigard?
- 2) where does CBB come from when green starts appearing? Especially if all trees are stripped & pruned
- 3) how effective is 1-2-3 row BF pruning or is it better to section the farm?
- 4) some people have said soil pH can affect whether a tree is more susceptible to CBB
- 5) are CBB attracted to the flowers? I have seen what I think are CBB in the dead flowers. next year take a handful of flowers that have died (turned black) and rub them in your hands lots of CBB-looking insects come crawling out.

I heard a product called "Bam" from Oahu is promising.

Effect of various fertilizer ratios on CBB, particularly the effect of Ammonium Sulfate.

Produce COFFEE SPECIFIC control -- fungus or pyrethrin product; produce fungus multiplier method to bring prices down.

How to make pickers more responsible for picking under Integrated Management Plan. Currently they can get a picking job anywhere at high wage without caring about IMP for CBB.

It is about people not technology.

Find a systemic solution to the problem that can be applied, sprayed, or spread several times a year, but independent of flying bugs.

Use of neem, garlic and planting of other plants that drive the bug away

Confirm that the use of commercial denatured alcohol as an attractant

Development of cherry from flower till CBB penetrate the bean.

What is the amount of rain in relation to the onset of CBB

Life cycle, habits, potential control approaches.

Some kind of indicator when to spray other than trapping and 30 tree monitoring like temp/moisture/ light.