



How are we doing in the war with CBB ? (Comparing CBB surveys 2015 and 2014)

H.C. Bittenbender <hcbitt@hawaii.edu>, A.M. Kawabata <andreak@hawaii.edu>, and S.T. Nakamoto
<snakamo@hawaii.edu> CTAHR, UHM.
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Highlights of 2015 Survey.

This 2015 survey covers the 2014-15 harvest and the 2015 growing season and CBB control tactics used for the 2015-16 harvest season. 59 farmers responded as well as 2 non-farming processors.

Crop loss due to CBB

Determining loss due to CBB in Kona is challenging. The Marketable Green Bean Recovery Ratio (MGBRR) is a very sensitive measure of CBB damage. There are several other ways to evaluate CBB. Loss due to CBB for 2014-15 season as stated by farmers in Question 10 (Q10) was 17% based upon pounds of off-grade green from the total weight of recovered green bean. On Q11 only five Kona growers reported their MGBRR, the average was 6.6 or 24% loss. Farms (Q12) that sell cherry reported their processor's average damage assessment was 12%. No cherry processor provided a MGBRR estimate in Q47, though 5 did in 2014. This year some farmers said the processor's estimates are too high. Therefore a reliable estimate of CBB damage for the 2014-15 is difficult. The average of the three estimates is 18% but the range is 12 to 24%. Average damage, 17%, was reported in 2014 for the 2013 crop where estimates ranged from 13 to 20%. No change in damage. Perhaps USDA and DOA can provide an estimate from their surveys.

Estate growers estimated crop loss as 17% to 24% vs. cherry growers who reported 12%. 23% of farms in 2015 said CCB was increasing, 31% said damage was the same as 2014, and 46% thought CCB was decreasing. In the 2014 survey 11% thought CBB damage was increasing, 35% same as previous year and 54% decreasing. These estimates suggest that the damage is about the same but morale has slightly declined.

Sanitation.

The slogan "Contain and Kill" means managing all coffee cherry on your farm beginning with the first picking harvest so that all CBB- adults, larvae, and eggs- in the cherries are destroyed during processing and after stripping all trees 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.

More farmers are pulping everything picked, including floating cherry and parchment. Less untreated pulping waste is returned to field; instead it is taken to a dump site. Therefore we deleted these questions in the 2015 survey. In the 2014-15 crop, strip picking any cherry-immature, ripe, or over-ripe- at the end of the harvest and treating to kill CBB was practiced. 72% of farms strip at least 90% of their trees, only 12% stripped just 50% of their trees after harvest. Further in 2015 50% of farms leave 5 or less ripe cherries on trees after each round of picking. This has been shown to reduce infestation later in the season. Most farms in Kona are annually pruned in the Kona style. Stumping by block as has been shown to reduce infestation in stumped prune blocks in the first crop season after pruning. Only 4% of farms reported adopting this tactic.

Trapping to determine CBB flying.

In 2015 the percentage of farms using trapping declined to 28%. This trend started in 2013. Farmers have realized that trapping is not an effective control tactic for CBB and there are more effective activities for their efforts.

30 Trees Sampling Method for CBB infestation in cherries.

The 30 Trees Sampling Method for detecting stage of infestation and evaluating the timing and effectiveness of the *Beauveria bassiana* sprays was introduced with workshops in 2012 and 2013. By 2014, 47% used it but only 40% used it in 2015, they have started using the 12 Trees Sampling Method which takes less time. 67% of farms who used it in 2015-16 season start 2 months after flowering. 86% who use it sample every 6 weeks or less, an improvement over 2014 when the figure was 58%. And 63% felt it was good to very good at determining the effectiveness of their spray

program. The decline in use reflects the required effort to sample and uncertainty with the method. Better experience with the 30TSM resulted in 60% indicating they will use in the 2016-17 crop.

Spraying commercial preparations of the fungus *Beauveria bassiana*.

Use has increased (Q25) to over 90% farms compared to 85% in 2014, 80% in 2013. In 2015, 72% began spraying before April an increase from 55% in 2014. 75% of farmers rated the effectiveness of the fungal sprays as good or very good. 70% spray every 4 weeks or more frequently. Amount of applied per acre has decline compared to 2014 as the frequency of use increased. Subsidized Botanigard/Mycotrol O is important. Without a subsidy (Q30) *Beauveria* use would decline 22%; though 7% of farms who use it are not receiving a subsidy.

Spraying other insecticides to control CBB.

Farmers rate insecticides (Q33) containing pyrethrins (Evergreen, Pyronyl) and kaolin clay (Surround WP) as very effective. Garlic Barrier was ineffective, and Admire Pro was poor. The increased use of pyrethrins-piperonyl butoxide –based insecticides for rapid knock down of CBB swarms had an unexpected impact. Piperonyl butoxide (PBO) is an ‘activator’ of the pyrethrins in the formulation. While these insecticides are exempt from tolerances in the US for green coffee, this is not the case in Japan which has not set a residue level in green coffee. Therefore Japan used the minimal detectable level as the maximum limit which is 0.01 ppm. Coffee from Kona has been found to contain 0.02 ppm of piperonyl butoxide, making it twice the legal limit in Japan. OMRI certified pyrethrins products like Evergreen Pyrethrum Concentrate® or Pyganic 5.0 EC products can be used instead although the efficacy compared to Evergreen 6-6® is unknown.

Economic impacts.

70% of farms in 2015 reported increased costs (Q34) which is lower than the 90% reported in 2014. Profitability for the 2014-15 crop was mixed; 30% had a loss, similar to 2013-14 crop. 49% had a profit between 0 to \$10.

Are farmers leaving coffee due to CBB?

In 2015 6% of farmers will stop growing coffee (Q41), in 2014 it was 2%. 52% said they knew between 1 and 4 farmers that were quitting in 2014; this was an increase from 44% in 2014. As in the past, 61% of farms in 2015 have neighboring farms not trying to control CBB; and 52 % of farms border areas with feral or abandoned coffee, similar to 2013 and 2012. This will increase if farm abandonment increases.

Where do you get CBB information?

Most farmers use multiple sources to get CBB control information (Q45).

The most important sources are:

CTAHR CBB webpage 86%

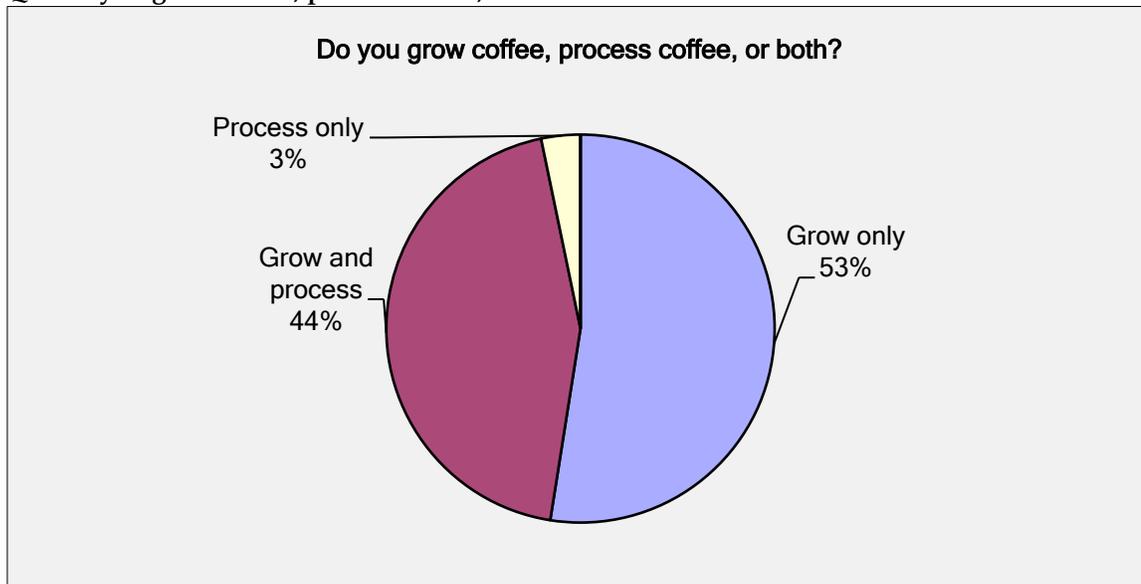
CTAHR workshops 70%,

Talking with other farmers 60%

Farmer’s coffee organization newsletter 57%

Questions and responses, followed by comments.

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



59 farms responded - 32 grow only, 27 grow and process, 2 process only.

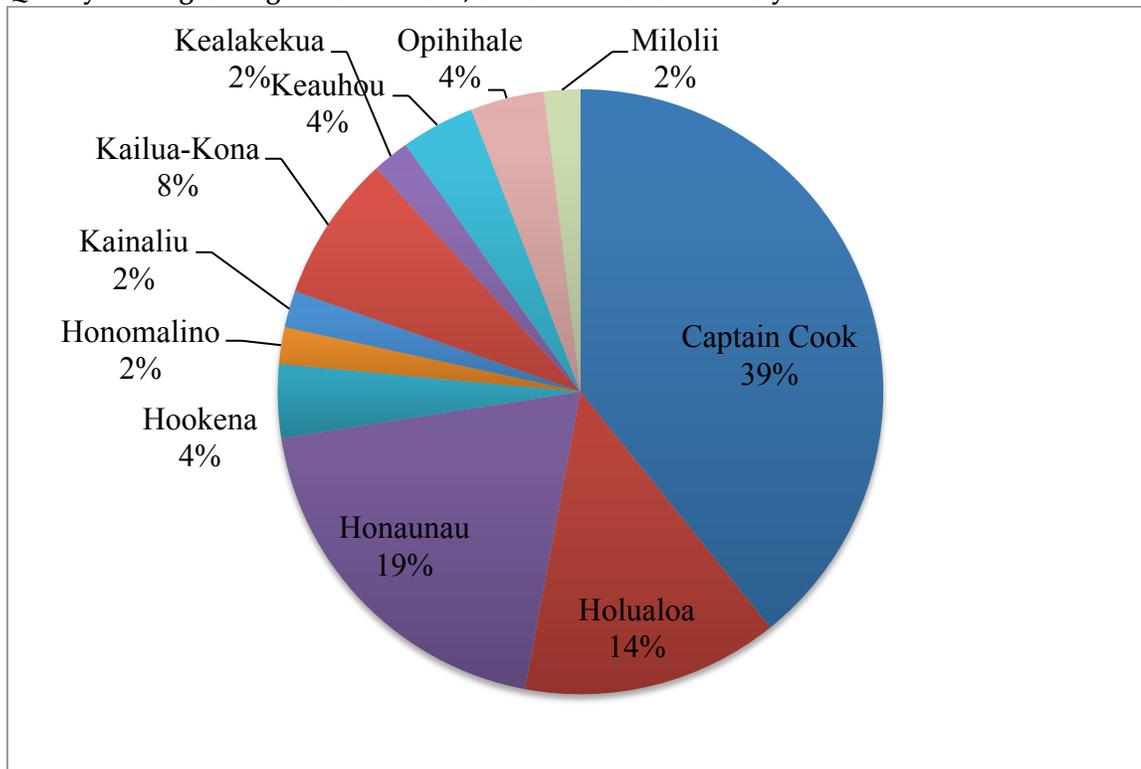
Q2. On which island are you farming coffee?

93% responses were from Big Island, 2 from Oahu, 1 from Maui, 1 Kauai

Q3. If you grow coffee on the Big Island, what district do you grow coffee?

87% from Kona, 5% from Kau, 5% Hamakua, 4% Puna

Q4. If you are growing coffee in Kona, select the area closest to your farm.



Most responses were from Capt. Cook- 39%, Honaunau- 19% and Holualoa - 14%.

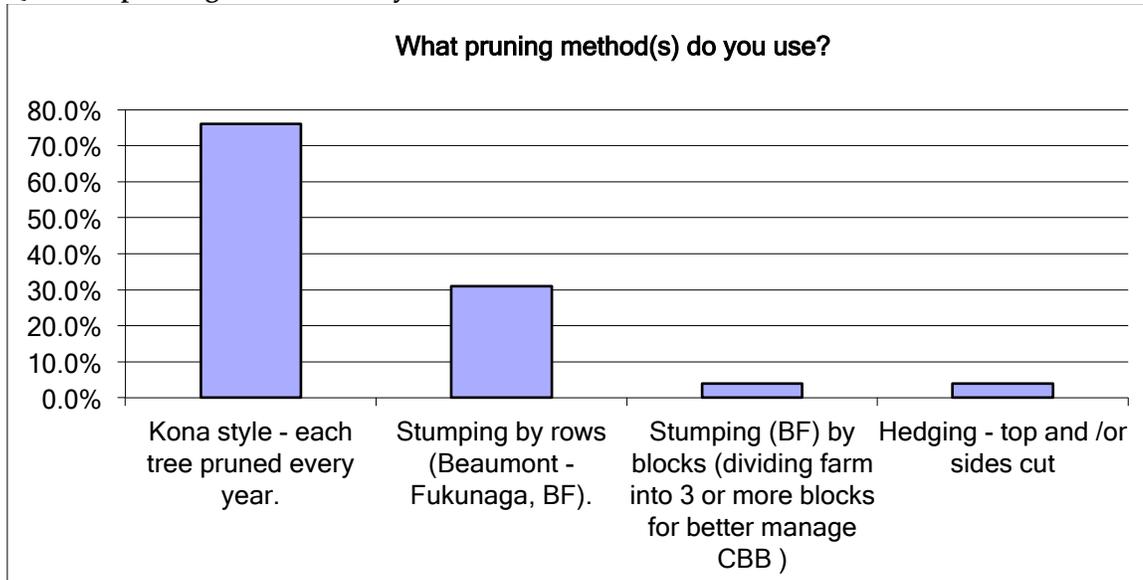
Q5. How big is your coffee farm ?

Response represents 330 acres on Big Island mostly in Kona averaging 6.6 acres.

Q6. What is the normal tree spacing on your farm, e.g. 8 by 8 ft.?

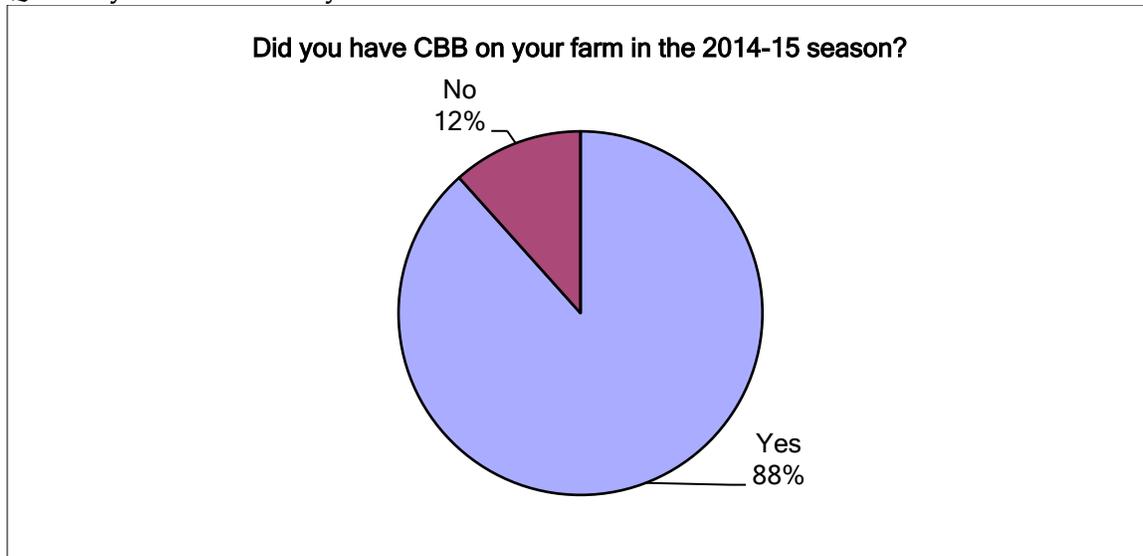
Average is 6.1 ft. in and 8.8 ft. across rows.

Q7 What pruning method(s) do you use?



Only 4% of Big Island growers reported using stumping by blocks which improve CBB control, over 75% use the Kona style pruning.

Q8. Did you have CBB on your farm in the 2014-15 season?



Q9. What was your total cherry yield in pounds for the 2014-15 season?

The average was 18600 lbs. / farm.

Q10. What was your green bean yield in pounds for the 2014-15 season?

Only 10 farms in Kona answered this. However they indicated the amount of off-grade green bean 17% due to CBB.

Q11. Marketable Green Bean Recovery Ratio (MGBRR) is the weight of cherry harvested during the 2014-15 season divided by the weight of marketable green bean, what was yours?

Only 5 Kona growers responded with cherry and green yield to calculate the MGBRR, the average was 6.6, or 24% CBB damage.

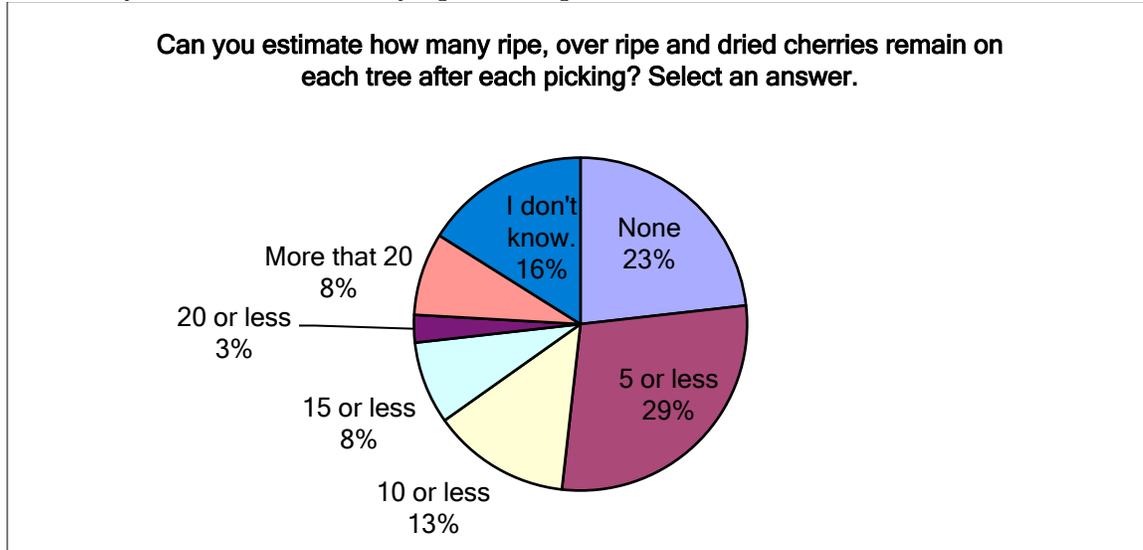
Q12. If you sell only cherry but your buyer samples your cherry and tells you the percent CBB damage please list all the damage percent's given to you for the 2014-15 season. List damage starting with early to last harvest, example 10%, 20%, 30%, 50%....

24 farms that sell cherry said their average CBB damage determined by the processor was 12%.

Q13. Compared to the beginning of the 2014-15 harvest season how does the CBB damage level on your farm look at the beginning of the 2015-16 season? Is CBB damage increasing, the same or decreasing?

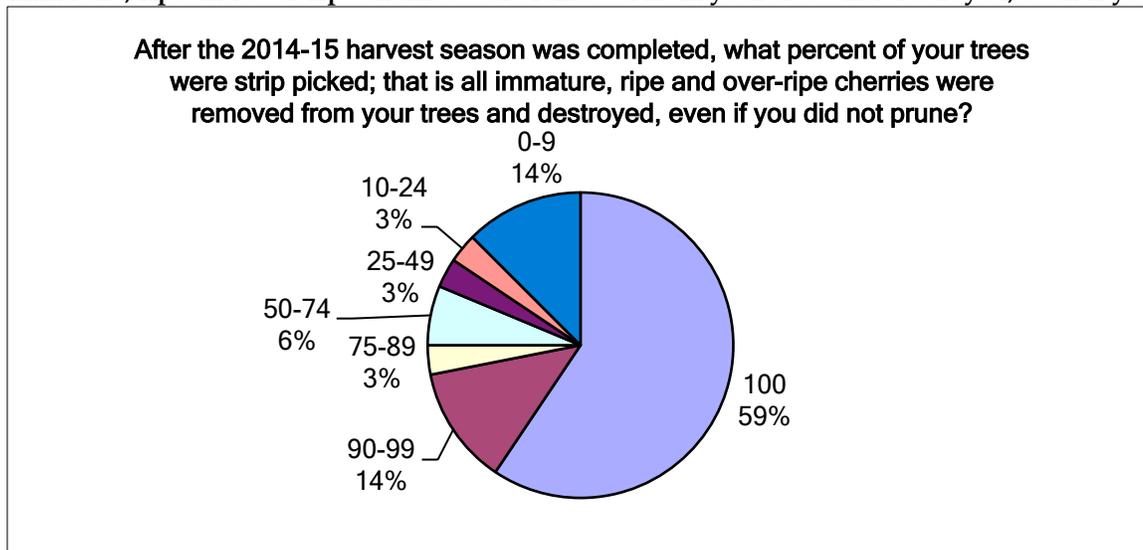
23% of farms said CCB was increasing, 31% said same as 2014, and 46% said CCB was decreasing in 2015.

Q14. Can you estimate how many ripe, over ripe and dried cherries remain on each tree after each picking?



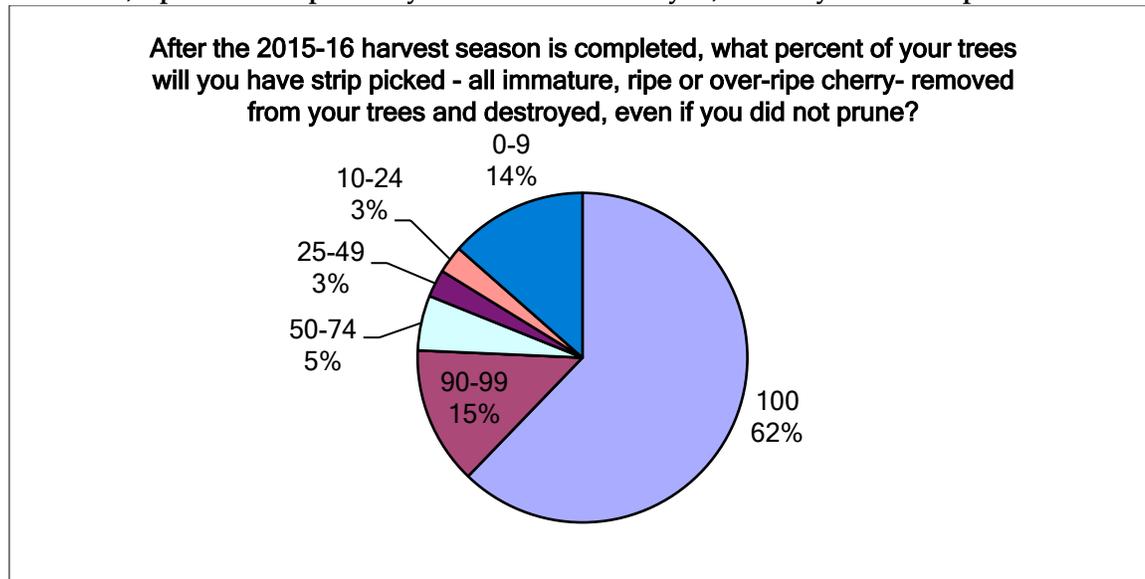
Over half of growers said 5 of less ripe, over ripe and dried cherry remained after each picking. Five cherries per tree remaining after each picking helps to reduce CBB during the season.

Q15. After the 2014-15 harvest season was completed, what percent of your trees were strip picked; that is all immature, ripe and over-ripe cherries were removed from your trees and destroyed, even if you did not prune?



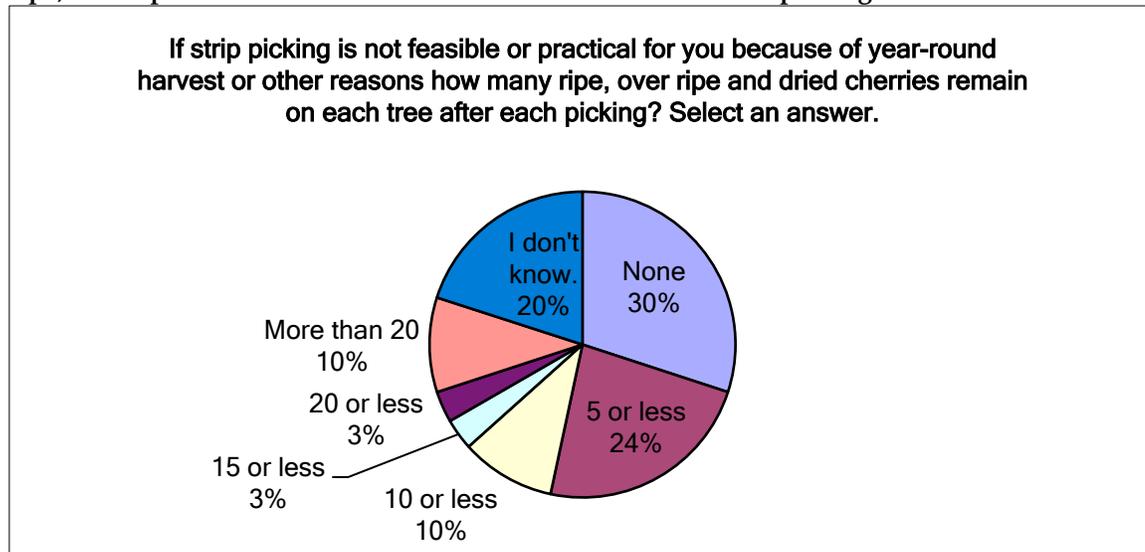
60% of farms were 100% strip-picked, 12% strip picked 90-99 % of trees, only 12% said the trees were less that 50% strip picked.

Q16. After the 2015-16 harvest season is completed, what percent of your trees will you have strip picked - all immature, ripe or over-ripe cherry removed and destroyed, even if you did not prune?



75% of farms will strip pick 90 to 100% all trees at the end of the 2015-16 crop slightly higher than at the end of the 2014 crop.

Q17. If strip picking is not feasible or practical for you because of year-round harvest or other reasons how many ripe, over ripe and dried cherries remain on each tree after each picking? Select an answer.



54% of farms say they leave 5 or less ripe, overripe and dried cherries on each tree after a picking round in the 2015-16 crop.

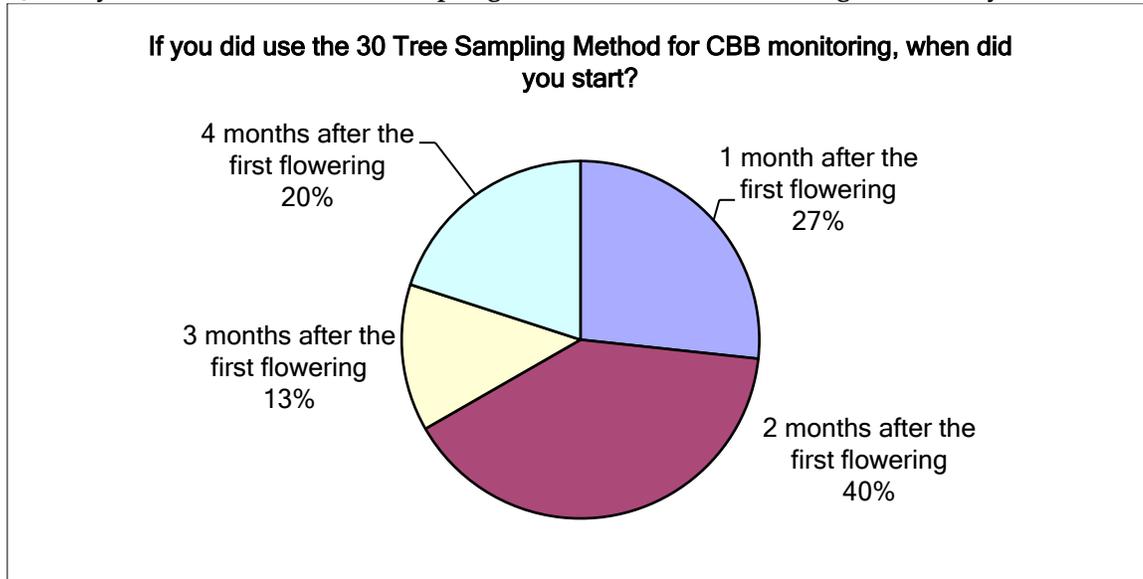
Q18. Did you use traps baited with methanol and ethanol to monitor CBB this 2015-16 season?

28% of farms use CBB traps to monitor in the 2015-16 crop, this is an expected decline from previous years due to farmers knowledge that this is not a control but a monitoring system.

Q19. Did you use the 30 Trees Sampling Method for CBB monitoring this season 2015-16 ?

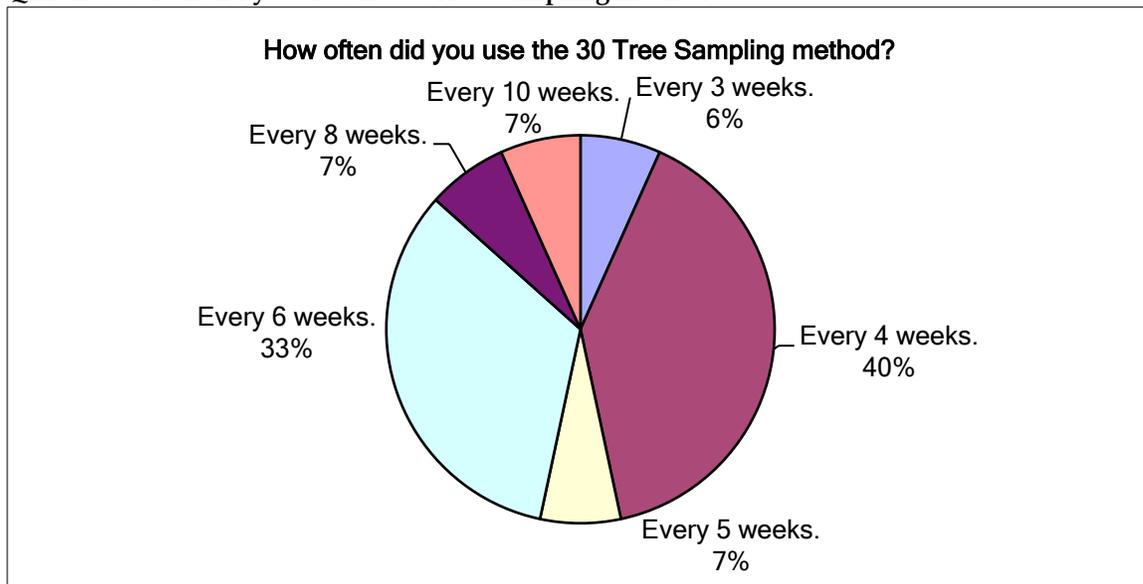
60% of farms do not use the 30 Tree Sampling method for CBB monitoring.

Q20. If you did use the 30 Tree Sampling Method for CBB monitoring, when did you start?



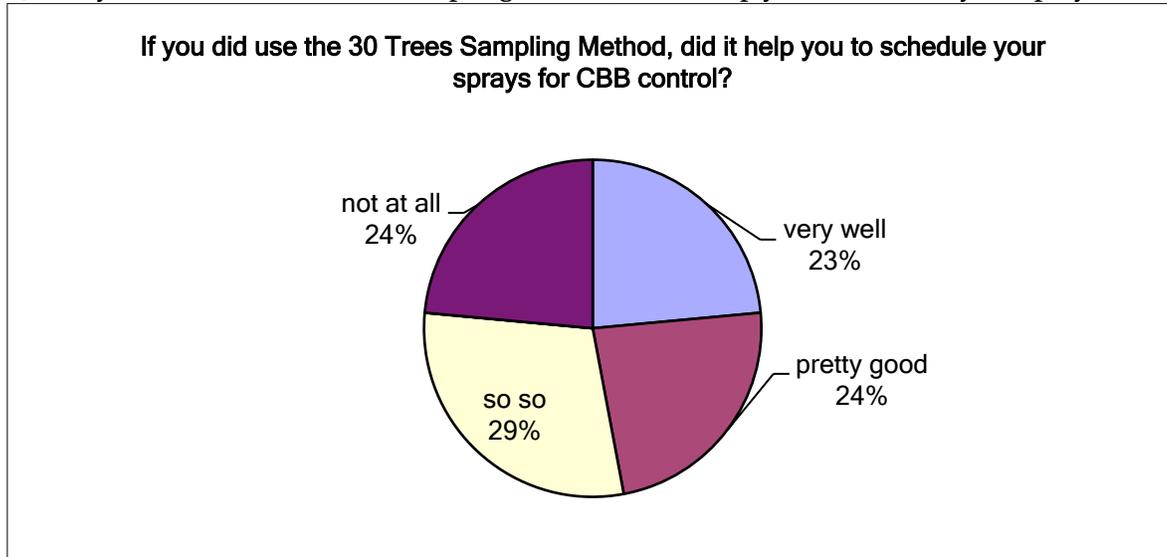
40% of farms that use the 30 Tree Sampling method begin 2 months after first flowering in 2015-16 crop.

Q21. How often did you use the 30 Tree Sampling method?



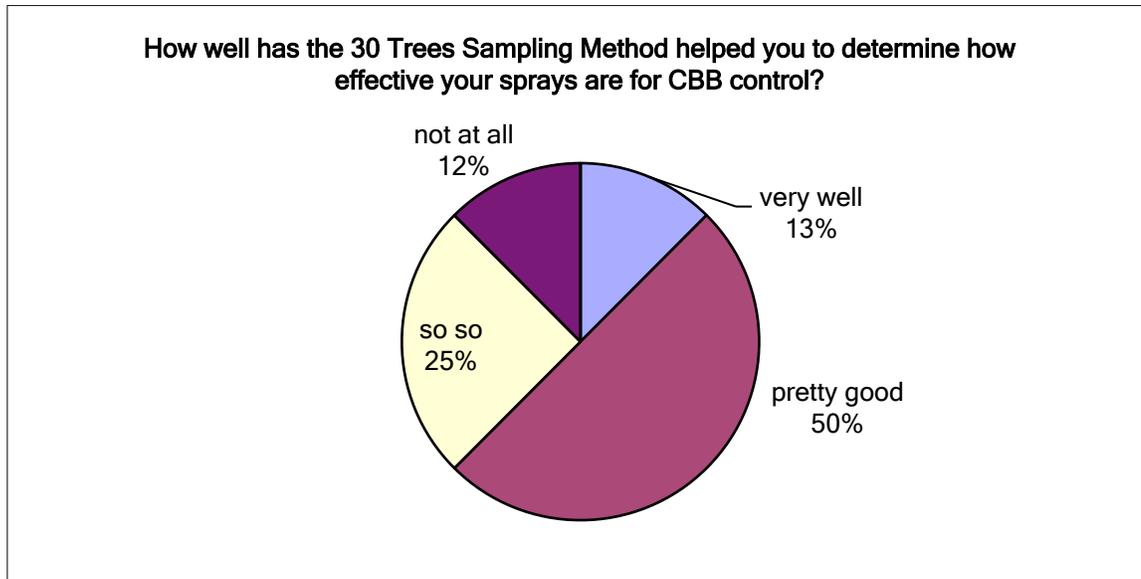
Of the farms that use the 30 TSM 40% sample every 4 weeks, followed by 33% sampling every 6 weeks.

Q22: If you did use the 30 Trees Sampling Method, did it help you to schedule your sprays for CBB control?



Farms that use 30TSM 47% were very positive about it helping them schedule Beauveria sprays, others were less convinced.

Q23. How well has the 30 Trees Sampling Method helped you to determine how effective your sprays are for CBB control?



63% of farms that used the 30TSM agreed it helped to determine the effectiveness of their sprays.

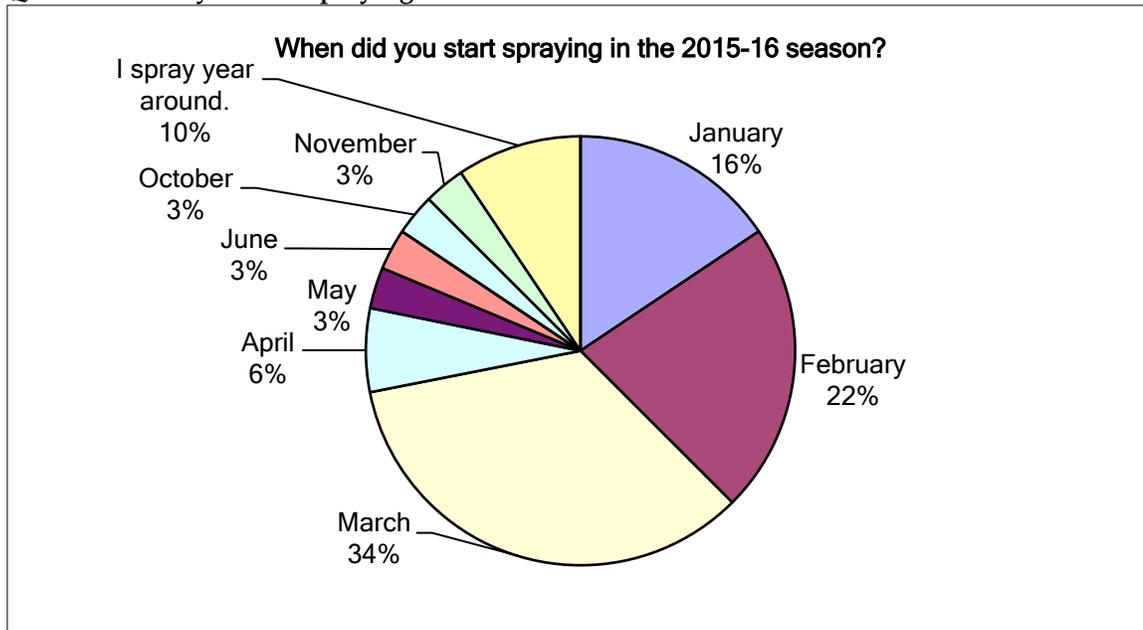
Q24. Will you use the 30 Trees Sampling Method in the 2016-17 harvest season?

61% of farms say they will use the 30TSM in the 2016-17 crop. Most common reason for not using it is too much work or using a 12 tree sampling method.

Q25. Did you spray commercial insecticides that contain Beauveria bassiana?

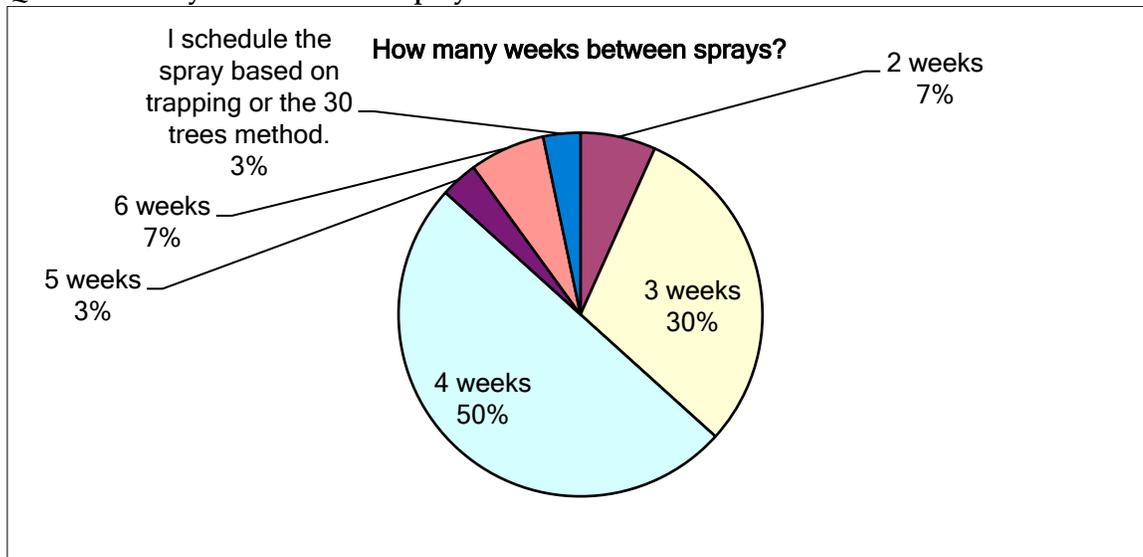
Over 90% of farms use Beauveria, Botanigard is preferred 10 times more than Mycotrol O.

Q26. When did you start spraying in the 2015-16 season?



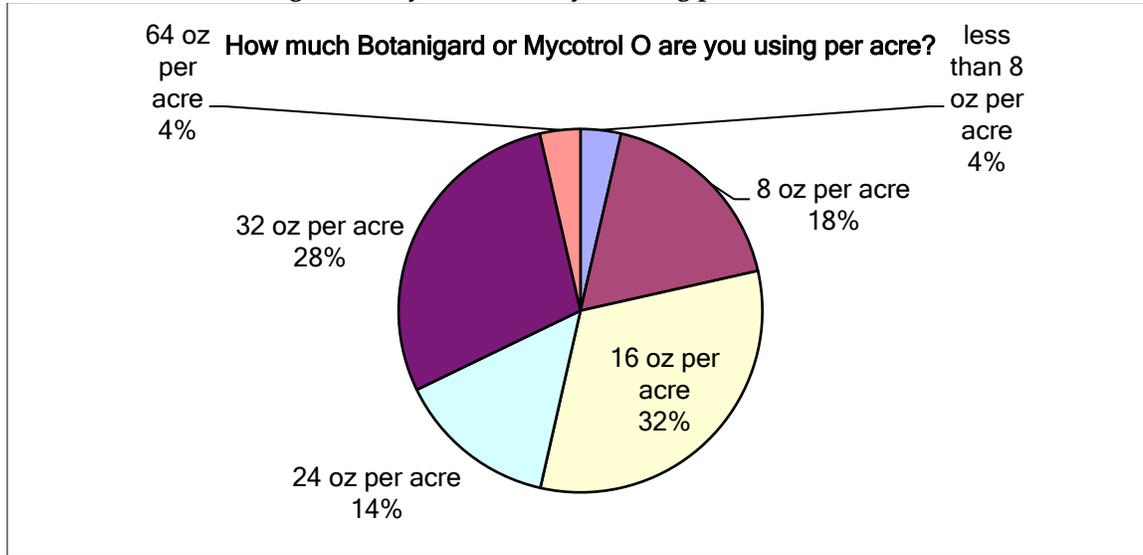
72% of farms that use Beauveria start sprays before April (March (34%), February (22%), January (16%)) or spray year-round (9%). Early sprays are important to reduce CBB damage for the season, in 2014 only 55% started before April.

Q27. How many weeks between sprays?



Most farms that use Beauveria spray at 4 week (50%) or 3 week (30%) intervals.

Q28. How much Botanigard or Mycotrol O are you using per acre?

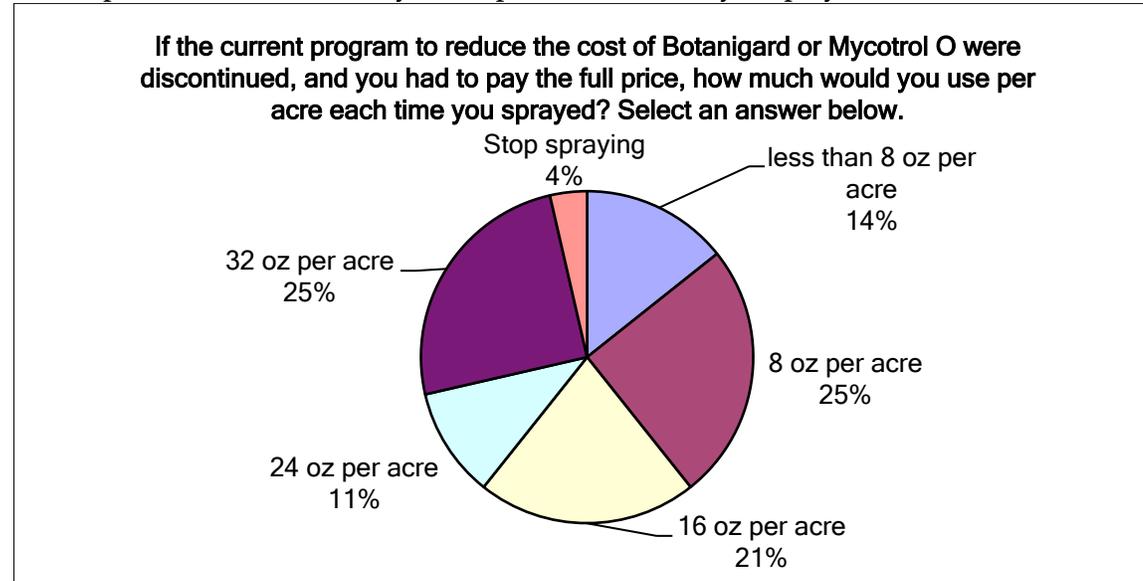


Per acre rates of Beauveria per application are mostly 16 oz. (32%) or 32 oz. (29%), much less or more is less common.

Q29 How much spray solution (water plus Beauveria) do you apply (gallons per acre)?

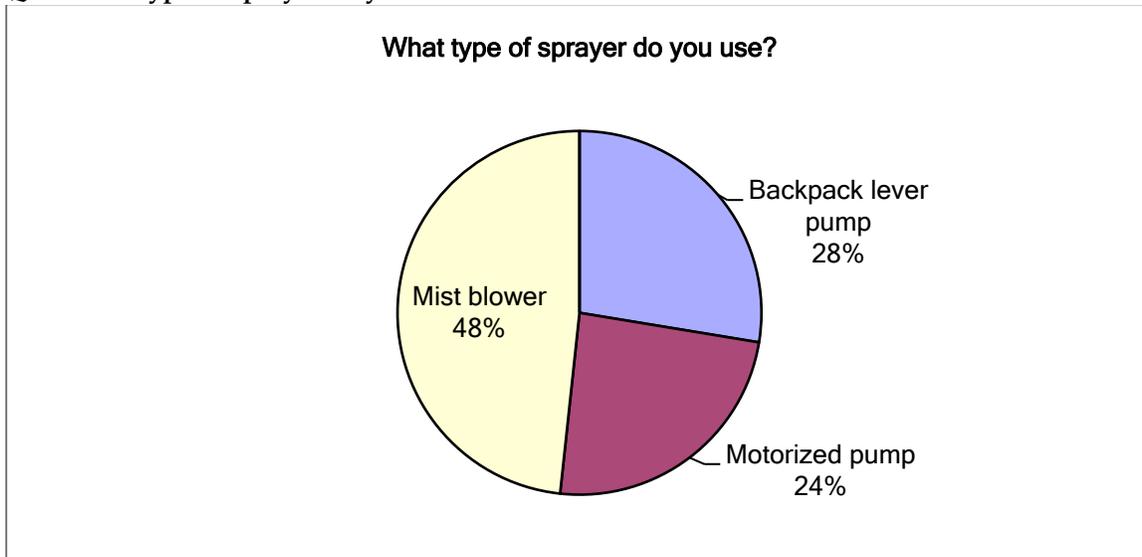
Beauveria spray solution (gal/acre) varies based upon equipment, ranges from 4 to 100 gal, averages 33 gal/acre, the median is 28 gal/acre.

Q30 If the current program to reduce the cost of Botanigard or Mycotrol O were discontinued, and you had to pay the full price, how much would you use per acre each time you sprayed? Select an answer below.



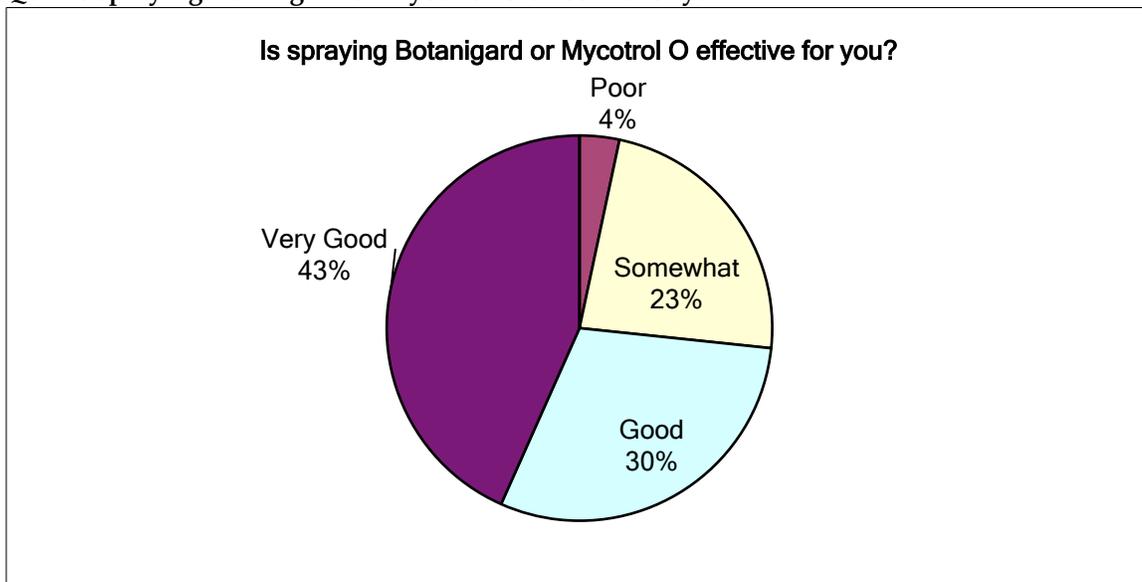
Without a subsidy Beauveria use would decline 22%, though 7% of farms are not receiving a subsidy.

Q31. What type of sprayer do you use?



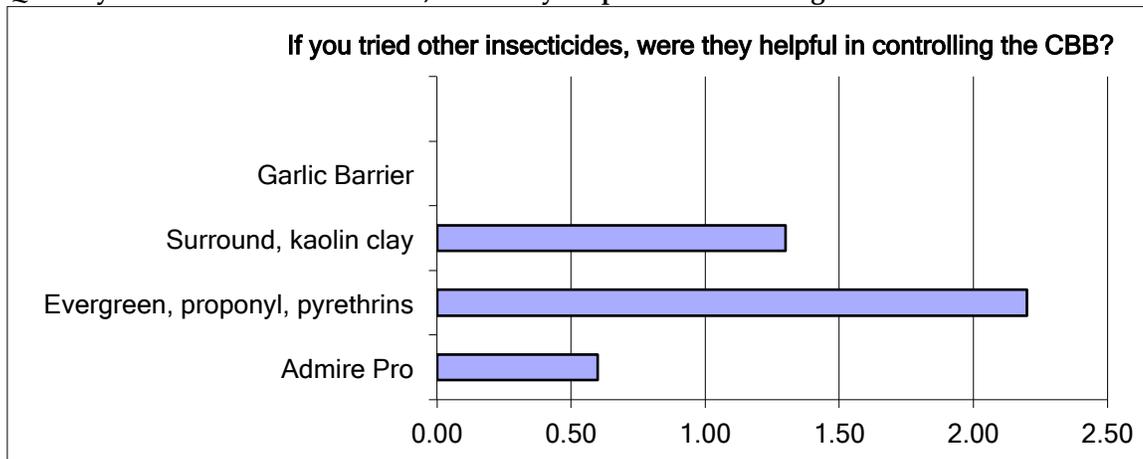
48% of farms use mist blower (air blast) sprayers.

Q32. Is spraying Botanigard or Mycotrol O effective for you?



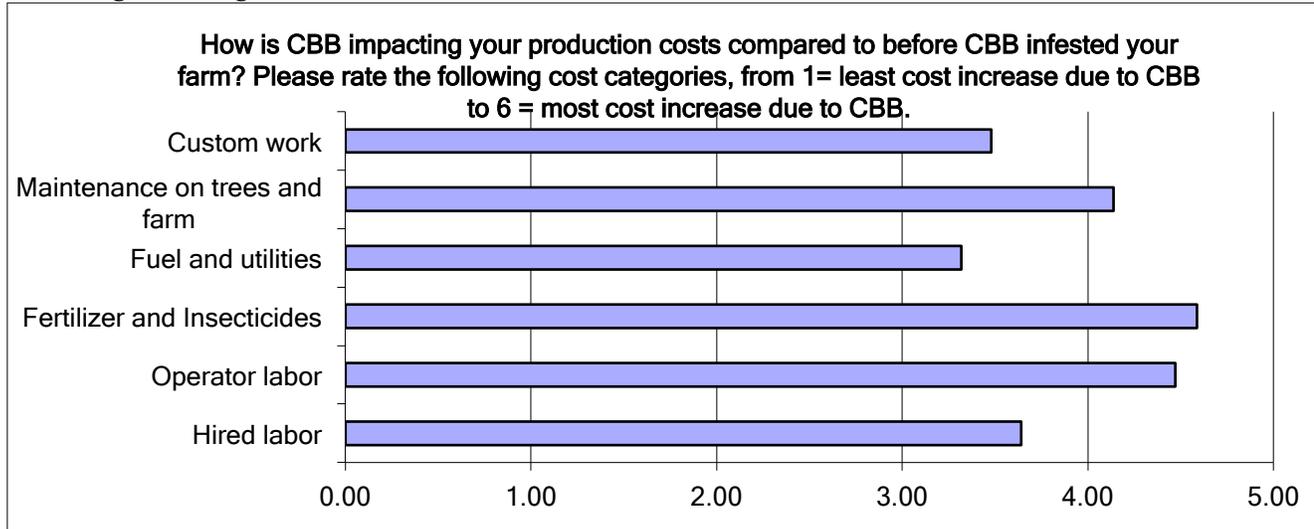
Nearly 75% of farms spraying Beauveria said its effectiveness was very good or good.

Q33. If you tried other insecticides, were they helpful in controlling the CBB?



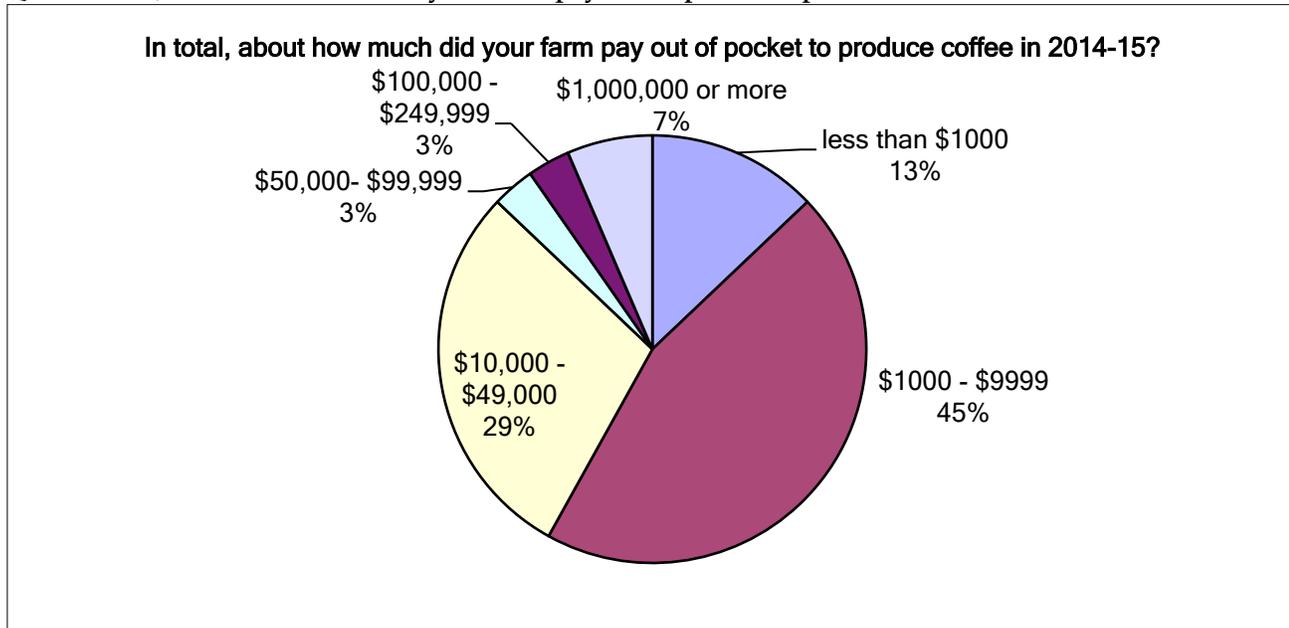
Farms that evaluated other pesticides rated garlic barrier ineffective, 92% rated evergreen, proponyl, and pyrethrins effective, 50% rated Surround or Kaolin clay slightly effective, and 36% rated Admire Pro poor.

Q34. How is CBB impacting your production costs compared to before CBB infested your farm? Please rate the following cost categories, from 1= least cost increase due to CBB to 6 = most cost increase due to CBB.



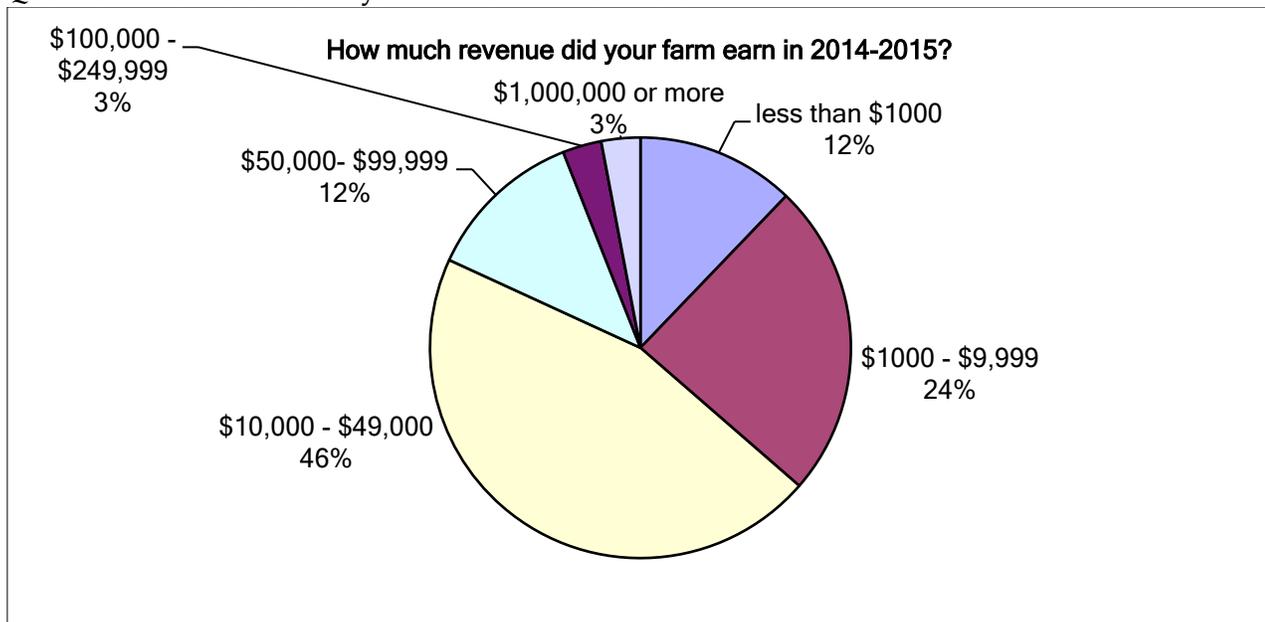
Cost of fertilizer and insecticides, the owner/manager's greater effort, and tree and farm maintenance were most impacted by CBB. Cost Hired labor, custom work, and fuel increased on slightly less.

Q35. In total, about how much did your farm pay out of pocket to produce coffee in 2014-15?



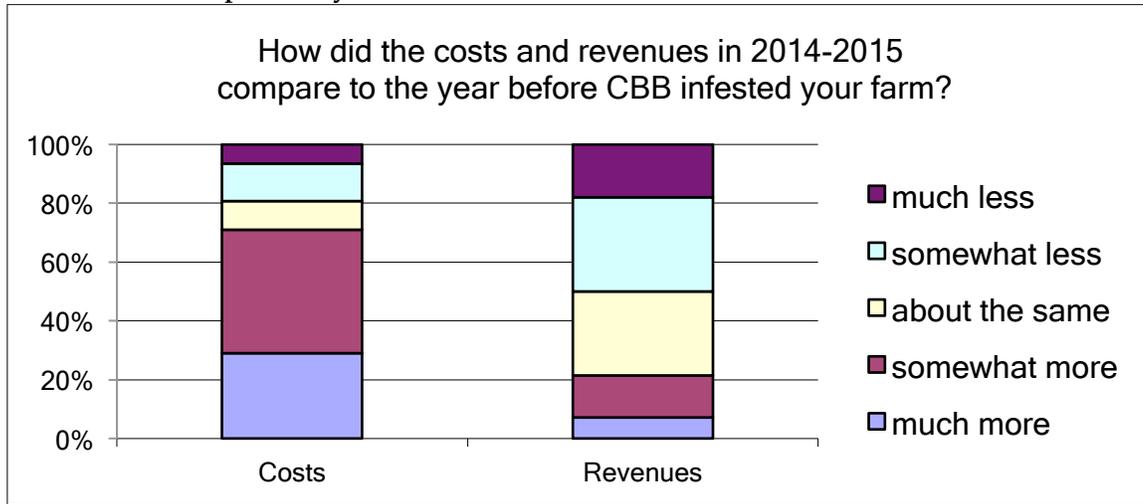
In Kona the average cost to produce coffee in 2014-15 season was \$83,700 but the median - half the farms below and half the farms above- was \$5500. 45% of responding said farms paid \$1000 to \$9999 to produce coffee in the 2014 -15 season, followed by 29% who paid \$10,000 to \$49,000.

Q36. How much revenue did your farm earn in 2014-2015?



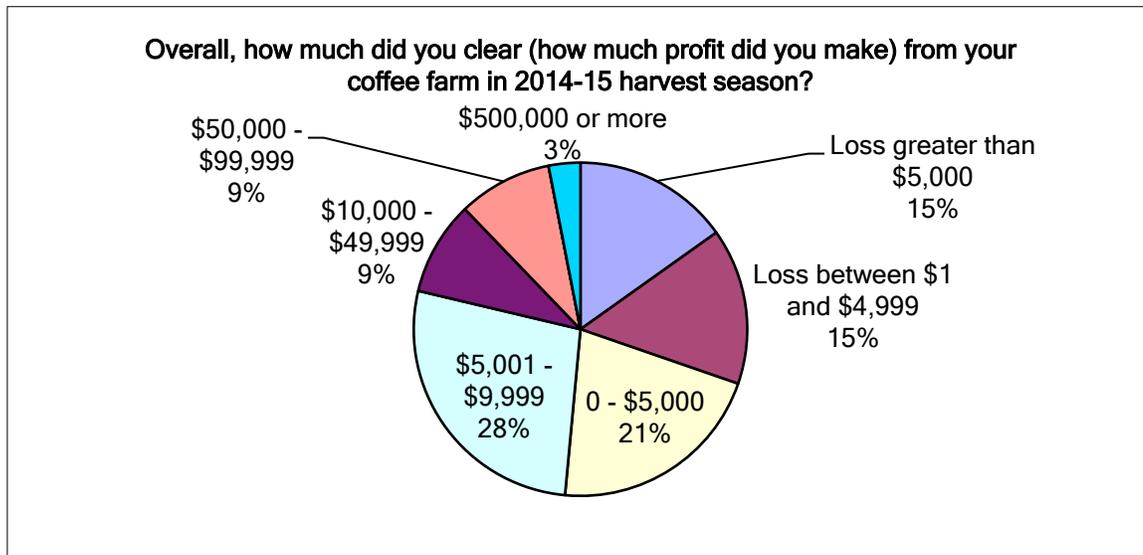
The average revenue reported from Kona was \$59,500 - but median was \$29,500, - half of farms earned less and half more. 44% of responding farms had between \$10,000 and \$49,000 in revenue and another 24% had \$1000 - \$9,999 in revenue.

Q37. How did the costs and revenues in 2014-2015 compare to the year before CBB infested your farm? Select the choice that best represents your situation.



Responding farms indicated that comparing costs and revenues before CBB and the 2014-15 crop 70% had more cost and 50% had less revenues.

Q38. Overall, how much did you clear (how much profit did you make) from your coffee farm in 2014-15 harvest season?



Farms on Big Island responding said 30% had a loss in the 2014-15 crop. 20% had 0 - \$5,000 and 28% had \$5001 - \$49,999 profit.

Q39. Do you have observations on CBB control that you want to share?

Get in and spray early after flowering

Timing of the first 2-3 sprays is critical and is practically the key to control the rest of the year.

Spray after rainy period.

Wet year drowned beetles. Or they were not able to find enough raisins.

I think strip picking and spray *B. bassiana* are the most important steps.

After the final, final, final pick to clean all off trees - when, at anytime walking through the orchard or during the pruning process, a raisin, red or green berry was spotted - it was stuffed in a pocket to be deposited of later.

My biggest problem is farm sanitation--getting the pickers to come more often, pick cleaner. Very difficult and when they miss a few weeks, its irreversible.

The measures for CCB by buyers is inconsistent, where CCB checks were made with samples before delivering cherry, and one buyer correctly noted very low CCB - less than 10 percent, where as another buyer noted 30 percent. It is being used to under pay for smaller beans.

Actual number of CCB, and or actual bean damage is the best way to assess severity.

There need to be better ways to offer farmers discounts than attending a meeting.

I'm losing the battle. It's almost not worth the labor and expense to grow the stuff...

Neighbors don't spray much. 1 does occasionally, 2 don't at all. If I stop spraying September, October, November damaged beans get very high. This year I'm spraying more frequently later in the season versus early.

We're searching twice weekly for any evidence of CBB infestation. So far none. However, we're devoting the equivalent of one full time employee for search.

Q40. What research do you want done about the CBB problem?

Sterilizing the female CBB the same as they did for the fruit fly.

How to educate pickers/provide incentives to practice good field sanitation.

More chemical trials. Anything else other Botanigard being tested? Any self propagating fungus?

Research on how to deal with neighboring abandon coffee properties

Systemic antibiotics against *Wolbachia* bacterium hosted by CBB

Pathways analysis, low elevation/high temperature *Beauveria bassiana* strains,

Improved trap lure solution.

Inoculation of adult coffee trees with fungal *Beauveria bassiana*

Something that works? :-)

Cheaper products that can kill the CBB

My losses are due to drought damage, not CCB.

Q41. Are you planning to stop growing coffee because of CBB?

6% of responding farms said they will stop growing coffee, of those 94 % continuing 17 % are considering quitting.

Q42. How many farmers do you know have stopped farming coffee?

52% of responding farms said they knew of 1 to 4 farms that stopped growing coffee.

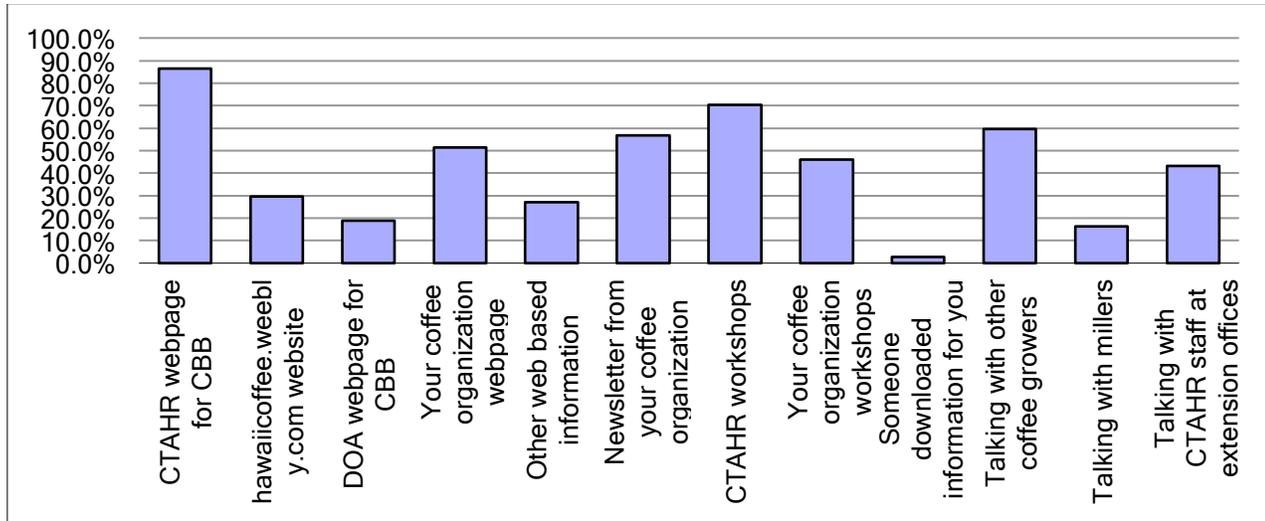
Q43. Does your farm border a farm that is not trying to control CBB?

61% of responding farms said they border a farm not trying to control CBB.

Q44. Does your farm border an area with wild, feral or abandoned coffee?

54% of responding farms said they border feral or abandoned coffee.

Q45. Where do you get information to control CBB? Select as many as you use.



The most common sources of information to control CBB are CTAHR webpage -86%, CTAHR workshops -70%, talking with other growers-60%, and newsletter from farmer's coffee organization -57%.

Q46. How are you measuring CBB damage on cherry you purchase in 2015-16 season?

Eight processors who purchase cherry use several methods to determine CBB damage. 50% do a visual assessment of cherry, a few report assessing damage on the parchment or the green bean, and DNA analysis.

Q47 Last season (2014-15) for the cherry you purchased can you estimate the marketable green bean recovery ratio (cherry weight divided by marketable green bean weight) ?

No processor provide a MGBRR estimate.

Q48 As a processor do you have comments?

Few processors responded, saying CBB was all over Big Island and that prompt payment by processors for cherry purchase might encourage growers to better manage CBB.