

Hawai'i Tea Growers' Survey

In 2019, the University of Hawai'i, College of Tropical Agriculture and Human Resources (CTAHR), conducted a survey of existing Hawai'i Tea growers. This was a follow-up to a similar survey conducted in 2014.

In addition to providing snapshots of the fledgling Hawai'i tea industry at two points in time, the second purpose of the survey was to identify problems that CTAHR might address in future research and extension programs. Funding support was provided by Hawai'i Department of Agriculture and the United States Department of Agriculture. The 2014 survey was a partnership between CTAHR, Mauna Kea Tea, and The Kohala Center.

A link to an online survey was distributed to mailing lists maintained by the partners, Hawai'i Tea Society, and various government agencies and organizations. Respondents were self-selected. There was a total of 17 valid responses, down from 39 respondents in 2014.

Summary of Findings

The greatest change from 2014 to 2019 was the lower number of respondents. Assuming this difference accurately represents tea growers in Hawai'i, the number of tea growers has decreased although there appears to be some new growers. The net result is a drop of more than half of the previous number of operations statewide. In general, although the total numbers dropped, the relative proportion of responses for many questions remained about the same.

Farm Location. Hawai'i Island remains the center of tea production, with over three-quarters (13 farms) of respondents located in the Kau-Volcano-Puna and Kona-Waimea areas (Q1). Four operations are located on other islands. There were some changes in the distribution of farms over different elevations. Three farms in the 2014 survey that were located above 4000' are not in the 2019 survey. In both periods, the number of farms are



evenly split at 2000' elevation (Q2).

Water Usage. Water is not a problem for most growers. Based on tea's water requirements, survey results indicated that about a quarter of the farms (those with less than 80 inches of rainfall a year) may need to irrigate at least during some time of the production season (Q3). This is a decrease from 41% in 2014. In 2019,

three respondents reported they did irrigate their crop (Q4).

Soil. In terms of soil depth, roughly half of the farms had at least 20 inches of soil (Q5). A quarter of the farms had five inches or less, with the actual number (4 farms) being the same as in 2014. Soil pH ranged from 4.5 to 6.5 (Q13). Two farms are in the optimal range (pH 4.5 to 5.0) and four have pH of 5.0-5.5. About 29% (5 farms) did not know their soil pH. Previously, we had speculated that improper soil pH would be a significant limitation to optimal tea growth and production. We note that many operations in 2014 with more extreme soil pH seem to no longer be in production in 2019.

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Subject Category: FN-62

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Analytic Lab Use. 59% had conducted soil analyses, similar to results in 2014 (Q14). The percentage conducting plant tissue analyses nearly tripled, to 29% of respondents (Q15). Over one-fourth, 29%, reported they do not fertilize. Those who do apply fertilizer applied a wide range of products and materials (Q16).

Tea Plantings. Farm age has a U-shaped distribution, with established growers on one end, and new operations on the other. 29% have grown tea for 10-15 years, while 59% have grown tea for five years or less (Q6).

There are more farms in 2019 that have larger acreage (Q7). Five farms have two or more acres, compared to one farm in 2014. Roughly 60% of the farms have an acre or less in tea, compared to 83% in 2014. These results imply that the total acreage for all tea production in Hawai'i is likely between 25 and 30 acres. Overall, there are fewer but larger farms. Most of the farms that are no longer growing tea were one acre or less in size, implying there is a minimum size for a farm to succeed, especially if they do their own processing and marketing. Just over half of the operations planted their tea in full sun, followed by mixed and partial shade (Q12). This is a big change from five years earlier, when no single way of growing tea constituted the majority.

2019 results showed there were relatively more farms with larger numbers of plants. Over half had at least 2,000 plants in 2019, an increase from 21% in 2014. Those with fewer plants probably are testing tea as a new crop and will need to increase their numbers of plants if they continue farming tea. Proportionately, much fewer growers were using only seedlings or only cuttings in 2019 (Q9). Most growers report having a mix. As might be expected, most growers (71%) have at least some seedlings (Q10). Bohea, Yutaka Midori, Benikaori, and Yabukita are the next most popular, although the majority of growers had 500 or fewer plants for any single variety. CTAHR/USDA and growers & friends were the main sources of planting stock for more than half of the respondents (Q11).

Harvesting and Processing. There is proportionately more harvesting in 2019, with three-fourths of respondents reporting harvest activity, compared to about half in 2014 (Q21). Most harvest six or fewer times per year, while two growers reported they harvest more than 35 times per year. In an open-ended question, five growers reported harvesting 50 or more pounds of fresh tea (Q22). Nearly all respondents processed by hand in 2014 and it is still the main method in 2019, although not as dominant since a larger proportion (41%) uses machines for some part of their processing (Q24 -- Respondents could select more than one response). The types of teas as end products in 2019 are generally similar to 2014, with green tea being produced the most (Q25). Oolong had a slight increase, so an equal number of growers produced oolong tea and

black tea in 2019. The biggest change was in the amount of other teas, which decreased from 27% in 2014 to 12% in 2019. Most growers who were selling tea marketed their product via a mix of methods (Q26). Direct sales was the method most commonly used, reported by about half of all respondents. Tea shops, food service, and other methods were used by about a quarter of respondents.

Bottlenecks/Problems. Respondents were also asked to describe their top barriers to production in an open-ended question (Q30). The lack of labor and time, processing issues, i.e. the lack of equipment/facilities and knowledge, and rules and laws were limitations most often mentioned. In 2014, the lack of plant material was also mentioned.

Most farmers in 2019 had little to no problem with specific pests or pests overall (Q18), which was comparable to survey results in 2014. The most challenging pest was the Chinese rose beetle, with several growers reporting moderate to severe problems. Pesticide usage remained the same, with 88% of growers reporting using no pesticides (Q17).

Several grasses, vines, and shrubs were listed as weed problems (Q20). Non-chemical methods were the predominant form of control, with the most popular being hand-weeding (used by 76% of respondents), mowing/weed whacking (71%), and mulching (53%). 29% reported using herbicides (Q19).

The problems with banji (shoot dormancy) seemed comparable for the 2014 and 2019 surveys (Q23); close to half of the respondents didn't know or were unfamiliar with the condition. The most notable difference is that a larger group of respondents in 2019 (41%) reported having no problem with banji.

Respondents were asked to select the top three topics where they would be interested in obtaining assistance from CTAHR (Q28). The top topics were recordkeeping, soil & tissue sampling, pruning & banji, and harvesting & processing. Three of the four are the same as in 2014, and recordkeeping replaced cultivation. The most popular topic (recordkeeping) was listed by a third of the responses, as opposed to the most popular topic selected by nearly half (cultivation) in 2014. A conference-type venue could be a good method to educate tea growers and provide periodic updates, and could also help to foster an industry organization. 88% of respondents stated they would definitely or might attend, with the remainder being uncertain. (Q29).

The remainder of this document provides results for 2019 and 2014 for each survey question. Results are provided as both tables and graphs, followed by observations and comments on the question.



Acknowledgements

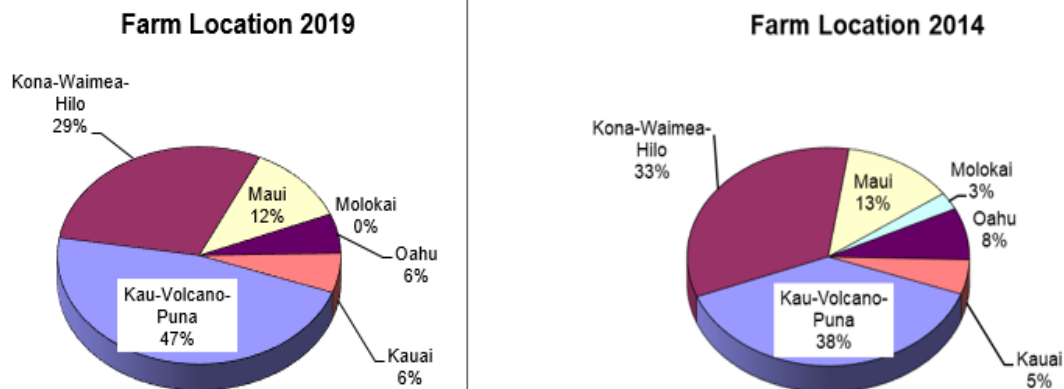
The authors gratefully acknowledge our colleagues Dr. Yan Chen, Professor at Louisiana State University; and UH-CTAHR Junior Extension Agent Russell Galanti and Assistant Extension Agent Shannon Sand for their constructive comments and suggestions. Responsibility for the final content rests with the authors. We also thank the Hawai'i Dept of Agriculture, Specialty Crop Block Grant Program, for funding support for this survey, especially the assistance of program administrator Sharon Hurd.

Survey Introduction and Instructions

You are receiving this message as a possible tea grower in Hawai'i. We are asking tea growers for their assistance in participating in the Hawai'i Tea Growers' Survey 2019. CTAHR is partnering with the Hawai'i Department of Agriculture in this effort. A similar survey of the tea industry was conducted in 2014. (The 2014 survey results are available at <https://www.ctahr.hawaii.edu/oc/freepubs/pdf/NPH-14.pdf>).

The purposes of the current survey are to (a) assess the current situation of the industry and (b) to see what has changed in the five years since the last survey. Reading and thoughtfully answering the questions may give you insights into typical problems and solutions in tea farming. Thank you again for your participation.

Q1. Where is your operation located?



	2019		2014	
	n	%	n	%
Kau-Volcano-Puna	8	47.1%	15	38.5%
Kona-Waimea-Hilo	5	29.4%	13	33.3%
Maui	2	11.8%	5	12.8%
Molokai	0	0.0%	1	2.6%
Oahu	1	5.9%	3	7.7%
Kauai	1	5.9%	2	5.1%
Total	17	100%	39	100%

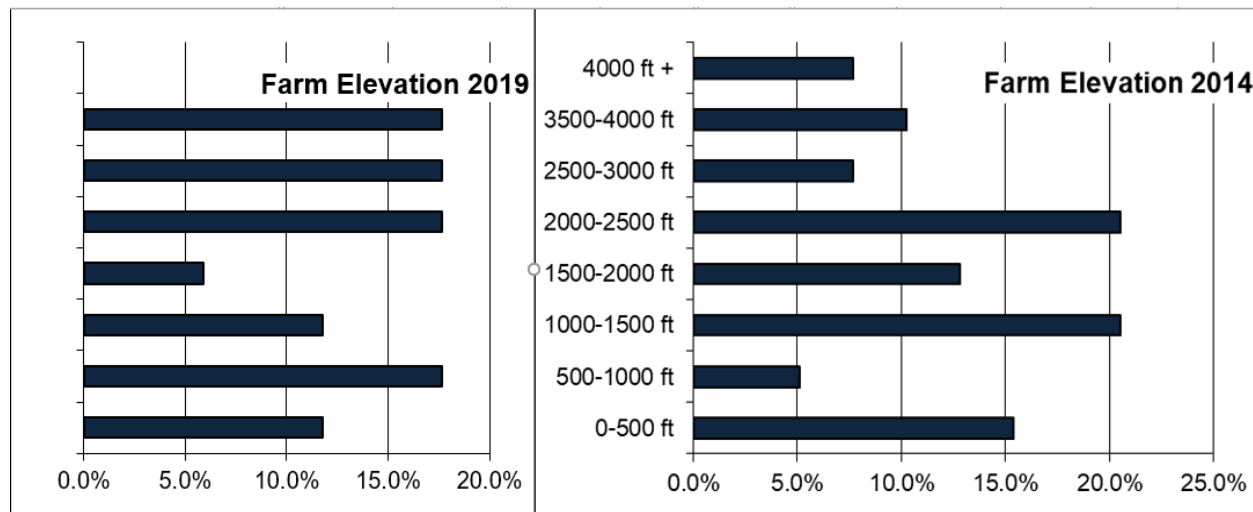
Highlights

2019

- Over three-fourths of respondents (76.5%) are from Hawai'i Island.
- Overall, half of the growers dropped out; declining from 39 in 2014 to 17 in 2019.
- The geographic distribution remains roughly the same.

2014

- Most respondents (72%) are from Hawaii Island, followed by Maui, O'ahu, Kaua'i, and Moloka'i.
- Combined non-Hawai'i Island count is 11 growers compared to 28 on Hawai'i Island.

Q2. At approximately what elevation is this farm?

	2019		2014	
	n	%	n	%
0-500 ft	2	11.8%	6	15.4%
500-1000 ft	3	17.6%	2	5.1%
1000-1500 ft	2	11.8%	8	20.5%
1500-2000 ft	1	5.9%	5	12.8%
2000-2500 ft	3	17.6%	8	20.5%
2500-3000 ft	3	17.6%	3	7.7%
3500-4000 ft	3	17.6%	4	10.3%
4000 ft +	0	0.0%	3	7.7%
Total Respondents:	17	100%	39	100%

Highlights

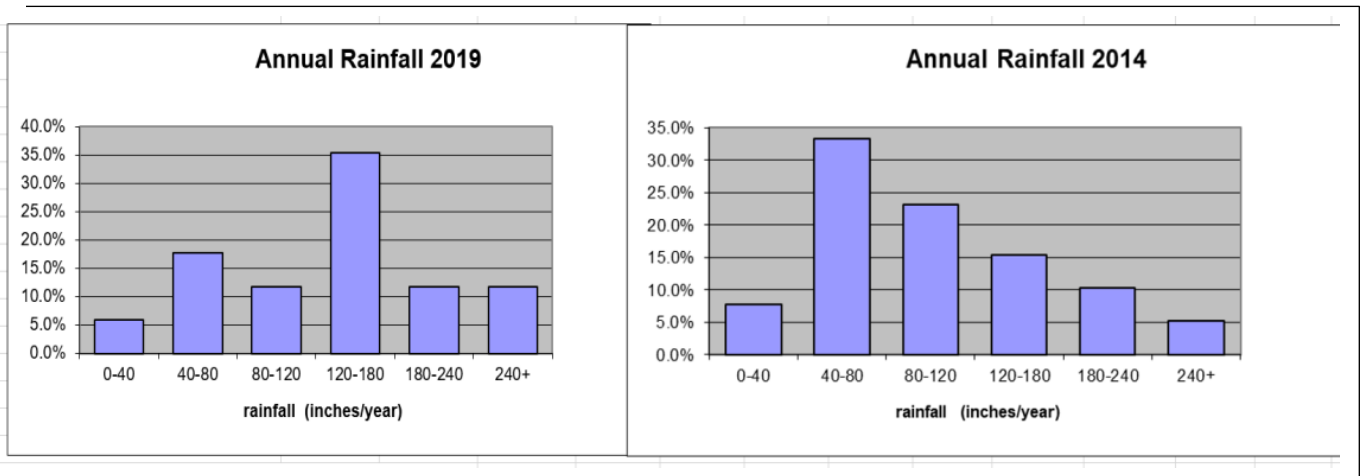
- The Mealani Research Station is at 2800' above sea level. In 2014, 74% of respondents were at a lower elevation than Mealani and 18% were higher. The ratio was roughly the same in 2019, but growers at the highest elevations were lost.
- In both years, 2000' elevation seems to be about the midpoint, with half the farms being 2000-2500' and higher, and half below 2000'.
- As previously noted, one difference relating to elevation is that respondents at lower elevations seem to have had more problems with the Chinese rose beetle compared to respondents with farms at higher elevations.

Q3. What is your approximate annual rainfall? _____

	2019		2014	
	n	%	n	%
0-40 in	1	5.9%	3	7.7%
40-80 in	3	17.6%	13	33.3%
80-120 in	2	11.8%	9	23.1%
120-180 in	6	35.3%	6	15.4%
180-240 in	2	11.8%	4	10.3%
240+	2	11.8%	2	5.1%
Not sure/don't know	1	5.9%	2	5.1%
Total Respondents:	17	100%	39	100%

Q4. Do you irrigate?

	2019		2014	
	n	%	n	%
Yes	3	17.6%	18	46.2%
No	14	82.4%	21	53.8%
Total Respondents:	17	100%	39	100%



Highlights

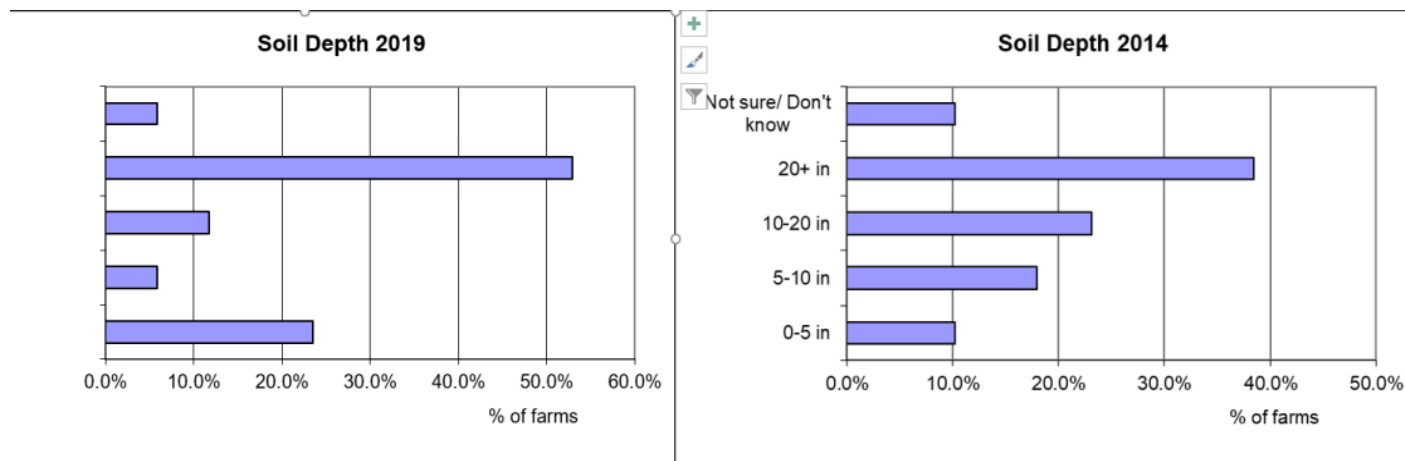
80" per year is minimum water requirement, if evenly distributed.

2019

- The largest group of farms, 35%, have 120-180 inches of rain annually.
- About a quarter of the farms (23.5%) may need irrigation at least during some part of the year, down from 41% in 2014.
- The percentage of farms reporting they had irrigation dropped by more than half, from 46% (18 farms) in 2014 to 18% (3 farms) in 2019.
- Results indicate that water is not a problem for most growers.

2014

- 41% of farms may need irrigation at least during some part of the year.
- 46% (18 farms) report they had irrigation.

Q5. What is your approximate soil depth?

	2019		2014	
	n	%	n	%
0-5 in	4	23.5%	4	10.3%
5-10 in	1	5.9%	7	17.9%
10-20 in	2	11.8%	9	23.1%
20+ in	9	52.9%	15	38.5%
Not sure/ Don't know	1	5.9%	4	10.3%
Total Respondents:	17	100%	39	100%

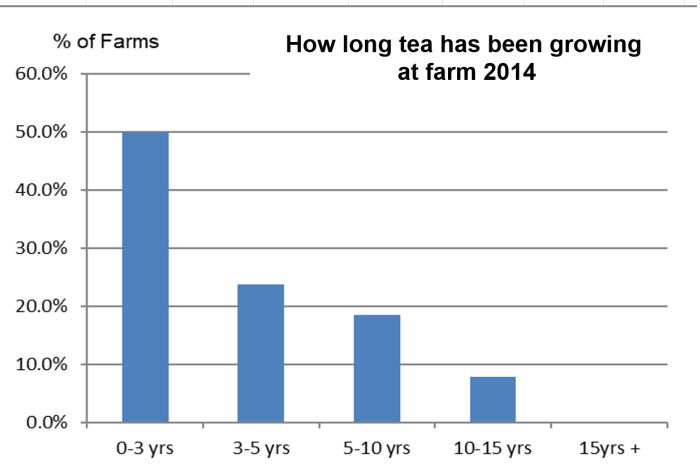
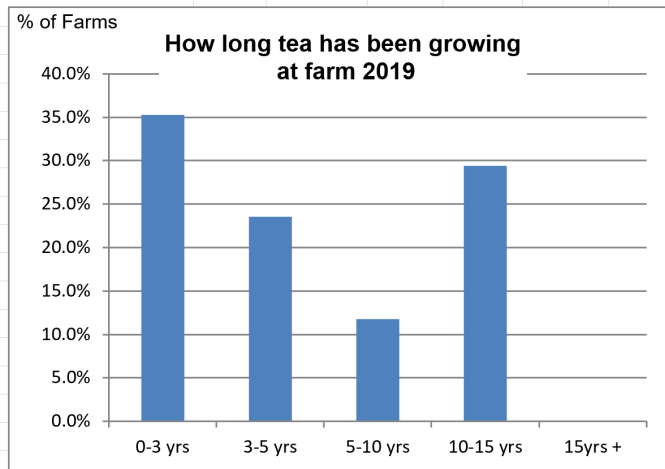
Highlights**2019**

- Roughly half of the farms had at least 20 inches of soil at their growing sites.
- A quarter of the farms had five inches of soil or less, but the actual number of operations (4 farms) is the same as in 2014.

2014

- 62% had plantings in fields with at least one foot of soil.
- The greatest impacts of having a shallow soil depth might be that the plants will be more prone to water stress during drought, and there may be a higher field establishment cost.

Q6. How long has tea been growing at this location?



	2019		2014	
	n	%	n	%
0-3 yrs	6	35.3%	19	50.0%
3-5 yrs	4	23.5%	9	23.7%
5-10 yrs	2	11.8%	7	18.4%
10-15 yrs	5	29.4%	3	7.9%
15 yrs +	0	0%	0	0%
Don't know/not sure	0	0%	0	0%
Total Respondents	17	100%	38	100%

Highlights

2019

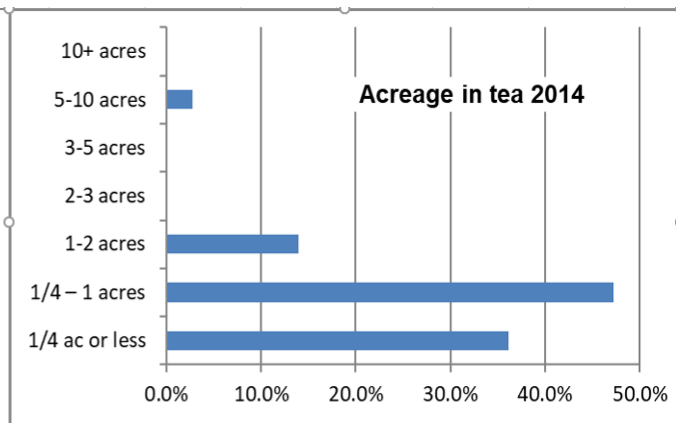
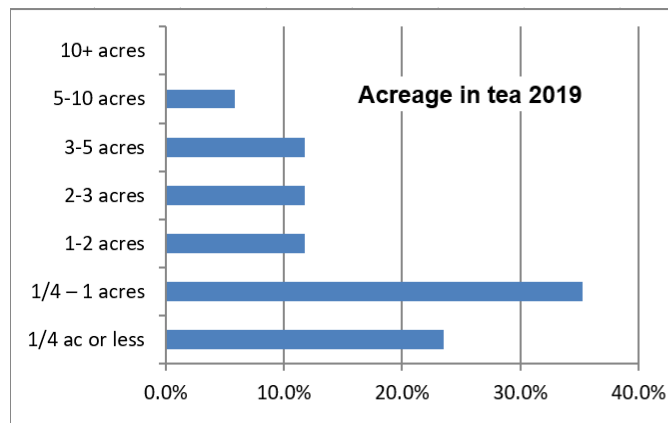
- The largest groups were old timers and new growers.
- It is interesting that none were in the 15+ years group, given that several growers were in the 10-15 year group in 2014.

2014

- No respondent had been in operation for more than 15 years.
- Half of respondents had been growing tea at their current location for three years or less, and three-fourths for five years or less.

Q7. At this location, how many acres are planted in tea?

1/4 ac or less	1-2 acre	3-5 acre	10-20 acres	50+ acres
1/4 – 1 ac	2-3 ac	5-10 acre	20-50 acres	



	2019		2014	
	n	%	n	%
1/4 ac or less	4	23.5%	13	36%
1/4 – 1 acres	6	35%	17	47%
1-2 acres	2	12%	5	14%
2-3 acres	2	12%	0	0%
3-5 acres	2	12%	0	0%
5-10 acres	1	6%	1	2.8%
10+ acres	0	0%	0	0%
Total Respondents	17	100%	38	100%

Highlights**2019**

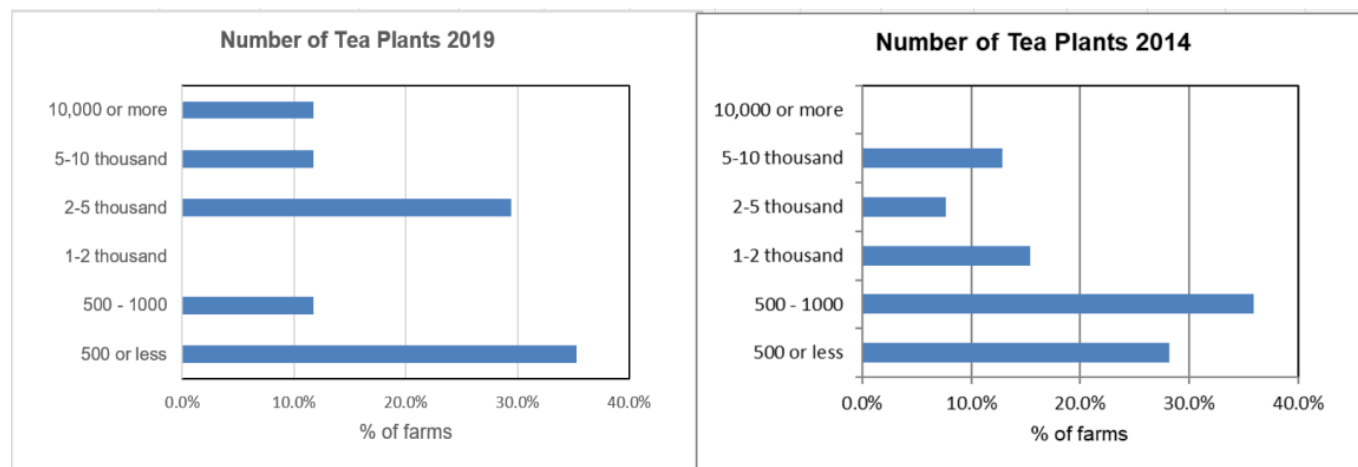
- The results suggest there were fewer but larger farms, compared to 2014.
- In terms of numbers, most farms that dropped out were the smallest ones, 1 acre or less. There may be a minimum size needed in order for a farm to survive, especially if they vertically integrate (do their own processing and marketing). In other words, there needs to be enough volume to make it worthwhile.

2014

- Based on this survey, the total acreage reported to be planted in tea in Hawai'i is somewhere between just under 16 acres and up to 42 acres.
- The largest tea planting is 5-10 acres in size.
- Most (83%) are an acre or less.

Q8. How many tea plants are at this location?

500 or less	1-2 thousand	5-10 thousand	Don't know
500 - 1000	2-5 thousand	10,000 or more	



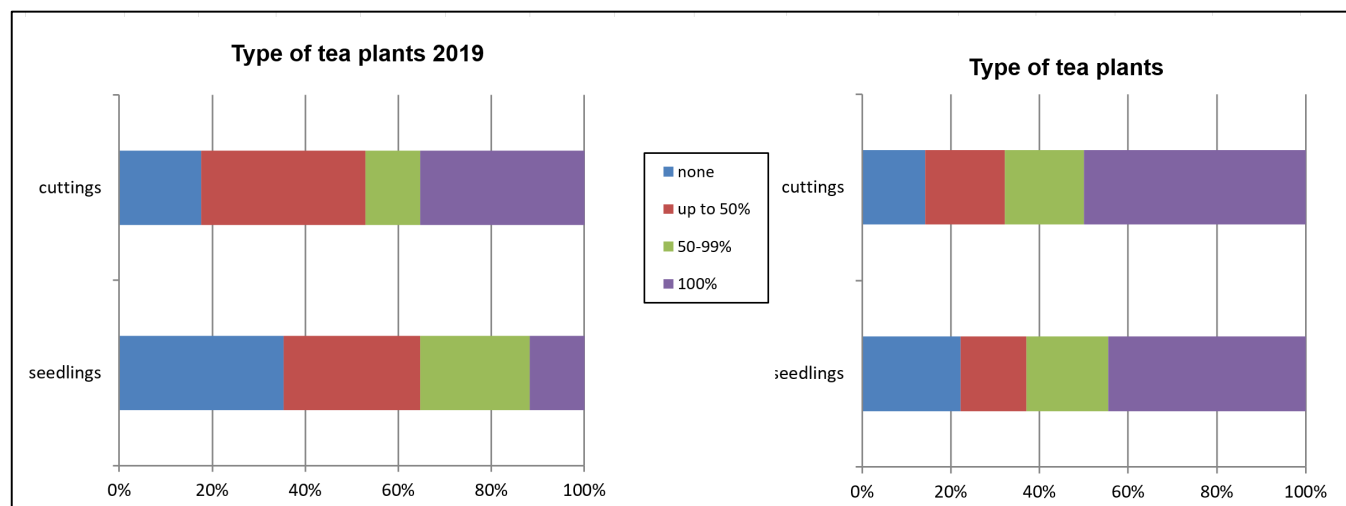
	2019		2014	
	n	%	n	%
500 or less	6	35%	11	28%
500 – 1000	2	12%	14	36%
1-2 thousand	0	0%	6	15%
2-5 thousand	5	29%	3	8%
5-10 thousand	2	12%	5	13%
10,000 or more	2	12%	0	0%
Total Respondents	17	100%	39	100%

Highlights

- There are relatively more farms with larger numbers of plants in 2019, although it is likely these are the same larger growers as in 2014.
- Those with fewer plants likely are farmers who are testing tea as a new crop, and who will need to increase their numbers of plants if they continue into tea farming.

Q9. About what percentage are:

% Seedlings	% Cuttings	% Don't Know
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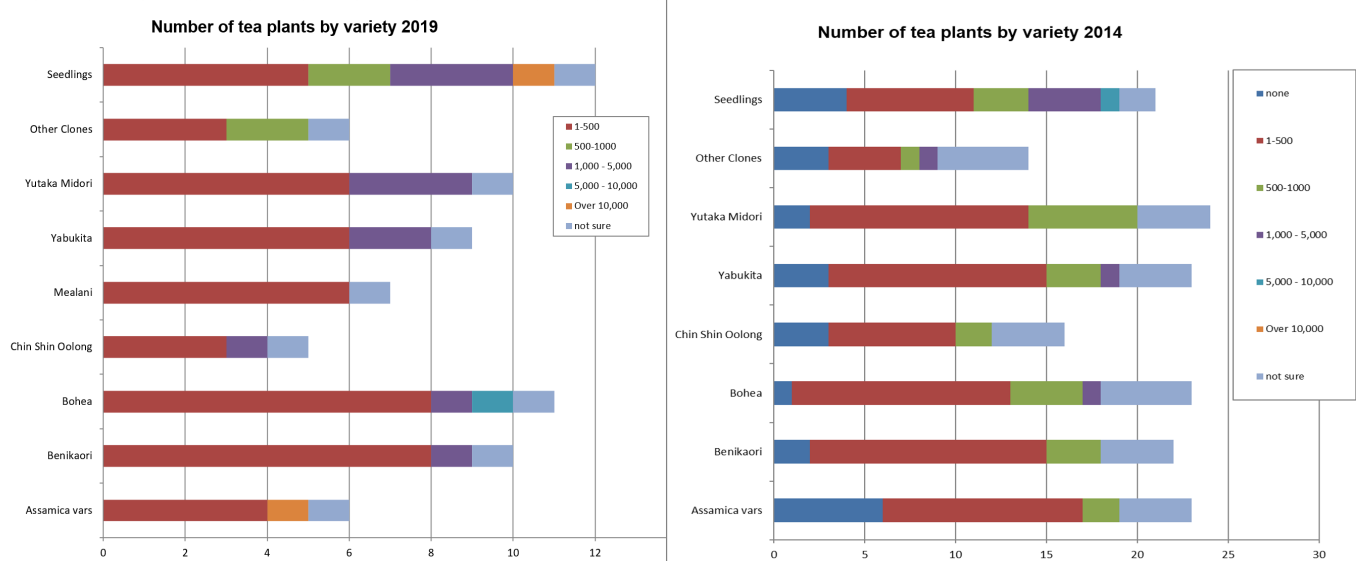


	2019				2014			
	seedlings		cuttings		seedlings		cuttings	
	n	%	n	%	n	%	n	%
None	6	35%	3	18%	6	21%	4	14%
Up to 25%	3	18%	3	18%	4	24%	4	14%
25-50%	2	12%	3	18%	0	0%	1	3%
50-99%	4	23%	2	12%	5	28%	5	17%
100%	2	12%	6	35%	13	46%	15	52%
Total Respondents	17	100%	17	100%	28	100%	29	100%

Highlights

- In 2014, proportionately more growers were using only cuttings or only seedlings. The percentages dropped significantly in 2019, especially for seedlings.
- The proportion of growers using no seedlings was higher in 2019.
- Note: the numbers are inconsistent. E.g. in 2019, if 3 growers used no cuttings then they must be using only seedlings, but there are 2 growers with 100% seedlings.

Q10. What varieties and numbers of plants are planted?

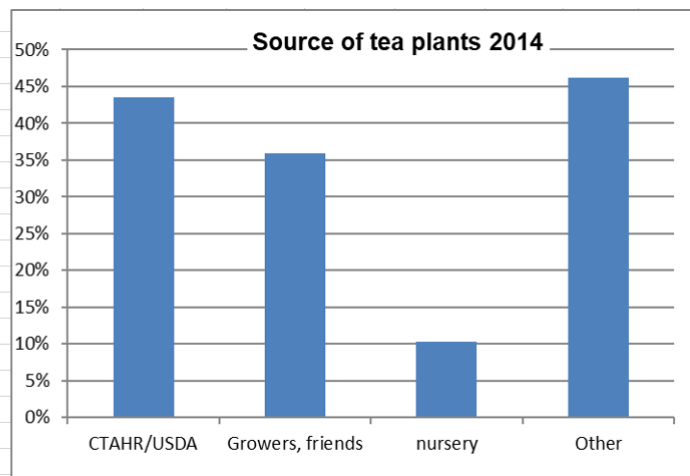
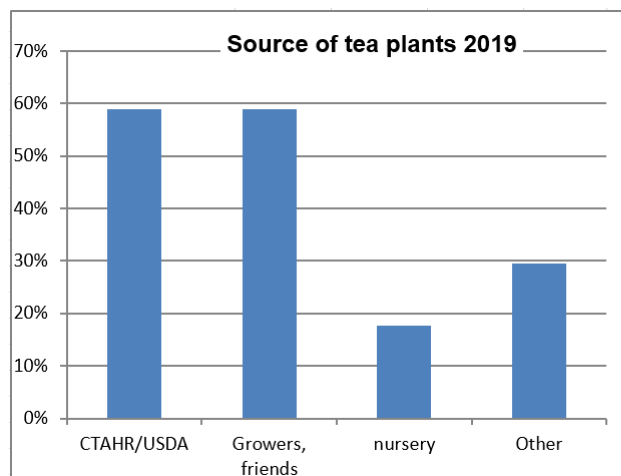


	2019							Total
	none	1-500	500-1000	1,000 - 5,000	5,000 - 10,000	Over 10,000	not sure	
Assamica vars	11	4	0	0	0	1	1	17
Benikaori	7	8	0	1	0	0	1	17
Bohea	6	8	0	1	1	0	1	17
Chin Shin Oolong	12	3	0	1	0	0	1	17
Mealani	10	6	0	0	0	0	1	17
Yabukita	8	6	0	2	0	0	1	17
Yutaka Midori	7	6	0	3	0	0	1	17
Other Clones	11	3	2	0	0	0	1	17
Seedlings	5	5	2	3	0	1	1	17

	2014							Total
	none	1-500	500-1000	1,000 - 5,000	5,000 - 10,000	Over 10,000	not sure	
Assamica vars	6	11	2	0	0	0	4	23
Benikaori	2	13	3	0	0	0	4	22
Bohea	1	12	4	1	0	0	5	23
Chin Shin Oolong	3	7	2	0	0	0	4	16
Yabukita	3	12	3	1	0	0	4	23
Yutaka Midori	2	12	6	0	0	0	4	24
Other Clones	3	4	1	1	0	0	5	14
Seedlings	4	7	3	4	1	0	2	21

2019 Highlights

- Most growers had seedlings. Bohea, Yutaka Midori, Benikaori and Yabukita the next most popular.
- The majority of growers had 500 or fewer plants for any single variety.

Q11. What was the source of these plants?

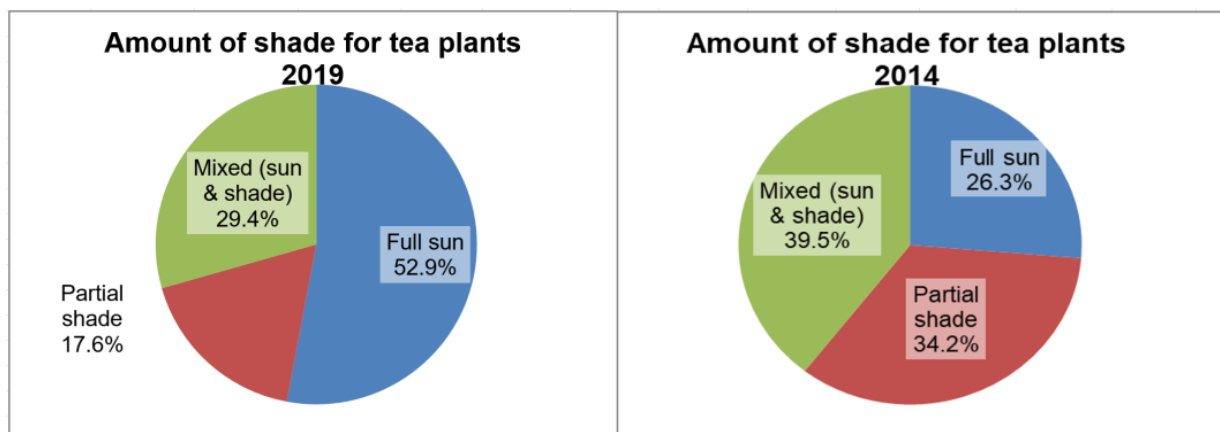
	2019		2014	
	n	%	n	%
CTAHR/USDA	10	59%	17	44%
Growers, friends	10	59%	14	36%
Nursery	3	18%	4	10%
Other	5	29%	18	46%
Total Respondents	17	100%	39	100%

Highlights

- In 2014, other sources accounted for the largest percentage of plants, closely followed by CTAHR/USDA, then growers and friends.
- In 2019, CTAHR/USDA and growers & friends were the main sources for more than half of the respondents.

Q12. Are your tea plants growing in:

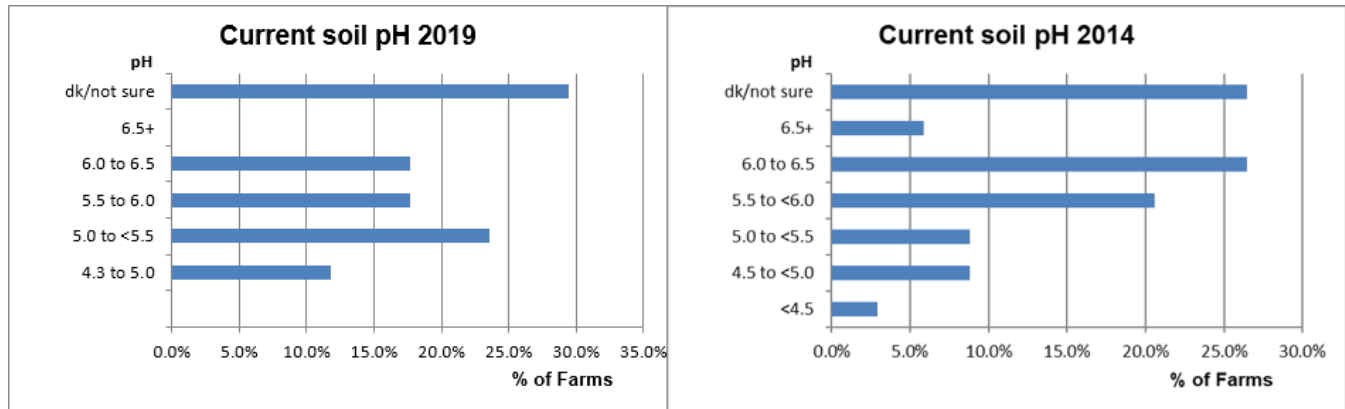
() Full sun () partial shade () Mixed (some in full sun/some shade)



	2019		2014	
	n	%	n	%
Full Sun	9	52.9%	10	26.3%
Partial Shade	3	17.6%	13	34.2%
Mixed (sun & shade)	5	29.4%	15	39.5%
Total Respondents	17	100%	38	100%

Highlights.

Just over half of the growers planted their tea in full sun followed by mixed and partial shade, doubling the share from 2014. This is a big change from five years earlier, when no single method was the majority and a mix of sun and shade was most popular.

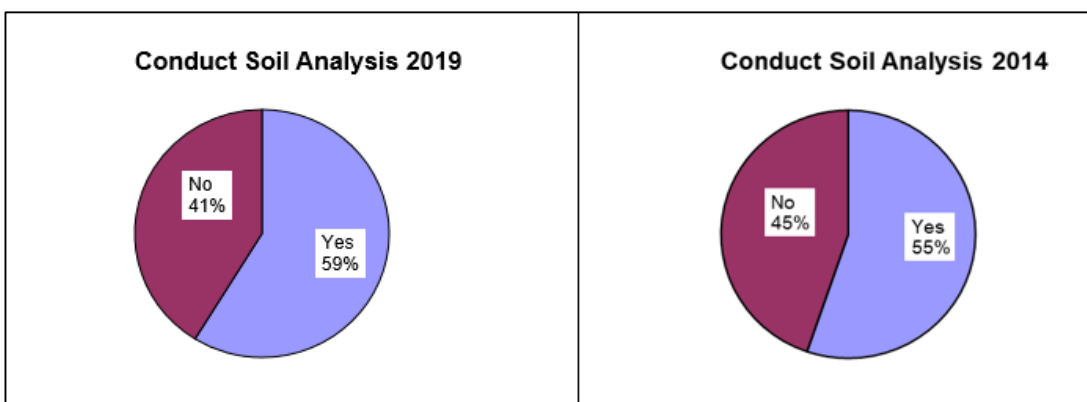
Q13. What is your current soil pH?

	2019		2014	
	n	%	n	%
6.5+		0%	2	5.9%
6.0 to 6.5	3	17.6%	9	26.5%
5.5 to <6.0	3	17.6%	7	20.6%
5.0 to <5.5	4	23.5%	3	8.8%
4.5 to <5.0	2	11.8%	3	8.8%
<4.5			1	2.9%
dk/not sure	5	29.4%	9	26.5%
Total Respondents	17	100%	34	100%

Highlights

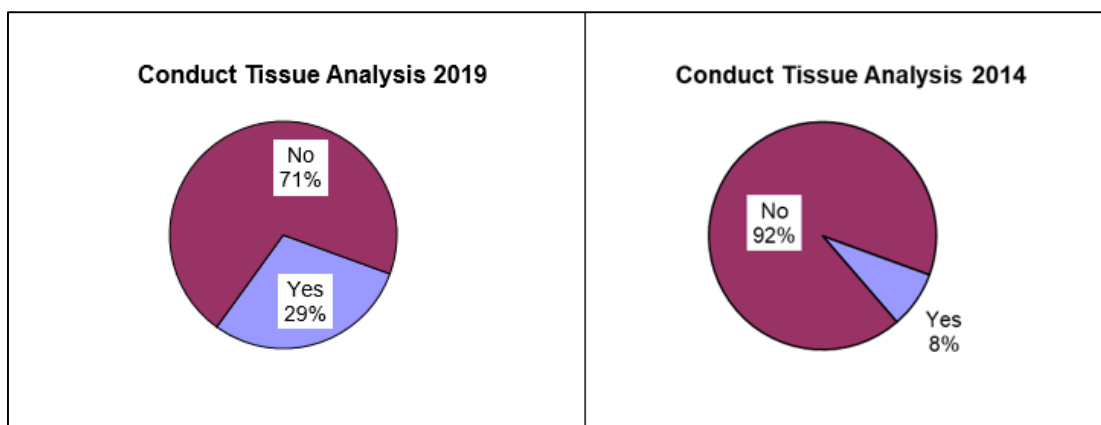
- As in the prior survey, a large portion of growers did not know their soil pH. This is problematical, as CTAHR research has indicated that proper soil pH is critical for successful operations.
- In 2019, 35% of the growers had pH in the optimum range of 4.5 to 5.5 compared to 18% in 2014. However, these represent the same number of respondents (6 farms).

Q.14 Do you conduct soil nutrient analysis?



	2019		2014	
	n	%	n	%
Yes	10	59%	21	55%
No	7	41%	17	45%
Total Respondents	17	100%	38	100%

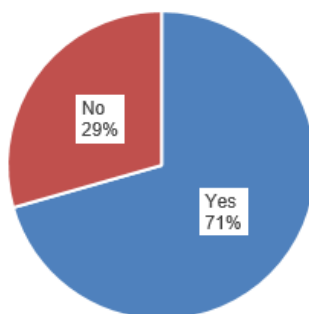
Q15. Do you conduct foliar/tissue analysis?



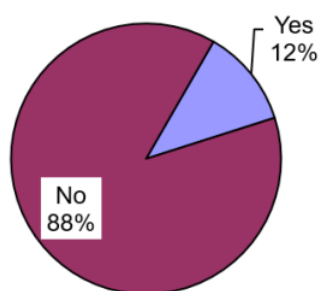
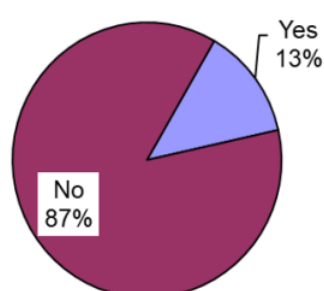
	2019		2014	
	n	%	n	%
Yes	5	29%	3	8%
No	12	71%	34	92%
Total Respondents	17	100%	37	100%

Highlights

- The ratio between soil testers and non-testers remained the same.
- The percentage of growers conducting tissue analysis more than tripled.

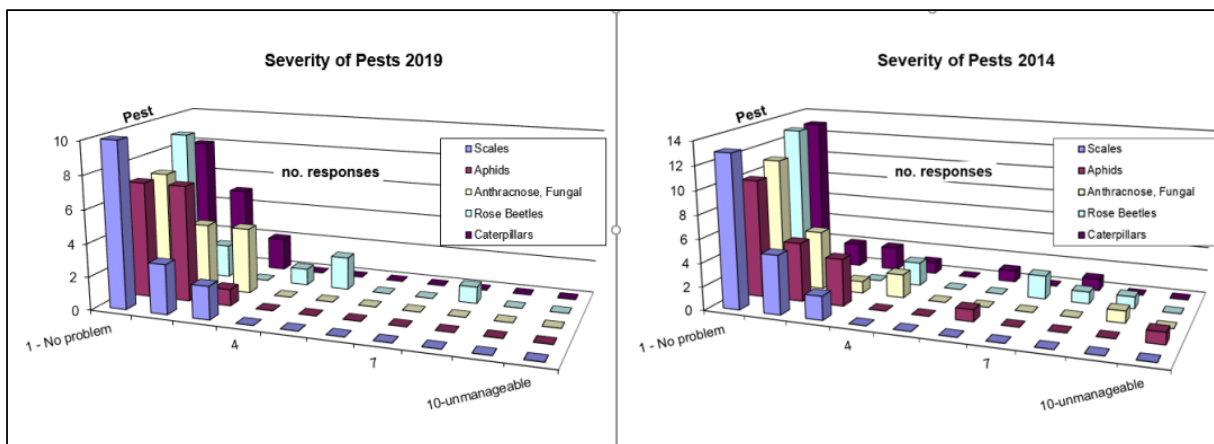
Q16. What kind of fertilizer do you use**Use Fertilizer 2019****Highlights**

- Nearly one third did not apply fertilizer.
- Those that did apply fertilizer applied a wide range of products and materials.

Q17. Do you use pesticides?**Uses Pesticides 2019****Uses Pesticides 2014**

	2019		2014	
	n	%	n	%
Yes	2	12%	5	13%
No	15	88%	33	87%
Total Respondents	17	100%	38	100%

Q18. What are your main pest or disease problems, and how serious is the problem?
(scale of 1-10, with 1 being no problem, 10 being unmanageable)



2019 %	1 - No problem	2	3	4	5	6	7	8	9	10-unmanageable	Total	Rating average
Scales	67%	20%	13%	0%	0%	0%	0%	0%	0%	0%	100%	1.5
Aphids	47%	47%	7%	0%	0%	0%	0%	0%	0%	0%	100%	2.5
Anthracnose, Fungal	47%	27%	27%	0%	0%	0%	0%	0%	0%	0%	100%	2.2
Rose Beetles	60%	13%	0%	7%	13%	0%	0%	7%	0%	0%	100%	2.9
Caterpillars	65%	10%	10%	5%	0%	5%	0%	5%	0%	0%	100%	2.2

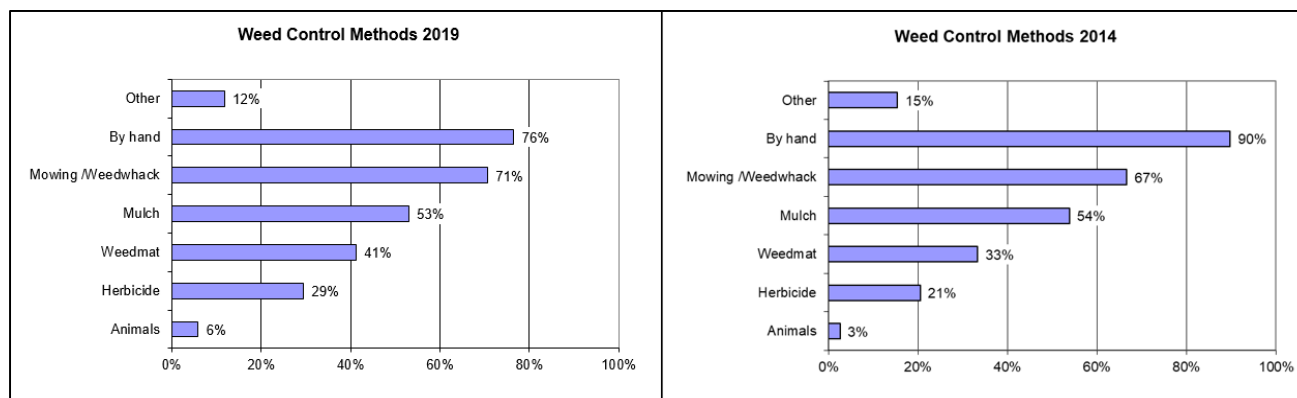
2014 %	1 - No problem	2	3	4	5	6	7	8	9	10-unmanageable	Total	Rating average
Scales	67%	24%	10%	0%	0%	0%	0%	0%	0%	0%	100%	1.5
Aphids	50%	23%	18%	0%	0%	5%	0%	0%	0%	5%	100%	2.5
Anthracnose, Fungal	57%	24%	5%	10%	0%	0%	0%	0%	5%	0%	100%	2.2
Rose Beetles	67%	5%	0%	10%	0%	0%	10%	5%	5%	0%	100%	2.9
Caterpillars	67%	10%	10%	5%	0%	5%	0%	5%	0%	0%	100%	2.2

2019 counts	1 - No problem	2	3	4	5	6	7	8	9	10-unmanageable	Total	Rating average
Scales	10	3	2	0	0	0	0	0	0	0	15	1.5
Aphids	7	7	1	0	0	0	0	0	0	0	15	2.5
Anthracnose, Fungal	7	4	4	0	0	0	0	0	0	0	15	2.2
Rose Beetles	9	2	0	1	2	0	0	1	0	0	15	2.9
Caterpillars	13	2	2	1	0	1	0	1	0	0	20	2.2

2014 counts	1 - No problem	2	3	4	5	6	7	8	9	10-unmanageable	Total	Rating average
Scales	13	5	2	0	0	0	0	0	0	0	21	1.5
Aphids	10	5	4	0	0	1	0	0	0	1	22	2.5
Anthracnose, Fungal	11	5	1	2	0	0	0	0	1	0	21	2.2
Rose Beetles	13	1	0	2	0	0	2	1	1	0	21	2.9
Caterpillars	13	2	2	1	0	1	0	1	0	0	21	2.2

Highlights

- Pesticide usage remained the same, with the vast majority not using any pesticides.
- As in 2014, most farmers had little to no problem with specific pests or pests overall. The most problematical pest is rose beetle, with several growers reporting moderate to severe problems.

Q19. How do you control weeds?

	2019		2014	
	n	%	n	%
Animals	1	5.9%	1	2.6%
Herbicide	5	29.4%	8	20.5%
Weedmat	7	41.2%	13	33.3%
Mulch	9	52.9%	21	53.8%
Mowing/weedwhack	12	70.6%	26	66.7%
By hand	13	76.5%	35	89.7%
Other*	2	11.8%	6	15.4%
Total Respondents	17	100%	39	100%

*Other: cover crop, groundcover

Highlights

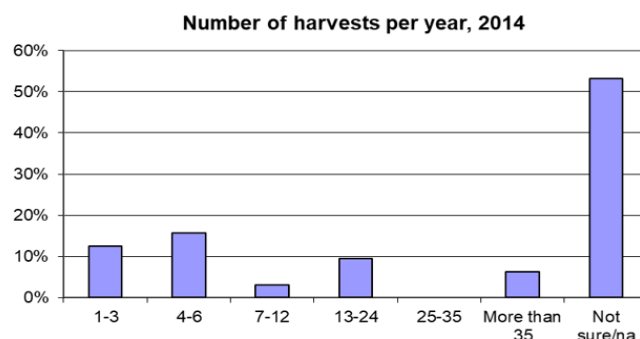
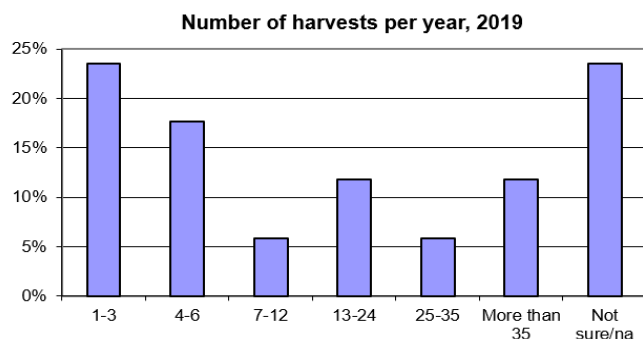
2019 is very similar to 2014 both in the ranking of control methods and the relative number of growers that use the methods.

Q20. What are your main weed problems?

A range of grasses & vines most often listed. Similar to 2014

Q21. How often do you harvest each plant in a year?

() 1-3 () 4-6 () 7-12 () 13-24 () 25-35 () More than 35



	2019		2014	
	n	%	n	%
1-3	4	24%	4	13%
4-6	3	18%	5	16%
7-12	1	6%	1	3%
13-24	2	12%	3	9%
25-35	1	6%	0	0%
More than 35	2	12%	2	6%
Not sure/don't know	4	24%	17	53%
Total Respondents	17	100%	32	100%

Q22. How many total pounds of wet leaf did you harvest in 2018? (fill in blank)

2019 responses

"Have not harvest yet"

"Not sure"

"50 "

"None"

"80+ lb dry tea"

"0"

"140"

"Don't know because don't weigh wet leaf"

"None"

"2000-lb ish"

"NA," "NA"

"50"

"20"

"too young"

"unknown"

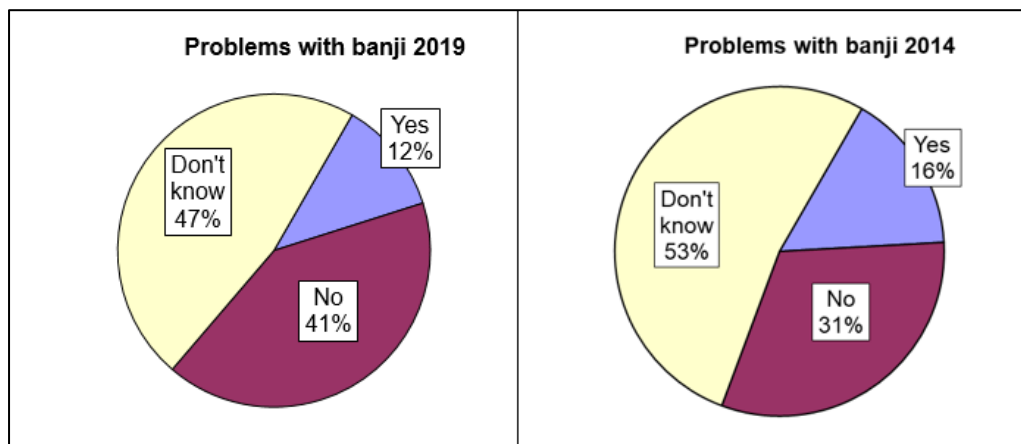
Highlights (Q21 & Q22)

2019

- There was proportionately more harvesting in 2019, with $\frac{3}{4}$ of respondents reporting harvest activity compared to about half in 2014.
- More growers were harvesting over 25# of wet leaf (the figure reported in 2014 was in error)

2014

- 18/32 (56%) did not harvest yet
- another 8 (25%) harvested test/very small quantities.
- 6 (19%) harvested significant quantities (over 25-30#) for the year.

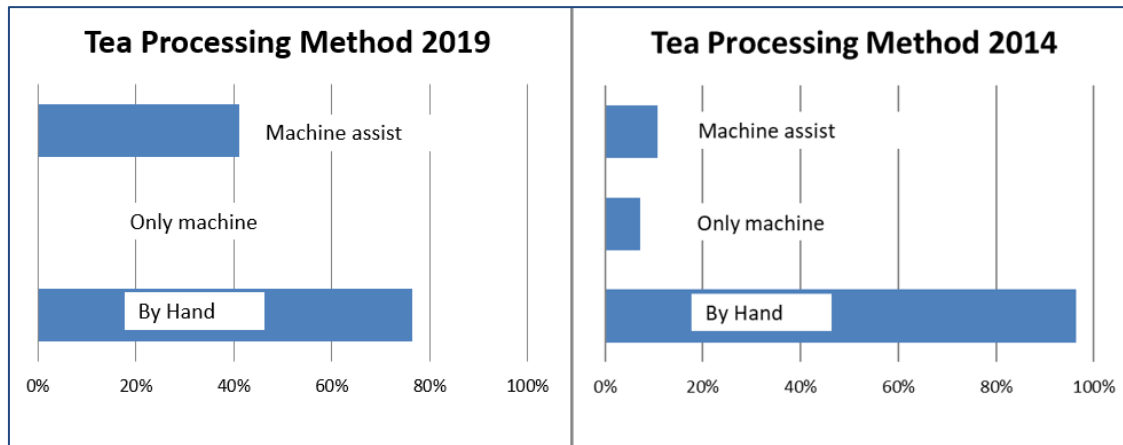
Q23. Do you have problems with banji?


	2019		2014	
	n	%	n	%
Yes	2	12%	6	16%
No	7	41%	12	31%
I don't know	8	47%	20	53%
Total Respondents	17	100%	38	100%

Highlights

The problems with banji seem quite close in both periods, with the most notable difference being the larger group in 2019, who had no problems with banji.

Q24. How do you process your tea? Check all that apply



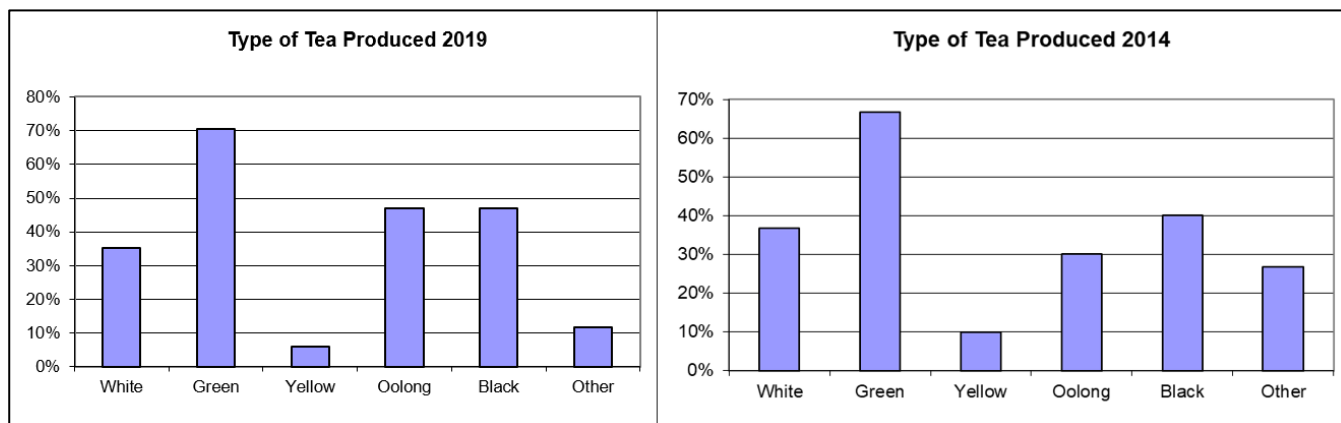
	2019		2014	
	n	%	n	%
By hand	13	76%	27	96%
Only machine	0	0%	2	7%
Machine assist	7	41%	3	11%
Total Respondents	17	100%	28	100%

Highlights

Processing by hand is still the main method in 2019, although it is not as dominant since a larger proportion (41%) uses machines for some part of their processing.

Q25. What type of tea is your end product? (More than 1 choice may be selected)

() White () Green () Yellow () Oolong () Black () Other



	2019		2014	
	n	%	n	%
White	6	35%	11	37%
Green	12	71%	20	67%
Yellow	1	6%	3	10%
Oolong	8	47%	9	30%
Black	8	47%	12	40%
Other	2	12%	8	27%
Total Respondents	17	100%	30	100%

Highlights**2019**

In general, the types of teas as end products in 2019 are similar to 2014, with green tea being produced the most. Oolong had a slight increase, so an equal number of growers produce oolong and black in 2019. The biggest change is in the amount of other teas, which decreased from 27% in 2014 to 12% in 2019.

2014

- Several listed non-*Camellia* teas: herbal, mamaki, kookoolau
- Silver needles, aged (puehr-like)

Q 26. In terms of sales (\$), what percentage of your buyers are in the following groups?

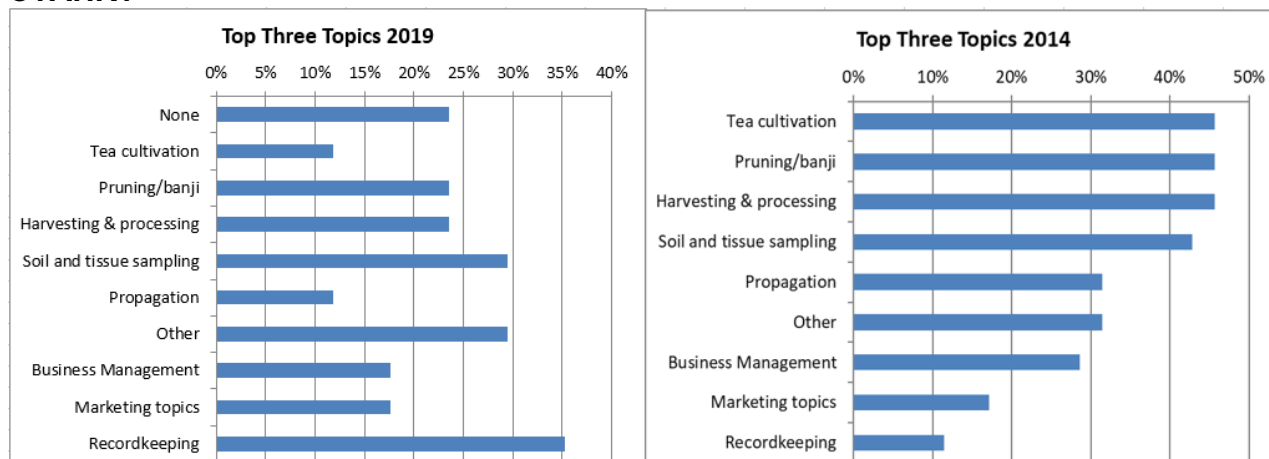
Percentage of buyers	Total responses			
	tea shop	food svc	direct	other
0	13	12	8	13
2	1	1		
3			1	1
5			1	
10	1			1
15		1		
20			1	
25		1	1	
35			1	
50	2		1	
51				1
70		1		
80				1
90			1	
100		1	2	
Total	17	17	17	17

	tea shop	food svc	direct	other
count	4	5	9	4
%	24%	29%	53%	24%

mean	6.59	12.47	25.18	8.47
median	0	0	3	0
variance	256.83	771.19	1300.5	464.13
std dev	16.03	27.77	36.06	21.54
std error	3.89	6.74	8.75	5.23

Highlights

Most growers who were selling tea, marketed their product via a mix of methods. Direct sales was the method most commonly used; it was reported by about half of all respondents and accounted for around 25% of tea buyers. Tea shops, food service, and other methods were used by about a fourth of respondents, and accounted for 6.6% to 12.5% of tea buyers.

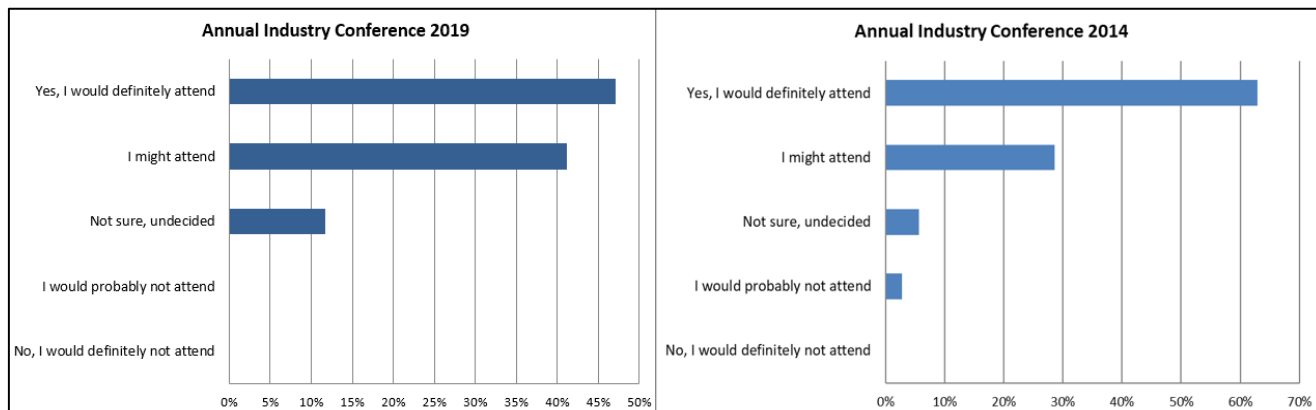
Q27. What are the top three topics where you would be interested in assistance from CTAHR?

topic	2019		2014	
	n	%	n	%
Soil and tissue sampling	5	29%	15	43%
Tea cultivation	2	12%	16	46%
Pruning/banji	4	24%	16	46%
Harvesting & processing	4	24%	16	46%
Propagation	2	12%	11	31%
Business Management	3	18%	10	29%
Recordkeeping	6	35.3	4	11%
Marketing topics	3	18%	6	17%
Other	5	29%	4	11%
Other, please specify	4	24%	8	23%
Total Respondents	17	100%	35	100%

Highlights

- The top topics in 2019 were recordkeeping, soil & tissue sampling, pruning & banji, and harvesting & processing. Three of the four are the same as in 2014; recordkeeping replaced cultivation. The most popular topic was listed by a third of the responses, as opposed to nearly half in 2014.
- The top topics in 2014 were cultivation, pruning/banji, harvesting & processing, and soil & tissue sampling.

Q29. How likely are you to participate in an annual industry conference-type event?



	2019		2014	
	n	%	n	%
No, I would definitely not attend	0	0%	0	0%
I would probably not attend	0	0%	1	3%
Not sure, undecided	2	12%	2	6%
I might attend	7	41%	10	29%
Yes, I would definitely attend	8	47%	22	63%
Total Respondents	17	100%	39	100%

Highlights

Most of the growers either would definitely attend or might attend an annual industry conference, with the remainder being undecided.

Q30. Please describe your top barriers to production

2019: often mentioned were: labor & time, processing issues, rules and laws

- "Lack of soil is my primary issue."
- "Labor"
- "Legal area for processing. Lack of county water and refusal of DOH to approve alternative water sources."
- "None"
- "Lack of time, labor"
- "Labor, and adequate processing-storage facilities"
- "Proper plant management"
- "Not dedicating time to plants"
- "Legalities, grading, county law, conflict of approach with investors"
- "Rose beetles, wind, finding the best varieties for our conditions"
- "Processing equipment, volume of harvested plant material"
- "Time"
- "Cost and time"
- "LABOR COSTS for good workers"
- "Cost of land prep on a large scale"

2014: Often mentioned were: Production cost, human labor, available services

- "So far none. Plants doing very well. Concerned about market, but that's down the road (we have about 6,000 cuttings, few mature plants.)"
- "labor"
- "Labor. It is so labor-intensive to plant, partly due to all the hand labor to make the soil amendments. And, pruning and harvesting and processing are all so laborious. We probably won't be able to exceed 3/4 acre due to these constraints."
- "I am still trying tea growing; I have a very few #plants. Not enough for production."
- "Not enough plants. At present there is not a Processing facility. One is badly needed or the industry will remain a backyard undeveloped industry. The potential for Tea to become a main industry for the Hawaiian Islands is overwhelming strong, however, without the infrastructure for processing the product, it will stagnate into a small household type of a business."
- "Young plants, green algae seems to wipe out some plants if not removed by hand."
- "Manpower"
- "Drought"
- "None"
- "Top barrier is huge Lava Rocks up to 70lbs."
- "Need labor but can't afford labor until producing more but can't produce more without labor..."
- "1. Need for seedlings 2. Need for money to pay labor to keep weeds at bay 3. Interested buyer of tea. We would just like to grow rather than value-add."
- "Right now we still have everything in the growing pots under a shed, our plants are 6-7 months old as of this time."
- "Slow growth; initially failure to prune early on...therefore, bushes aren't as thick and dense as should like."
- "Concerns about processing harvested tea. No facility on Maui and equipment expensive plus not much expertise here either. Also LBAM (little brown apple moth) that love the new tips. Really a problem here."
- "Seedlings result in mixed genetics. Plants are not uniform resulting harvesting issues and mixed quality."
- "Poor clay soils and high labor costs."
- "Obtaining quality plant material."
- "Cost and availability of processing equipment, time availability & labor cost, affordable access to farmland with long-term lease (at least 40 yrs.)."
- "Knowledge"
- "Brand new...don't know much about anything yet."
- "Not enough time to prune, weed and manage fields all by myself."
- "Lack of processing education and equipment."
- "None assessed, but availability of processing equipment."
- "Irrigation and time!"
- "Labor"
- "We don't have a full time farmer. We have approximately 2000 tea plants in the ground. We acquired the plants from a local grower on the Big Island. They are all an Indian variety "Darjeeling". My partner attended the CTAHR Tea Class in May 2014. We would like to acquire some Japanese variety to plant on our farm but are unsure on how to pursue."
- "Lack of water as we're off the grid, expense to obtain more plants."
- "Rain"