

## ABSTRACT

The Catracha Quality Project (CQP) began in Santa Elena, La Paz, Honduras in 2015 with the initial goal of better understanding how Catracha farmers process coffee. The long-term mission is to promote consistency and quality in the way coffee is processed and to contribute to industry understanding of processing. Specifically, we are interested in understanding fermentation processes and their effect on cup quality. Santa Elena has high elevation (1600-1800m) and cool evening temperatures (10-12 degrees C). Fermentation times range from 24-56 hours, averaging out at about 48 hours. With limited resources, any suggestions for improvement must be economically feasible as well as sensitive to existing processes and resource constraints.



Fermentation slurry in concrete tank. All photos by Kate Fischer.

## INTRODUCTION

We hypothesize that cherry with higher brix will be riper, denser, take longer to ferment, have a lower end pH, and have a longer exposure to acetic acid, resulting in a more "alive" seed and greater complexity and brightness in the cup.

Fermentation variables we are interested in and able to measure include:

- 1) Cherry density (as a proxy for seed size/density), measured in number of cherries per pound
- 2) Brix readings from cherries and during fermentation
- 3) Ambient temperatures during fermentation
- 4) Slurry temperatures during fermentation
- 5) Slurry pH levels during fermentation
- 6) Slurry depth and surface area
- 7) Total fermentation time

Producers currently determine the end of fermentation by feeling the slurry. Is there a quantitative method that could be used instead? At what point should the process be stopped: when the rates of decline in the pH and brix levels stabilize? The temperature shows a dramatic decline? Exposure to acetic acid for a certain time? All of the above?

## METHODS

Quality Project members fill out data sheets for each day of processing, recording pounds of cherry picked and rejected; depulping, fermentation, and drying times; pH and Brix readings; temperatures in the slurry (depulped coffee covered in mucilage), throughout the process; and depth of the slurry in the fermentation tank. Fixed loggers automatically record ambient temperatures inside solar dryers and near depulping stations. These measurements and blind cupping scores are analyzed to determine what, if any, variables correlate with cup quality. Interviews and observations of fermentation processes aim to understand farmer knowledge and decision-making as well as logistical challenges to changing practices.

### Current Practices

- 1) How do different farmers measure and judge fermentation? What shapes decision-making about fermentation?
- 2) What are the structural, logistical, social, and/or financial impediments to changing processing methods?
- 3) To what degree can fermentation variables be manipulated?

### Quality and Logistics

- 1) What is the impact of fermentation variables on the cup? How can they be measured in an environment with no electricity, variable temperatures, and minimal economic resources?
- 2) If such manipulation is both possible and positive, how would that timing interact with other demands on farmers, such as the arrival of the next day's harvest or space on the drying patio?



Above Left: Measuring brix content of newly harvested cherry  
Above Right: Close-up of mechanical depulper. Machines are cranked by hand or a portable battery.  
Above: Measuring brix and pH in fermenting coffee as CQP members record data.

## RESULTS

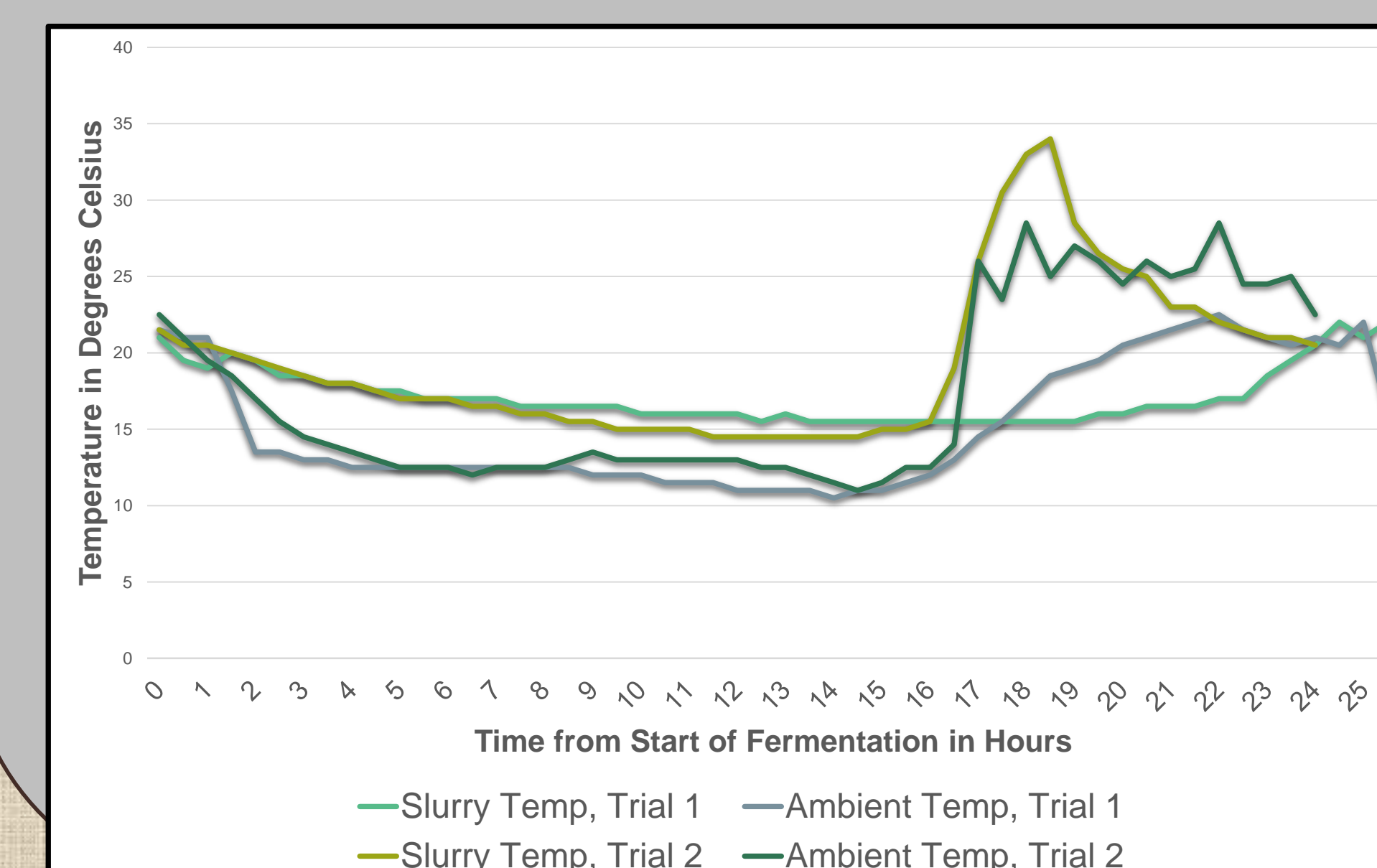
### Fermentation Process

- 1) Coffee is selectively harvested by family members and/or temporary workers.  
*Variations:*
  - a. Some sort cherry again after the pick.
  - b. Farmers may float cherries in water and remove those that float to the surface.
  - c. Some cover cherries with water overnight and depulp two days of harvest together.
- 2) Depulped mechanically onto a screen to remove unpulped cherry and damaged beans.
- 3) Depulped beans ferment 24-56 hours in a tank, usually made of concrete.  
*Variations:*
  - a. Some tanks are lined with ceramic tiles.
  - b. A few farmers ferment in wooden tanks.
  - c. No farmers report stirring the slurry, but several move the slurry from one tank to another after 24 hours, usually because of logistical concerns from the position of the depulper in relation to tanks.
- 4) Fermentation is judged to be complete when beans feel like "stones in a river," slightly tacky to the touch. Fermentation is also said to be done when the hole formed by poking a stick into the slurry does not collapse; i.e., the beans are not slippery enough to slide back into the hole.
- 5) Beans are washed until the water runs clear. This may occur in the fermentation tank or a washing channel.

### Fermentation Trials

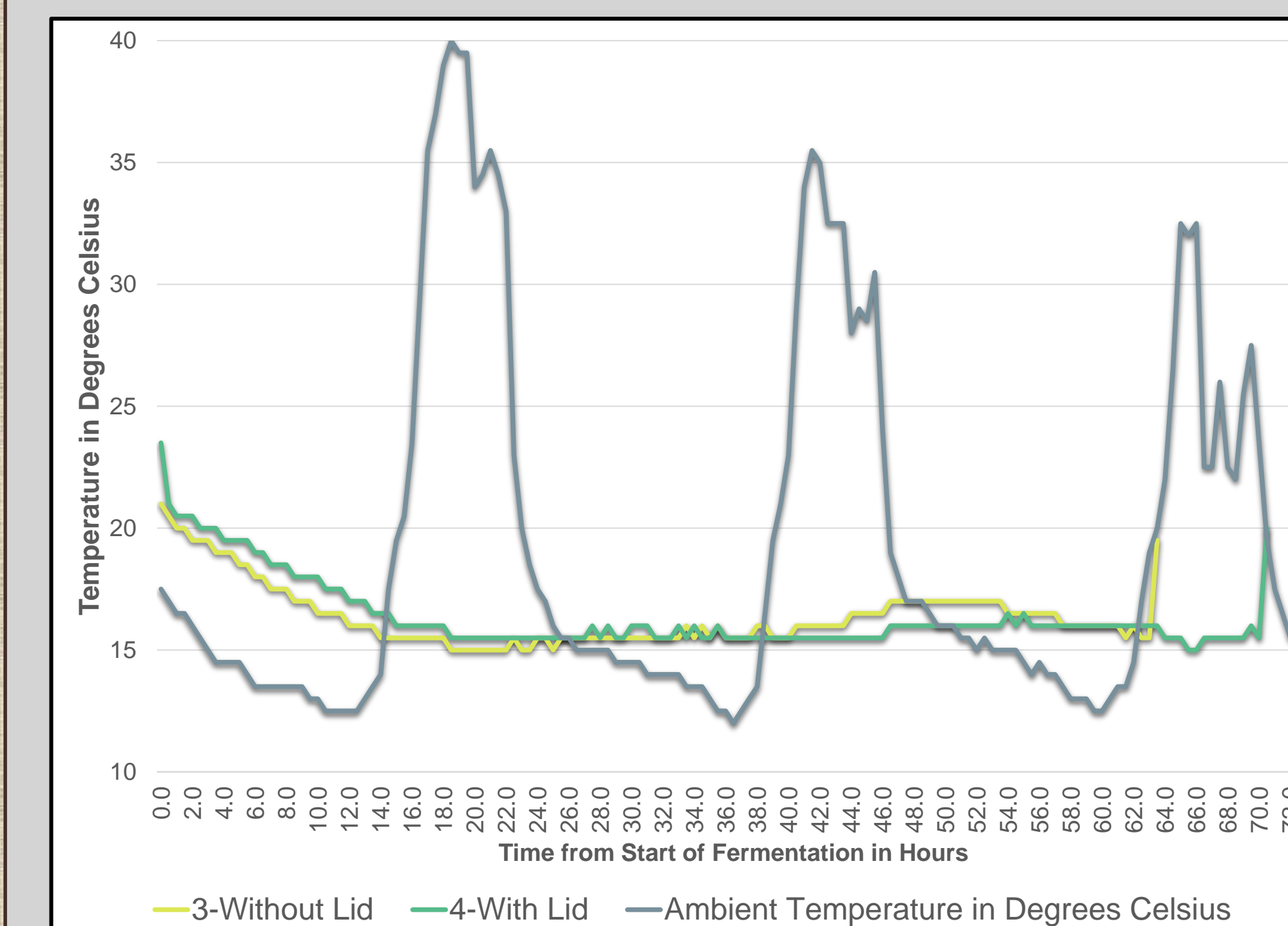
	Trial 1	Trial 2	Trial 3	Trial 4	Trial 5	Trial 6
<b>Total Time in hours</b>	25.5	24	63.5	70.5	51	51.5
<b>Slurry Temp Min/Max °C</b>	15.5 / 22	14.5 / 34	15 / 21	15 / 23.5	20 / 27.5	15 / 27.5
<b>Ambient Temp Min/Max °C</b>	10.5 / 22.5	11 / 28.5	12 / 40	12 / 40	11 / 38	11 / 38
<b>Start/End pH</b>	5.8 / 4.7	5.4 / 3.2	6.4 / 4.3	6.4 / 4.3	5.6 / 4.2	5.6 / 4.1
<b>Brix (start)</b>	20	17	18	18	20	20
<b>Cherries / pound</b>	260	289	230	230	252	252
<b>Slurry Depth</b>	8.89cm (3.5")	30.48cm (12")	15.24 cm (6")	15.24 cm (6")	15.24 cm (6")	15.24 cm (6")

*Trials 1 and 2: CQP members fermenting in open-air concrete tanks*  
*Varietal: Catuai*

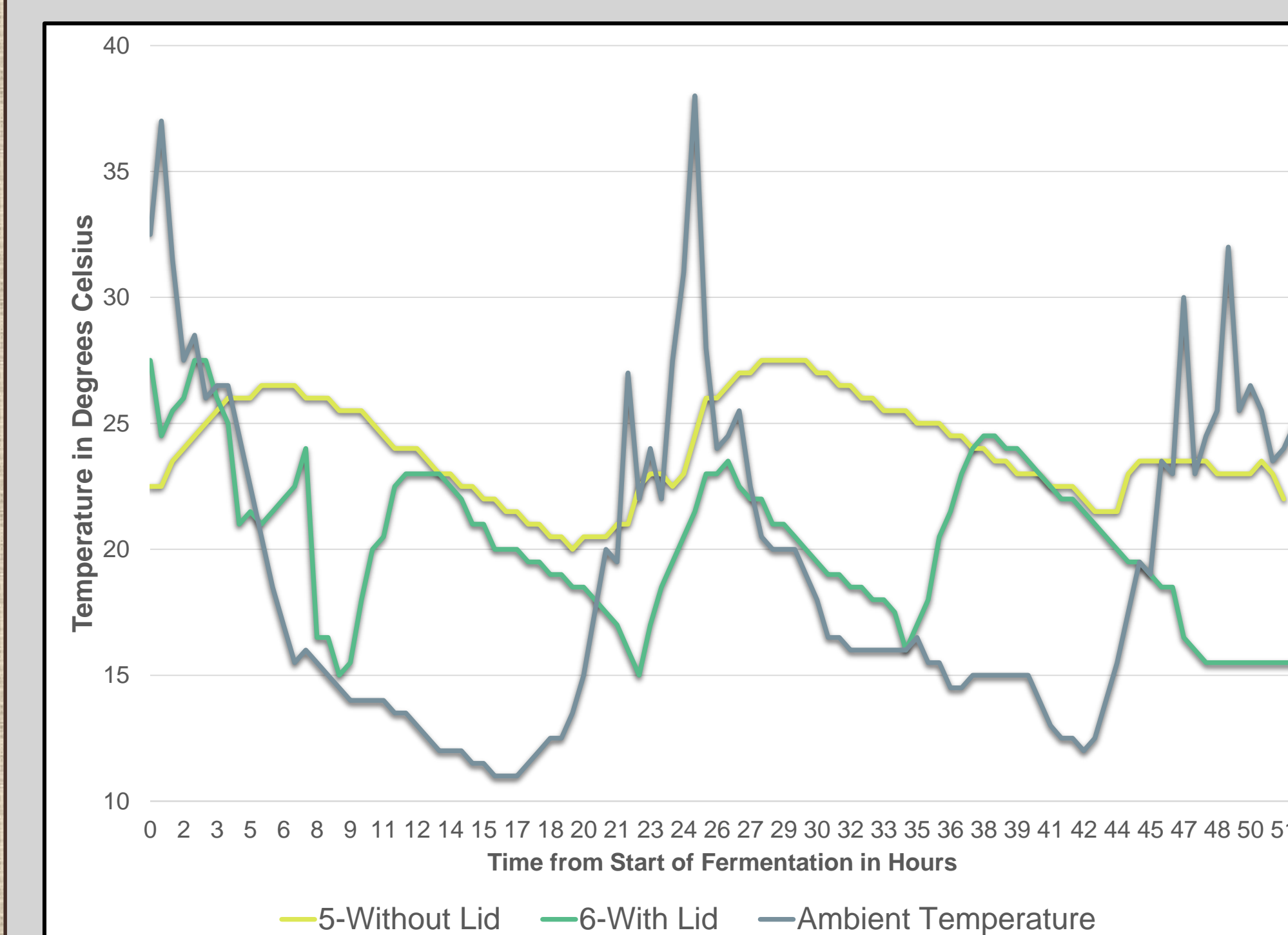


## RESULTS

*Trials 3 and 4: Fermentation indoors in plastic buckets with/without lids*  
*Varietal: Mixed*



*Trials 5 and 6: Fermentation outside in plastic buckets with/without lids*  
*Varietal: Mixed*



## DISCUSSION

This coffee was harvested in January and February, so cupping data are not yet available. Preliminary findings and areas for further research:

- We are particularly interested in the relationship between temperature, final pH, and cup quality: e.g., the CQP fermentations had higher slurry temperatures and lower pH than the lower temperatures and higher pH in the bucket trial – will we be able to taste the difference?
- The cooler temperatures make embryo damage during fermentation unlikely. It also makes controlling fermentation difficult, as all tanks are open-air.
- More selective harvesting is correlated with heavier, denser seeds (measured via cherry count). Selectivity is subjective, but picks with more partially green cherries reached 350+ cherries per pound, while those that were uniformly red were in the 250 per pound range.
- Roasters note that it is easy to under-roast Catracha beans, suggesting that they are denser than others in the Marcala region. This may be due to slower fermentation times.
- Are seeds still alive during processing? Fermentation and washing are often talked about as cleaning seeds, but our results and anecdotal evidence from other regions suggests that activity continues within the embryo even after picking. Our working theory is that the seed is contributing acids and sugars to the fermentation process, so different seed densities (from different elevations) should have different fermentation time targets.