

## EVALUATION OF THE APPLICATION OF CAFEDAK IN COFFEE CULTIVATION

Ecuador/Cafe/2022

### GENERAL INFORMATION:

Country-State-Zone: Ecuador-Loja-Chaguarpamba  
Property, place: Indera  
SAS Follow-Up Manager: M<sup>a</sup> Cecilia Núñez  
Distributor in the area: FARMAGRO  
Responsible Distributor Technician: Geovanni Sarango  
Trial start date: December 17, 2021

### 1. Objective of the trial:

- To evaluate the incidence and severity of *Hemileia vastatrix* CLR, with applications of Cafedak versus conventional farm management.
- Evaluate production with the application of Cafedak versus conventional farm management, within a nutritional management program.
- To evaluate bean and cup quality with Cafedak management versus nutritional management.

### 2. Introduction:

CLR is one of the catastrophic diseases in coffee production with great economic importance. Controlling it is a challenge that has involved many skills developed from since the time of our grandparents. Aspects that influence the disease caused by CLR include:

- Coffee variety
- Soil type
- Tree age
- Fertilizer management
- Preventive measurements taken
- Climate and weather

The cost of inputs to control this pest has become costly, especially in terms of cost-benefit, as some chemicals do not have high efficiency of control and can be detrimental to the surrounding environment.

Coffee has been cultivated in Ecuador since 1860, but since the opening of the world trade chain significant incentives have been given to small plantations, reaching a

certain degree of development, until coffee has become an important product for the nation's economy.

Coffee in the form of green or roasted beans is exported in 60-kilo bags of cabuya, and soluble coffee in boxes of 25 to 30 kilos, or in glass jars, cans or sachets. It is also exported as frozen extract in 55-gallon drums.

Ecuador has a great capacity as a coffee producer and is one of the few countries in the world that exports all varieties of coffee: washed Arabica, natural (honey) Arabica and Robusta, because it has an optimal geographical location. Coffee is produced throughout the country, including the Galapagos archipelago.

Coffee is one of the main crops in the province of Loja, forming an integral part of the economy of the farmers in the area; especially from the regions of Quilanga, Espíndola, Puyango and Chaguarpamba.

The soil and climatic conditions and the different altitudinal levels have allowed Café Lojano to have superior flavor and aroma conditions; being considered in the last 10 years among the best in the country and the region.

Loja coffee has competed in events such as: "The Golden Cup", "The Cup of Excellence", "AVPA" among others, in addition to being marketed both nationally and internationally in countries such as: United States, Germany, Spain, Chile, Colombia, Italy, France, Poland, Japan, Belgium, Argentina, Netherlands, Canada, among others.

In Chaguarpamba, at an altitude of 1130 meters (3,707 ft.), is where Indera Farm is located, whose owners are specialty coffee producers, both locally and internationally recognized; remaining in the top 20 spots in the Golden Cup 2020, 2021 and 2022 competition.

Inadequate fertilization of macros and micros in most crops can exacerbate disease virulence. Cafedak is a micronutrient pack that stimulates the plant physiology of the coffee plant to improve production and quality. It contains a balanced formulation of micronutrients (B, Fe, Mn, Mo and Zn) that prevents and/or corrects deficiencies during all phases of cultivation, with a specific polymer of condensed oligosaccharides that favor the plant structure of the plant against abiotic and/or biotic factors. Used regularly as a preventative, it increases the crop's ability to respond to attacks by pathogens such as CLR (*Hemileia vastatrix*), American leaf spot (*Mycena citricolor*) or Cercospora leaf spot (*Mycosphaerella coffeicola*).

Finca Nindera produces Geisha and Villalobos coffee, varieties in which the Cafedak trials were carried out.

### 3. Materials and Methods:

- The application of Cafedak to control Coffee Rust (*Hemileia vastatrix*) and improve production in the cultivation of Coffee (*Coffea arabica*), will be at a dose of 2 liters per hectare, in 3 applications: pre-flowering, fruit set and filling.

#### 3.1 Treatments:

## Lot Villalobos and Geisha (Test Plot – 1.33 acres for each variety-treatment)

T <sup>o</sup>	Treatments	Rates	1 <sup>st</sup> App (2/9/2022)	2 <sup>nd</sup> App (4/6/2022)	3 <sup>rd</sup> App (8/17/2022)
T1	Cafedak + Farmer's Standard Pest. Rotation	2 pt./acre	Pre-bloom	Fruit Setting	Fruit Filling
T2	Farmer's Standard Pest. Rotation: <b>Alto 100</b> <b>Mancozeb</b> <b>Mancuerna</b> <b>Melatox</b>	Not Available	Not Available	Not Available	Not Available

### 3.2 Experimental design and trial management:

Province	Loja
Locality	Choose a Choice
Farm	Indera
Variety	Geisha y Villalobos
Planting density	3000 and 2557 plants
Soil type	Clay loam
Altitude	3,707 ft. or 1130 m.
Average temperature per year	71.6°F or 22 °C
Average humidity per year	78 %
Average Precipitation Year	26.6 in or 676 mm
Usual fertilization in the year	3 applications of granular

### 3.3 Controls and data collection of each processing:

#### PARAMETERS FOR MEASURING BIOLOGICAL EFFECTIVENESS

OIRSA's methodology was used for this evaluation:

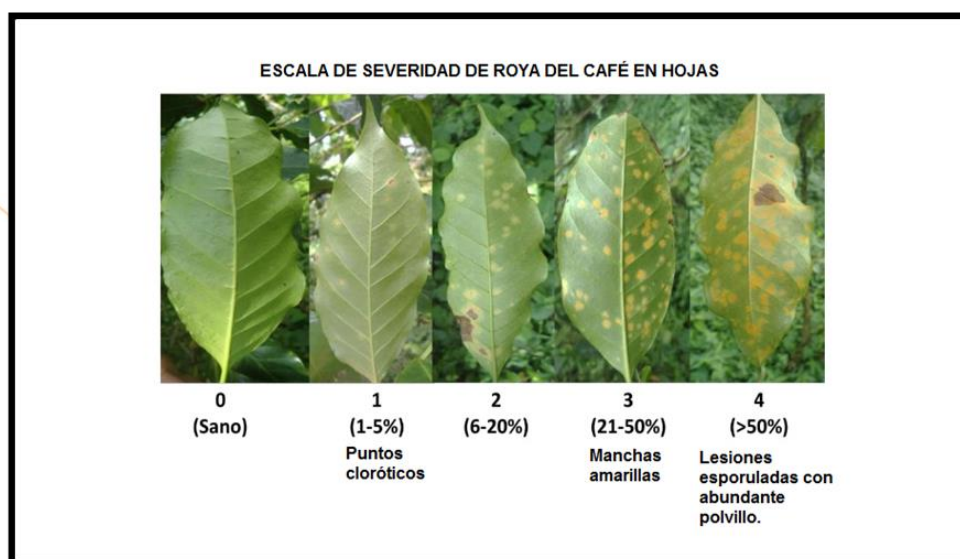
#### INCIDENCE AND SEVERITY OF RUST

- To evaluate the incidence of the disease, 5 sites will be selected at random within the lot to be sampled (1 ha) in each site 5 plants are selected, then in each plant 6 branches are selected (2 from each stratum, low, medium and high) and in each branch the # of leaves with the presence of rust and the # total of leaves are counted, determining the percentage of incidence of the disease.

$$\%IR = \frac{\text{Infected leaves}}{\text{Total, Sample Sheets}} \times 100$$

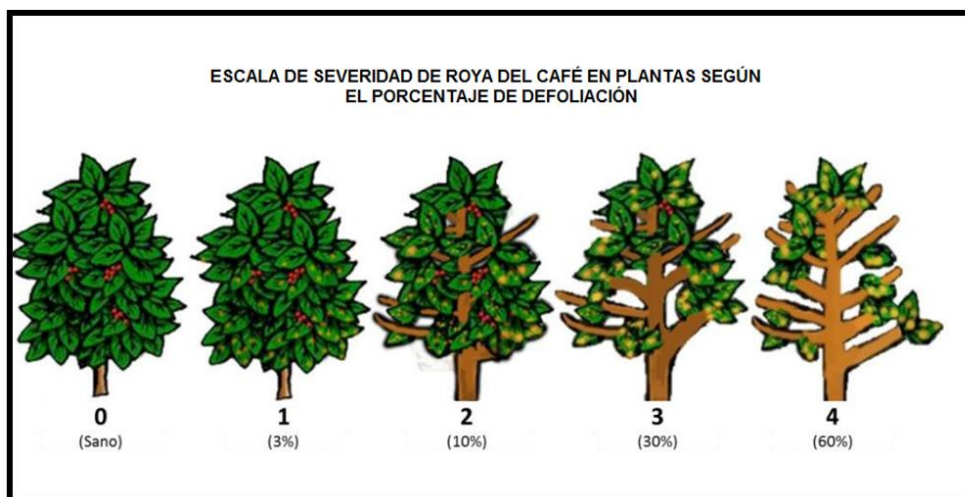
- To assess the severity, the level of damage to leaves showing symptoms of rust will be determined, according to the scale of the chart

DEGREE	DESCRIPTION	PERCENTAGE
0	HEALTHY LEAF	0 %
1	MILD SYMPTOMS (CHLOROTIC SPOTS)	1 -5 %
2	MODERATE SYMPTOMS	6-20 %
3	SEVERE SYMPTOMS (YELLOW SPOTS)	25 %
4	VERY SEVERE SYMPTOMS (SPORULATED LESIONS WITH A LOT OF DUST)	EQUAL TO OR GREATER THAN 50%



DEGREE	DESCRIPTION	PERCENTAGE
0	HEALTHY TREE	0 %
1	TREE WITH MILD SYMPTOMS	3 %
2	TREE WITH MODERATE SYMPTOMS	10 %
3	TREE WITH SEVERE SYMPTOMS	30 %
4	TREE WITH VERY SEVERE SYMPTOMS	60%

## DEFOLIATION ASSESSMENT



### 3.4 Other relevant data:

Incidence of rust *Hemileia vastatrix*

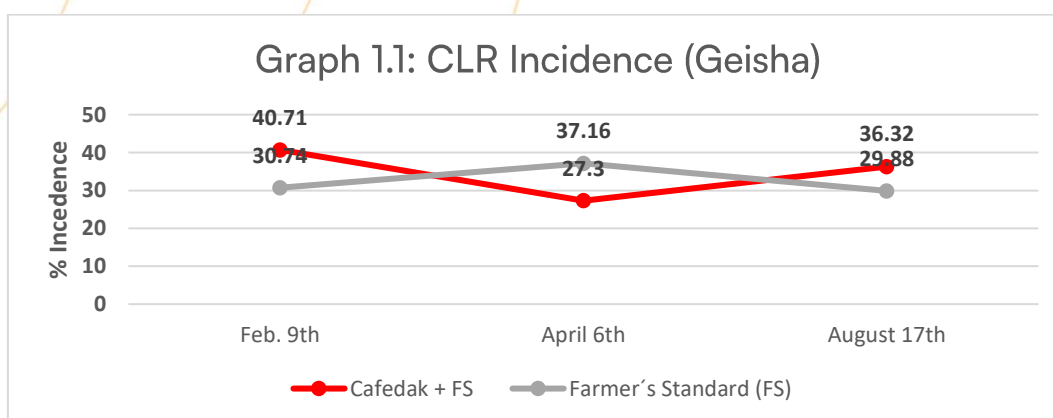
Physical appearance of the plant

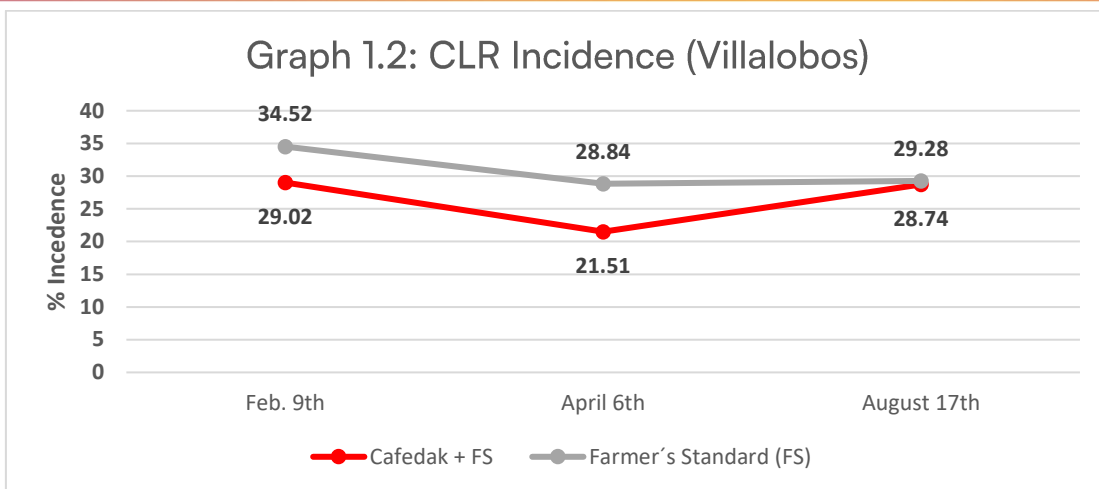
## 4 Results

- Data on the incidence and severity of rust will be presented for the T1 and T2 treatments, both varieties, which allow a comparative sequence to be made, as well as the respective photographic evidence.

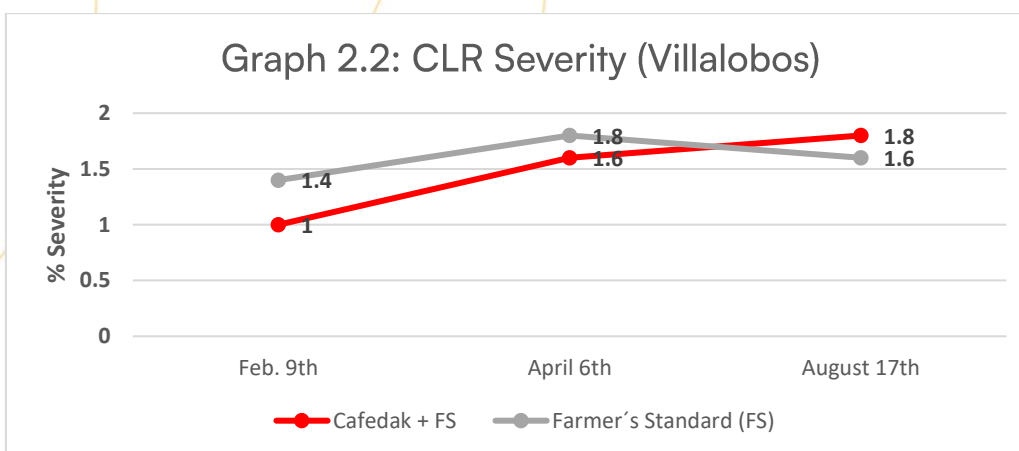
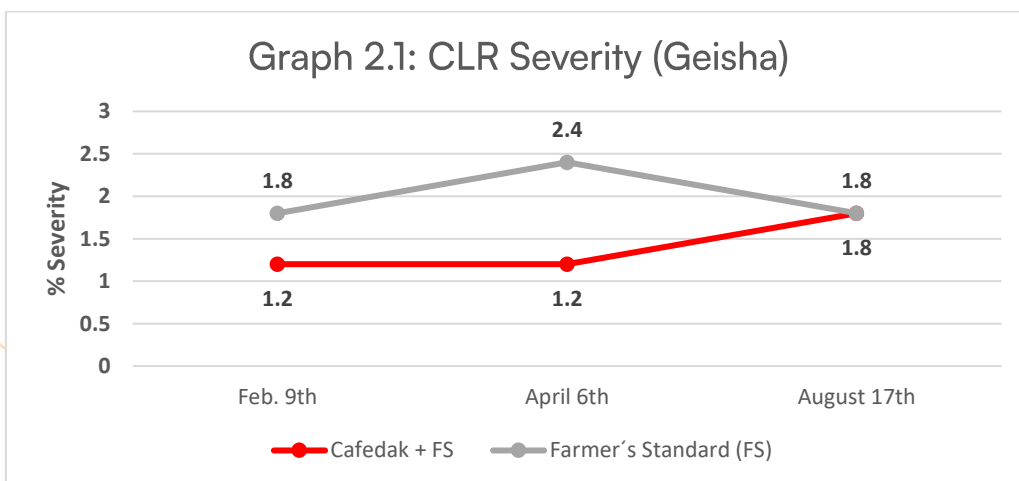
- An analysis of defoliation will be carried out for each T1 and T2 treatment, in both varieties, which allows a comparative sequence to be made and photographic evidence to be obtained

### 4.1 Incidence

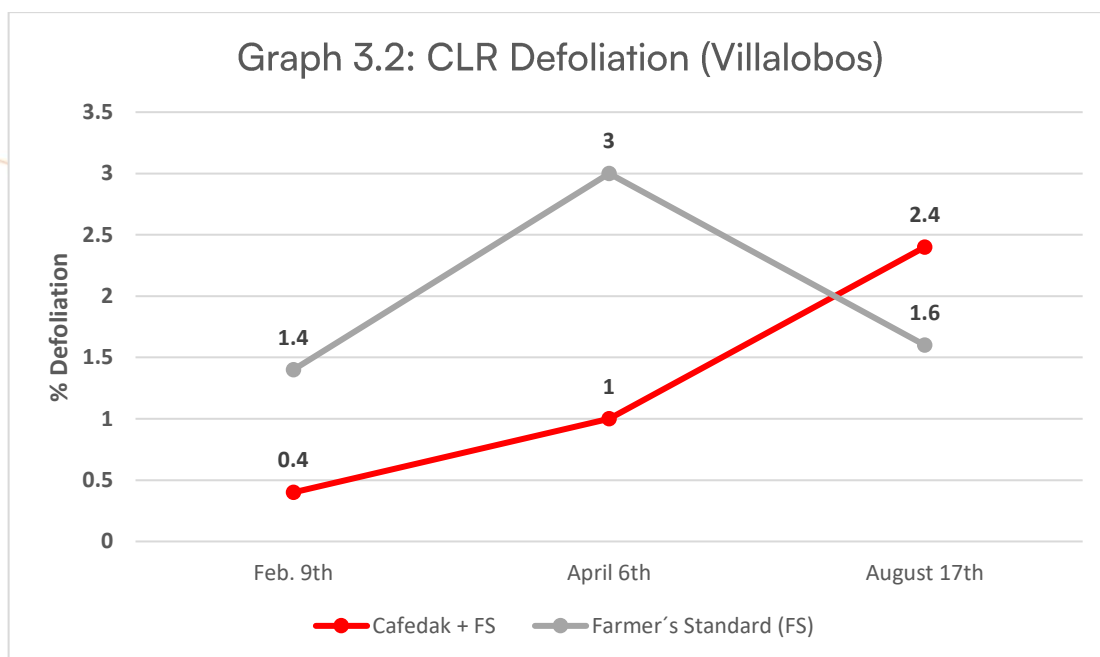
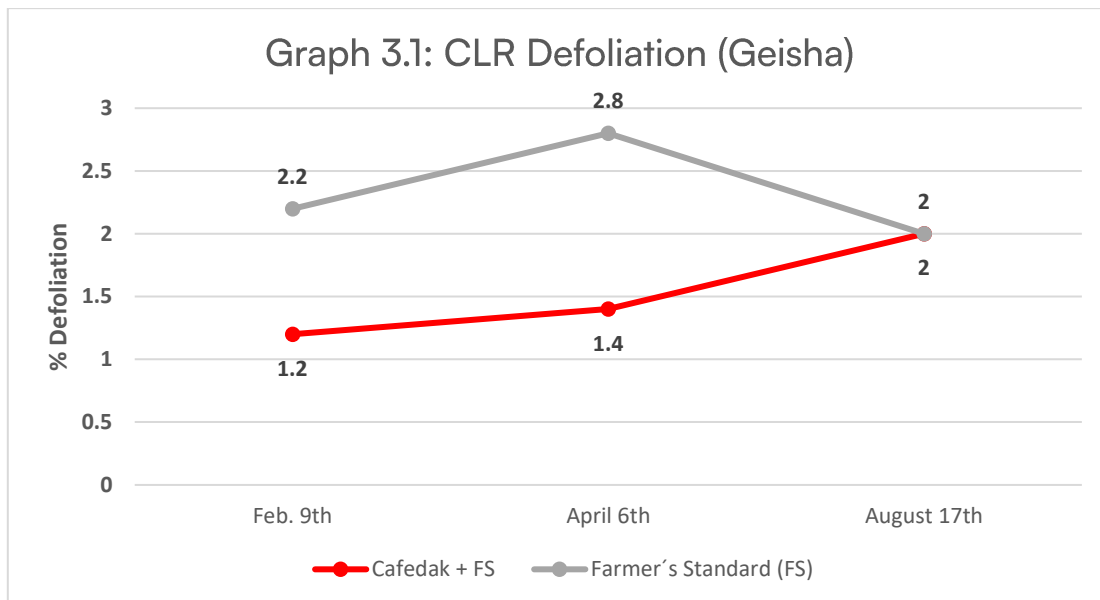




## 4.2 Severity



## 4.3 Defoliation



## 4.4 Production of the Geisha Lot

**Yields for Cafedak Geisha Lot**

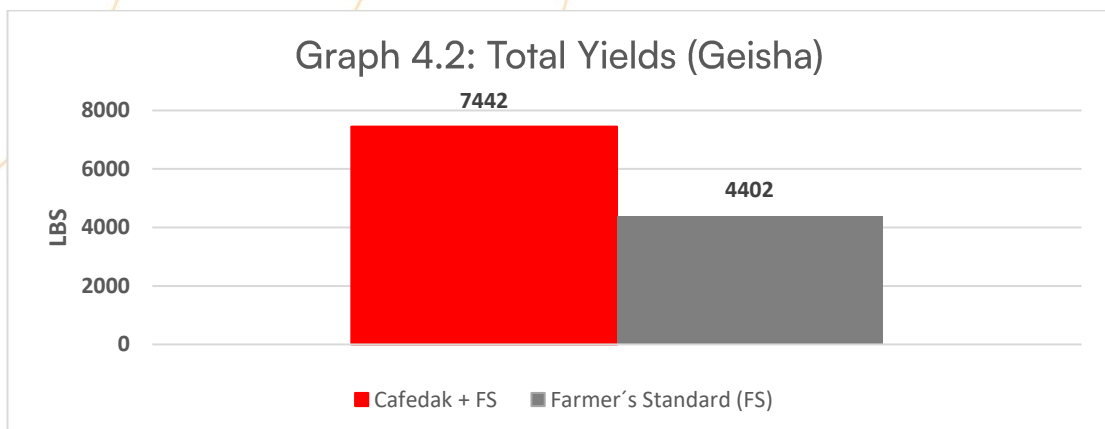
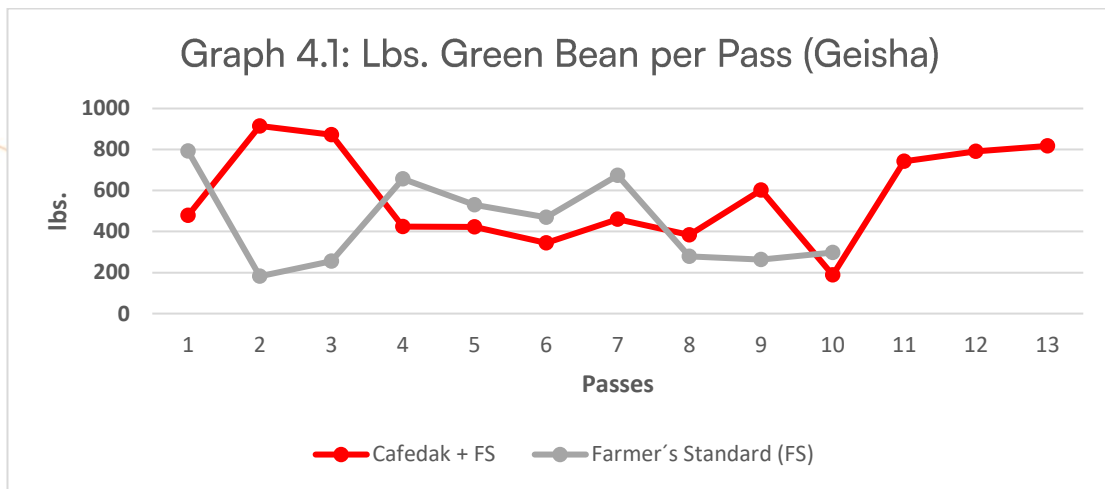
Pass #	Lbs.	Harvest Date
1	479	21-Jul
2	915	22-Jul
3	872	23-Jul
4	424	24-Jul
5	423	6-Aug
6	344	8-Aug
7	460	10-Aug
8	384	11-Aug
9	602	12-Aug
10	188	13-Aug
11	743	22-Aug
12	791	24-Aug
13	817	25-Aug

**Total 7442 lbs. green bean**  
**74.42 cwt green bean**

**Yields for FS Geisha Lot**

Pass #	Lbs.	Harvest Date
1	792	21-Jul
2	182	22-Jul
3	255	23-Jul
4	656	24-Jul
5	531	6-Aug
6	470	8-Aug
7	674	10-Aug
8	279	11-Aug
9	264	12-Aug
10	298	13-Aug
-	-	-
-	-	-
-	-	-

**Total 4401 lbs. green bean**  
**44.01 cwt green bean**



## 4.5 Production of the Villalobos Lot

**Yields for Cafedak Villalobos Lot**

Pass #	Lbs	Harvest Date
1	675	14-Aug
2	794	10-Oct
3	672	11-Oct
4	562	12-Oct
5	262	13-Oct
6	323	24-Oct
7	695	25-Oct
8	749	26-Oct
9	895	1-Nov
10	692	3-Nov
11	806	4-Nov
12	261	7-Nov
13	448	8-Nov

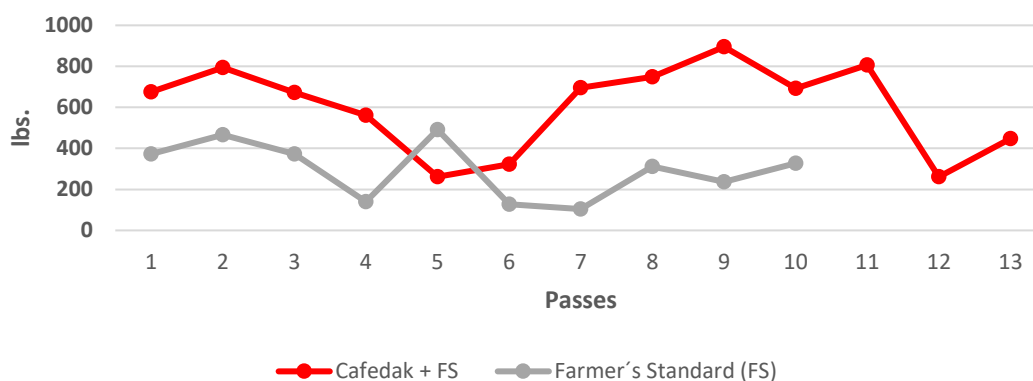
**Total 7834 lbs. green bean**  
**78.34 cwt green bean**

**Yields for FS Villalobos Lot**

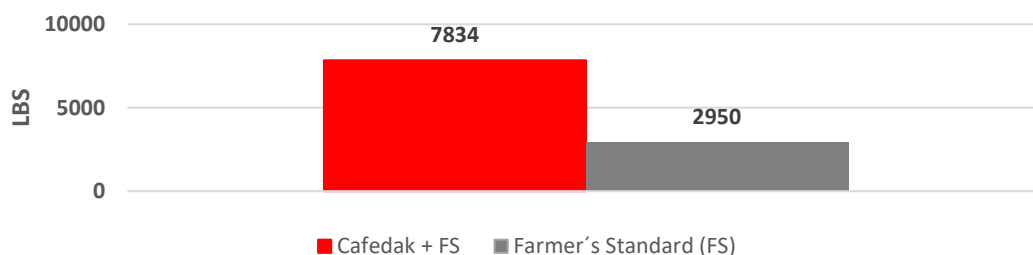
Pass #	Lbs.	Harvest Date
1	372	15-Aug
2	466	17-Oct
3	373	18-Oct
4	140	19-Oct
5	491	20-Oct
6	128	9-Nov
7	104	10-Nov
8	312	11-Nov
9	236	14-Nov
10	328	15-Nov
-	-	-
-	-	-
-	-	-

**Total 2950 lbs. green bean**  
**29.5 cwt green bean**

**Graph 5.1: Lbs. Green Bean per Pass (Villalobos)**



**Graph 5.2: Total Yields (Villalobos)**



## 4.6 Finca Indera Cup Quality

Golden Cup Tasting Competition	
Farm	Indera
Points	89.04
Place	8 <sup>th</sup>
Province	Loja
Area	Chaguarpamba
Variety	Geisha
Process	Honey

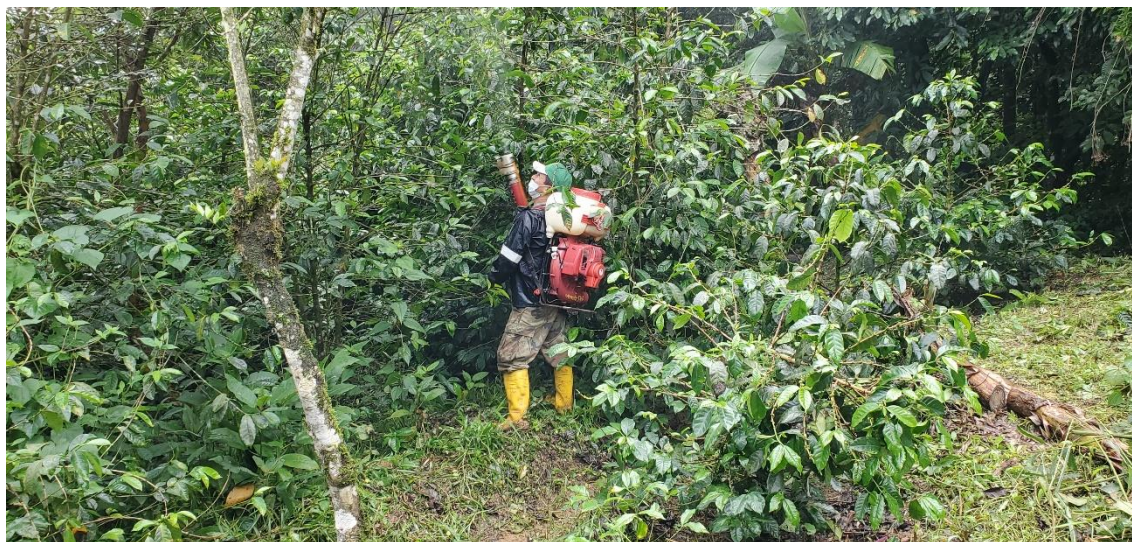
Golden Cup Tasting Competition	
Farm	Indera
Points	85.01
Place	Did not place
Province	Loja
Area	Chaguarpamba
Variety	Villalobos
Process	Washed

## 4.7 Photographic Annex

### Preparation of stock solution



## 4.2.- Cafedak Application



## 4.3.- Coverage

Adaxial



Abaxial



## 4.4.- Initial state of the farm



## 4.4.- Defoliation

**FS**



**Cafedak + FS**

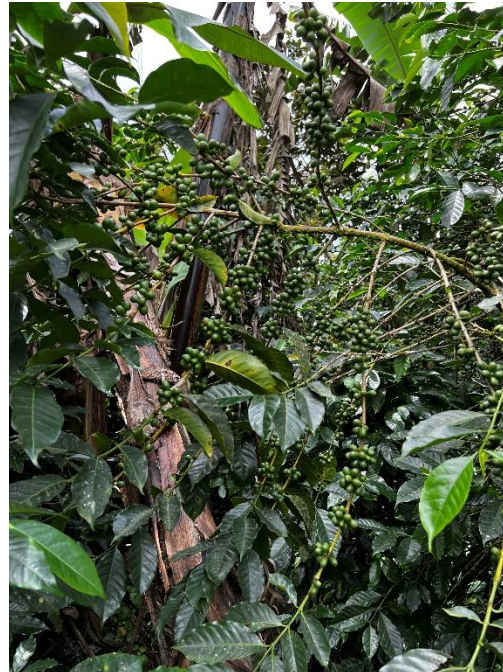


## 4.5.- Defoliation

FS



Cafedak + FS



## 5 Conclusions

- In terms of incidence and severity, in both parameters and in both varieties, the Cafedak treatments and the Farmer's standard standalone rotation shows a similar behavior in the face of rust control. In general, the first application of Cafedak that was introduced into rotation helps decrease the rate of incidence, severity, and defoliation. However, the time between the first-second, and second-third applications were outside the 30 to 45-day window that is recommended for Cafedak, in this case, 60 days and 120 days, respectively. It is recommended to apply Cafedak within the recommended time frame to maintain product efficiency.
- The use of Cafedak shows clear evidence in yields:
  - **Geisha:** +3342 lbs. or +40.84%
  - **Villalobos:** +4884 lbs. or + 62.32%
- Both lots that were handled with Cafedak scored high in competition, however they were not qualified as micro-lots but as complete lots.
  - **Geisha:** 89.04 points
  - **Villalobos:** 85.01 points