Monitoring the CBB, Using Traps, and Making Decisions about Where and What Control is Needed

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Why is it Important to Monitor the CBB?

In order to implement an IPM program for CBB, it is necessary to measure the infestation level in the field and correlate it with damage in parchment coffee.

Sampling gives the information necessary to make decisions about control actions.

Monitoring CBB populations means counting the number of insects in a specific area at a specific moment.

Random sampling is most appropriate to estimate CBB populations.

Characteristics of a Sampling

Sampling has to be:

1. **Credible.** It has statistic support.

2. **Economic.** Low cost for execution.

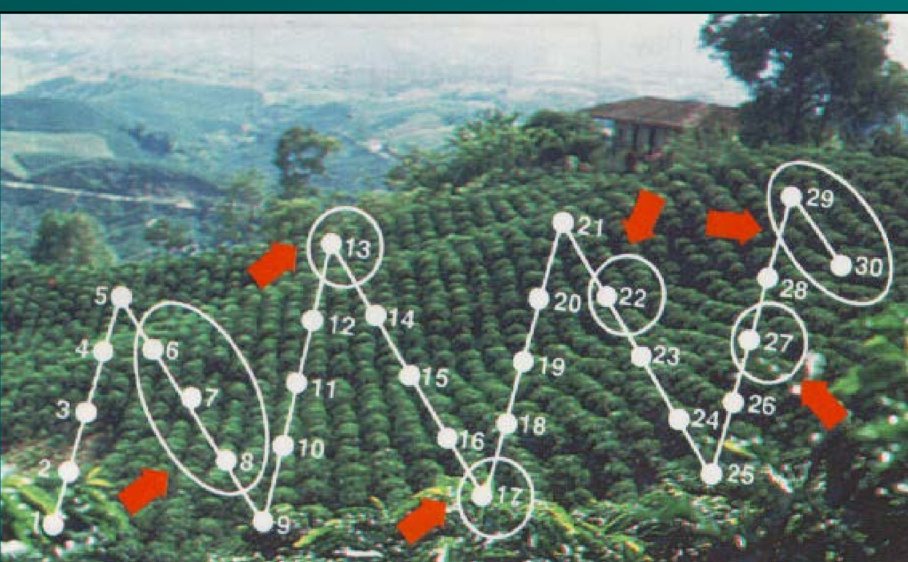
3. **Easy to run.** Practical to do.

4. **Fast.** Use less time. Possible to estimate the population.

Sampling Method of CBB by Cenicafé

Know as the method of the 30 branches.

1. Divide the farm in coffee lots (same age).



2. Select 30 sites per hectare

Density:
(5000 coffee trees/ ha).

(Bustillo et al. 1998).

Sampling Method of CBB by Cenicafé

3. Select a coffee branch in the middle of the tree.

They have more berries than bottom or top branches.

4. Just count the green berries in the branch.

No ripe berries because they are going to be harvested .

(Bustillo et al. 1998).

Sampling Method of CBB by Cenicafé

5. Counting:

Total number of green berries per branch.

The number of green berries infested by CBB (berries with hole).

(Bustillo et al. 1998).

Sampling Method of CBB by Cenicafé

6. Making Calculations:

Total number of green berries infested by CBB, (in 30 branches) = 40

Total number of green berries (in 30 branches) = 1500

Examples:

Total berries infested = 40

Total berries counted = 1500

Percentage of infestation:

% infestation = 40 ÷ 1500 × 100 = 2.6%

Look at the hot spot. 6.8%

# Tree	Total Berries	Berries infested
1	55	0
2	50	1
3	48	2
4	64	0
5	53	1
6	67	**4**
7	72	**3**
8	51	**5**
9	49	**3**
10	55	**5**
11	61	1
12	58	0
13	60	0
14	52	1
15	65	0
29	54	2
30	63	0
Sum	**1500**	**40**

Infestation by CBB (%)

Date **Farm :**
Lot # **Evaluator:**

Tree #	# Green Berries	# Berries Infested	*B. bassiana*
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			
14			
15			
16			
17			
18			
19			
20			
21			
22			
23			
24			
25			
26			
27			
28			
29			
30			
Total			

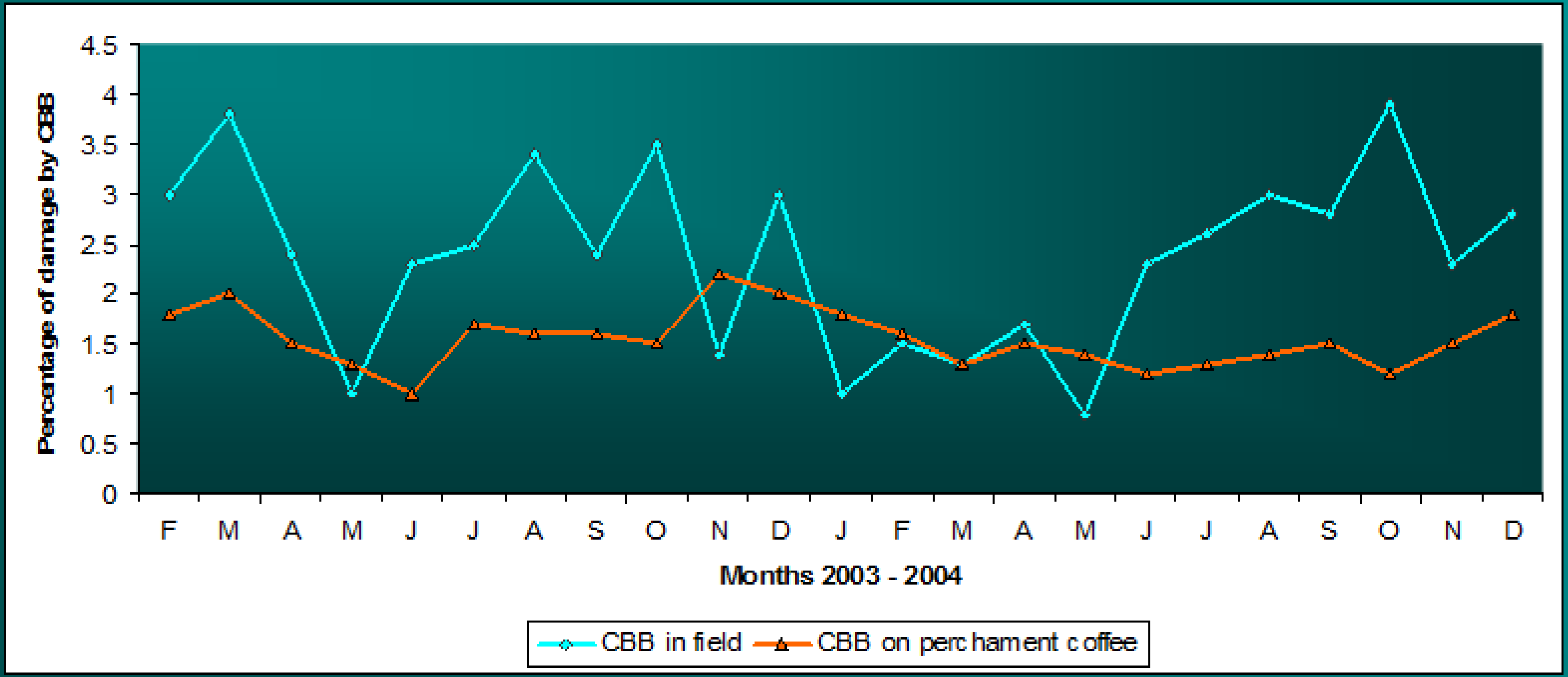
% infestation = $\frac{\text{Berries Infested x 100}}{\text{Green Berries}}$ **=**

% Positions of CBB = **Live AB =** **Dead AB =**
CD = **Absent =**

Observations:

Infestation on Field & Parchment Coffee

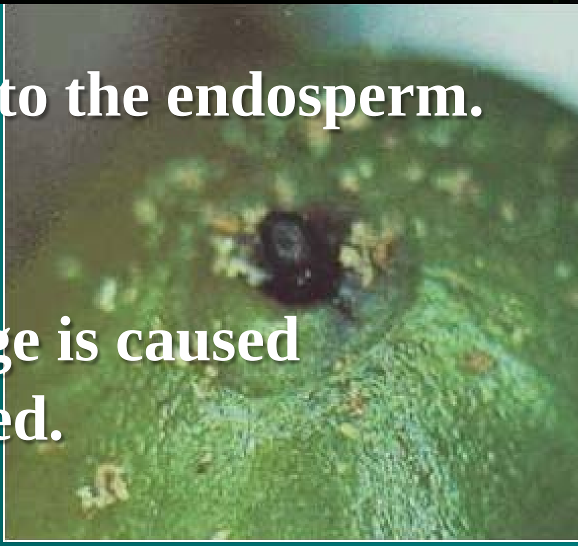
Threshold of 5% on the tree is needed to prevent losses in parchment coffee .



"La Esperanza" small coffee farm, Quimbaya, Quindío, Colombia. (Aristizábal et al. 2011).

Positions of CBB in the Coffee Berry

(Bustillo et al. 1998; drawing by Gonzalo Hoyos, Cenicafé}.



AB = CBB is entering. (No damage is caused to the endosperm. CBB is vulnerable to be killed.

CD = CBB is inside of the endosperm. Damage is caused by adult and immature stages. CBB is protected.

Evaluation of CBB Position in the Coffee Berries

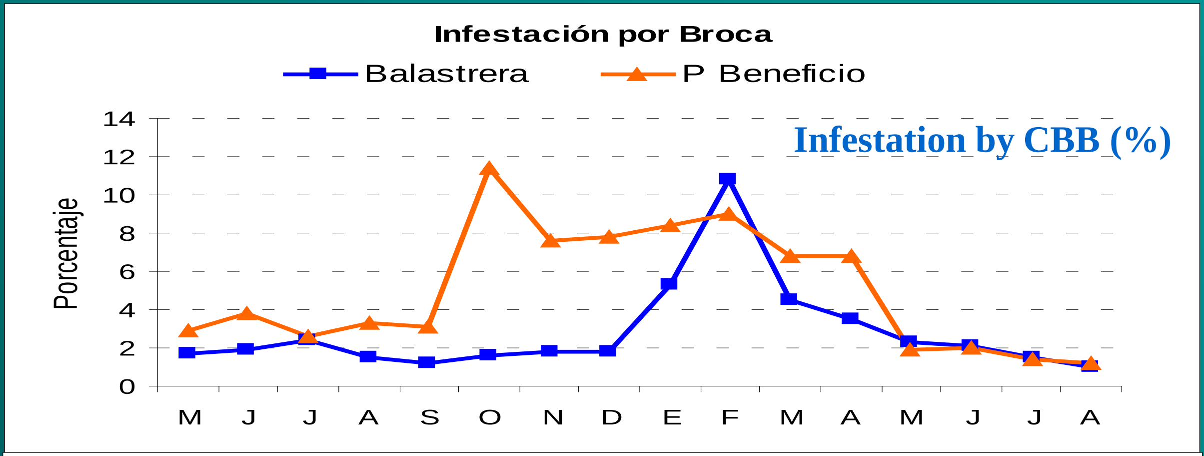
100 coffee green berries infested by CBB are collected per 30 coffee trees sampling in a coffee lot.

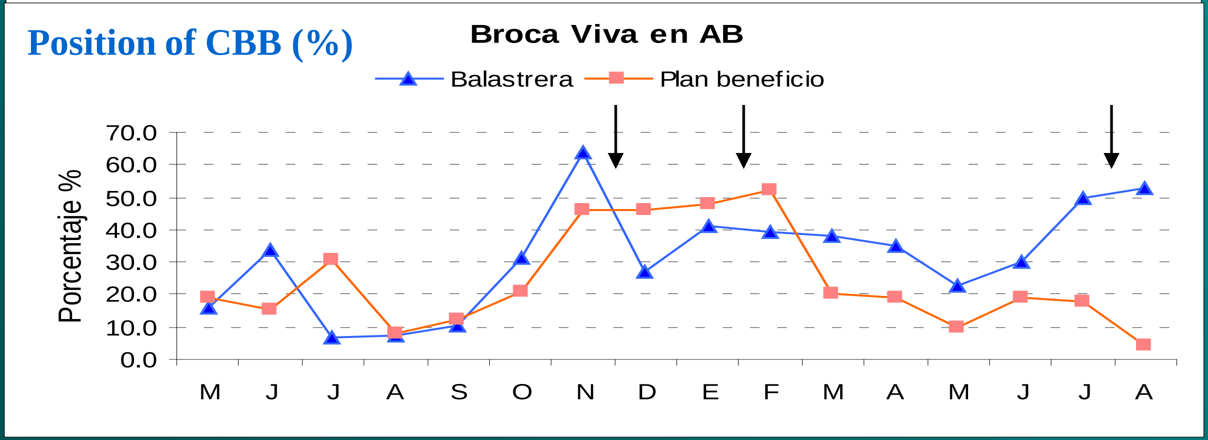
Cut berries to check the position of the CBB (AB or CD). Then the percentage on AB and CD is calculated.

Example: From 100 berries collected,

60 % was on AB, 30% on CD, and 10% of CBB was dead (Mortality).

Dynamic of CBB Population





AB position

CBB is vulnerable

With > 50 % AB

Balastrera: 1100 m a s l ; Plan Beneficio: 1450 m a s l; La Marina farm Risaralda, Caldas, Colombia (May 2003 – August 2004).

(Aristizábal et al. 2004).

Criterion to make Decisions

Under Colombian conditions.

Economic Threshold damage:

Parchment coffee with more that 5% damage (by CBB and others damages) affects the price of the coffee .

Under field conditions:

Infestations by CBB higher that 2.5% with more that 50% of CBB on AB position are the threshold to apply insecticides or bio-insecticides.

However, it depends on each coffee lot's conditions.

CBB Levels of Infestation, Lot No. 2, (11 Squares), Months 2002-2003

Cuadro	Jun	Ago	Sep	Oct	Nov	Dic	Ene	Feb	Mar	Abr	May	Jul	Ago	Oct	Dic
20	7,16	9,20	7,1	6,13	3,50	1,20	8,67	7,10	6,07	5,65	3,29	1,94	1,07	1,10	1,90
21A	4,89	3,27	2,5	2,31	1,60	1,71	1,96	3,20	4,64	6,86	2,51	2,10	0,83	1,3	1,20
21B	1,98	2,17	2,5	3,13	1,90	1,30	6,34	4,50	3,54	10,07	2,26	1,00	2,18	1,1	1,05
22	1,00	0,38	0,4	0,51	0,50	0,44	0,43	2,30	3,97	7,19	1,42	2,85	1,49	0,90	0,35
23	0,83	1,12	1,3	2,38	1,10	0,43	3,03	5,20	8,86	9,35	1,57	3,11	1,42	1,10	0,25
24	5,41	5,65	6,5	8,97	3,20	1,67	2,54	4,50	7,59	7,46	1,68	2,33	1,95	1,50	2,29
25	5,58	4,66	4,8	5,22	3,30	0,28	2,40	3,50	4,19	7,14	2,21	1,94	0,76	1,20	1,19
26	4,50	6,74	5,2	4,45	2,60	1,18	2,12	6,80	11,02	8,40	2,44	2,40	1,59	1,10	1,15
27	1,62	2,75	3,1	4,23	2,70	0,28	3,01	4,20	6,18	6,91	1,59	1,38	2,01	1,70	2,41
28	0,42	0,53	1,5	2,71	1,70	1,38	1,66	4,60	8,11	9,77	2,67	3,07	1,62	1,30	0,84
29	1,13	0,71	1,4	2,23	2,10	1,96	1,74	2,70	5,32	6,71	1,64	2,29	1,24	1,00	0,76
Prom.	**3,19**	**3,10**	**3,3**	**3,84**	**2,2**	**1,07**	**3,08**	**4,418**	**6,32**	**7,77**	**2,11**	**2,22**	**1,47**	**1,21**	**1,22**

Ranges of Infestation:
Less than 1% = Very Good
Between 1.1 - 2% = Normal
Between 2.1 - 4%= Semi-Critical
Over 4.1% = Critical

CBB Position on the fruit is important on semi-critical and critical ranges if it is over 50%

Applications of Bio-Insecticides

Before applying any product, be sure that recollection of ripe, overripe, and raisin berries has been done.

Check the sprayers (good condition).

Read the bio-insecticide label.

Use adjuvants or surfactants .

Use protective equipment.

Apply on hot spots or coffee lots that need it.

Use of Traps

Mass trapping is a new tool to control CBB populations.

It is supported by the knowledge of the female colonizing behavior.

When do adult females emerge from residual berries to search for new fruits in order to produce the new generation of the CBB?

It depends on each coffee location and it is related to weather, flowering, development of berries, and harvest time.

(Dufour & Frérot 2008; Mathieu et al. 1997).

CBB Attraction

Only colonizing females (previously mated) leave the berries where they were born.

Those females respond to chemical attractants such as ethanol and methanol. (Mixture in ratio 1:1).

Diffusion rate: 0.175 g/dispenser /day.

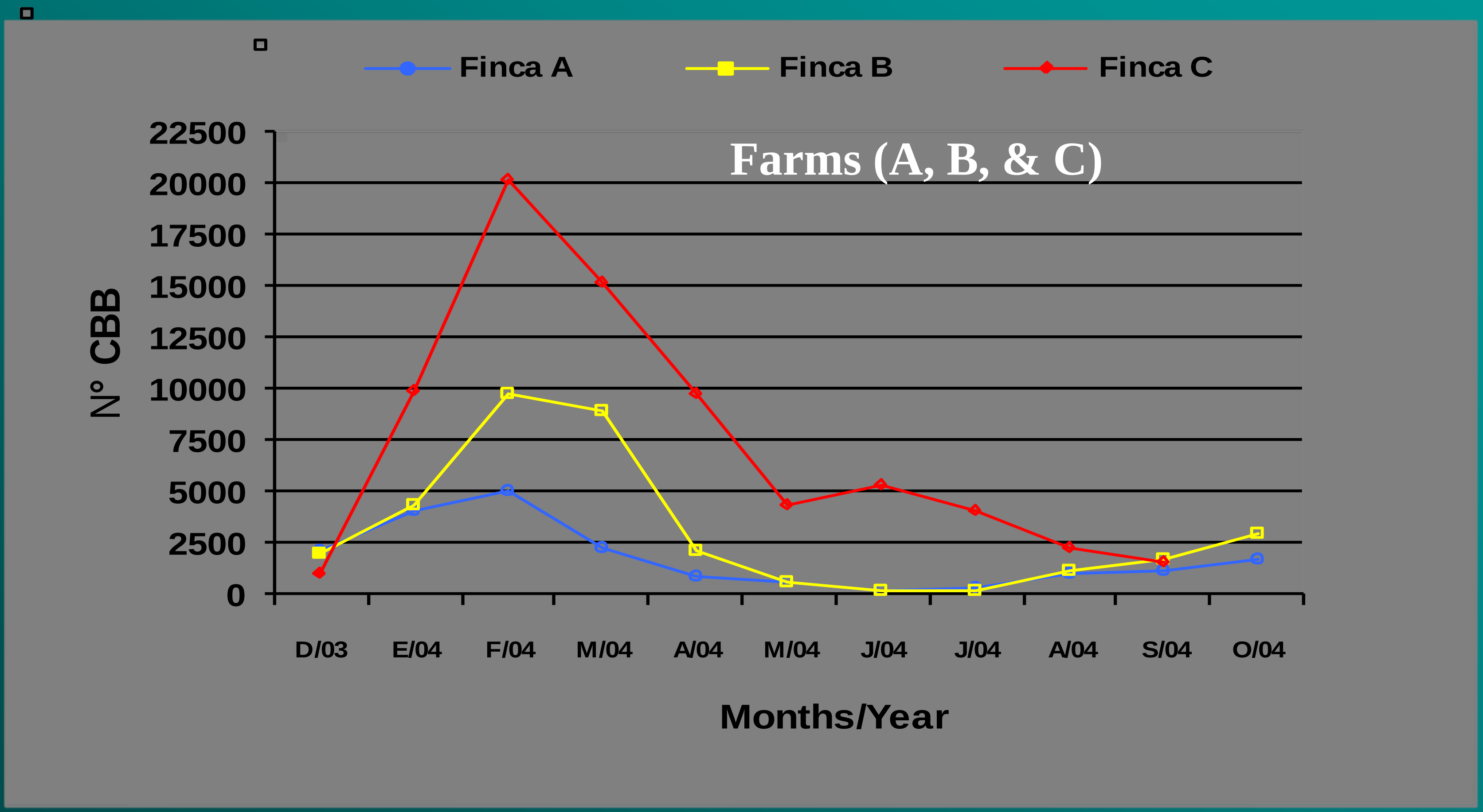
CBB responds better to red color.

1.2 m is the best height to install the traps.

Distribution of 22 traps/ha. (8 / acre).

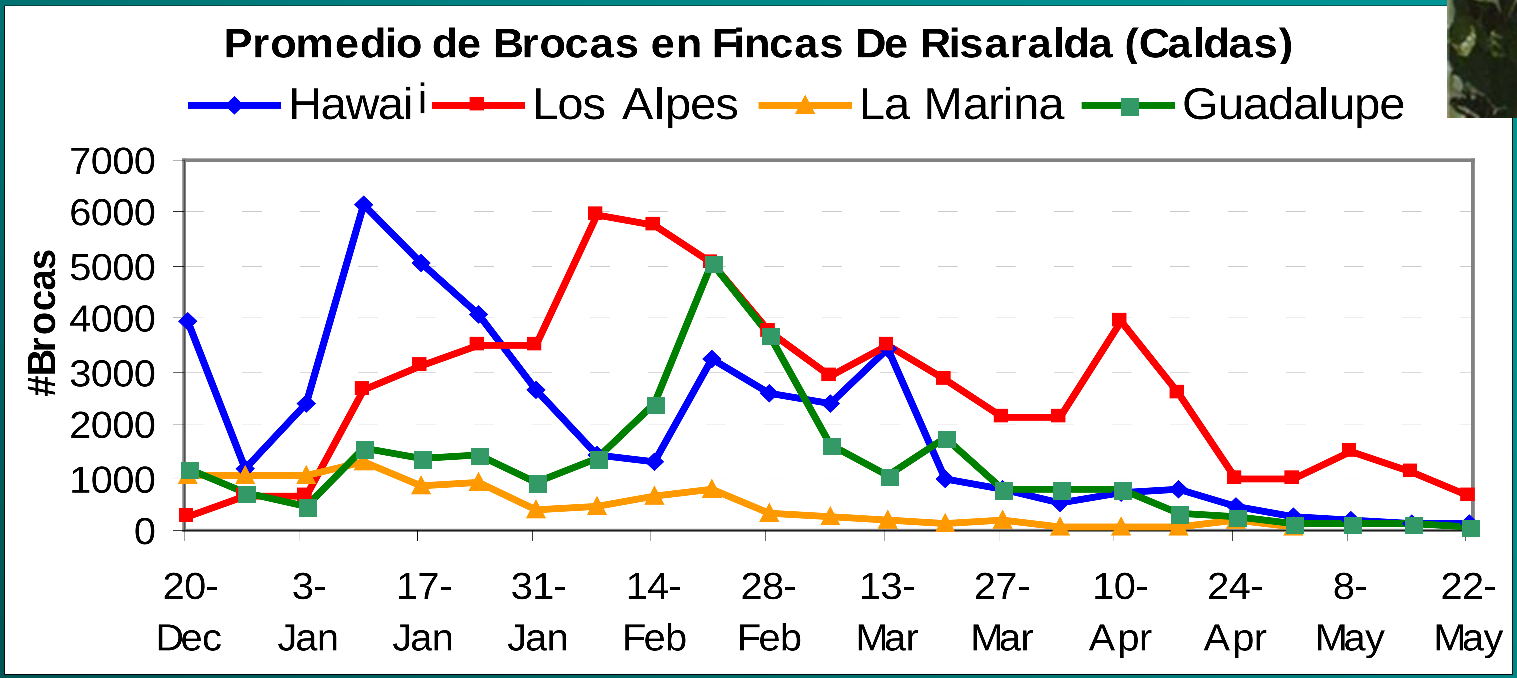
(Dufour & Frérot 2008).

Monitoring Populations of CBB by Trapping



(Trujillo & Aristizábal 2004).

Monitoring CBB in large Commercial Coffee Plantations



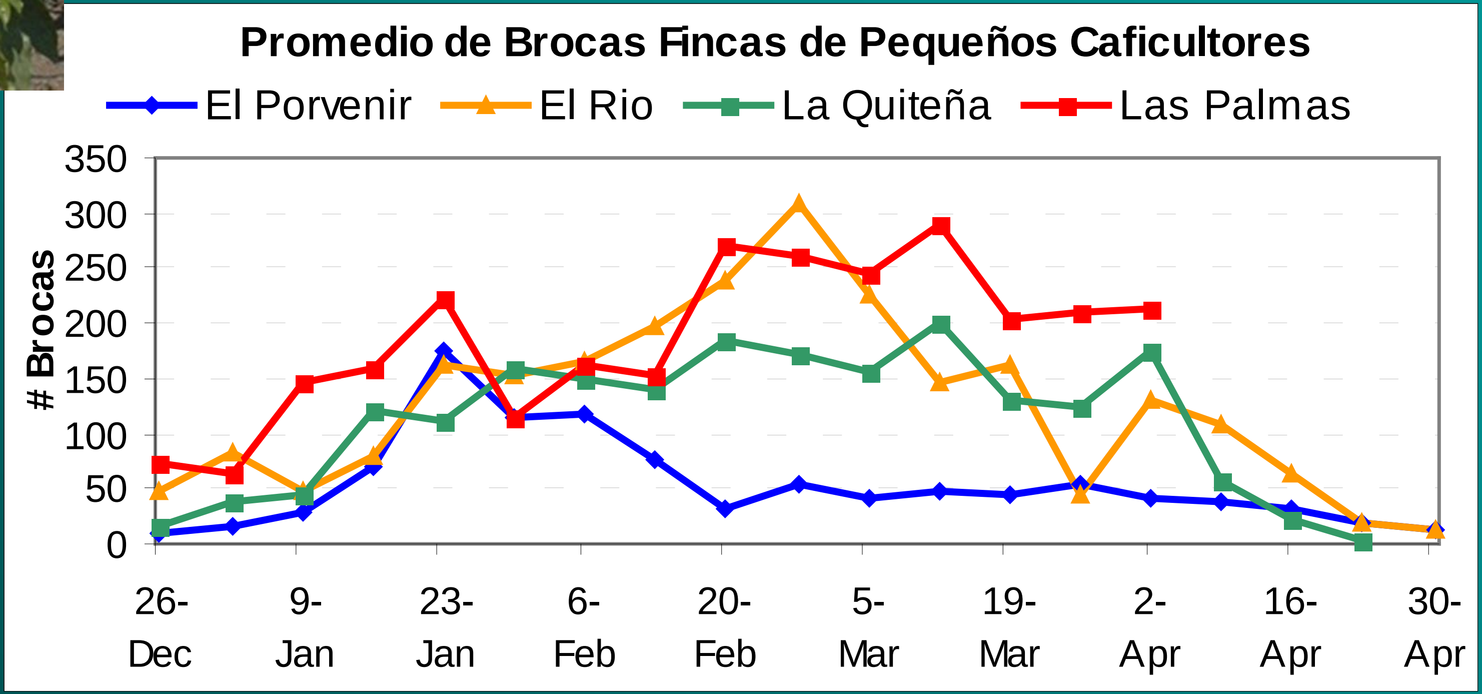
Farms: Hawaii, Los Alpes, La Marina, and Guadalupe. (Risaralda, Caldas, Colombia).

10 traps/ coffee lot.

Attraction area (500 trees/trap; total 5000 trees).

(Aristizábal et al. 2004).

Monitoring CBB in Small Coffee Farms



Farms: El Porvenir, El Rio, La Quiteña, and Las Palmas (Viterbo, Caldas, Colombia).

5 traps/ coffee lot.

Attraction area: 500 trees / trap; Total 2500 trees.

(Aristizábal et al. 2004).

Using Traps for CBB

Trapping detects the season of year with higher peak weeks transit (fly) of CBB.

It is a tool to monitor the CBB populations.

Using traps in hot spots, processing areas, and close to roads, they help to detect and capture CBB.

Massive trapping of CBB is a new methodology in the process of development. More studies are needed for best performance.

Thank you for your Attention

Acknowledgments

Peter S. Baker
Alex E. Bustillo
Steven P. Arthurs
Olga Lara
Carlos A. Leon
Juan C. Zape
Jaime Orozco
Juan C. Lopez
Bernardo Chavez
Esther C. Montoya
Lucely Orozco
Reinaldo Cardenas
Francisco J. Posada
Hernando Duque
Hector I. Trujillo
Mauricio Salazar
Carlos G. Mejia
Mauricio Jimenez
Carlos A. Marin
Arturo Gomez
German Aguirre
Julio C. Patiño
Mauricio Vidal
Myrian Perez
Sandra P. Velarde
James Kerrigan
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