

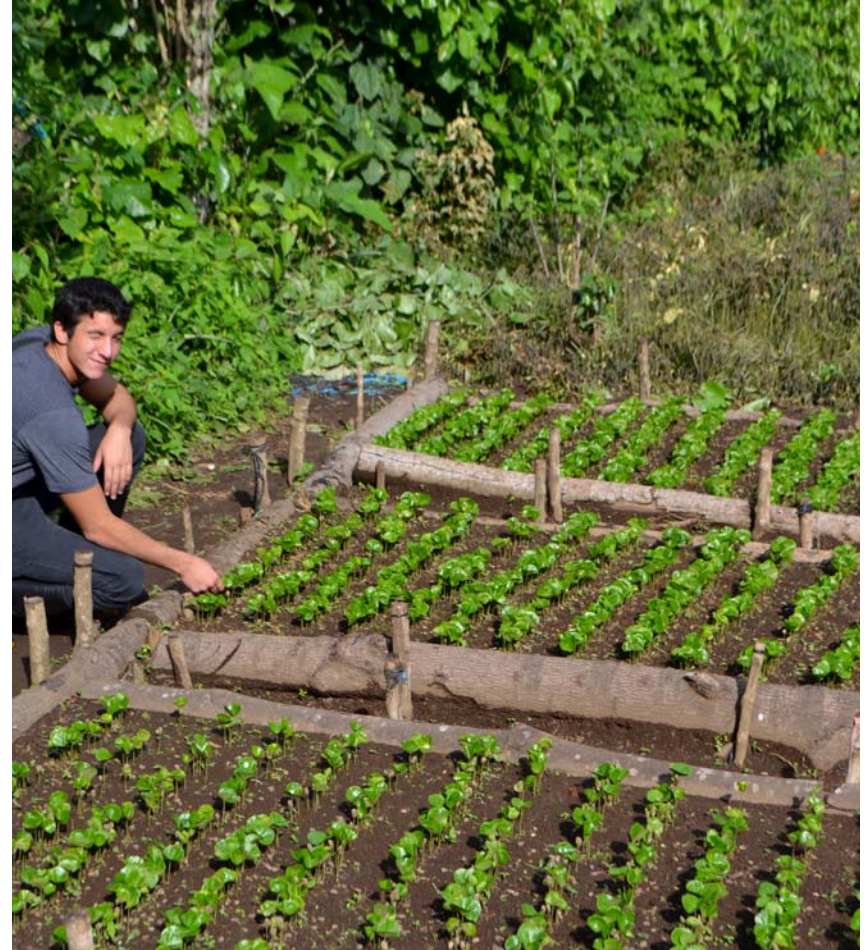
INTEGRATED CBB MANAGEMENT PROGRAM

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MAUI – HAWAII 2012
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FARMER - PANAMA



LOS LAJONES PANAMA / Q&K ESTATE EL SALVADOR



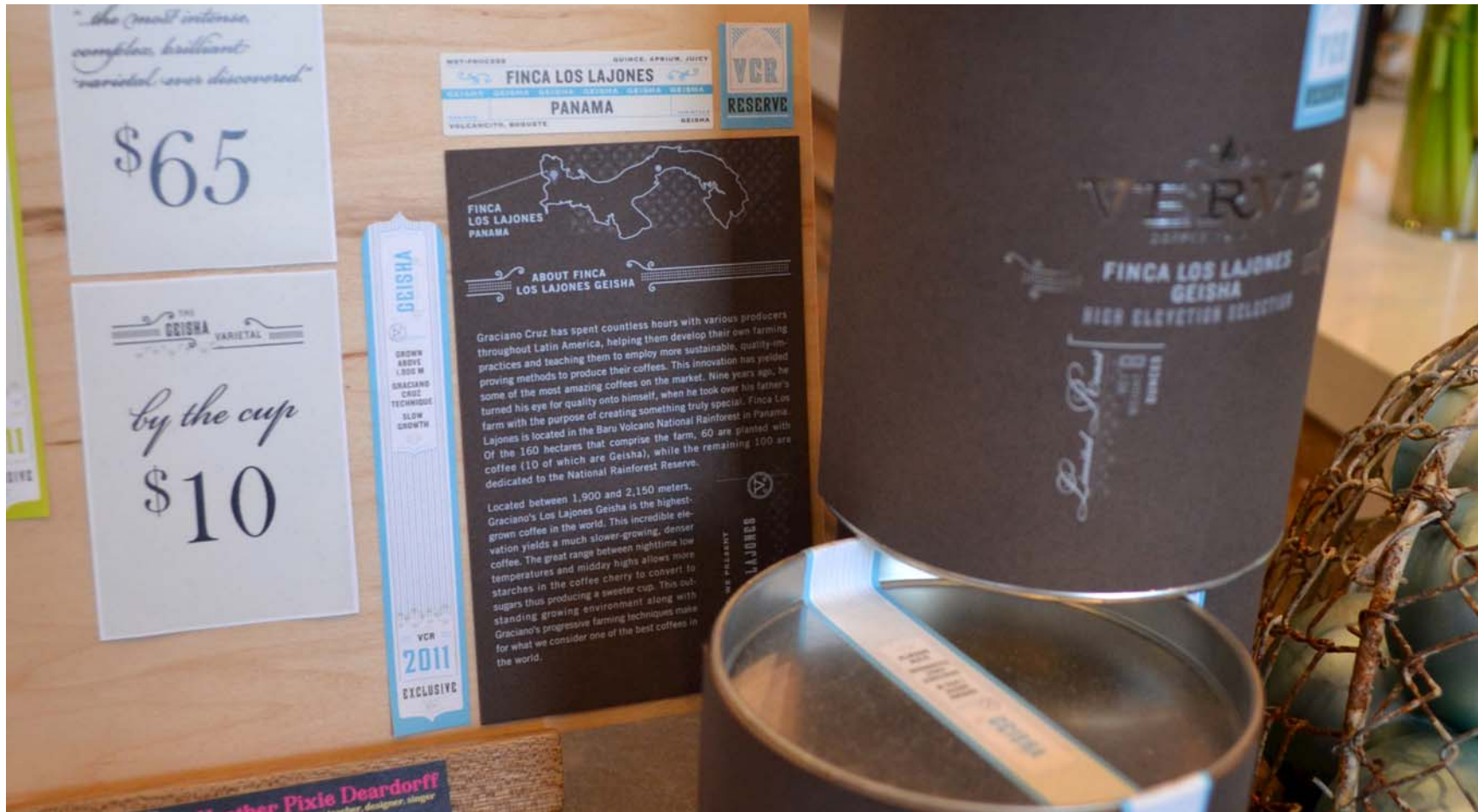
FARMER – EL SALVADOR



LOS LAJONES ESTATE



LOS LAJONES ESTATE



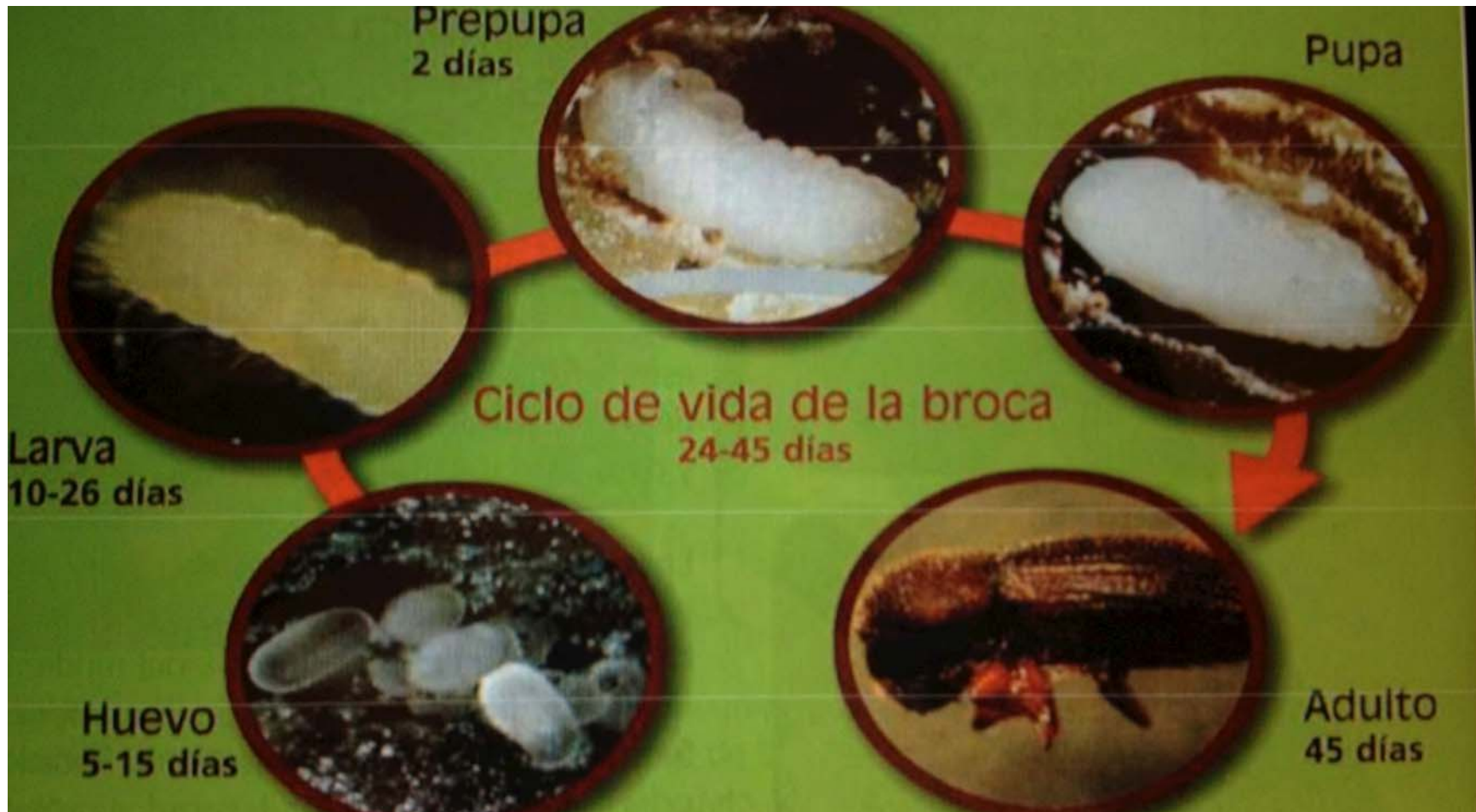
BACKGROUND

- Biopesticide development at Laverlam / Colombia (8 years). Central America & Caribbean / Colombia / Brazil. (1993 – 2002)
- Leading Technical Team responsible for designing the CBB Integrated Management / Panama. (2003-4)
- Building the first entomopathogens reproduction laboratory in Panama for CBB National Program (2004-5).

BACKGROUND



COFFEE BERRY BORER



NATIVE FUNGI STRAINS



CBB LIFE CYCLE / 1

- 24 -45 days / each generation!!! Weather conditions.
- Mainly eats coffee. Favorite food!!!
- Each female puts between 50 -70 eggs in different cherries.
- Attack cherries in early stages as soon have 20% dry matter.
- Cherries are only drill by adult females, the rest of the cycle occurs inside the cherry.

CBB LIFE CYCLE / 2

- Larvae and adults eats 5 -20% of the endosperm. (green bean).
- Eggs / 2 weeks. Larvae / 15 -19 days. Pre & pupae 9 days.
- Progeny ratio 10:1 female / male.
Arrhenotoky!!
- Male life cycle is all inside the cherries, smaller than the female, don't fly, all mating inside the cherry.

HOW THE INSECT MOVE IN THE WORLD

- Original from Africa Central (Guinea, Congo, Uganda & Kenya) / 1867 / Ferrari.
- Brazil 1913.
- Peru 1962. Ecuador 1981. Colombia 1988.
- Guatemala 1971. Honduras 1977. Mexico 1978. El Salvador 1981. Nicaragua 1988. Costa Rica 2000. Panama 2005.
- Jamaica 1978. Rep. Dominicana / Haiti 1995.
- Hawaii / Kona 2010.

PRINCIPAL WEAKNESS OF MOST CBB CONTROL PROGRAMS LATIN AMERICA

- ALWAYS TRY TO CONTROL THE INSECT NOT TO MANAGE THE POPULATIONS.
- CHEMICAL INSECTICIDE ABUSE.
- INSECT FASTER THAN MEN!!!!
- LACK OF QUALITY CONTROL IN BIOLOGICAL PRODUCTS.
- NON EFFECTIVE EDUCATIONAL PROGRAMS TO FARMER & WORKERS.

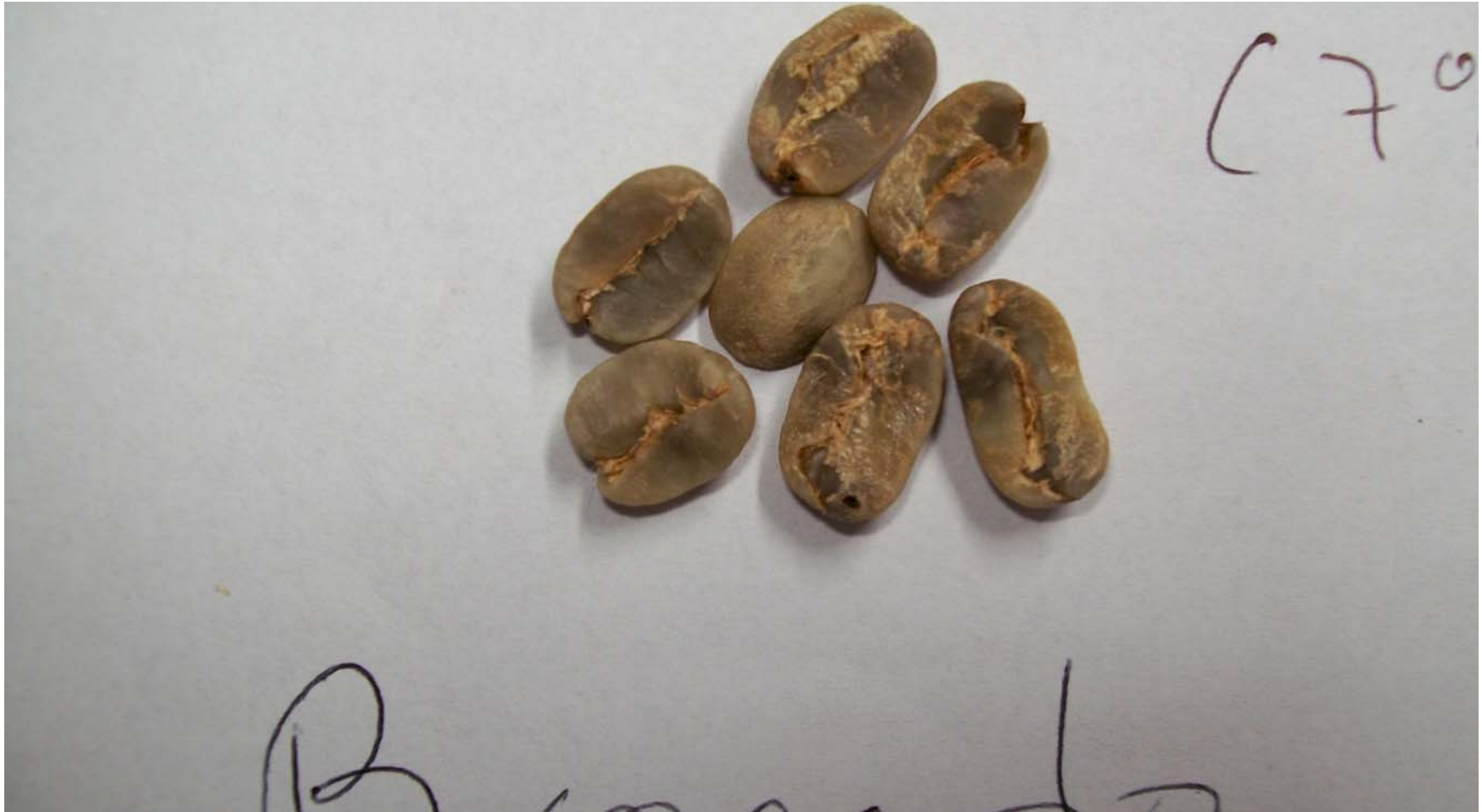
CBB INTEGRATED MANAGEMENT PANAMA PROGRAM

- Panama coffee area 24,000 hectares (70,000 acres).
- 8,000 farmers.
- 30 millions dollars income to the country.
- Coffee is #3 export product.
- Employed 32,000 permanent workers and 70,000 temporary workers in a 4 months period a year.

MAIN DAMAGE

- Attack the fruit.....direct economical damage.
- Decrease green bean quality.
- Decrease yield.
- Loss of quality markets.
- Increase production cost.
- Increase processing cost.

GREEN BEAN DAMAGE



DISSEMINATION

- Parchment use for seedlings.
- Cherries & parchment deliver to mills.
- Farming tools and equipment.
- Workers clothes.
- Mills waste water.
- The wing.
- Transportation, cars, tractors, bags.

MAIN OBJECTIVES DESIGNING THE MANAGEMENT PROGRAM

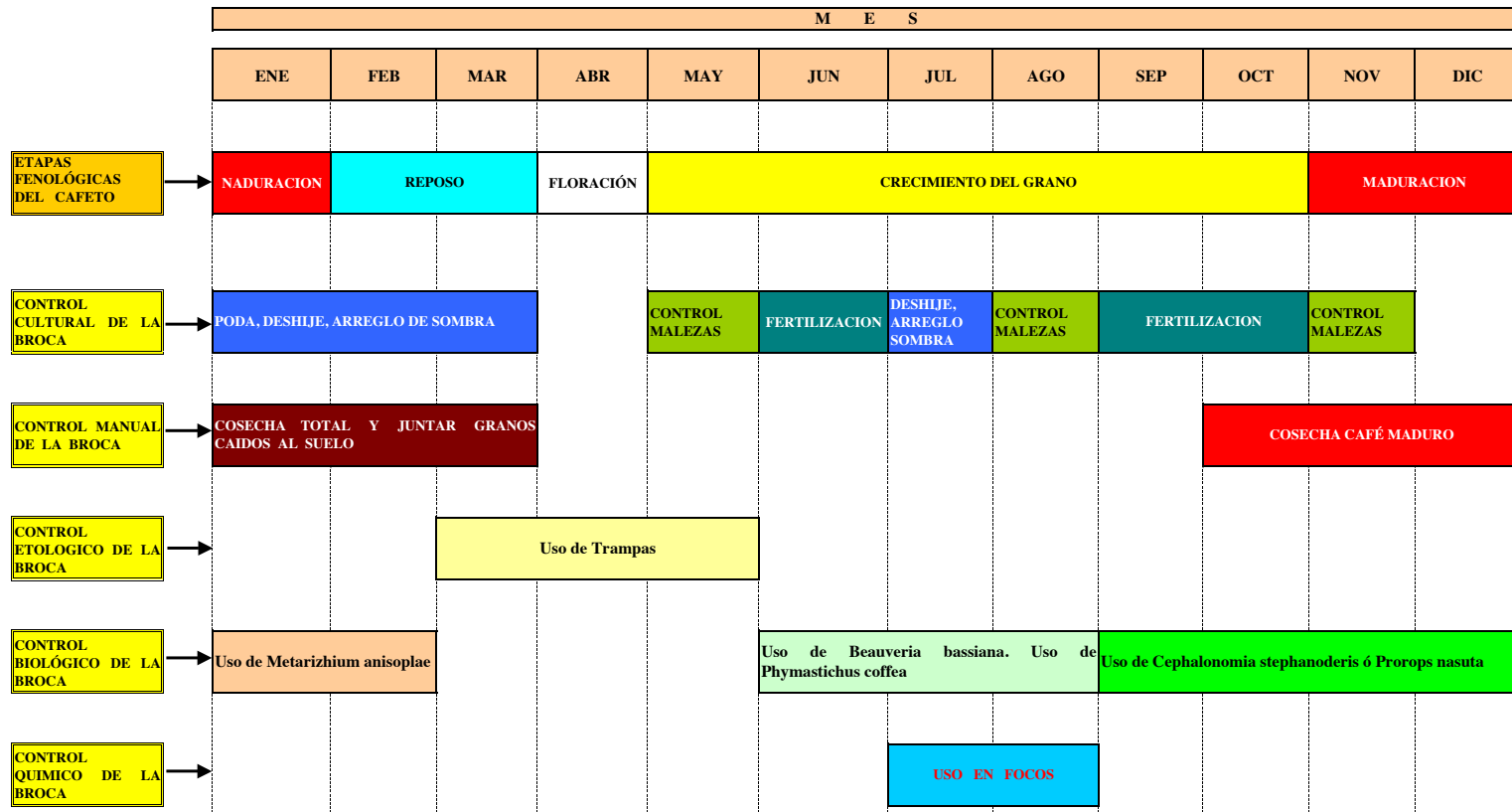
- TEAM ALL THE RESOURCES AVAILABLE .
- DELAY THE DISSEMINATION TIME.
- MAINTAIN THE QUALITY STANDARDS AND IMAGE OF PANAMA COFFEES.
- REDUCE THE MANAGEMENT COST.
- REDUCE TO THE MAXIMUM THE USE OF CHEMICAL PESTICIDES.

KEY ACTIONS

- LEGAL : law # 47, law # 23, Ministry of Agric. Resolution 061 – ADM 2004, resolution 064 – ADM 2005.
- ADMINISTRATIVE: teaming all the main players, government, farmers, quarantine, plant protection agencies, agricultural research institute, Universities, private sector.
- EDUCATIONAL: developing a team of technicians and extensionist totally focus in the CBB Program.
- Quarantine Regulations Inforcement.

CBB INT. MANAG. PROGRAM

**DIRECCION NACIONAL DE AGRICULTURA
PROGRAMA NACIONAL DE CAFÉ
MANEJO INTEGRADO DE LA BROCA DEL FRUTO DEL CAFETO**



METHODOLOGY

- AFTER STUDYING ALL THE DIFFERENT PROGRAMS IN LATIN AMERICA AND AFRICA WAS DECIDE TO APPLY AND PROTECT FIRST THE CBB FREE AREAS IN CONCENTRIC RINGS UNTIL HITTING THE CBB HOT SPOTS OR INFESTED AREAS.
- MAPPING THE WHOLE COFFEE AREAS INCLUDING ABANDONED FARMS OR BACKYARD TREES. FARMER BY FARMER.

CULTURAL CONTROL

- HARVESTING THE FIRST RIPE AND DRY CHERRIES FROM THE TREE.
- COLLECTING THE FALLEN CHERRIES FROM THE SOIL. (80 % CONTROL)
- BREAKING THE ESTABLISHING OF NEW GENERATIONS COLLECTING THE LAST CHERRIES AT THE TREES.
- BEGIN THE HARVESTING AT THE LOTS WITH HIGHER INFESTATION.

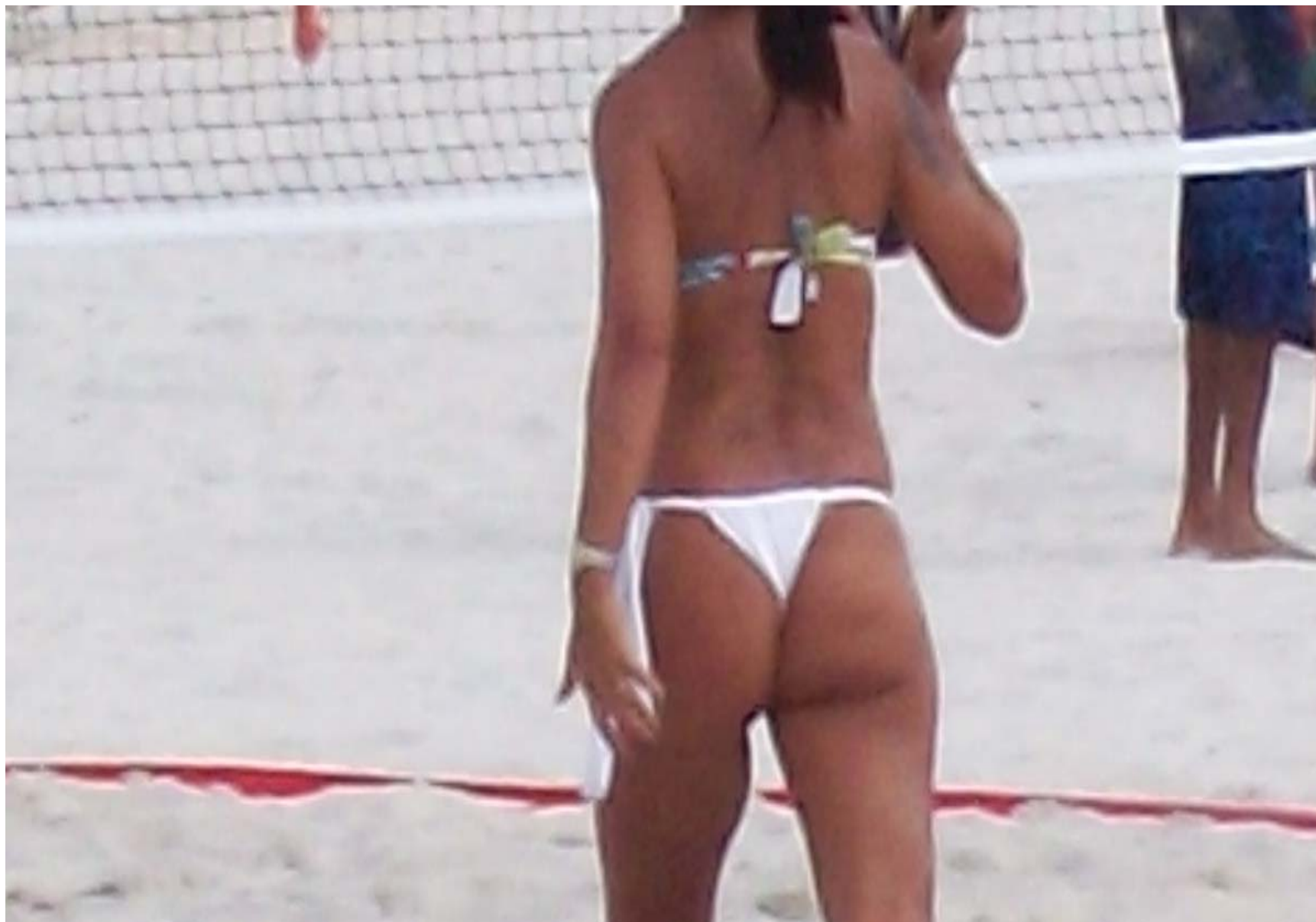
CULTURAL CONTROL

- DECOMPOSTING TOTALLY THE COFFEE PULP BEFORE USING IT AS FERTILIZER.
- USING ORGANIZE PRUNNING AND CANOPY MANAGEMENT.
- WEED CONTROL ON TIME.

GOOD HARVESTING



BRAZIL



MECHANICAL HARVESTING



MECHANICAL HARVEST BRAZIL





MECHANICAL VACCUM MACHINE



MECHANICAL VACCUM



BIOLOGICAL CONTROL

BAUVERIA BASSIANA



METHARIZIUM ANISOPLAE



BIOLOGICAL CONTROL



BIOLOGICAL CONTROL



PARASITOIDS

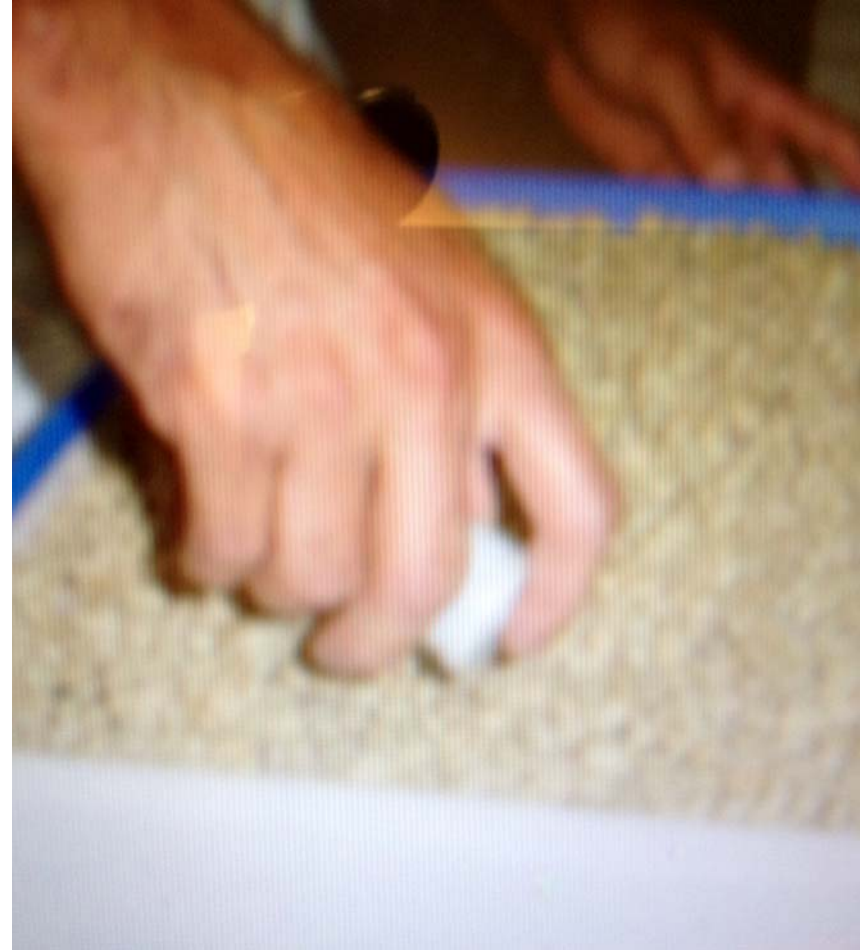
Cephalonomia stephanoderis



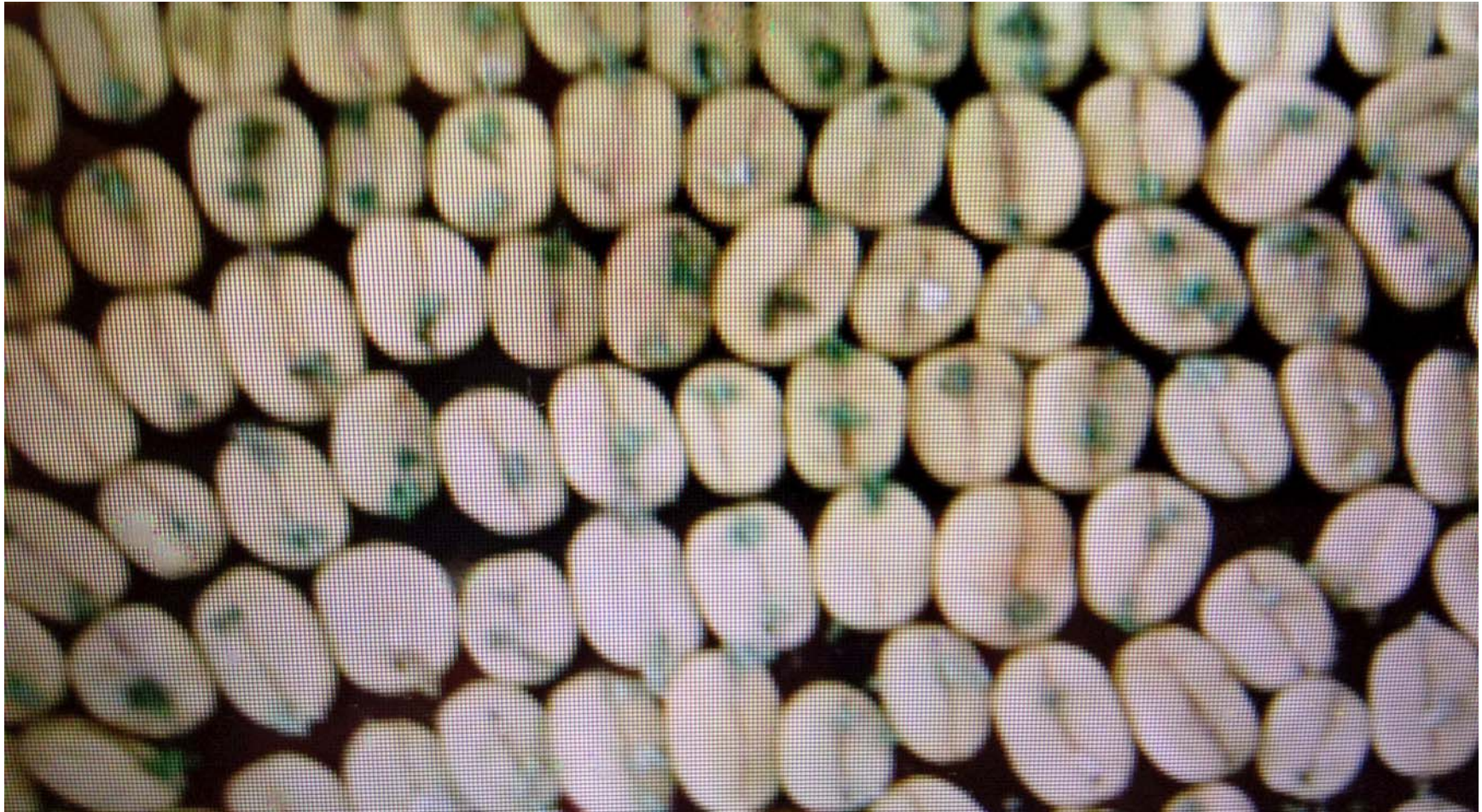
Prorops nasuta



PARASITOIDS PRODUCTION



PARASITOIDS



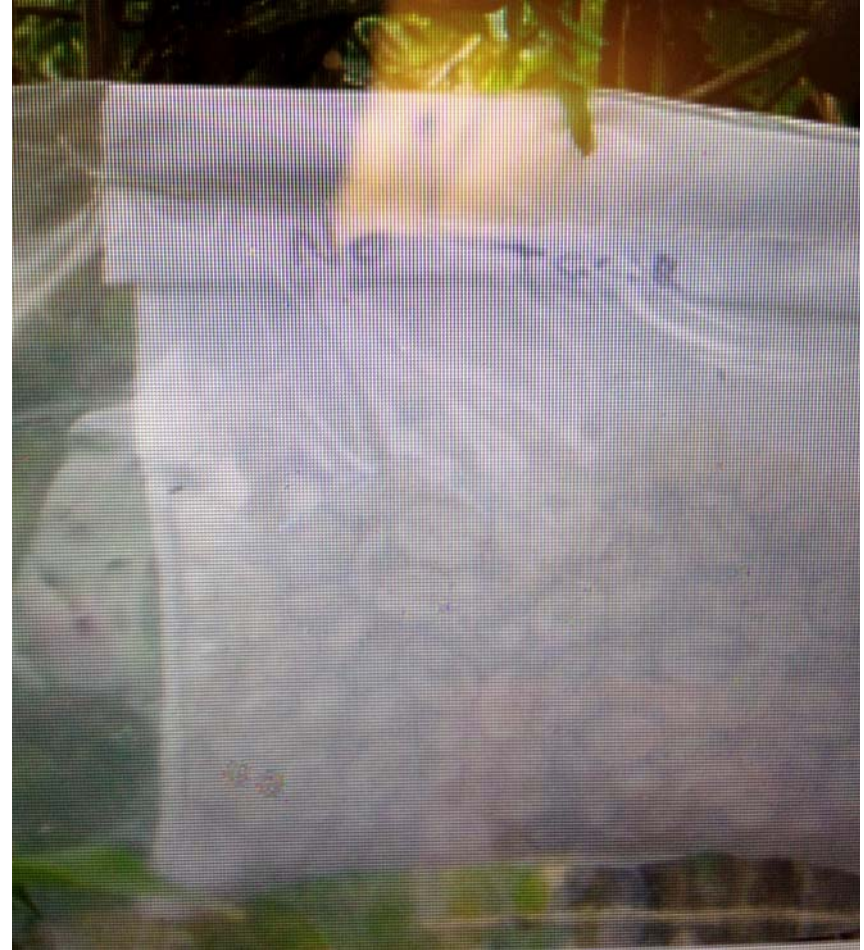
PARASITOIDS



PARASITOIDS



FIELD LIBERATION



PARASITOIDS

- NEMATODES
- *Steinernema feltiae*
- *Heterorhabditis* sp
- *Metaparasitlenchus hepothemi* (Mexico).

LAST CHOICE

CHEMICAL INSECTICIDES CONTROL

CBB – KONA / HAWAII CASE

- REPORTED IN 2010
- LOCATED IN 8 FARMS IN KONA
- SPECIAL CASE DIFFERENT ANYWHERE ELSE.
- ORGANIZED TASK FORCE AND BEGINNING ACTIONS ON THE FIELD.
- INFORCE LAW TO REGULATE TRANSPORTATION OF COFFEE.
- APPROVAL THE USE OF BAUVERIA BASSIANA.

ACTUAL SITUATION

- PROPOSAL AND FUNDS TO BEGIN THE HAWAII CBB INTEGRATED MANAGEMENT.
- MAPPING THE WHOLE COFFEE AREA.
- MONITORING INFESTED AREAS FARMER BY FARMER.
- DESIGN A SOFTWARE MODELING PROGRAM TO MANAGE THE DATA BASE.
- TEAM ALL HUMAN AND ECONOMICAL RESOURCES.

ACTUAL SITUATION / KONA

- INFORCE ACTION INTEGRATED PROGRAM.
- IMPORTANCE OF RESEACH.
- EDUCATION TO FARMERS AND WORKERS.
- DELIVERING SHORT TERM RESULTS.
- ANALIZE ALL THE FACTORS SPECIFIC FOR HAWAIIAN COFFEE INDUSTRY.
- ALL THE OTHER ISLANDS SHOULD BE AS WORRY AS THE KONA OR BIG ISLAND FARMERS.

USE OF DIFFERENT TOOLS

- COLLECTING ALL THE CHERRIES / TREE & SOIL.
- ESTABLISH AN INDEPENDENT QUALITY CONTROL OF THE BIOLOGICAL CONTROL USE OR PRODUCE LOCALLY.
- AWARENESS OF DAMAGE OF CHEMICAL INSECTICIDES AS A CONTROL. ONLY HOT SPOT, FOCUS HIGH INFESTED SPOTS.

KONA / HAWAII ISLAND



KONA / HAWAII



KONA / HAWAII



MAHALO

HAWAII