



Service Bulletin Farmer's

Coffe Crops

Guarany
tradition and technology



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Farmer's
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INDEX

| | | |
|---|---------------------------------------------------------------|----|
| 1 | Introduction | 04 |
| 2 | Coffee crops - mature plants - plantation in production | 05 |
| | Weed control in coffee crops (mature plants) | 06 |
| | Guarany Solutions | 07 |
| 3 | Control methods for main diseases in coffee crops | 08 |
| | Coffee Leaf Rust | 08 |
| | Guarany Solutions | 09 |
| 4 | Control methods for main pests in coffee crops | 10 |
| | Phoma Leaf Spot | 10 |
| | Guarany Solutions | 11 |
| | Coffee Leaf Miner | 12 |
| | Guarany Solutions | 13 |
| | Coffee Borer Beetle (CBB) | 14 |
| | Guarany Solutions | 15 |
| | Red Mite | 16 |
| | Guarany Solutions | 17 |

Introduction

The coffee plant originated in Ethiopia (Africa) and was introduced to Brazil in 1727, in Belém, Pará State. Since then the crop has adapted to various regions of the country, making Brazil the world's largest coffee producer and one of the largest exporters.

Because of the importance of coffee, both in Brazil as well as in many other countries throughout the world, Guarany has invested in the development of products that could make an effective contribution to the control of pests and diseases, thus ensuring the higher quality crops for both producer and the consumer.

Currently we offer the most complete range of equipment and accessories for treating this crop with both innovative design and application solutions.

Our equipment meets ISO and FAO standards and along with the rational application of products for a wide range of uses, always respecting the environment and the operator's safety.

With the objective of added value for the producer, we have produced this handbook which provides useful information and tips

regarding the application of pesticides and how to treat coffee plants.

The 1st **FARMER'S SERVICE HANDBOOK**, prepared by our technicians and specialists, aims to help producers in crop management, focusing on the aspects of sanitary pest control for the coffee plant during its mature phase. In a simple and objective manner, we highlight the principle diseases, pests and weeds affecting crop development during this phase. Key points are addressed such as: principle symptoms; crop damage; conditions conducive to the occurrence of these problems; optimal timing for the control and the ideal solutions using Guarany equipment.

We hope that this handbook acts as a pocket guide for the producer, and will prove useful for achieving the best possible crop results.

You can always count on Guarany who, in providing certified products recognized for their quality in Brazil and throughout more than 60 countries worldwide, always puts the producer in first place.

**WEED CONTROL
IN THE CULTIVATION
OF COFFEE**

WEED CONTROL IN THE CULTIVATION OF COFFEE

CONTROL TIMING

• Main Season - Late Spring-Early Autumn

The rainy season is the time of the highest incidence and growth of weeds. Grass-type weeds predominate.

• Secondary - Early Winter to Early Spring

This is the dry season, when broadleaved weeds predominate, which are more resistant to a lack of rain due to their deeper root system.

During this time, these weeds do not usually compete with the coffee crop, however, good crop management is required to facilitate harvesting by hand.

- Selective herbicides - to control narrow or broad leaf (monocots/dicots) invaders;
- Non-selective herbicide - for general weed control.

In coffee plantations, weed management control focuses on already emerging weeds.

TIPS ON PRODUCT APPLICATION

Identify the weed types to be controlled (use historical area data);

Select the ideal herbicide:

- Pre-emergence = dosages depend on soil texture;
- Post-emergence = dosages depend on the stage of weed development;

GUARANY SOLUTIONS

□ 12L PRO, 16 and 20 Litre Knapsack Sprayer

Accessories:

Horizontal spray boom (4 or 6 nozzles spaced at 50 cm);

Flow rate valve, for pressures of 1 bar (yellow), 1.5 bar (red), 2 bar (blue) and 3 bar (green);

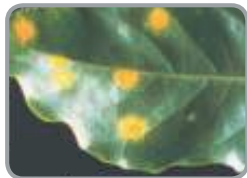
Flow rate regulator - with control and pressure gauge (Figure 2).

For this type of control, all the Guarany knapsack sprayers can be used and for better performance we recommend the use of our horizontal spray boom, which will increase the yield and efficiency of the operation and can be placed in front or behind the operator;

Associated with the above mentioned equipment, Guarany also recommends the use of the flow/pressure regulating valve, - for pressures 1 bar (yellow) 1.5 bar (red), 2 bar (blue) and 3 bar (green) - for optimal control of flow/pressure and hence less interference on the variation in volume application and droplet size.

CONTROL OF THE MAINDISEASES IN COFFEE CROPS (Mature plant)

LEAF RUST (HEMILEIA VASTATRIX)



SYMPTOMS

- Underside of the leaf = yellow-orange spots that can reach 2 cm in diameter, with a powdery appearance.
- Upper surface of the leaf = yellow chlorine stains, which develop into necrosis.

DAMAGE

Severe attacks = defoliation and poor granulation of fruit, which leads to weight loss and degradation of the quality of the, to the stunting of plants and the reduction of the plant's life cycle.

CONDITIONS CONDUCTIVE TO DISEASE

Temperature between 21 and 23°C, prolonged leaf wetness, high relative humidity, and plants with significant leafage

Important

The most severe fungus attacks are usually more pronounced during years of high yield (high fruit load on the plant). Planting at altitudes above 1000m reduces the incidence and severity of the disease.

PROGRESS OF DISEASE DURING YEARS OF HIGH YIELD

- Initiation in the field –mid Summer
- Significant increase –Autumn
- Peaks –early Winter
- Decreases–Winter
- Decreases - June

CHEMICAL CONTROL - TIMING SPRAYING

During years of high yield

Protective fungicides (preventive) 4-5 times early Summer to mid Autumn with an interval of 30 days between applications; or systemic fungicides, 2 applications, early Summer and two months later

Low yield years - Number of applications should be half that of high yield years.

SYSTEMIC FUNGICIDE VIA SOIL

- Application at the beginning of the rainy season (late Spring or early Summer)
- Application on the soil around the plant base gives good moisture levels.

CHEMICAL CONTROL

Spraying based on disease incidence

Sampling

Collect 10 leaves from the bottom third of random plants (in middle of the branches), collecting a total of 100 leaves per field.

Control

If the percentage of leaves with rust infestation is below 5% = start spraying with fungicides;
If the percentage is > 5% reaching 12% = apply systemic fungicides.

GUARANY SOLUTIONS

- Application of systemic fungicide granules through the use of: Manual Granule Applicator (MGD);
- Application of liquid systemic fungicides, through the use of: Soil injector and liquid metering device; Dosing Kit for liquid agrochemicals; Universal Dosimeter valve (with dosing tube);
- Foliarspray application through the use of: 11 Litre and 18 Litre tank capacity Knapsack Power Mist Blower.

When using the Guarany Mist sprayers, special attention should be given to ensure reaching the underside of the leaves (region of fungus penetration), as the fungicide is incapable of translocation through the leaves and also to paying attention to the lower third of the plant (disease onset area).

Manual Granule Applicator (MGA) – Applies doses of 1.5 to 12 g, up to 5cm deep in the soil.

Soil injector - Offers 7 different product doses, between 5 to 50 ml and up to 25 cm in depth.

Dosimeter valve (with dosing tube) - Applies doses from 2 to 25 ml.

Liquid metering device – Offers 7 different product doses from between 5 to 50 ml.

In applications with the Soil Injector and the agrochemical liquid dosimeter kit, the Guarany Symmetrical Manual Knapsack 16 Litre and 20 Litre sprayers can be used. In applications using the Universal Liquid Dosimeter, the same sprayers can be used as well as the 12 Litre Guarany PRO knapsack.

Spray Nozzle Tip: with 5 flow options between 200 and 2500 ml/min and adjustable jet to increase the diameter of the droplet cone size.

CONTROL OF THE MAIN DISEASES IN COFFEE CROPS

PHOMA LEAF SPOT (PHOMA COSTARICENSIS)



SYMPTOMS

Leaves

These appear as new dark spots forming concentric rings (1 to 3 cm in diameter); the leaf becomes wrinkled.

Fruit

Can be attacked at any stage of development. The young fruit becomes black and mummified (figure below).



DAMAGE

- Intense loss of leaf, scorched flower buds and flowers, drying at extremity of branches and fall of fruit.
- Successive attacks = buds on side branches.

CONDITIONS CONDUCIVE TO DISEASE

- Mild temperatures ($\pm 18^{\circ}\text{C}$);
- Places with constant strong and cold winds;
- Prolonged periods of rain/fog/high humidity;
- Plantations at high altitude (greater than 900 m).

Critical period

Beginning and end of the rainy season in scrub-land regions and at high altitude.

SPRAYING

- Preventive control late Spring – early Summer is essential for areas with a history of disease

Important

The control has also been recommended by experts for pre- and post-flowering of the coffee plant (early Spring), as outbreaks of the disease have been occurred in some regions at the time of flowering.

GUARANY SOLUTIONS

Spraying

11L and 18L Knapsack Power Mist Blowers

When using the Guarany Mist Blower, operators should direct the application jet mainly towards the upper part of the plant, where there are younger shoots, which are prone to wind damage. They should treat the more productive branches with applications when coming into flower.

11L The Knapsack Power Blower:

comfort and ergonomic design for the operator, using a high performance (high power) Kawasaki engine, low fuel consumption and excellent penetration of the droplets into the crop.

Spray Nozzle Tip: with 5 flow rate options between 200 and 2500 ml/min and an adjustable dispersion device to increase the diameter of the droplet cone size.

Knapsack Sprayer with Discharge

Extension/Telescopic Lance: allows for more accurate spraying, ideal for applications in the upper region of the plant on new shoots.

CONTROL OF THE MAIN INSECT PESTS IN COFFEE CROPS

COFFEE LEAF MINER (LEUCOPTERA COFFEELLA)



Adult moth = 6.5mm wingspan up to 2.2mm long.



Larva

SYMPTOMS/DAMAGE

- The moth eggs are laid on the leaves; Larvae hatch and form galleries.
- Impairment of photosynthesis; plant defoliation.

IDEAL CONDITIONS FOR THE PEST

- Temperature of around 27°C;
- Long periods without water (drought);

- Plantations having wider spacing between plants;
- Hot regions = higher generation of the pest.

CHEMICAL CONTROL - TIMING

1. Regions where the pest is not so common

Spraying should be carried out when 30% of the leaves from the mid and upper thirds of the plant are infested (without damage caused by predatory wasps).

2. Regions where the pest is commonly found

- Firstly = application of granular systemic insecticides (in the soil) or liquids (onto soil - crop row - or on the bark of plants - "drenching");
- Secondly = spray if the infestation level reaches 30% of the leaves, as mentioned above.

Note: Spraying should be done during the periods of dawn or dusk.

1. Application of granular systemic insecticides:

Manual Granule Applicator (MGA);

2. Application of liquid systemic insecticides:

Soil injector with applicator; Liquid agrochemical dosimeter kit; Universal dosimeter valve; Liquid Applicator (with dosing tube);

3. Moth control spraying:

Knapsack Power Mist Blower with 11 and 18 litre tank capacity.

Soil injector :

Offers 7 different product doses, between 5 to 50 ml and up to 25 cm in depth.

Universal dosimeter valve (with dosing tube) :

Applies dosages from 2 to 50 ml

Liquid metering device

Offers 7 different product doses from between 5 to 50 ml.

Universal dosimeter valve

Applies a dose of 1.5 to 12g up to 5cm deep in the soil.

According to research by RIGATANO (2002), the application of neo-nicotinoid thiamethoxan insecticide by irrigation ("drenching") at the base of the stem delivers excellent results.

The Knapsack Power Blower:

comfort and ergonomic design for the operator, using a high performance (high power) Kawasaki engine, low power consumption and excellent penetration of the droplets into the crop.

Spray Nozzle Tip :

with 5 flow rate options between 200 and 2500 ml/min and an adjustable dispersion device to increase the diameter of the droplet cone size.

CONTROL OF PRINCIPLE DISEASES IN COFFEE CROPS

COFFEE BORER BEETLE (HYPOTHENEMUS HAMPEI)



Adult beetle (± 1.65 mm length)



Borer larva



Fruit perforated by the borer

SYMPTOMS/DAMAGE

- Adult beetles open a hole and deposits its eggs in the fruit; Larvae hatch and open up galleries
- Attacks the fruit (green, ripe and dry). Very young fruits are not preferred.
- Loss of weight and fruit flavour (loss of quality) and fruit drop.

IDEAL CONDITIONS FOR THE PEST

- When plant is in fruit;
- Long periods without water (drought);
- Plantations having wider spacing between plants;
- Hot regions = greater number of pests generated.

Critical period

November to January = 90 days after the main flowering.

CHEMICAL CONTROL - TIMING

Sampling

Monthly (November to March): sample ± 100 fruits/plants (internal branches); 50 plants/field.

- Apply when field infestation reaches 5% of that field (infested fruit v healthy fruit). Traps = Place 20 traps/ha.
- Control timing = When 4 mature adults/trap/fortnight are found, when the price of coffee is high and; when 7 adults/trap/fortnight are found, when the price is low.

Important

Application of Endosulfan insecticide is forbidden to be used with knapsack sprayers. Consult an agronomist for other controlled insecticides.

GUARANY SOLUTIONS

1. Spraying = controls the beetle (contact action)

Knapsack Power Mist Blower.

Due to the need to reach the coffee fruit, where the beetles tend to concentrate, the inner part of the canopy should be targeted (especially plants with excessive foliage). Guarany Mist Sprayers are the ideal equipment for this application, as they can produce fine droplets (DMV), using any of the flow options, facilitating the penetration and improving plant coverage.

The Knapsack Power Blower:

comfort and ergonomic design for the operator, using a high performance (high power) Kawasaki engine, low fuel consumption and excellent penetration of the droplets into the crop.

Spray Nozzle Tip :

with 5 flow rate options between 200 and 2500 ml/min and an adjustable dispersion device to increase the diameter of the droplet cone size.

GUARANY SOLUTIONS

1. Spraying

Knapsack Power Mist Blowers

When using the Guarany blower, operators should direct the application jet mainly towards the upper part of the plant, where there are a greater number of younger shoots which are susceptible to wind damage; as well as treating the more productive branches when coming into flower.

The Knapsack Power Blower:

comfort and ergonomic design for the operator, using a high performance (high power) Kawasaki engine, low fuel consumption and excellent penetration of the droplets into the crop.

Spray Nozzle Tip :

With 5 flow rate options between 200 and 2500 ml/min and an adjustable dispersion device to increase the diameter of the droplet cone size.

Manual Knapsack Sprayer with Discharge Extension/Telescopic Lance

allows accurate spraying, ideal for applications in the upper region of the plant on new shoots/flowers.

SOLUTIONS GUARANY





18 litre Knapsack Power Mist Blower



11 litre Knapsack Power Mist Blower



Spray Nozzle Tip



Application using 11 litre Knapsack Power Mist Blower

GUARANY SOLUTIONS



Gate Flow Rate Regulator



Lance Extension



16 and 20 litre Knapsack Sprayer



Guarany Knapsack Granule Applicator



12 litre PRO Knapsack Sprayer



Horizontal Boom



Granule Metering Device



Soil Injector



Universal Dosimeter Valve



Liquid Metering Device



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