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| TerrAmaz : un partenariat inédit qui concilie lutte contre la déforestation  et développement en Amazonie | Land PortalDeSIRA: Development Smart Innovation through Research in Agriculture |  International Partnerships    **Protocol P&D dynamic**  ***DeSIRA ROBUST project***  ***12th January 2023***    **Houssem TRIKI** |

**Scope**:

The objective of the study is to monitor the dynamics of 4 pests and diseases (P&D) at the tree level and the physiological responses of coffee to attack under shaded and unshaded conditions. The 4 P&D are Black Twig Borer (BTB), Red Blister Disease (RBD), Coffee Berry Borer (CBB) and Coffee Leaf Rust (CLR).

**Site and clones selected**:

The site is the CAFNET trial.

Two clones were selected.

L2 (named: J24/13/20/4) has 67 trees in the trial

L3 (named: MFCT1) has 57 trees in the trial

The 2 experiments will be done at regular intervals on the same trees.

* Mark the selected trees that will remain the same for the duration of the project

1. **Experiment 1: Pest Interaction (P&I Experiment)**

**Tree selection**:

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| Shade | Clone | BTB | RBD | CLR | CBB | All |
| No | L2 | 5 | 5 | 5 | 5 | 20 |
| L3 | 5 | 5 | 5 | 5 | 20 |
| Yes | L2 | 5 | 5 | 5 | 5 | 20 |
| L3 | 5 | 5 | 5 | 5 | 20 |
| Total | | 20 | 20 | 20 | 20 | 100 |

* 20 L2 shaded
* 20 L2 unshaded
* 20 L3 shaded
* 20 L3 unshaded

**Assessment and data recording**

The assessments are of two types:

* Tree characteristics
* The absence and presence of each pest on every branch of the tree.

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| Date | Repetition | Block | Line and column | Clone | Branch Level from top | Tagged branches in experiment 2 C&P | BTB | RB | CBB | Dieback | Other |
| xx-xx-xxxx |  |  |  |  | 1 | X = if tagged  0 = if not tagged | 1 = presence |  |  |  |  |
|  | 2 |  | 0 = absence |  |  |  |  |
|  | 3 |  |  |  |  |  |  |
|  | 4 |  |  |  |  |  |  |
|  | 5 |  |  |  |  |  |  |
|  | 6 |  |  |  |  |  |  |
|  | 7 |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | . |  |  |  |  |  |  |
|  | 67 |  |  |  |  |  |  |
|  | 68 |  |  |  |  |  |  |
|  | 69 |  |  |  |  |  |  |
|  | 70 |  |  |  |  |  |  |
|  | 71 |  |  |  |  |  |  |

1. **Experiment 2: Contamination and Physiology (C&P Experiment)**

**Tree selection**:

The same trees are selected for this experiment as the one before (P&I experiment)

**Branches selection**:

Two pairs of branches are taken from each tree and marked (4 branches per tree). The branches will remain the same throughout the study.

The two pairs of branches are chosen at two different levels:

* One pair around level 10 from top
* One pair level 20 from top

For each pair: select 1 attacked branch and a healthy branch in the same direction, as close as possible to the attacked branch

**Assessment and data recording**

The assessments are of four types:

* Tree characteristics (clone, Id)
* Branches characteristics (levels from top)
* The level of the first cluster with fruits
* Total and attacked fruits per cluster on every cluster of the branch
* **Black Twig Borer:**

**Objectives of the measurement:**

* Understand and model dynamics of BTB
* Estimate the photosynthesis of the branch when the leaves are not green and healthy

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Repetition** | **Block** | **line and column** | **Clone** | **Branch Level from top** | **Type of measurements** | **Date** | **Measurement** |
|  |  |  |  |  | Number of holes | xx-xx-xxxx | 3 |
| Order of the attacked phytomere (Holes placement) | P1; P5; P8 |
| Total number of phytomere | 20 |
| Number of phytomeres with dieback | 5 |
| Order of phytomeres with dieback | P10-p15 |
| number of harvested fruits |  |
| number of Green leaves |  |
| number of yellowish leaves | 3 |
| order of yellowish leaves | 10 |

* **Red Blister:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Repetition** | **Block** | **line and column** | **Date** | **Branch level from top and state** | **Measurements** | **Cluster 1** | **Cluster 2** | **…** | **Cluster n** |
|  |  |  |  | 11 /attacked | Total number of fruits |  |  |  |  |
| Number of fruits with spots (start of a contamination) |  |  |  |  |
| Number of contaminated fruits (advanced) |  |  |  |  |
| Number of fruits with necrosis |  |  |  |  |
| Presence of CBB (1=yes, 0= no) |  |  |  |  |

* **Coffee Berry Borer:**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Repetition** | **Block** | **line and column** | **Date** | **Branch level from top and state** | **Measurements** | **Cluster 1** | **Cluster 2** | **…** | **Cluster n** |
|  |  |  |  | 18 /Healthy | Total number of green fruits |  |  |  |  |
| Number of green drilled fruits |  |  |  |  |
| Total number of red fruits |  |  |  |  |
| Number of red drilled fruits |  |  |  |  |