



## Effect of insect frass on the growth of barley crop

1-5 September, 2024

**Presented by :**  
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# Contexte and objectives

## Economic importance of barley crop in Morocco

**Cultivated area:** 2 to 3 million hectares, representing a significant proportion of the total cereal-growing area in the country (30-40% of the cereal crop area) adapted to semi-arid and arid regions.

**Annual Production:** The annual production of barley in Morocco varies significantly due to climatic conditions, particularly rainfall (1.5 to 3 million tonnes annually).

**Yield in average:** relatively low, between 0.8 to 1.5 t/ha.

## Contribution to Gross Domestic Product

**Use:** 60-70% for animal fodder and human consumption.

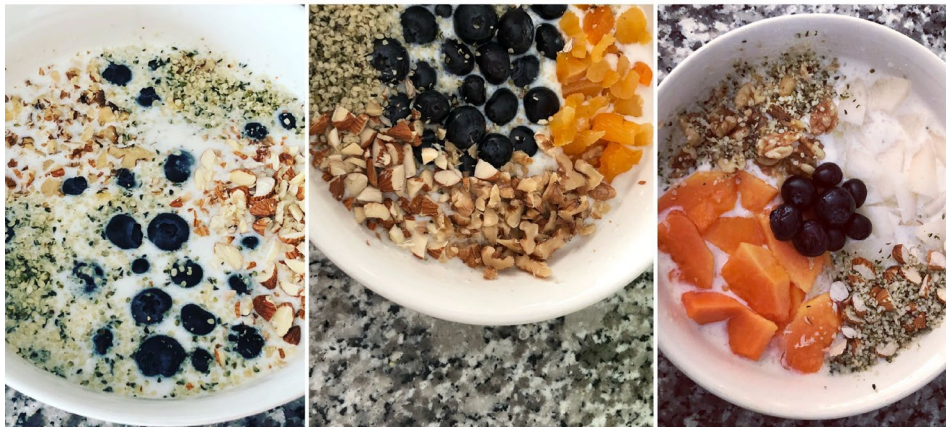


## Contexte and objectives

Different  
uses and  
foods



## The Amazing Super Food





## Contexte and objectives

Environmental and health issues of other organic fertilizers: example of poultry manure

- Odor nuisances in the neighborhood, case of Ain Taoujdate city, Morocco.
- Poultry manure contain ammonia, which is a colorless gas that is irritating to both humans and animals.



## Contexte and objectives

Objective was to valorize and optimize the frass insect for barley crop under Moroccan climate conditions  
Circular economy without waste by using frass insect





# Methodology

During December 2023, field trials were implemented at Ain Taoujdate, Morocco using insect frass as biofertilizer for local barley crop (“*Beldi*” variety).





# Methodology

## Soil analysis

The physicochemical analysis of the soil was released, including pH, organic matter, P, K and electric conductivity.





## Methodology

Based on N content in the frass and the rate of N used as reference for barley crop, six treatments were used, including negative and positive controls. All treatments (3 replications each) were disposed according to a randomized block. Water consumption (drip irrigation) was also calculated using a flow meter.

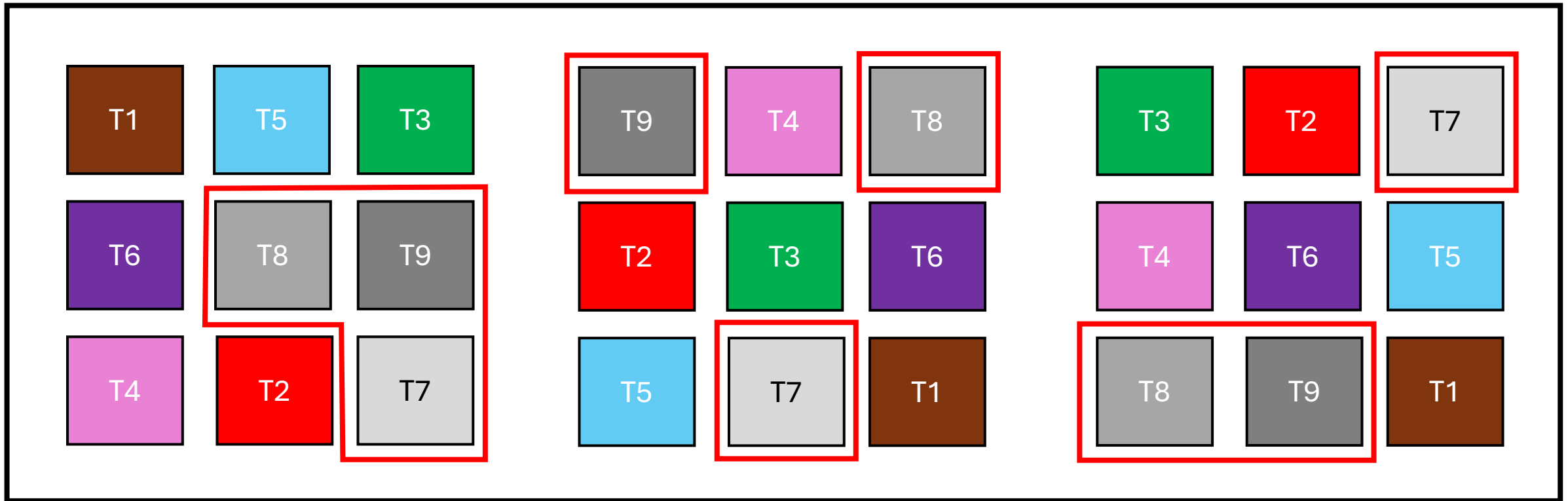
**N content in the frass : 2,09%**

**Need of barley crop in N: 120Kg/ha**

**T<sub>3(Ref)</sub>: 5,8 t/ha of insect frass.**



# Methodology



**T1:** NC (0t/ha).

**T2:** PC using chemical fertilizer 46-0-0 (~219 Kg/ha).

**T3<sub>(Ref)</sub>:** 5,8 t/ha of insect frass.

**T4:** 2,9 t/ha of insect frass (Red. of 50%).

**T5:** 1,45 t/ha of insect frass (Red. of 75%).

**T6:** 11,6 t/ha of insect frass (X2).

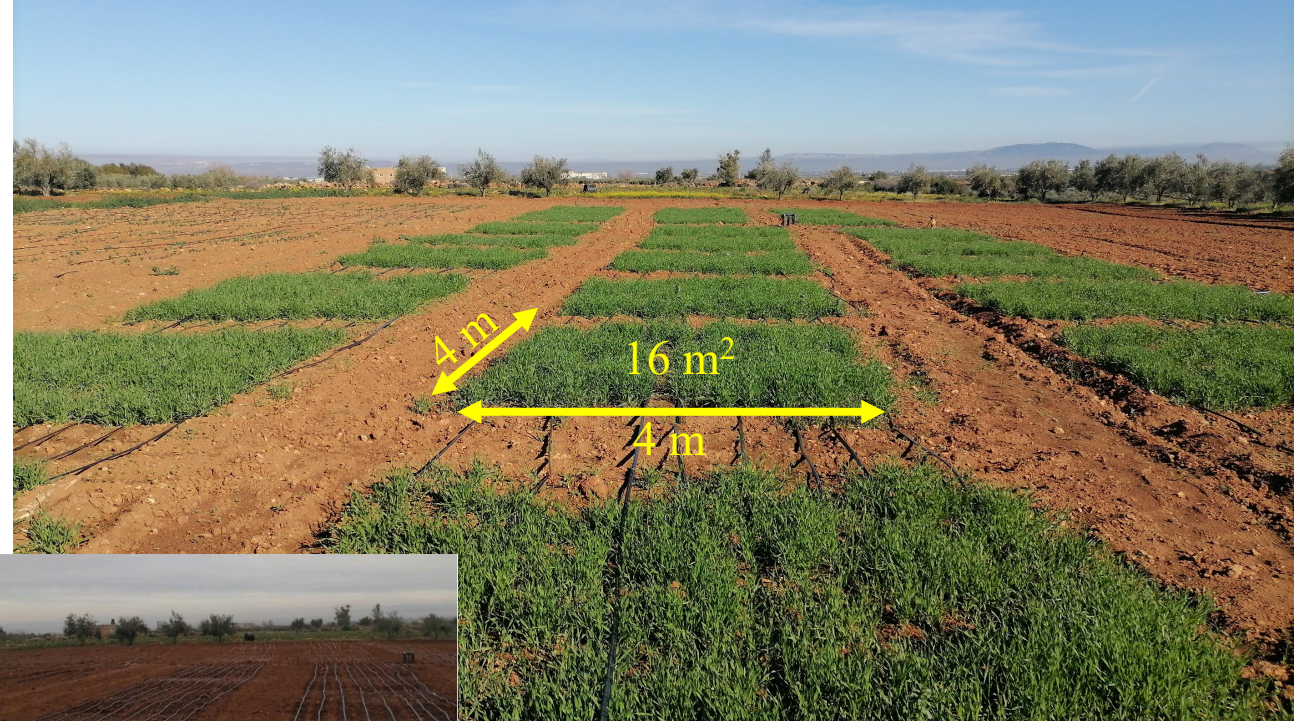
**T7, 8 and 9 :** Poultry manure at different rates.

# Methodology

All treatments were applied on 16 m<sup>2</sup> square of land, where barley seeds were broadcast sowed at 30 g/m<sup>2</sup>.

Dirp irrigation were used, consuming about 48m<sup>3</sup> of water during all barley cycle.

Phytosanitary treatments were used for fungus disease and weed, according to standard agricultural practices.





# Methodology

## Morphological, physiological and agronomic parameters

Plant height

Number of stems

Leaf area

leafs fresh weight

Number of stem nodes

Fresh weight of root

Leaf area / leaf FW



Beard lenght

Number of grains/ear

Root lenght

Stem diameter

Weight of 1000 seeds

Stomatal conductance

SPAD



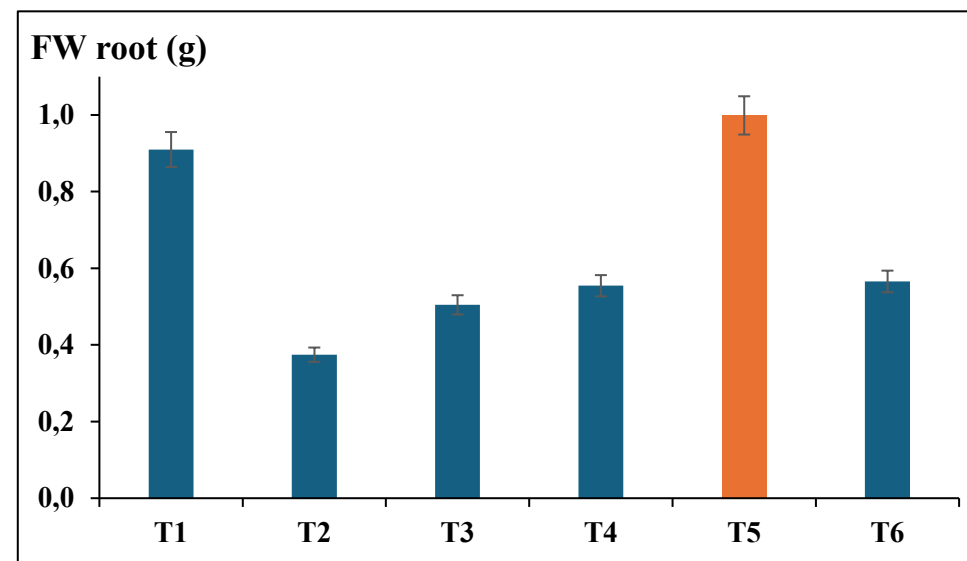
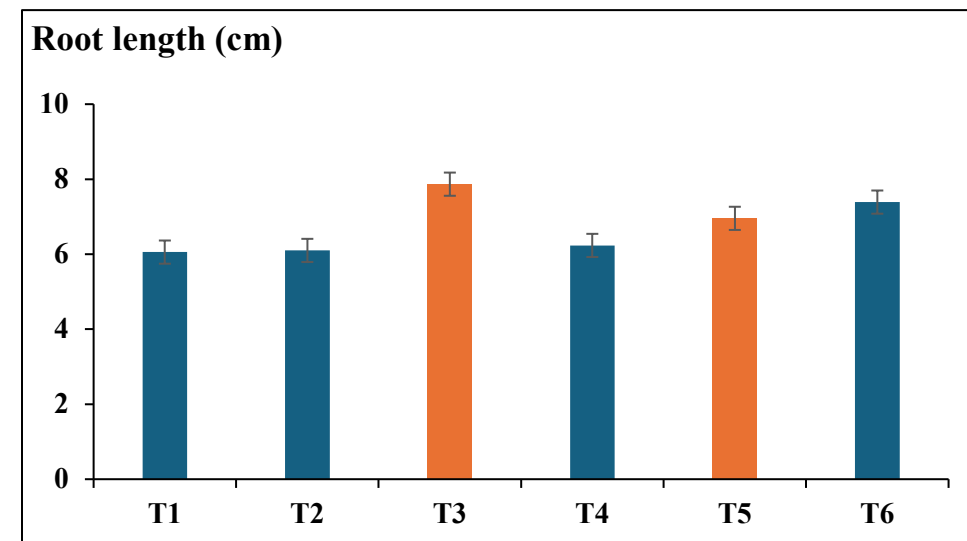
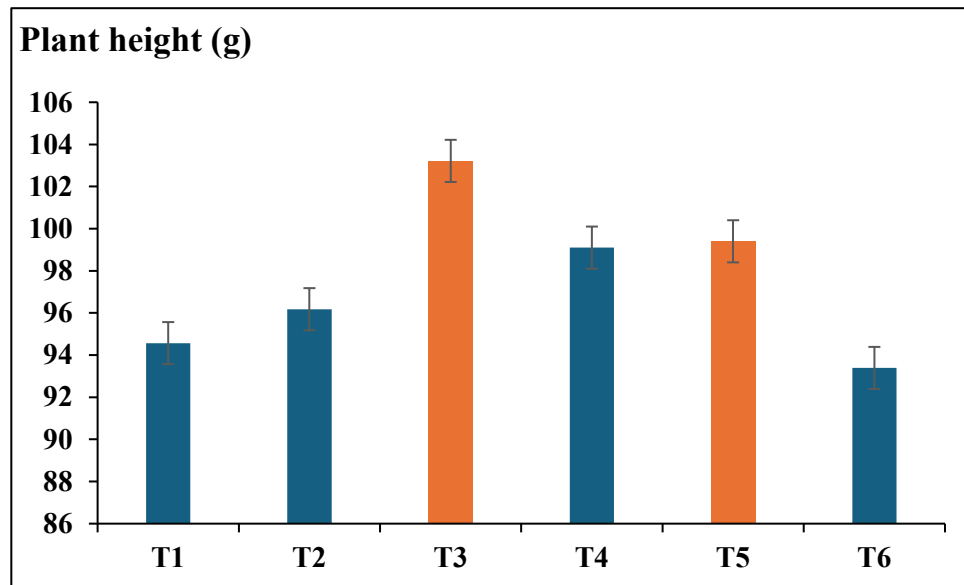
# Results

## Soil analysis

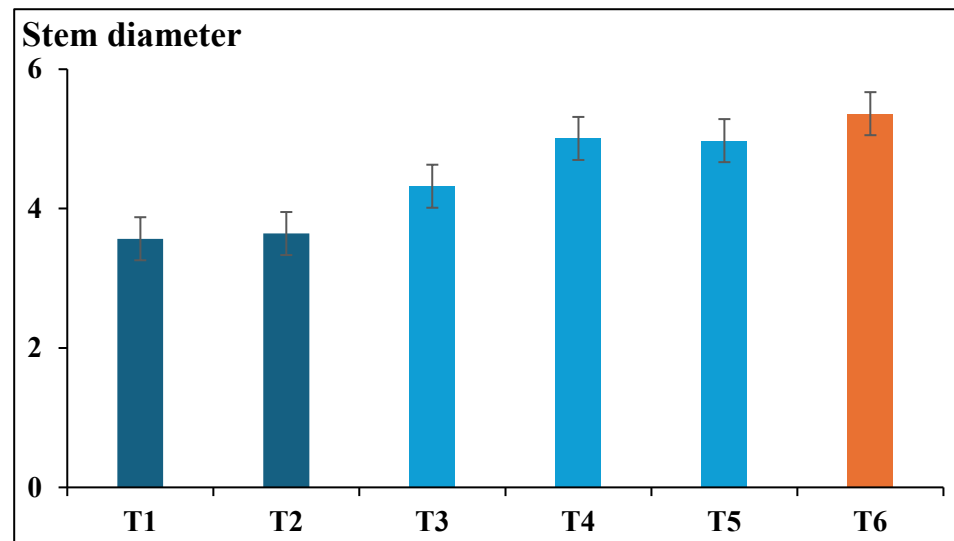
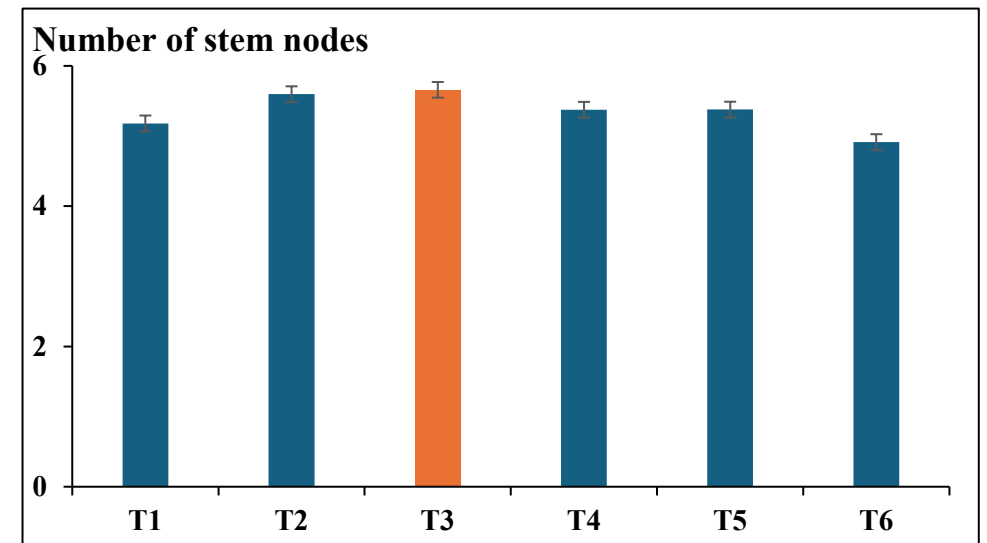
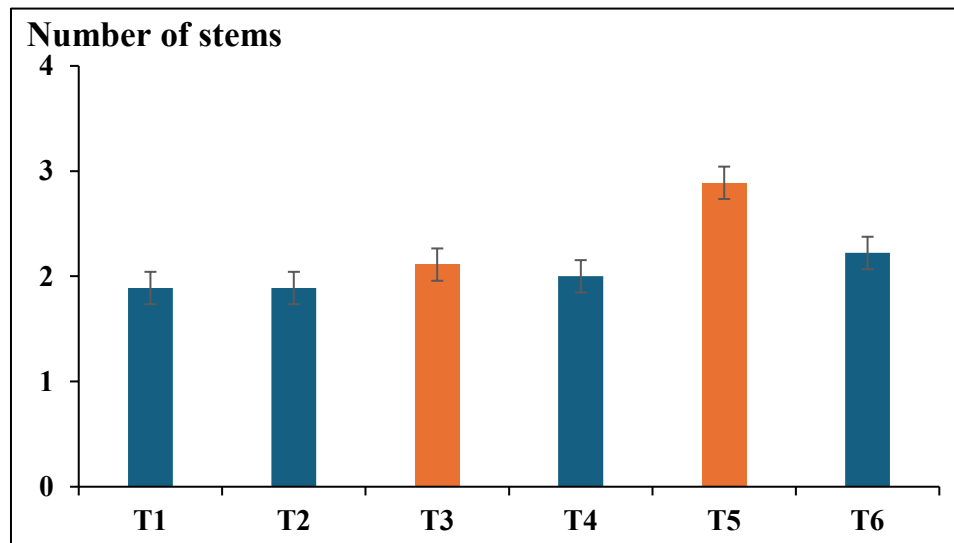
| Sample | pH   | Organic matter (%) | Phosphore (ppm) | Potassium (ppm) | Electric conductivity (ms/cm) |
|--------|------|--------------------|-----------------|-----------------|-------------------------------|
| 1      | 8.00 | 1.93               | 52.6            | 13.24           | 2.33                          |
| 2      | 8.06 | 1.72               | 49.2            | 13.65           | 1.11                          |
| 3      | 7.94 | 2.55               | 64              | 33.08           | 1.92                          |
| 4      | 7.98 | 2.27               | 67              | 34.94           | 0.70                          |
| 5      | 7.98 | 2.13               | 58              | 26.05           | 0.96                          |
| 6      | 8.08 | 2.34               | 68.6            | 20.47           | 0.89                          |



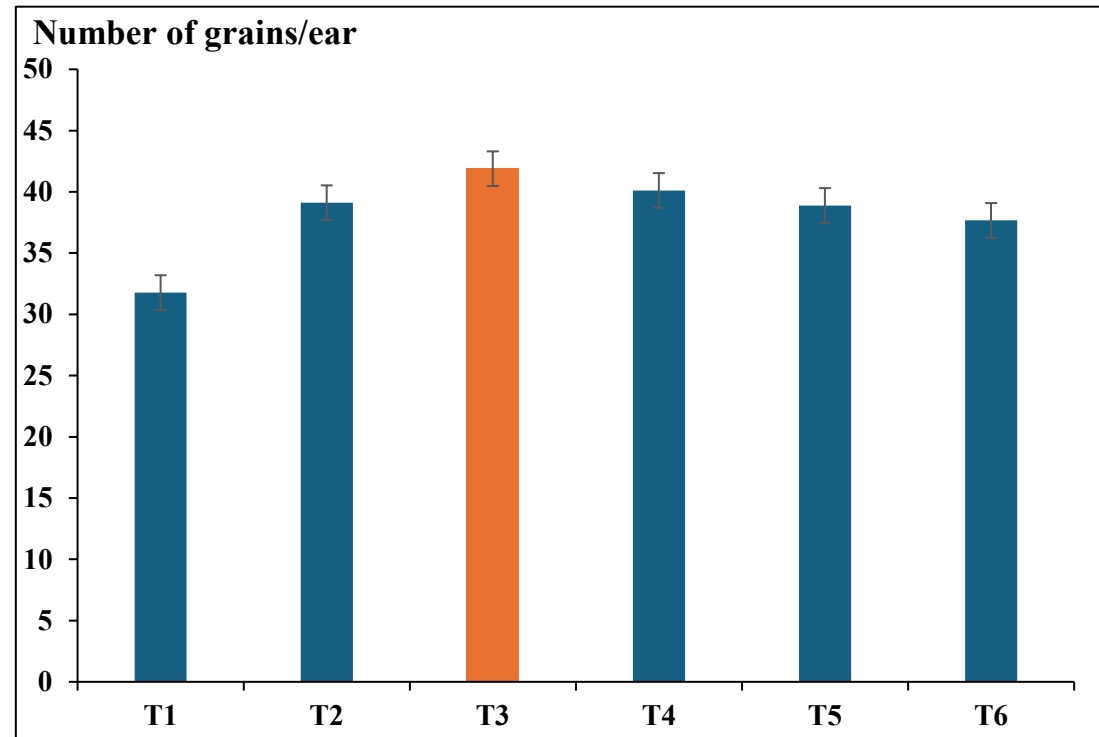
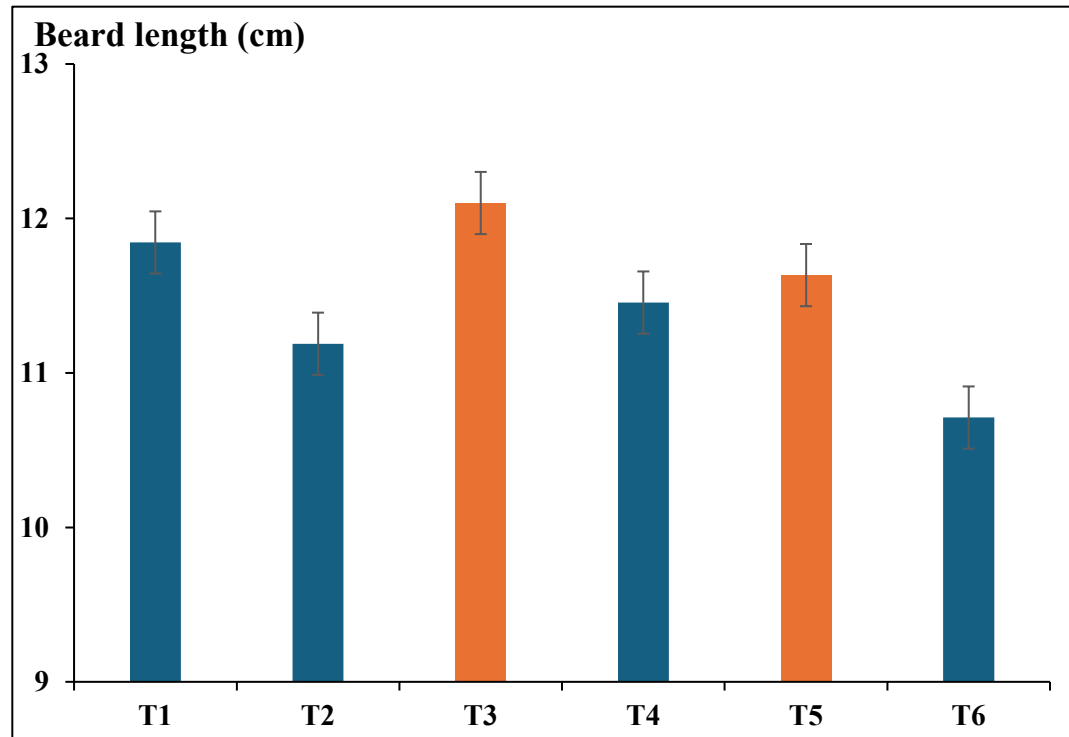
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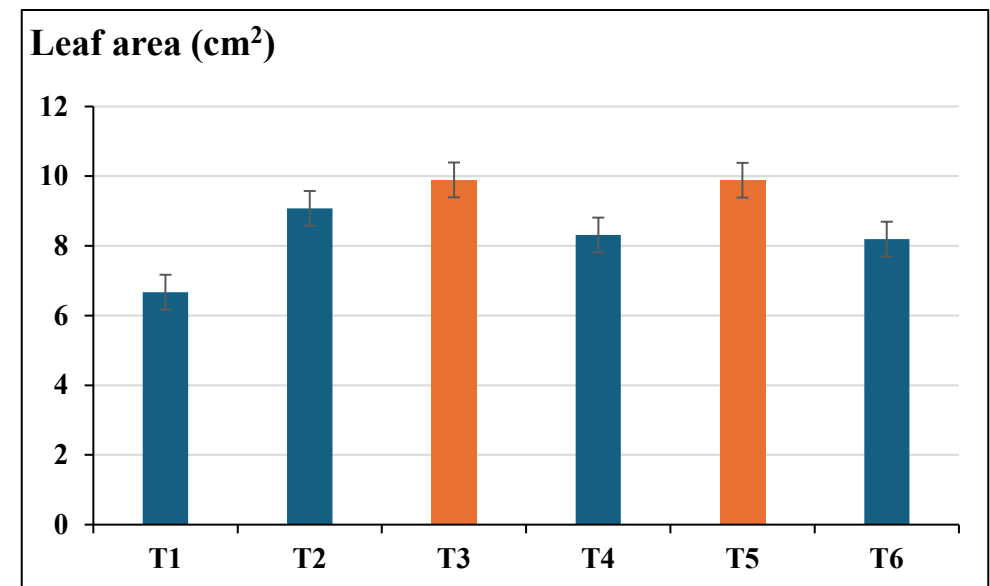
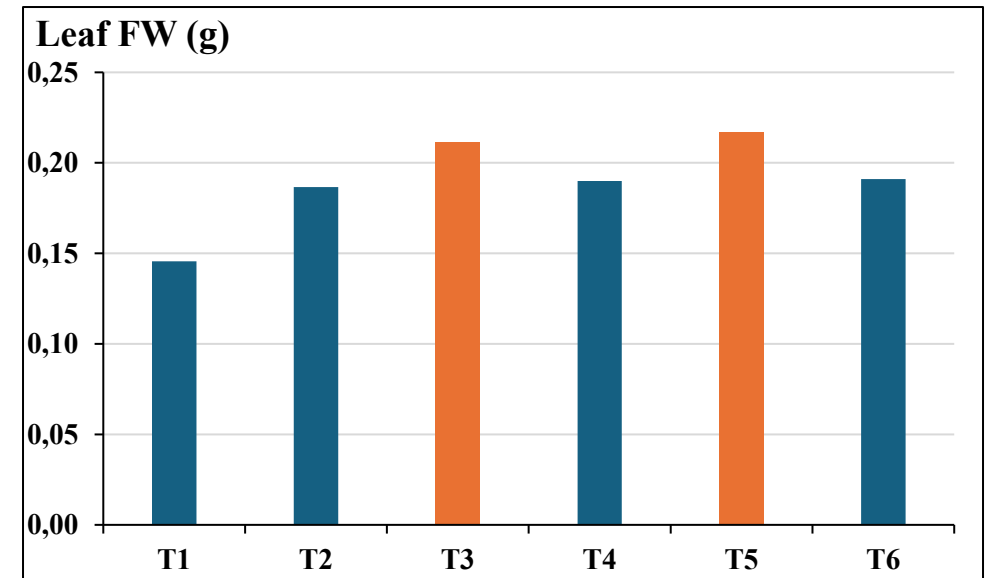
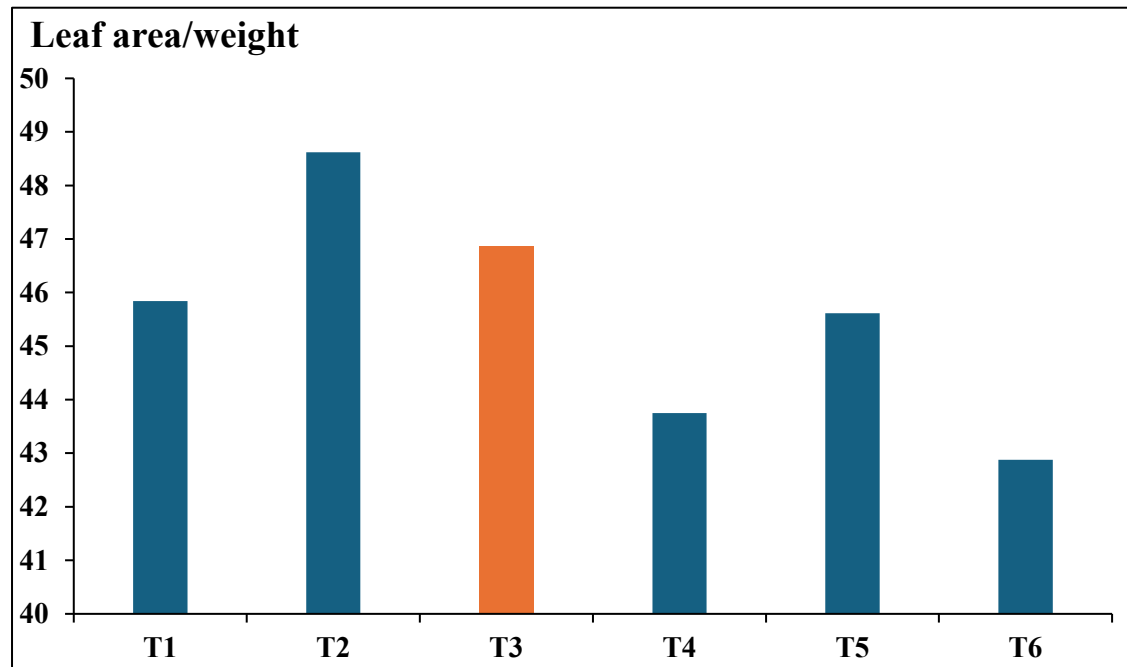


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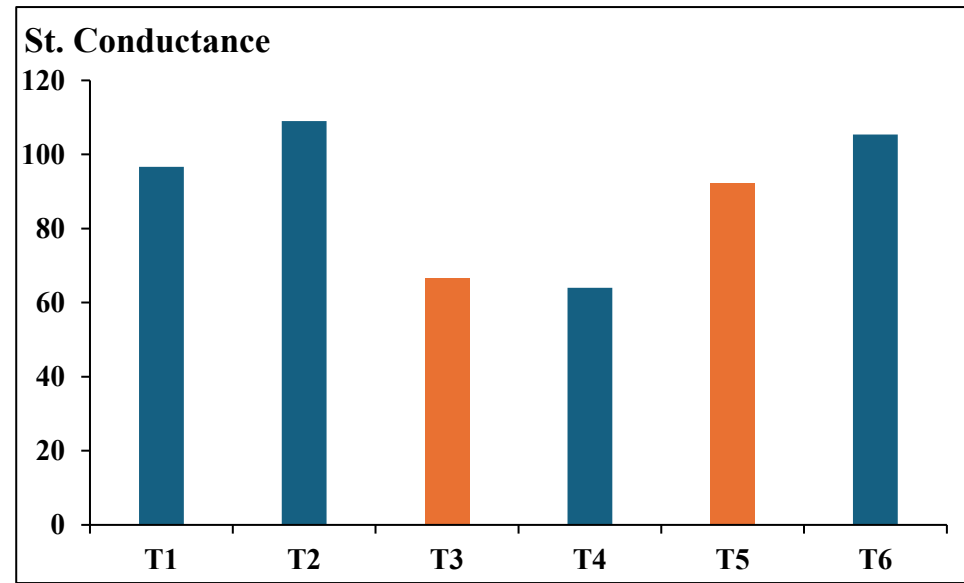
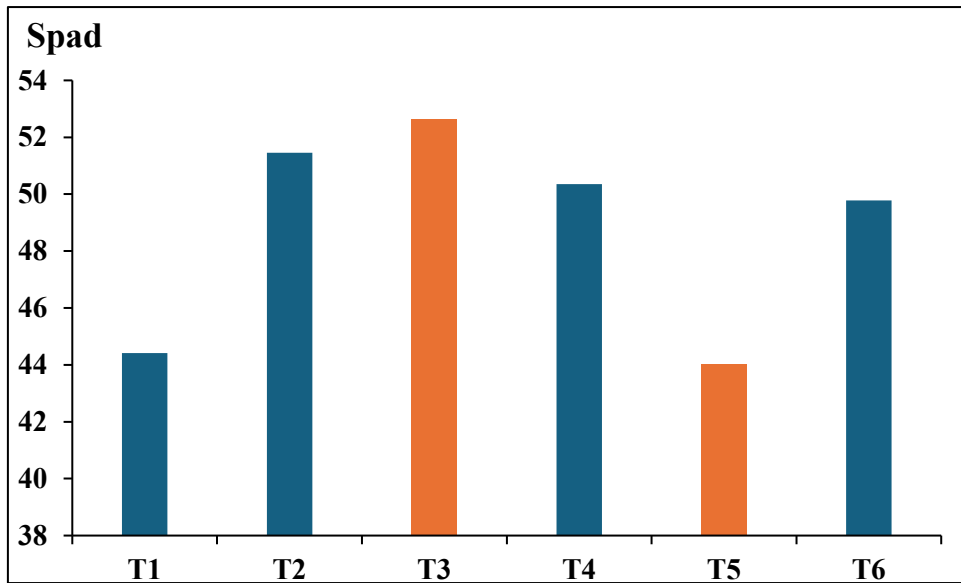




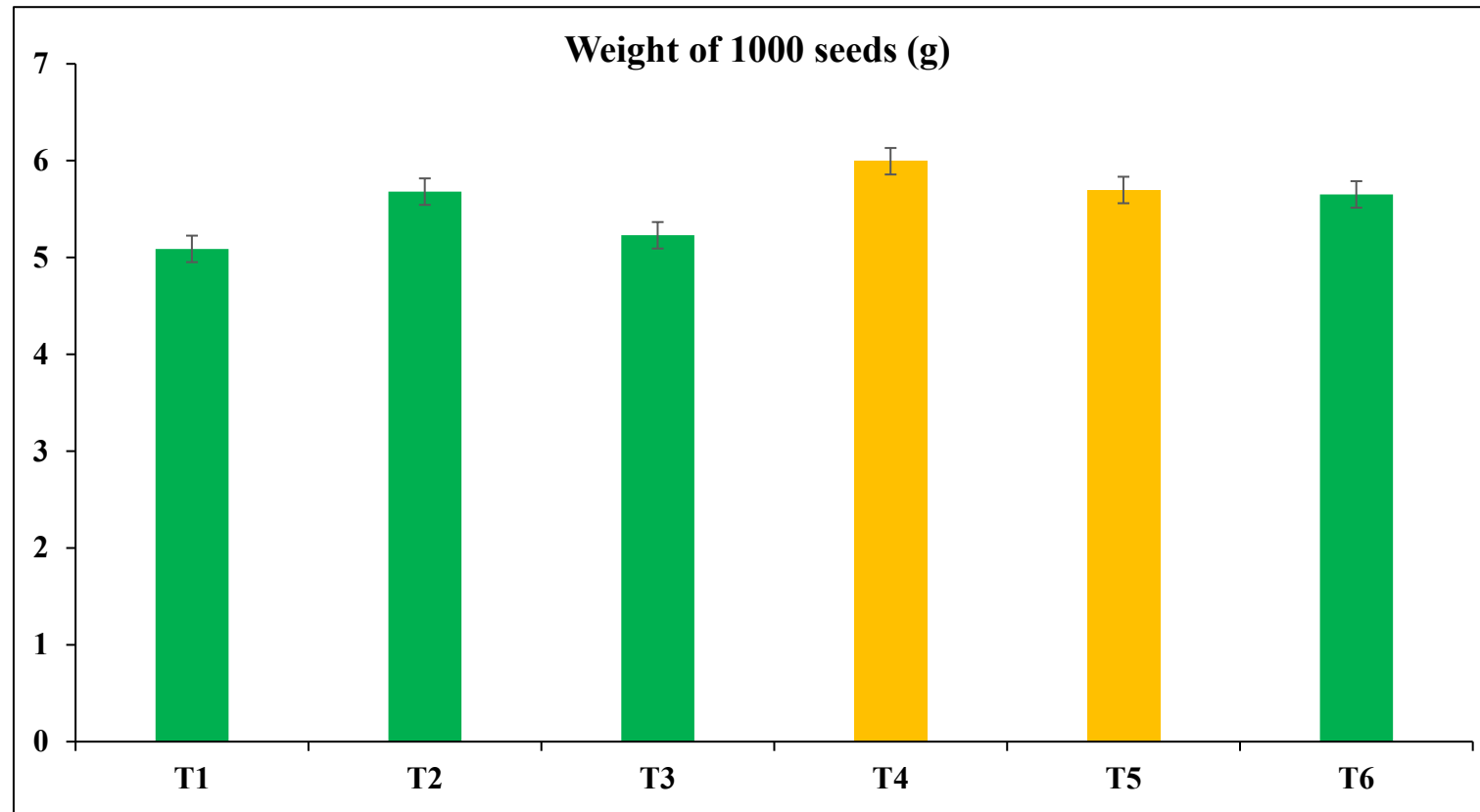
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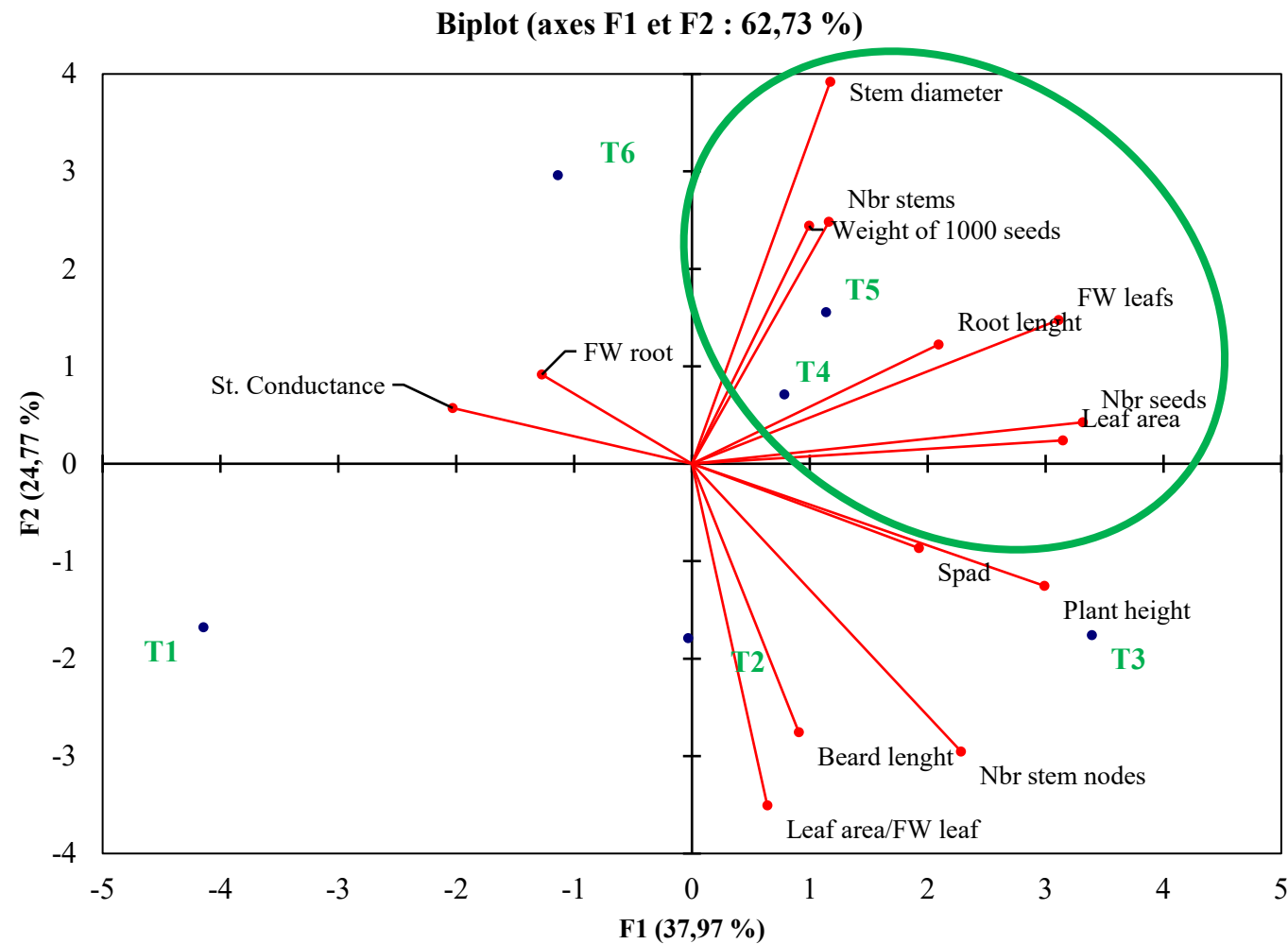




## Conclusion

**Strong correlation between the weight of 1000 grains and T4 and T5.**

**Application of 1,45 - 2,9 t/ha of frass to be validated and recommended**



**Thank you**

**c:**



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Cherroud Sanaa



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