



CIPROMED



PRIMA
PARTNERSHIP FOR RESEARCH AND INNOVATION
IN THE MEDITERRANEAN AREA

**Circular and Inclusive utilisation of
alternative PROteins
in the MEDiterranean value chains**



Assessment of insect frass as biofertilizer for fava bean cultivation under Mediterranean climate conditions

1-5 September, 2024

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The PRIMA programme is an Art. 185 initiative supported and founded under Horizon 2020, the European Union's Framework Programme for Research and Innovation



GDI is an NGO working in the field of :

- Sustainable agriculture.
- Conservation of natural resources, agro-food and agrobiodiversity in the context of climate change.
- Implementing modern and innovative approaches, and environmentally friendly technologies.



Fez-Meknes region in North of Morocco

Collaboration with local farmers and companies to conduct experimental field trials.

Contexte and objectives

Economic importance in Morocco

Fava beans are produced in Morocco for human consumption and animal feed.

The average annual production is 3.2 million quintals.

Among legumes, the fava bean occupies the first place in terms of surface area (50%) and production (52%).



Contexte and objectives

Potentialities of fava beans



Contexte and objectives



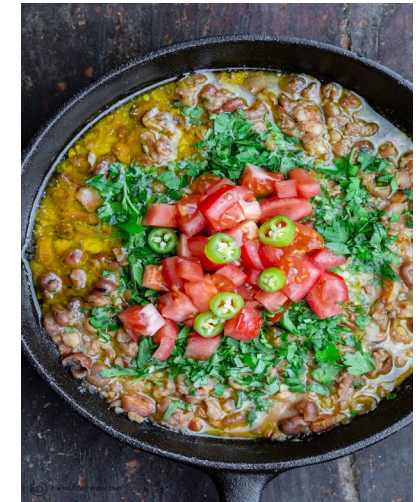
Mexican Fava Bean Soup (Sopa de Habas)



Grilled Fava Beans with Mint, Lemon Zest, and Sumac



Steamed beans



Ful Mudammas (Egyptian Fava Beans) - The Mediterranean Dish



Fava bean puree



Moroccan fava bean veloute (soup)

Contexte and objectives

Constraints

The production of the fava bean has recorded a very significant decline in recent years because:

- Several climatic conditions (drought).
- Agronomic and technical of production (fertilization, parasitism, certified seeds...).
- Socio-economic constraints (professional organization, competition with imported seeds, prices...).



Contexte and objectives

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

Poultry manure is a high nitrogen fertilizer that can burn plants if used in excess.

Poultry manure can contain pathogens such as salmonella or *E. coli* that can contaminate plants and vegetables.



Methodology

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



Methodology

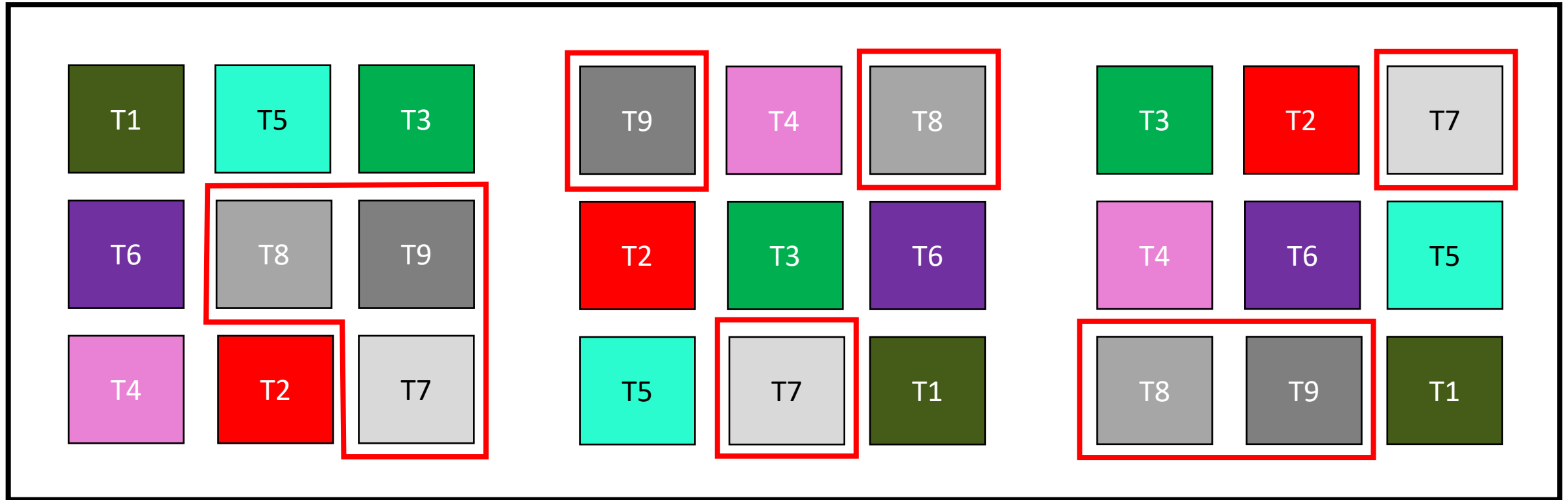
Based on N content in the frass and the rate of N used as reference for barley crop, six treatments were used, including negative and positive controls. All treatments (3 replications each) were disposed according to a randomized block. Water consumption (drip irrigation) was also calculated using a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

N content in the frass : 2,09%

Need of fava bean crop in N: 90Kg/ha

T3_(Ref): 4.35 t/ha of insect frass.

Methodology



T1: NC (0t/ha).

T2: PC using chemical fertilizer 46-0-0 (~312 Kg/ha).

T3_(Ref): 4,35 t/ha of insect frass.

T4: 2,18 t/ha of insect frass (Reduction of 50%).

T5: 1,09 t/ha of insect frass (Reduction of 75%).

T6: 8,7 t/ha of insect frass (X2).

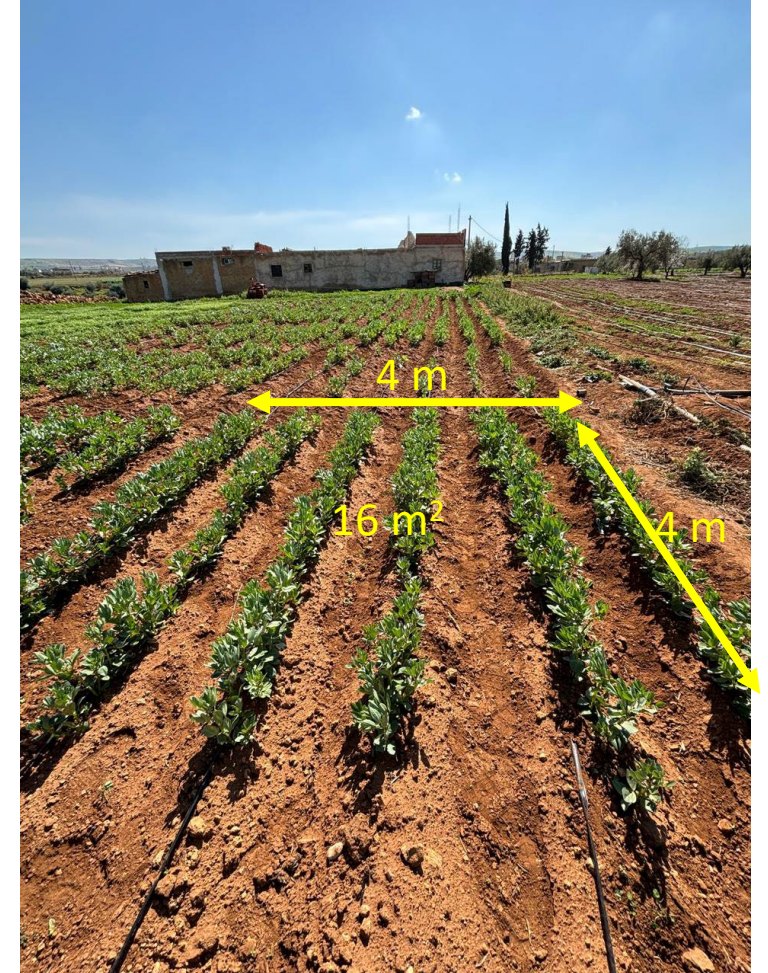
T7, 8 and 9 : Poultry manure at different rates.

Methodology

All treatments were applied on 16 m² square of land, where fava beans seeds were sowed at 40 seeds/line at distance of 10 cm (about 240 seeds/square).

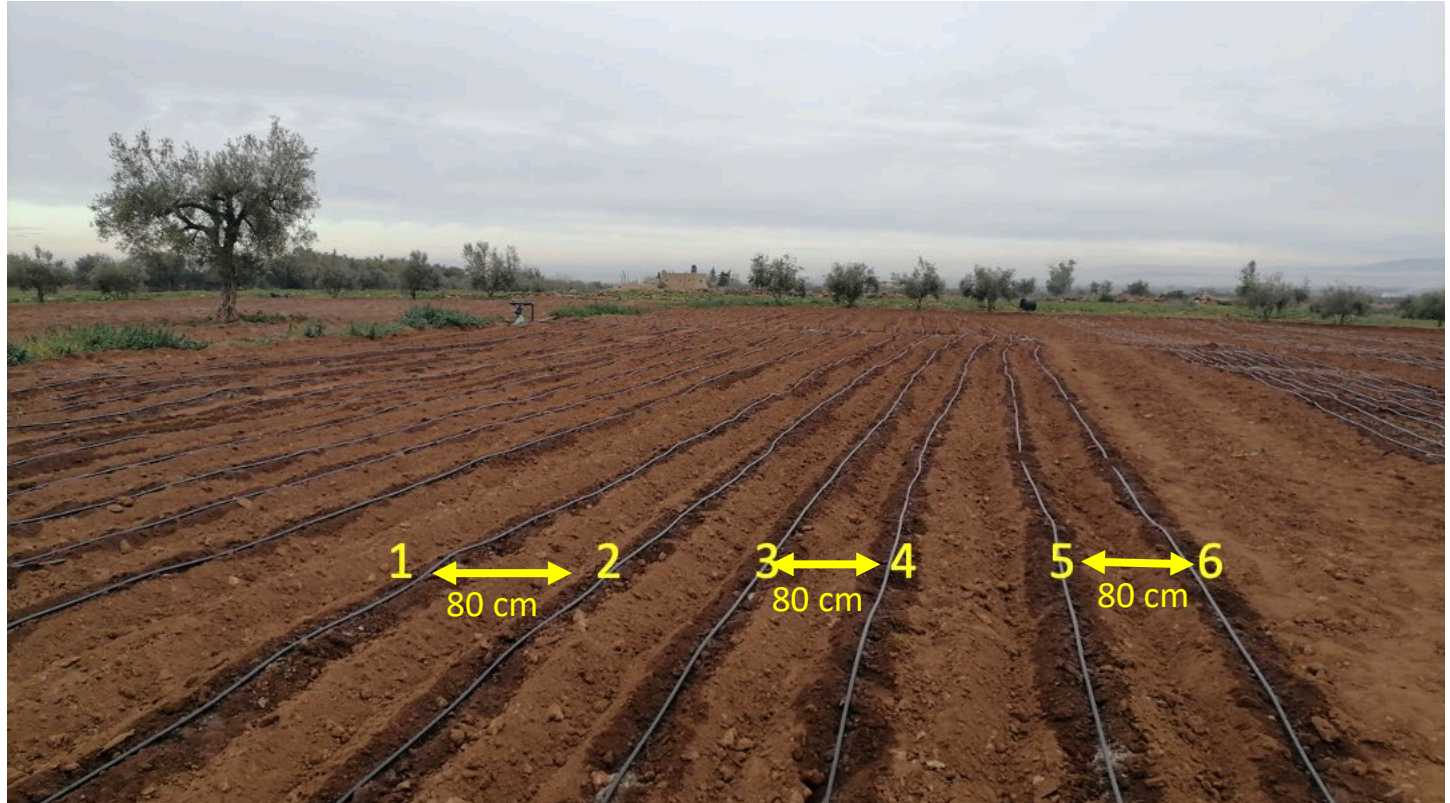
Drip irrigation was used, consuming about 36 m³ of water during all fava beans cycle.

Phytosanitary treatments were used against **broomrape** according to standard agricultural practices, while wild elimination was done manually.



Methodology

16 m² square of land, where fava bean seeds were sowed.



Methodology

Morphological, physiological and agronomic parameters

Plant height at two dates: 5/3/2024 (T1) and 16/4/2024 (T2)

Fresh weight of plant

Number of leafs

Leaf fresh weight

Number of nodules

Number of stems

SPAD



Dry weight of seeds

Fresh weight of seeds

Leaf area

Fresh weight of root

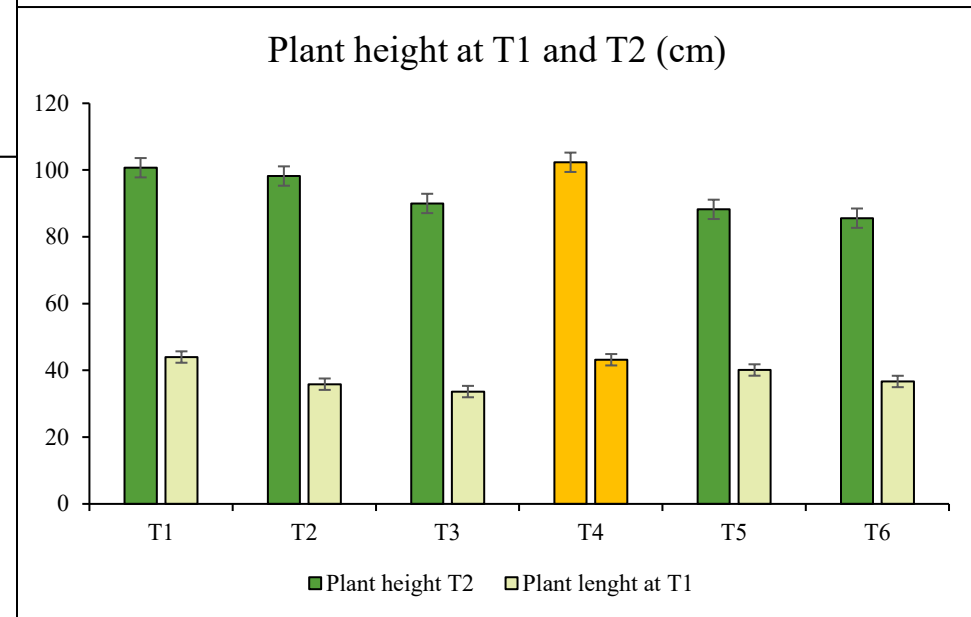
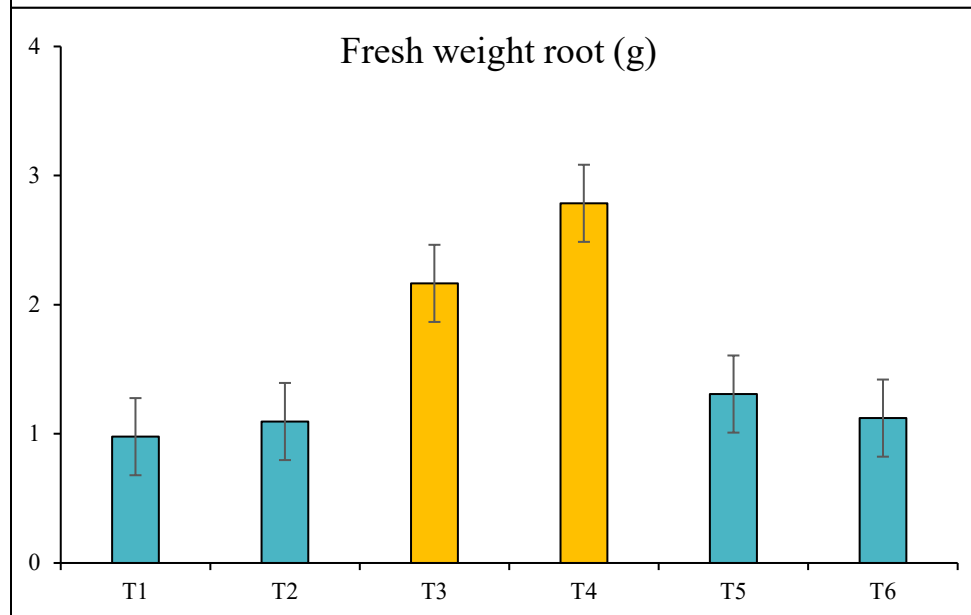
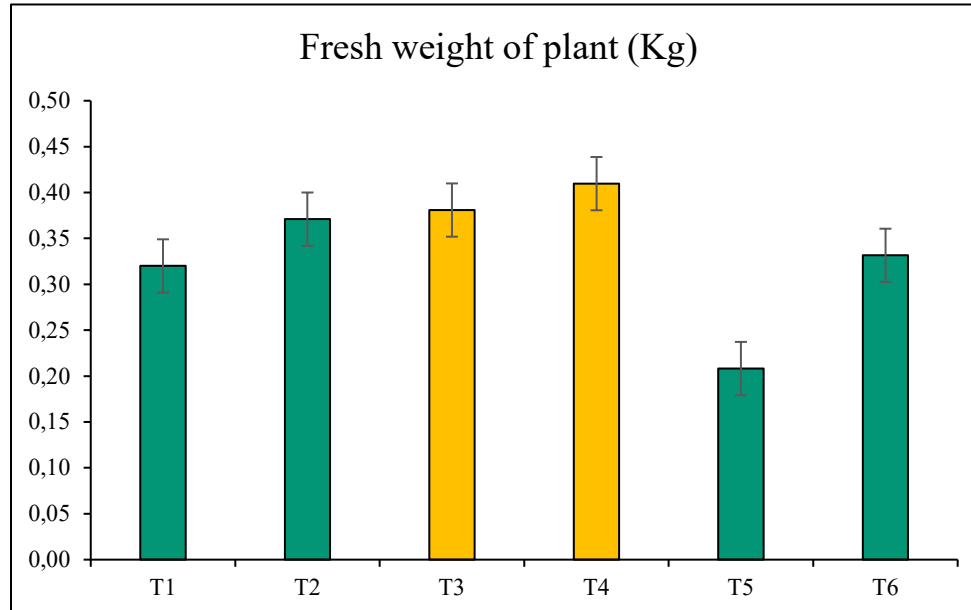
Specific leaf area

Weight of 100 seeds

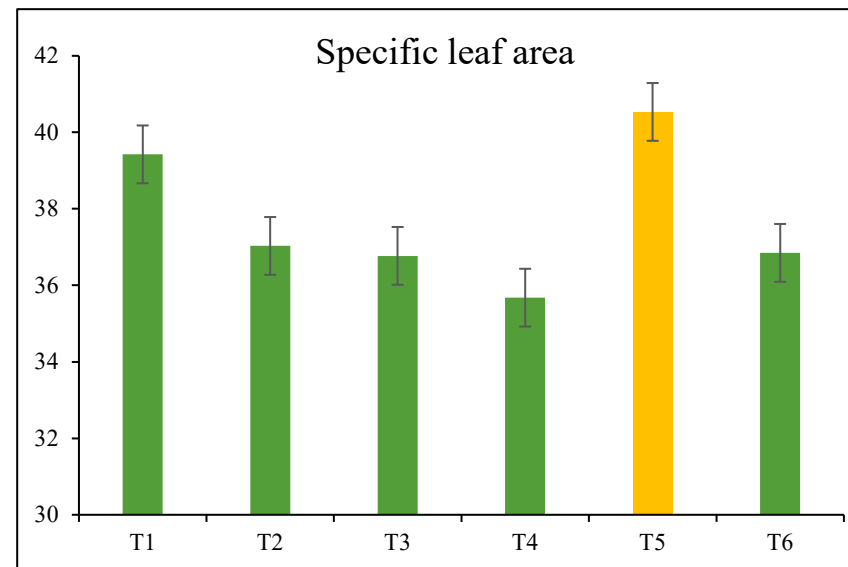
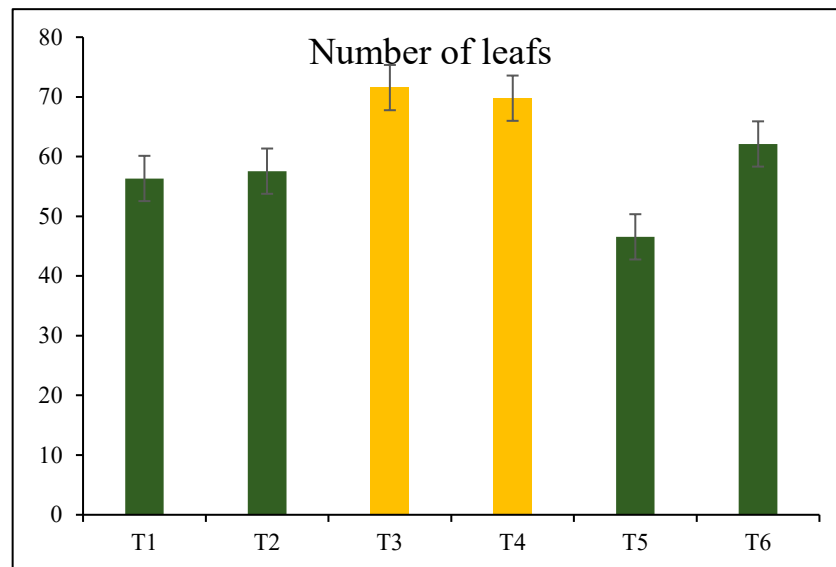
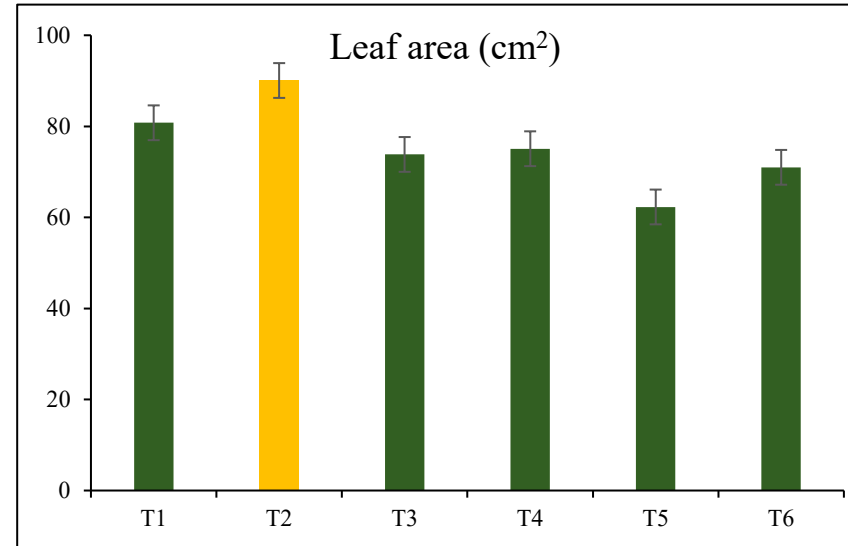
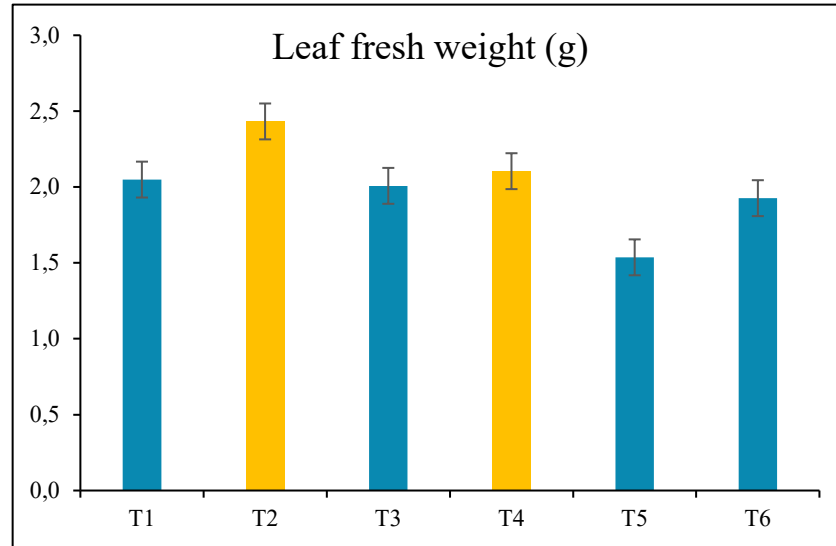
Stomatal conductance



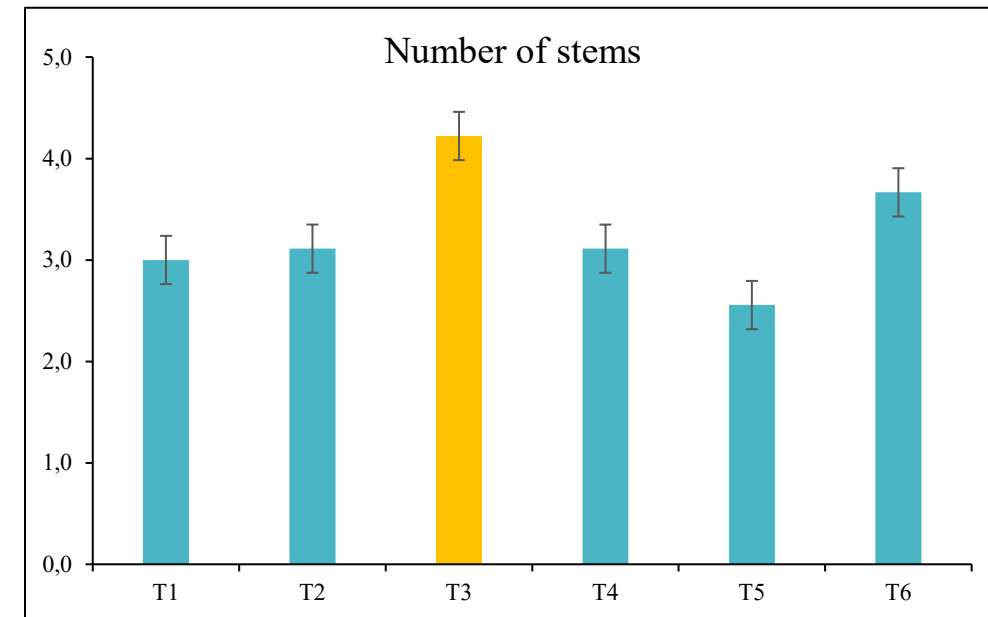
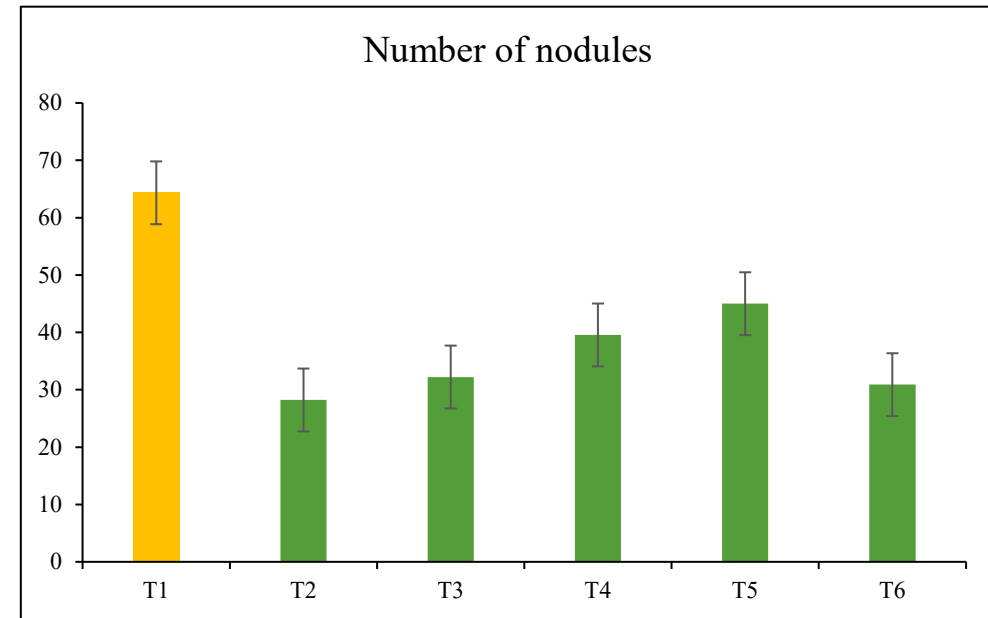
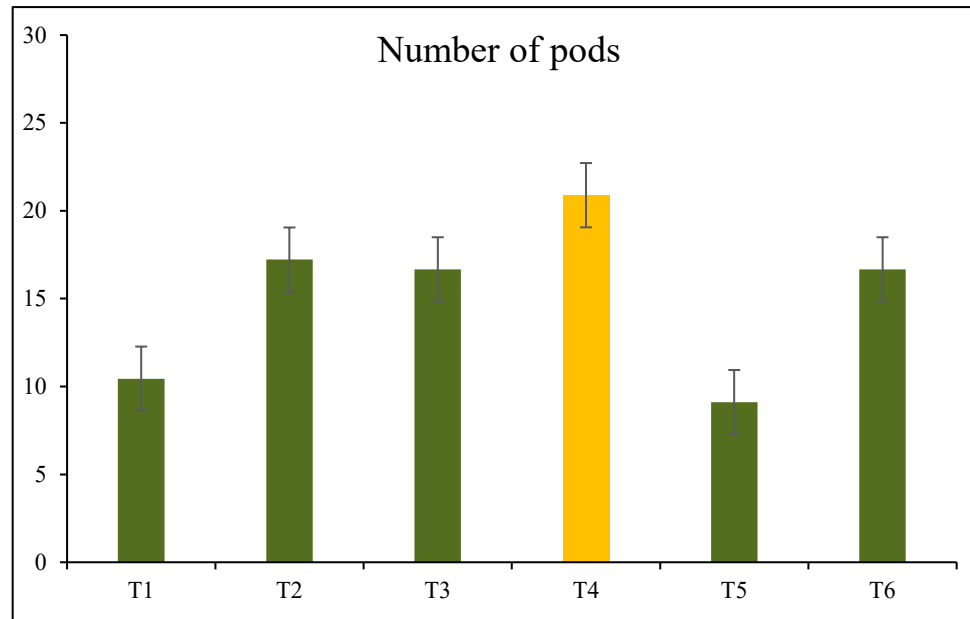
Results



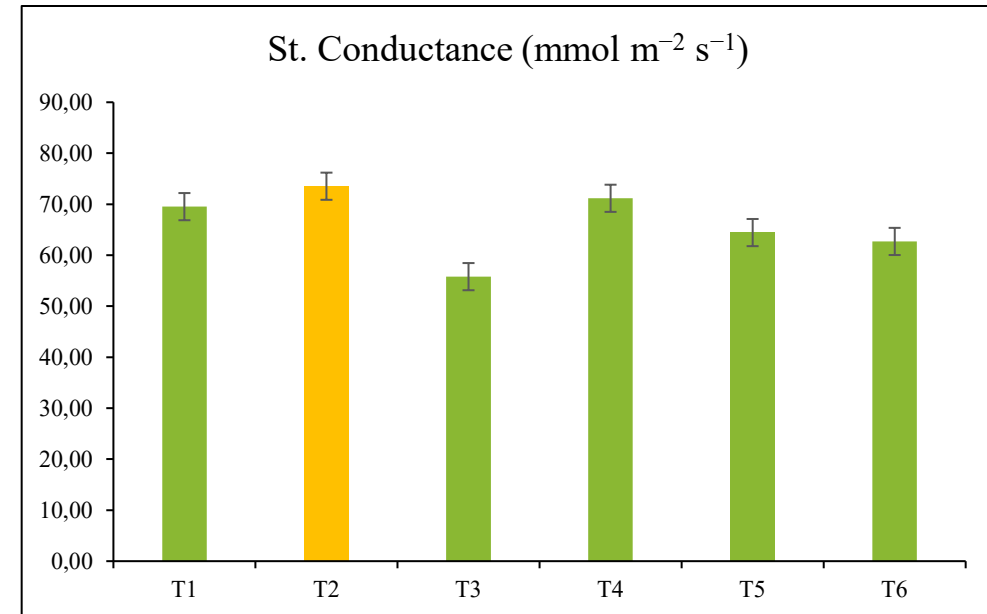
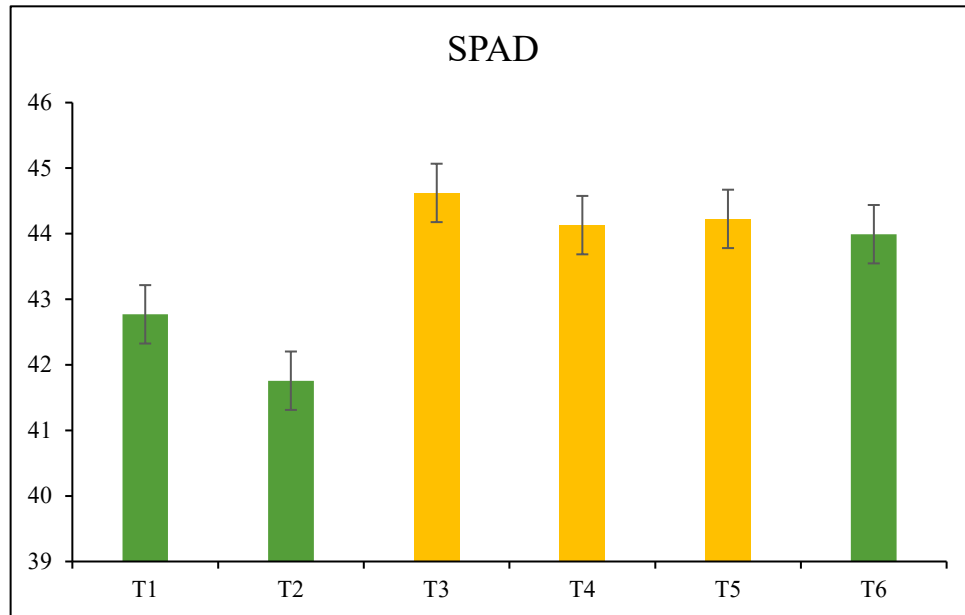
Results



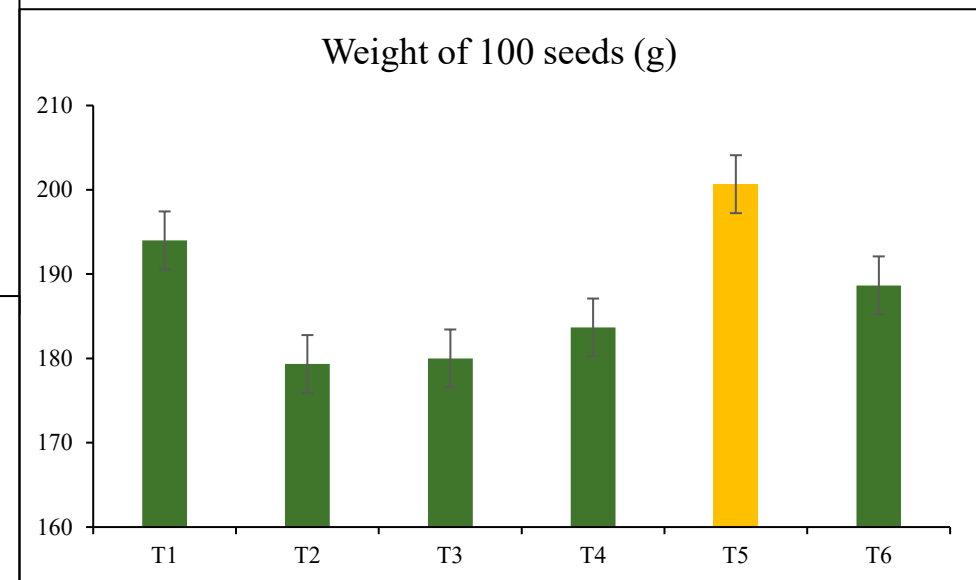
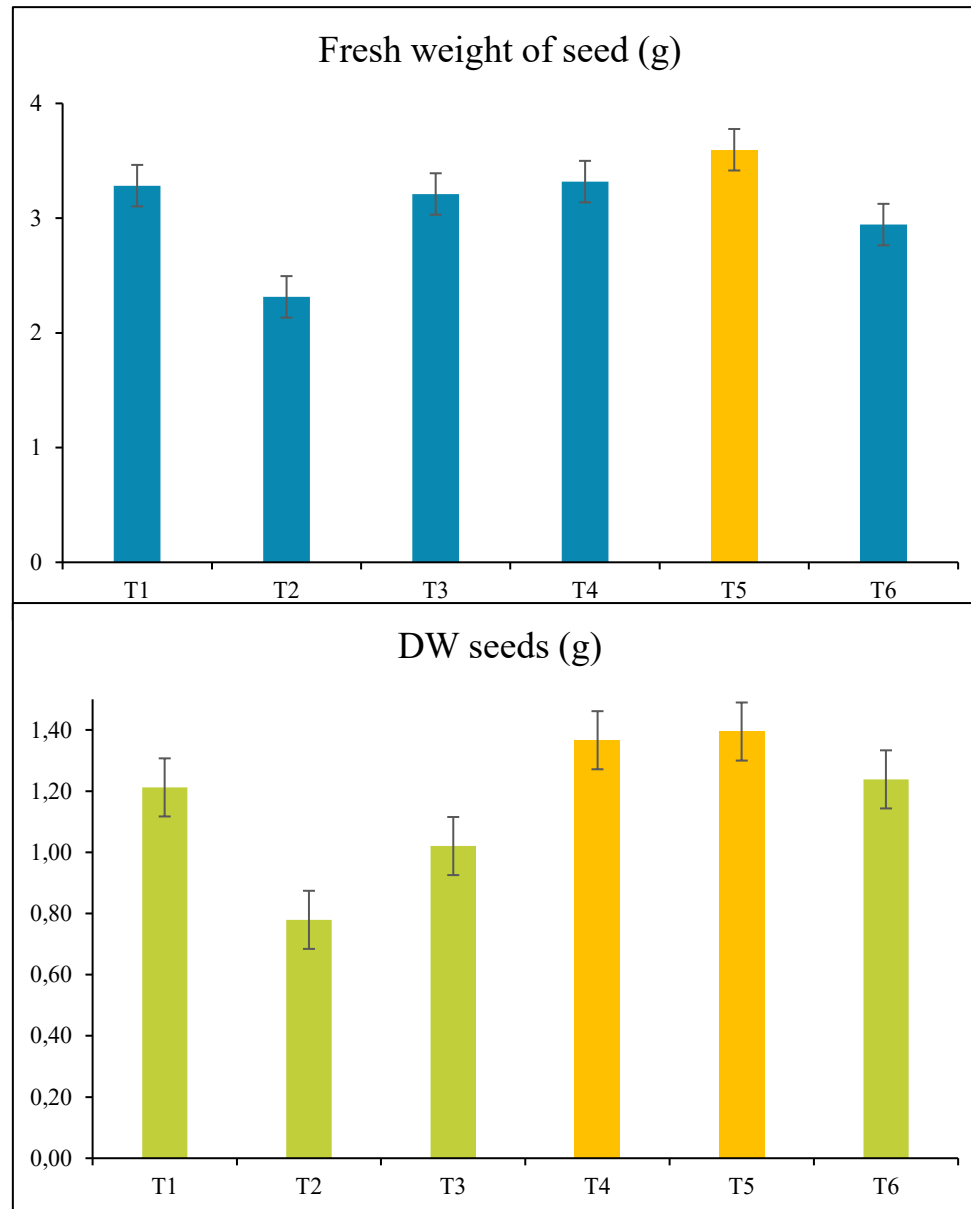
Results



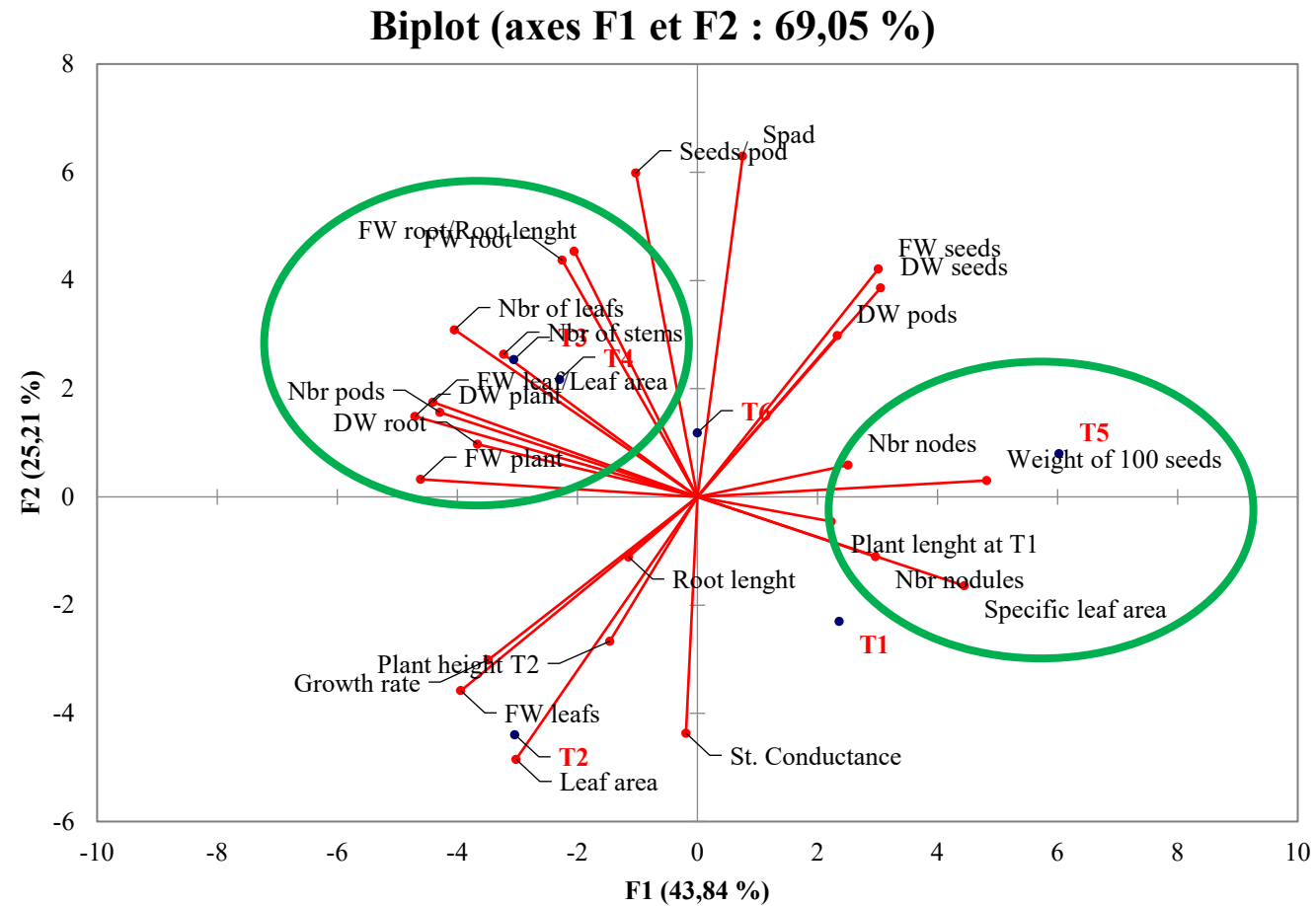
Results



Results



Conclusion





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Circular and inclusive utilisation of alternative proteins
in the Mediterranean value chains

**Thank you for
your attention!**



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