

# Diversified cropping systems with cereal and legume intercropping to maintain sustainability

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## Introduction

Intercropping received significant attention in recent years due to its advantages within cropping systems. It notably contributes to enhancing biodiversity (Cappelli et al., 2022). In contrast, monoculture systems, characterized by intense use of fertilizers, pesticides, and herbicides (Ren et al., 2014), lead to soil degradation, biodiversity decline and impair agroecosystem functionality (Brooker et al., 2021). Hence, there is an urgent need to adopt practices that enhance biodiversity while ensuring high productivity and sustainability.

The objective of the present study was to assess the performance of four faba bean and two winter wheat cultivars as sole crops and intercrops, with the aim of identifying the most suitable combination of them.



Figure 1. Monoculture bean.



Figure 2. Intercrop wheat and bean.

## Materials and methods

The experiment was carried out during 2022–2023 growing season, at the experimental farm of the Aristotle University of Thessaloniki in northern Greece (40°32'07.7" N 22°59'20.5" E). Two bread wheat (Elissavet and Flamenko) and four faba bean (Polycarpi, Organdi, Nebraska, and Bumble) varieties were used. These cultivars have differences in maturity, plant height, and grain size. The characteristics that were studied were morphological, physiological, and agronomic at three stages of plant development. The data were analyzed with the analysis of variance (ANOVA) method within the methodological frame of General Linear Models, using the IBM SPSS, Version 27.0 statistical software (IBM Corporation, Armonk, New York, United States).

## Results

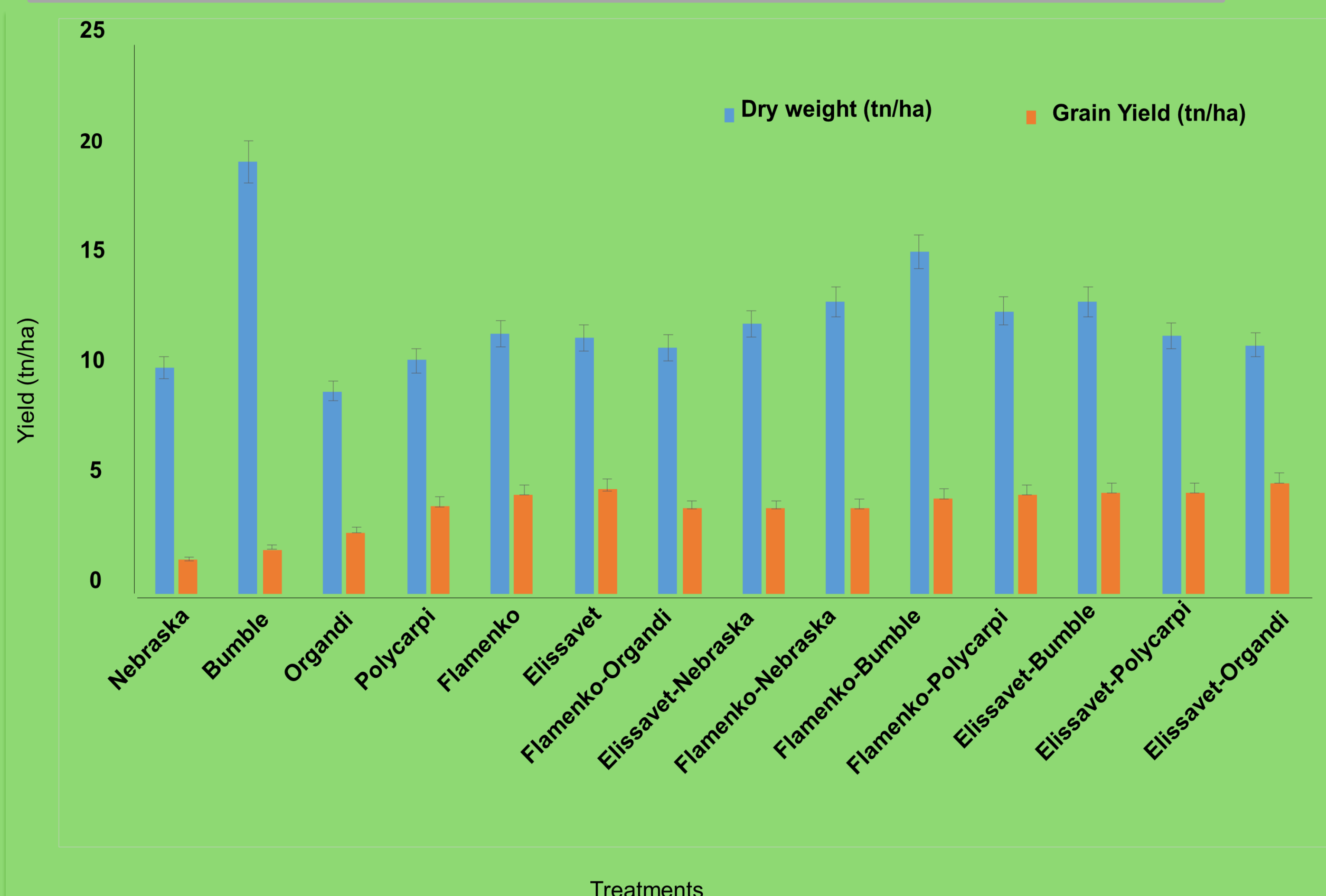


Figure 3. Dry and grain yield for the different faba bean - wheat treatments.

Two cultivars Flamenko and Bumble monocrops and also their intercrop obtained the highest yields for biomass (Fig. 3). In addition, Organdi-Elissavet and Polycarpi-Elissavet treatments recorded the highest grain yield (Fig. 3).



Figure 4. Intercrop wheat and bean and the field during the measurements that were taken with the phenotyping facility.

## Discussion

In the present study, it was found that the wheat cultivar can be used in an intercropping system for biomass production is Flamenko and from faba bean is Bumble. On the other hand, Elissavet is a wheat cultivar that is more suitable than Flamenko, for the grain yield. Therefore, intercropping systems of wheat with faba beans using proper cultivars can be used by the farmers as they can give higher biomass and grain yield and utilize the environmental resources more efficiently (Brooker et al., 2021; Michalitsis et al., 2024).

## References

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