

Interaction Effect of Foliar Fertilisation and Precision Drip Irrigation on Cob-related Yield Components in Maize Hybrids

Brian Ssemugenze 1,2*, Akasairi Ocwa 1,2, Ronald Kuunya 1,3, Costa Gumisiriya2,3, Noel Kishajja 4,5, Marveen Nafula6, Hope Namara6, Árpád Illés1, Csaba Bojtor1

1Institute of Land Use, Engineering and Precision Farming Technology, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 138 Böszörményi street, 4032, Debrecen, Hungary

2Kálmán Kerpely Doctoral School, University of Debrecen, 138 Böszörményi Street, 4032 Debrecen, Hungary

3Institute of Agrochemistry and Soil Science, Faculty of Agricultural and Food Sciences and Environmental Management, University of Debrecen, 138 Böszörményi street, 4032, Debrecen, Hungary

4Institute of Environmental Protection and Nature Conservation, Faculty of Forestry, University of Sopron, H-9400 SOPRON, Bajcsy-Zs, Hungary

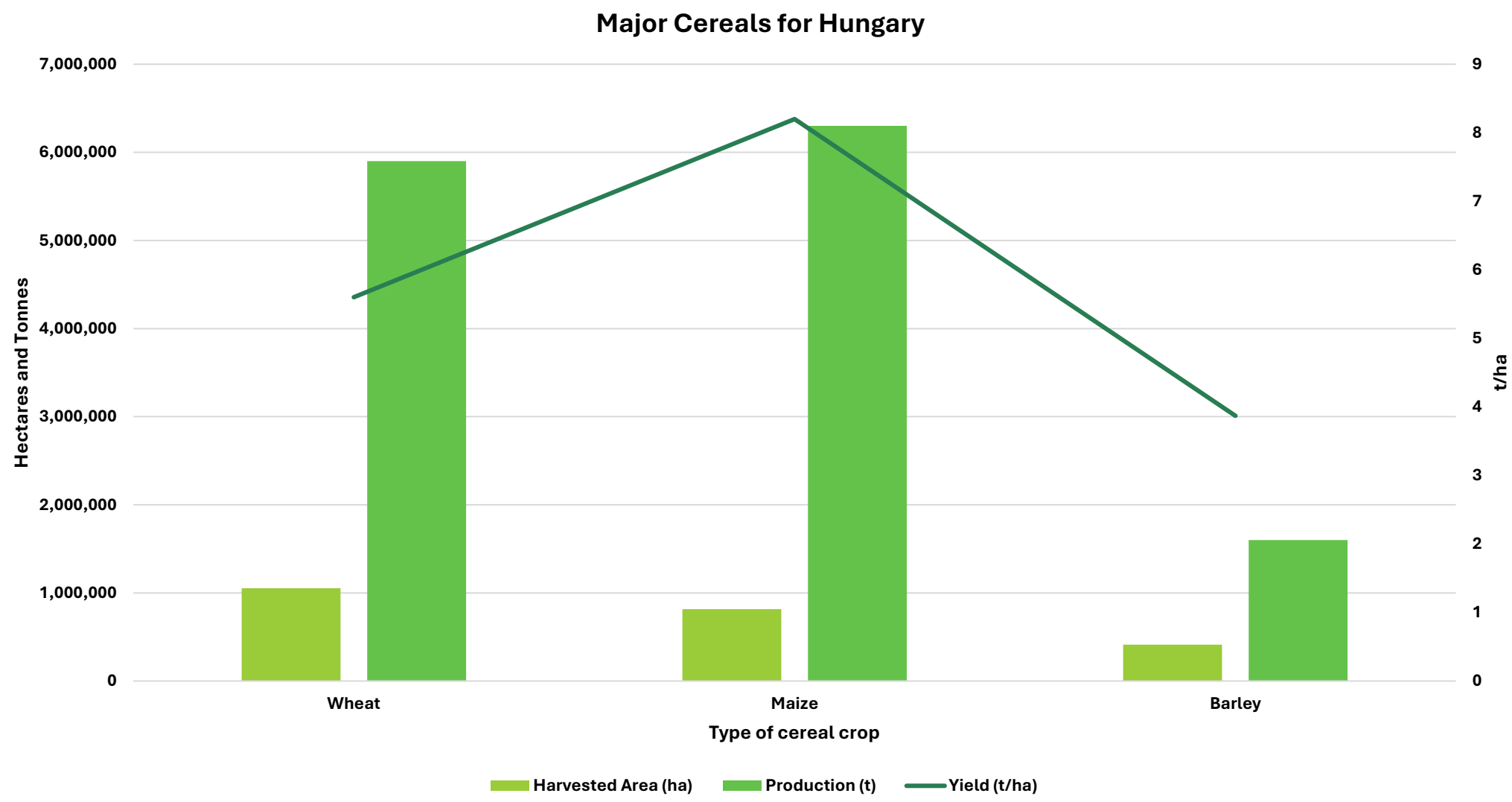
5Production and Marketing Department, Sheema Municipal Council, Kabwohe P.O. Box 160, Uganda

6Doctoral school of Agriculture and Food Science, Hungarian University of Agriculture and Life Sciences Villanyi street 29-43, 1118, Budapest, Hungary

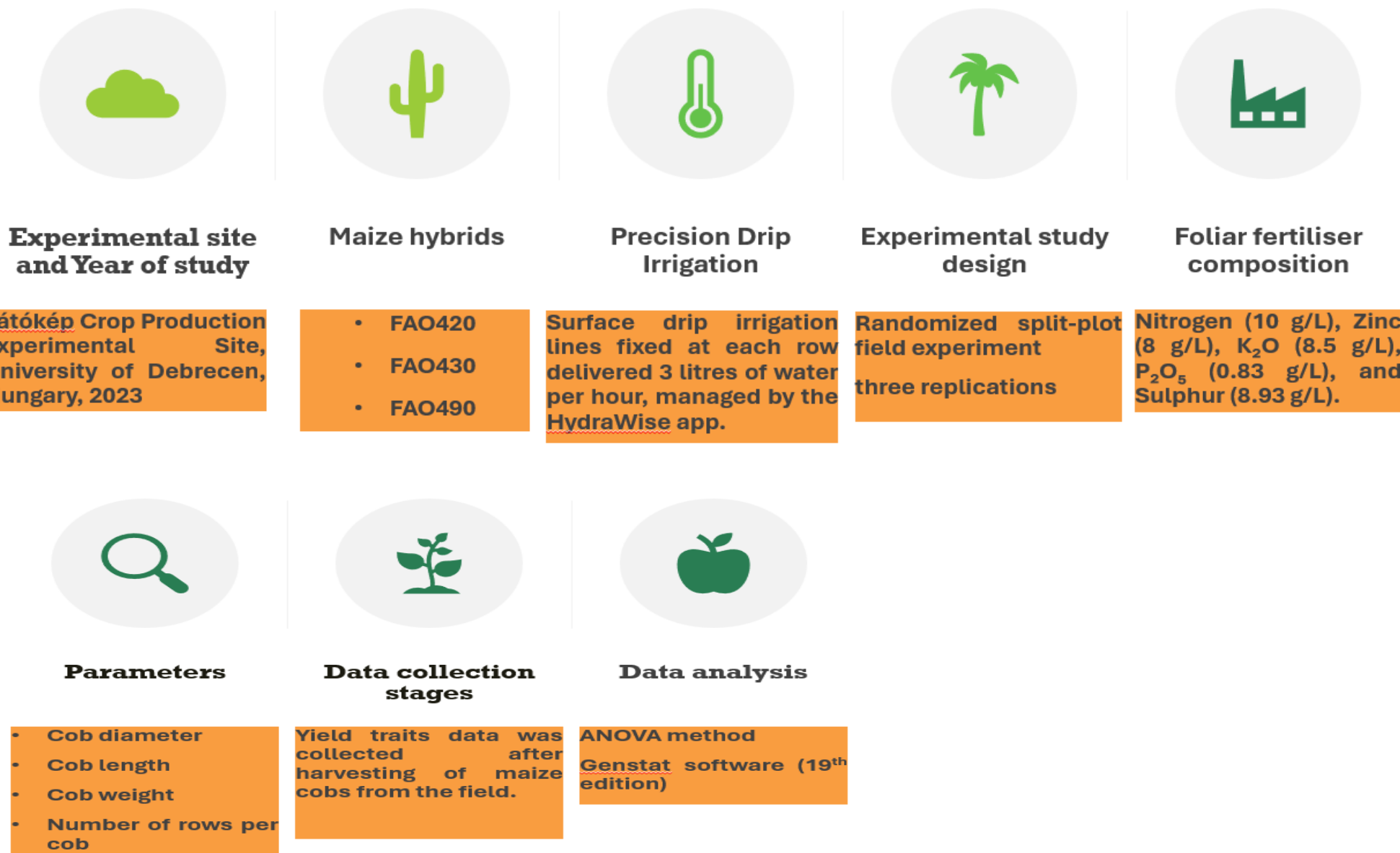
INTRODUCTION & AIM

- ❖ The 2050 world population prediction shows a total of 9.7 billion people who will need enough nutritious food according to FAO, (2017).
- ❖ Currently the global cereal production stands at 2,853 million tonnes (FAO, 2024) acting as a strong foundation for the global food security (Laskowski et al., 2019).
- ❖ Maize contributes an estimated 42% and 37% of the global food calories and protein intake respectively (FAO, 2021).
- ❖ High maize cultivation and production as major cereal can be employed as strong measure to feed the growing population (Poole et al., 2021).
- ❖ Thus, the adaptability nature of maize to diverse environmental and agro-ecological conditions, cropping systems justifies the crop's global significance.
- ❖ Cereal crop production like maize have dropped due climate change effects and increased soil infertility (Ocwa et al., 2023).
- ❖ The agro-ecology potential of Hungary and its utilization has greatly decreased (Sarudi and Lakner, 2003), thus necessitating the need for robust research to bridge the agro-ecology gaps like drought, soil infertility, pests and diseases, climate change (Chukwudi et al., 2021).

STUDY AIM: Evaluation of the interaction effect of foliar fertilisation and precision drip irrigation on cob diameter, cob length, cob weight, and number of rows per cob in maize hybrids (FAO420, FAO430, FAO490)



METHOD



Assessment and measurement

- ❖ Timely harvesting was done after the appearance of the black layer in the grains on 28th September 2023.
- ❖ A total of ten (10) maize ears were randomly selected from ten plants in each replication and processed using a HALDRUP LT-35 laboratory thresher (HALDRUP GmbH, Ilshofen, Germany).
- ❖ The cob weight (g) was measured using an electronic weighing balance.
- ❖ Cob length (cm) was measured using a meter ruler,
- ❖ Cob diameter (mm) using digital Vanier calliper,
- ❖ Number of rows per cob were manually counted and recorded.

RESULTS & DISCUSSION

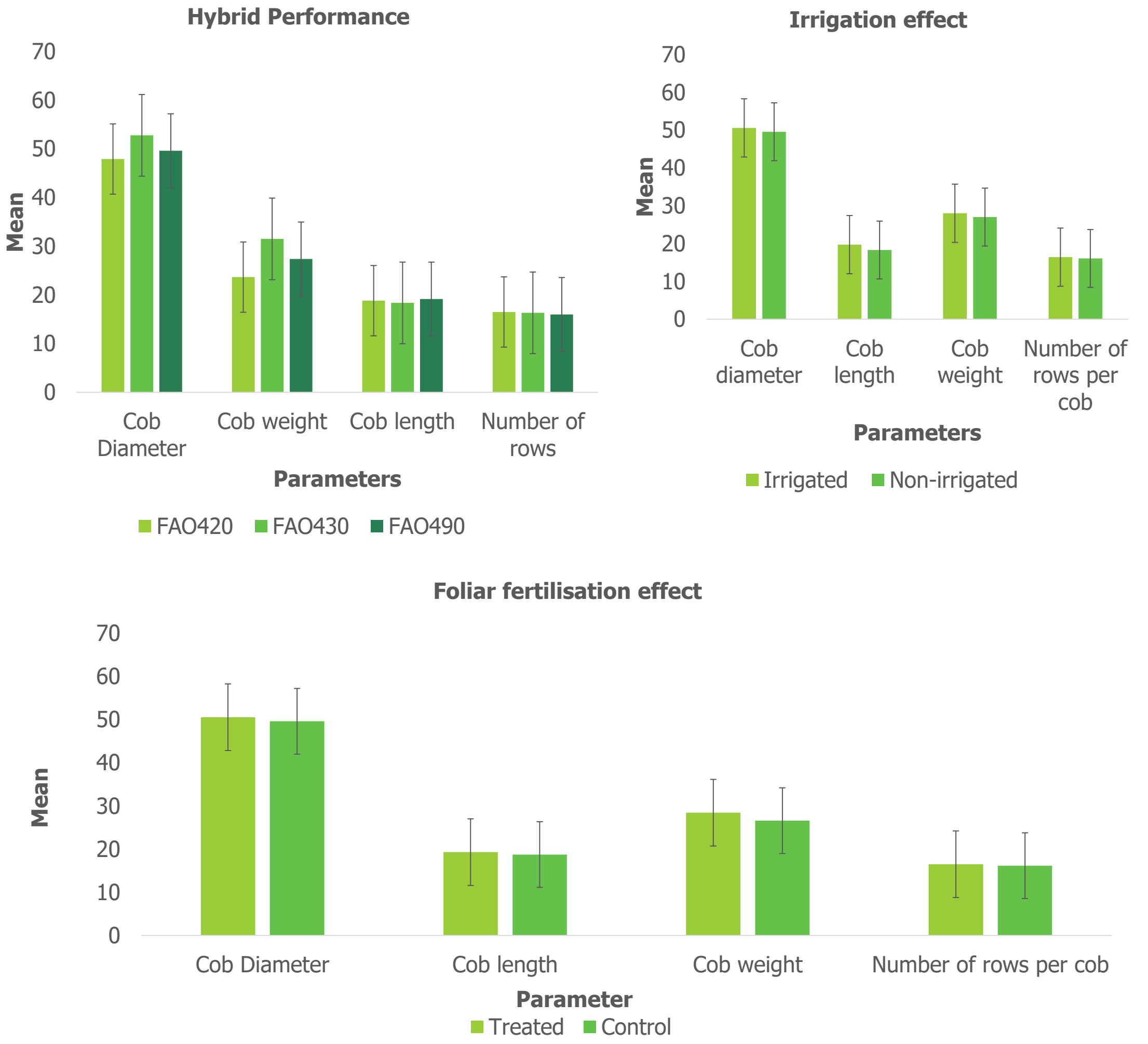


Table 1: Foliar Fertilisation x Irrigation Interaction on studied parameters

	Cob Diameter		Cob length		Cob weight		Number of rows per cob	
Foliar Fertilisation	Irrigated	Non irrigated	Irrigated	Non irrigated	Irrigated	Non irrigated	Irrigated	Non irrigated
Control	51.04	48.23	19.58	17.91	29.24	23.95	16.33	15.83
Treatment	50.19	50.97*	19.89	18.71*	26.81	30.1**	16.5	16.33*

- ❖ Cob diameter (mm) was significantly influenced by foliar fertilisation × irrigation interaction (p < 0.001). Difference in cob diameter under irrigated and non-irrigated conditions whereby cobs had larger diameter due to foliar treatment under non-irrigated conditions.
- ❖ No significance difference on cob length. Foliar fertilisation × irrigation effect was observed on increased length of cobs under non-irrigation conditions.
- ❖ Foliar fertilisation × irrigation interaction (p = 0.019) had a high significant effect on cob weight. The effect of foliar treatment was high (22.08%) under non-irrigation conditions.
- ❖ Foliar fertilisation × irrigation interaction showed no significant effect but marginal increase in the number of rows per cob were noted

Summary of Key Findings

- ❖ FAO430 Hybrid showed better performance almost across all the parameters compared to other hybrids.
- ❖ Across most parameters, both irrigation and foliar fertilisation where non-significant however slightly difference mean values were recorded for treatment over control.
- ❖ Across all parameters, treatment under non-irrigated conditions performed better than control.
- ❖ Maize plants benefited more from foliar fertilisation under non-irrigated conditions, suggesting a compensation strategy for reduced water availability.

CONCLUSION

- ❖ Combined input application enhanced yield components compared to single-factor effects. Therefore, hybrid x precision drip irrigation x foliar fertilisation has a profound interactive effect on cob-related yield components.

FUTURE WORK

- ❖ The partial results presented are part of our 3-year study (2023-2025).
- ❖ Comparative analysis over the 3 experimental years is on-going.
- ❖ Correlation of physiological growth and cob parameters with yield is on-going.