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COMPARATIVE ASSESSMENT OF MAIZE GRAIN YIELD UNDER DIFFERENT IRRIGATION TECHNOLOGIES, HYBRIDS AND PLANT DENSITIES IN THE GREAT ISLAND OF BRĂILA, ROMANIA, IN 2026

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Abstract: *A 2026 field study in the Great Island of Brăila compared maize grain yield across four irrigation regimes, five hybrids and two target plant densities. The 40 treatment combinations occupied individual plots, with three harvest subsamples per plot. Mean STAS grain yield was 8,108 kg ha^{-1}. Sprinkler-lateral and travelling-gun treatments averaged 9,726 and 9,634 kg ha^{-1}, respectively. P0710 had the highest hybrid mean (12,210 kg ha^{-1}), while the 60,000 plants ha^{-1} target exceeded 80,000 plants ha^{-1} by 20.2%. Results describe the yields observed in this trial.*

• Introduction

Water availability and plant population influence maize yield, with responses varying among hybrids and growing environments. Irrigation comparisons also require consideration of applied water volumes. This study aimed to describe grain yield patterns across irrigation technologies, hybrids and target plant densities under the 2026 conditions of the Great Island of Brăila.

• Material and method

The trial at ARDS Brăila followed a 4 × 5 × 2 factorial arrangement: A1 rainfed, A2 drip, A3 sprinkler lateral and A4 travelling gun; five hybrids (P0710, P0900, P1441, P1570 and P9975); and target densities of 60,000 and 80,000 plants ha^{-1}. Each combination occupied one plot. Three 5 m^2 harvest subsamples per plot produced 120 observations. Plot yield was the mean of its subsamples, and factor means were calculated from plot means. Grain yield was expressed on a standard-moisture basis.

• Results and discussions

Irrigation regimes. A3 and A4 exceeded the rainfed mean by 61.6% and 60.0%, respectively (Table 1). Their means differed by only 92 kg ha^{-1}, although A3 received 30% more irrigation water. These contrasts cannot be attributed solely to irrigation technology.

Table 1. Grain yield and recorded irrigation water by regime.

Regime	Yield kg ha^{-1}	Gain vs A1 %	Irrigation m^3 ha^{-1}
A1 Rainfed	6,020	—	0
A2 Drip	7,052	17.1	970.5
A3 Sprinkler lateral	9,726	61.6	1,300
A4 Travelling gun	9,634	60.0	1,000

Hybrid performance. P0710 had the highest mean yield, exceeding P0900 by 3,019 kg ha^{-1} (Figure 1). This ranking applies to the site and season studied.

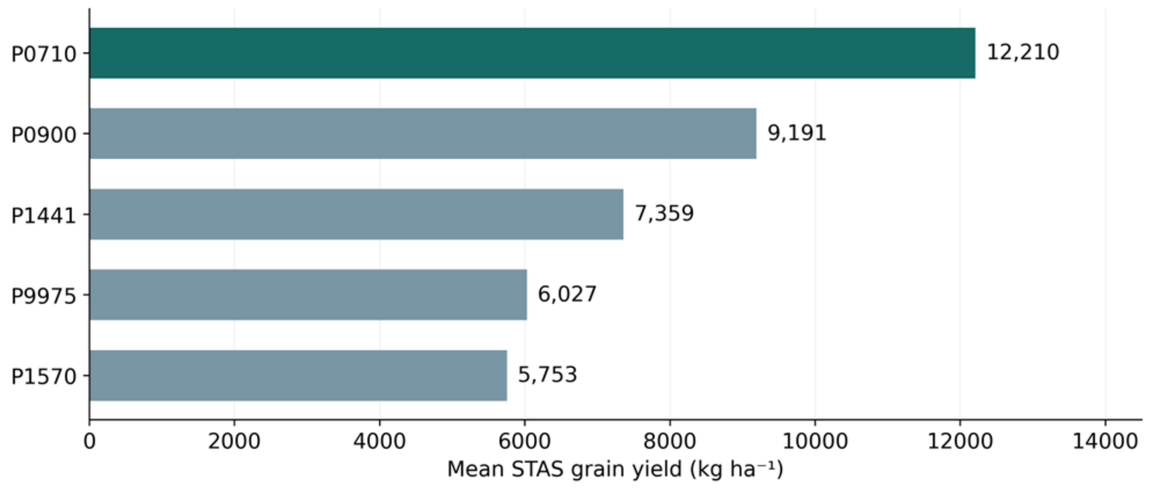


Figure 1. Mean STAS grain yield by hybrid, averaged across four irrigation regimes and two target densities. Descriptive means of eight plots per hybrid.

Target plant density. Mean yield was 8,851 kg ha^{-1} at 60,000 plants ha^{-1} and 7,364 kg ha^{-1} at 80,000 plants ha^{-1}. The difference was 1,487 kg ha^{-1}, or 20.2% relative to the higher-density mean. Assigned densities may differ from realized populations.

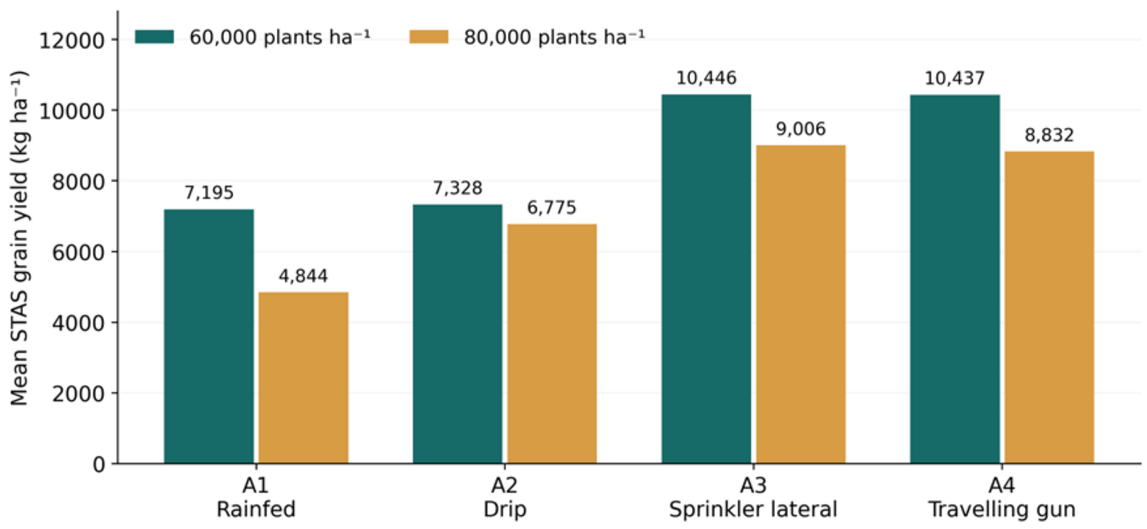


Figure 2. Mean STAS grain yield by irrigation regime and target density, averaged across five hybrids. The lower target density had higher observed yield under every regime. Bars show descriptive means, without inferential error bars.

Highest plot means. Sprinkler lateral × P0710 × 60,000 plants ha^{-1} produced the highest plot mean (15,404 kg ha^{-1}). The three leading combinations all included P0710 (Table 2).

Table 2. Three highest yielding treatment combinations.

Irrigation regime	Hybrid	Target density plants ha^{-1}	Yield kg ha^{-1}
Sprinkler lateral	P0710	60,000	15,404
Travelling gun	P0710	60,000	15,071
Sprinkler lateral	P0710	80,000	14,563

• Conclusions

The highest irrigation-category means occurred under sprinkler-lateral and travelling-gun irrigation. P0710 led the hybrid ranking, and the 60,000 plants ha^{-1} target yielded more than 80,000 plants ha^{-1} under all irrigation regimes. These observations identify combinations for further testing, rather than a validated agronomic optimum.