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Effect of Organic, Chemical and Integrated Fertilisers on Quantitative Traits of Sunflower (*Helianthus annuus* L. cv. Alestar)

Sanaz Shoghi Kalkhoran, Amir Ghalavand, Seyed Ali Mohammad Modarres-Sanavy

Tarbiat Modares University, Department of Agronomy, Iran

Abstract

A study was conducted to evaluate the effects of organic manure (farmyard manure (FYM), biofertiliser (Azotobacter and Azospririllum)), green manure (winter wheat), and chemical and integrated fertiliser systems on the quantitative traits of sunflower (*Helianthus annuus* L. cv. Alestar). The experiment was carried out on the experimental farm at the faculty of agriculture of the Tarbiat Modares University (35°44'N, 51°10'E, and 1352 m asl) of Iran in 2008. This location is located in a semi arid zone and characterised by warm and dry summers. The experimental design was a split plot with randomised complete blocks and three replications, in which seven fertiliser treatments were the main plot units: F1 (100 % organic, *i.e.* FYM at a rate of 48 t ha^{-1}), F2 (75 % organic + 25 % chemical), F3 (50 % organic + 50 % chemical), F4 (25 % organic + 75 % chemical), F5 (100 % chemical, *i.e.* urea at a rate of 240 kg ha^{-1}), F6 (50 % organic + 50 % chemical + green manure), F7 (75 % organic + 25 % chemical + green manure) , and two levels of biofertiliser I1 (inoculation) and I0 (control) were the sub plot units.

Grain yield and yield components (head diameter, seed number per head, 1000 seed weight), plant height, leaf area, biological yield and harvest index (HI) were measured. The results showed that the grain yield in the integrated systems was significantly higher than in the organic and chemical systems (F6>F3>F4>F7>F2>F5>F1), also all yield components were the highest in the F6 treatment. The results also revealed that inoculation of biofertiliser improved the quantitative traits of sunflower and significantly increased grain and biological yield (by 6 % and 5 %, respectively). Also leaf area (11 %), plant height (5 %) and yield components were significantly higher as compared to the plants without biofertiliser. It can be concluded that an integrated system (the use of chemical, organic and biofertiliser) and the planting of winter cereals as a green manure can not only increase sunflower grain yield but will also reduce the usage of chemical fertilisers and bring us closer to sustainable agriculture.

Keywords: Biofertiliser, grain yield, green manure, integrated systems, sunflower

Contact Address: Sanaz Shoghi Kalkhoran, Tarbiat Modares University, Department of Agronomy, Jalal-Ale Ahmad Nasr Bridge, 1411713116 Tehran, Iran, e-mail: shoghi@modares.ac.ir