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PJBS

ISSN 1028-8880

**Pakistan
Journal of Biological Sciences**

ANSI*net*

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308 Lasani Town, Sargodha Road, Faisalabad - Pakistan

Effect of Potassium Levels on the Yield of Sunflower (*Helianthus annuus* L.)

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Abstract

Effect of various levels of potassium on the yield of sunflower (*Helianthus annuus* L.) was studied at the Agronomy Research Area, Gomal University, D.I. Khan, during autumn 1997. The highest 1000-seed weight (53.71 g) was obtained from the plot, fertilized with 150kg potassium ha⁻¹, while the minimum 1000-seed weight (46.41 g) was obtained in common plots. the highest seed yield (4153 kg ha⁻¹) was also obtained in plots where 150 kg potassium per hectare was applied. The lowest seed yield was recorded in control plots (3402 kg ha⁻¹). It can be suggested from these results that potassium can be applied up to 150 kg ha⁻¹ to obtain high seed yield of sunflower and to maintain the fertility regarding potassium I in the soil of D.I. Khan.

Introduction

Sunflower (*Helianthus annuus* L.) is an important edible oil crop, ranking next to soybean. Sunflower is a drought tolerant and short duration crop and has a wider range of adaptability. Under our agro-climatic conditions, it can be grown successfully twice a year as spring and autumn crop, both in irrigated and rainfed areas. Its seed contains high oil content ranging from 40-50 percent and is rich in protein 23 percent. Moreover its oil quality is better due to higher percentage of linoleic acid and low percentage of linalenic acid which is the most desirable character, lacking in other oils. Its oil is also free from toxic elements. Its seed cakes has proved to be a good quality feed for dairy animals and particularly for poultry birds. Further more, sunflower is also a good source of nectar for honey production. Apart from other factors responsible for increasing per hectare yield, application of potassium is considered to play a remarkable role in boosting up production. Osman and Abo Lila (1984) reported that application of potassium in combinations with phosphorus and nitrogen increased the seed index (1000-seed weight). Osman and Abo Lila (1984) found that maximum 1000-seed weight was recorded in the crop fertilized with potassium in combination with phosphorus and nitrogen. Lewis *et al.* (1991) reported that potassium application boosted up seed yield of sunflower. Sirbu and Ailincal (1992) found a direct correlation between potassium and seed yield of sunflower. Harmati (1993) reported that optimum yields were obtained with 60 kg potassium ha⁻¹. Shinde *et al.* (1993) found that potassium application increased seed yield. Annadurai *et al.* (1994) found that phosphorus and potassium application increased seed yield and seed oil content of sunflower. The present study was therefore, under taken to determine the effect of different levels of potassium on the yield of sunflower under field conditions at Agronomic Research Area, Faculty of Agriculture, Gomal University, D.I. Khan, Pakistan.

Materials and Methods

The experiment was conducted on effect of different potassium levels on sunflower hybrid 6435 at Agronomy Research Area, Faculty of Agriculture, Gomal University Dera Ismail Khan, during autumn 1997. The treatment comprised five potassium levels (0, 50,100,150 and 200 K₂O ha⁻¹). The experiment was laid out in randomized complete block design with four replications. The appropriate sunflower hybrid 6435 was sown by hand dibbling in 1st week of August 1997, on a well prepared seedbed plant spacing of 25 cm x 60 cm, respectively. The crop was harvested at its respective physiological maturity. data were recorded on 1000-seed weight (g) and seed (kg ha⁻¹). The data collected were analyzed statistically used the Fisher's analysis of variance technique (Steel and Torrie, 1984).

Results and Discussion

Effect of potassium on 1000-seed weight (g) and seed yield (kg ha⁻¹) were significantly affected.

1000-seed weight: The crop fertilized with 150 kg K₂O ha⁻¹ had the maximum 1000-seed weight (53.71 g) which however, on a par with 200 kg K₂O ha (53.18 g) (Table 1). On the contrary, the minimum 1000-seed weight (40 g) was obtained in the control crop. The results indicated that 1000-seed weight increased gradually by increased potassium levels. Although, it decreased at the high potassium level but its statistical difference from 150 K₂O ha⁻¹ was non-significant. Similar results have reported by Osman and Abo Lila (1984) who stated that potassium application in combination phosphorus and nitrogen increased seed index. The combination with phosphorus and nitrogen increase index. The increased in seed index resulted in an increased seed yield.

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Table 1: 1000-seed weight (g) and seed yield (kg ha⁻¹) of sunflower hybrid "6435" as affected by potassium levels

Potassium levels	1000-seed weight (g)	Seed yield (kg ha ⁻¹)
0	46.41c	3402c
50	49.58b	3589bc
100	50.08b	3716b
150	53.71a	4153a
200	53.18a	3785b
LSD	2.726	230

Seed yield: The maximum seed yield (4153 kg ha⁻¹) was reduced by the crop fertilized with 150 kg K₂O ha⁻¹, this as significantly different from all potassium levels. The unimunn seed yield (3402 kg ha⁻¹) was recorded in the control which did not differ significantly from seed yield obtained from potassium application at the rate of 50 kg K₂O ha⁻¹. The results indicated that seed yield increased gradually by increasing potassium levels. However, it decreased at high potassium level. Evidently, the highest seed yield was due to the highest seed index in case of potassium application at the rate of 150 kg K₂O ha⁻¹. These results are in accordance with the results of Lewis *et al.* (1991), Sirbu and Ailincal (1992), Harmati (1993), Shinde *et al.* (1993) and Annadurai *et al.* (1994) who all found that potassium application alone or in combination with phosphorus and nitrogen increased seed index, seed yield and seed oil content of sunflower. It may be concluded from the above discussed results that potassium at the rate of 150 kg K₂O ha alone or in combination should be applied to get maximum yield of sunflower.

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