

Effect of fertilizer doses on yield and quality of sunflower hybrids

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ABSTRACT

A Field experiment was conducted to optimize the fertilizer dose for different sunflower hybrids on deep black soil at college of Agriculture, Latur during *kharif* – 2003 under rainfed condition. Sunflower hybrid KBSH – 1 recorded significant differences in growth parameters viz., number of functional leaves, stem girth, dry matter, leaf area, head diameter, number of filled grains, test weight, grain yield per plant and seed yield (1296.50 kg ha⁻¹) stalk yield (4374.1 kg ha⁻¹) dry weight of capitulum (1522.3 kg ha⁻¹), harvesting index (55.83 %), oil content (39.93%) and oil yield (517.69%) over SCH – 35, Application of fertilizer dose 80 : 40 : 40 NPK kg ha⁻¹ recorded higher in all growth and yield attributing characters and seed yield (1447.50 kg ha⁻¹) as compared with other fertilizer doses and control.

Key words : Sunflower hybrids, Fertilizer doses, Seed yield and quality.

INTRODUCTION

Sunflower (*Helianthus annuus* L.) is photo and thermo insensitiveness profitable oilseed crop. It served a good substitute for groundnut crop. Whenever there is considerable delay in monsoon, it has got wide adaptability and can fit in the existing crop rotation (Singh *et al.*, 1977). Sunflower can be grown in all the three main season under wide range of agro – climatic situations (Singh, 1972).

Increased nitrogen levels were shown to increase the growth and yield attributes with concurrent increase in seed yield of sunflower (Muthuvel *et al.*, 1983), Khaturia *et al.* (1996) in a field experiment on sunflower carried out at Hissar observed that application at 90 kg N + 60 kg P₂ O₅ + 60 kg K₂ O ha⁻¹ was optimum for highest seed yield in sunflower. The present experiment was conducted on effect of fertilizer doses on growth, yield and quality of sunflower hybrids.

MATERIALS AND METHODS

A field experiment was conducted during *kharif* season of 2003 – 2004 at department of Agronomy farm, College of Agriculture, Latur. The soil of the experimental plot was deep black with pH 8.0, low in available nitrogen (187.4 kg ha⁻¹), medium in available phosphorus (20.12 kg ha⁻¹) and high in available potassium (695.7 kg ha⁻¹). The experiment was laid out in Randomized Block Design (factorial) with 8 treatments replicated 4 times. For doses of fertilizer 80: 40: 40, 60: 30: 30, 40: 20: 20 and 00:00: 00 NPK kg ha⁻¹ and two hybrids KBSH – 1 and SCH – 35 were tried. Sunflower hybrids were sown at 60 x 30 cm apart during first fortnight of July (10th July). Half doses of nitrogen, full doses of phosphorus and potassium were

applied as per treatment as a basal dose and remaining 50 per cent nitrogen was applied 30 days after sowing. All package and practices were followed as per recommendations.

RESULTS AND DISCUSSION

The observations recorded on growth parameters are given in Table 1. The data shows that significant differences observed in hybrids in respect to number of functional leaves, stem girth, dry matter, leaf area, head diameter and number of filled seeds per plant.

The variety KBSH – 1 resulted in more number of functional leaves, stem girth, dry matter, leaf area, head diameter and number of field seeds per plant. Application of fertilizer dose as 80 : 40 : 40 NPK kg ha⁻¹ resulted in more number of functional leaves, stem girth, dry matter, leaf area, maximum head diameter, number of filled seeds per head as compared to other fertilizer doses. F₃ dose significantly superior over F₁ and F₀ and at par with F₂. Value of LAI was maximum due to application of 80: 40: 40 (F₃) fertilizer dose. Same result was observed by Hange (1984). The improvement in growth parameter was noticed due to 80: 40: 40 fertilizer dose. Balanced fertilization of N, P and K through F₃ fertilizer dose played a major role in furnishing the needs at sunflower crop to attain its maximum growth. Similar findings were reported by Kene *et al.* (1994), Sathiyavelu *et al.* (1994) and Tomer *et al.* (1997).

The data from Table 2 depicted that the significant differences were observed in seed yield, stalk yield, dry capitulum, test weight, harvest index, oil content and oil yield among the different hybrids. Hybrid KBSH – 1 was significantly superior over the hybrid SCH – 35 was in all

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Table 1: Growth Parameters of sunflower as influenced by hybrids and fertilizer doses						
Treatments	No. of functional leaves	Stem girth (cm)	Total dry matter (g)	Leaf area (dm ²)	Head diameter (cm)	No. of filled seeds per plant
Hybrids						
KBSH-1(H ₁)	24.01	11.00	75.74	41.63	17.66	412.88
SCH-35 (H ₂)	21.08	9.96	70.54	37.00	17.25	404.25
S.E. ±	0.32	0.08	1.73	0.67	0.12	2.74
C.D.(P=0.05)	0.95	0.24	5.08	1.99	0.37	80.5
Fertilizer dose (NPK kg ha⁻¹)						
00:00:00(F ₀)	19.62	9.53	70.15	34.75	15.80	384.50
40:20:20(F ₁)	20.77	10.10	73.29	38.75	16.80	39.75
60:30:30(F ₂)	23.93	10.87	77.13	41.32	18.23	424.12
80:40:40(F ₃)	25.87	11.42	81.89	42.43	19.00	425.88
S.E. ±	0.45	0.11	2.00	0.95	0.17	3.87
C.D.(P=0.05)	1.34	0.35	5.87	2.81	0.52	11.39
Interaction (HxF)						
S.E. ±	0.64	0.16	3.47	1.35	0.25	5.48
C.D.(P=0.05)	N.S	N.S	N.S	N.S	N.S	N.S
General Mean	22.55	10.49	74.69	39.33	17.46	408.56

Table 2 : Yield attributes and oil content of sunflower as influenced by various treatments							
Treatments	Seed yield (kg ha ⁻¹)	Stalk yield (kg ha ⁻¹)	Dry wt. of capitulum (kg ha ⁻¹)	Test weight (g)	Harvest index (%)	Oil content (%)	Oil yield (kg ha ⁻¹)
Hybrids							
KBSH-1(H ₁)	1296.5	4374.1	1522.3	23.26	55.83	39.93	517.69
SCH-35 (H ₂)	1189.6	3948.5	1415.8	21.40	20.53	35.17	418.35
S.E. ±	15.09	67.28	24.23	0.26	0.36	0.41	13.05
C.D.(P=0.05)	44.33	197.62	71.16	0.78	1.07	1.22	38.08
Fertilizer dose (NPK kg ha⁻¹)							
00:00:00(F ₀)	858.57	3729.4	1244.0	15.44	19.90	36.45	312.95
40:20:20(F ₁)	1261.1	4033.1	1422.4	22.70	22.77	37.55	473.54
60:30:30(F ₂)	1396.9	4350.5	1575.5	20.05	23.48	37.76	527.42
80:40:40(F ₃)	1447.5	4534.0	1634.5	26.05	23.56	38.46	556.71
S.E. ±	21.34	95.17	34.26	0.40	0.51	0.59	18.48
C.D.(P=0.05)	62.69	279.47	100.64	1.12	1.5	1.7	53.87
Interaction (HxF)							
S.E. ±	30.19	134.57	48.46	0.53	0.73	0.83	28.11
C.D.(P=0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S
General Mean	1242.2	4161.7	1469.1	22.35	21.68	37.50	467.79

studied parameters.

Application of fertilizer dose 80 : 40 : 40 NPK kg ha⁻¹ was at par with 60:30:30 NPK kg ha⁻¹ and recorded significantly more grain yield (kg ha⁻¹), stalk yield (kg ha⁻¹), harvest index (%), test weight (g), oil content (%) and oil yield (kg ha⁻¹) over its respective lower doses of fertilizers. Remarkable improvement in seed yield (1447.5 kg ha⁻¹), were noticed due to 80: 40: 40 fertilizer dose.

This improvement may be due to maximum seed getting percentage and test weight. Similar findings were observed by Kene *et al.* (1994), Sharma (1994) and Tomer *et al.* (1997).

As the oil yield is the function of seed yield and oil content in seed, the maximum oil yield (556.71 kg ha⁻¹) was recorded with application of fertilizer dose 80: 40: 40. The higher dose of nitrogen supplemented with higher

phosphorus application exerted in more oil production, which reflected in higher oil yield as application of fertilizer dose F_3 . This result in conformity with the results of Sathiyavelu (1994).

The interaction effect of hybrids and fertilizer doses on growth and yield attributes was not observed significant.

Conclusion:

From the present findings, it could be suggested that the hybrid KBSH – 1 was good performer for cultivation during *khariif* season and application of fertilizer dose 80 : 40 : 40 NPK kg ha⁻¹ gave more seed yield and oil yield.

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