

GROWTH AND YIELD OF SUNFLOWER AS INFLUENCED BY DATES OF SOWING AND LEVELS OF N, P AND K

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A field experiment was conducted during *summer* season to study the effect of sowing dates and NPK combinations on growth and yield of sunflower. Sowing the crop on the 1st week of March proved to be better than delayed sowing on 4th week of March. Application of 80 Kg N + 17.5 kg P + 33.3 kg K ha⁻¹ resulted in higher dry matter production (DM), leaf area index (LAI), number of seeds head⁻¹, 1000-seed weight and seed yield compared with all other treatment combinations.

Key words : Nitrogen, phosphorus, potassium, sowing dates, sunflower

Oilseed production in West Bengal is insufficient to meet the requirements of the state and there is little scope for further expansion of acreage under oilseed crops. Amongst the oilseeds, sunflower has a good yield potential and is tolerant to soil salinity and moisture stress. It can be grown throughout the state during *summer* season. Detailed investigations concerning agronomic requirements of the crop in the state are scanty. The present investigation was carried out to study the effect of different sowing dates and various combinations of N, P and K on growth and yield of sunflower in *summer*.

A field experiment was conducted for two years during the *summer* season of 1996 and 1997 at 'C' Block farm of Bidhan Chandra Krishi Viswavidyalaya, Kalyani, West Bengal. The soil was sandy loam in texture having low available nitrogen (148 kg ha⁻¹), medium available phosphorus (15.4 kg ha⁻¹) and available potassium (118 kg ha⁻¹) with neutral pH (7.2). The experiment was conducted in split plot design taking two dates of sowing in main plot and eight N, P and K combinations in sub-plot (control, N, P, K, NP, NK, PK, and NPK where N, P and K were 80, 17.5 and 33.3 kg, respectively) in three replicates. The sowing dates were 1st and 22nd March and 4th and 25th March during 1996 and 1997, respectively. The sunflower variety KBSH 1 was sown with a spacing of 45cm x 30 cm in both the years.

Sowing the crop in the 1st week of March produced higher amount of dry matter as compared to sowing on

22nd and 25th of March. Application of N, P, and K brought about an increase in dry matter production as compared to control. However, the combined application of NPK produced maximum dry matter (520.6 gm⁻²) which was 73.8, 37.5, 49.2, 22.4, 15.9 and 33.7% higher than control N, P, K, NP, NK and PK combinations, respectively (Table 1). This was due to the beneficial role played by NPK in increasing plant height and leaf area index (LAI) due to better photosynthetic activity. Earlier sowing coupled with combined application of NPK resulted in higher yield than the late sowing of the crop.

Significantly higher LAI was recorded in the earlier sown crop (1st week of March). The highest LAI (3.49) was recorded with combined application of NPK as compared to N, P and K alone and their combinations in both the years which might be due to increased leaf size as a result of better photosynthesis.

The number of filled seeds head⁻¹ was higher when the crop was sown in the 1st week of March compared with the sowing on 22nd and 25th March. Similar results were also reported by Pol *et al.* (1990). However, irrespective of dates of sowing, combined application of NPK resulted in the highest number of filled seeds head⁻¹ as compared to all other treatments. This corroborates the findings of Bhan (1976).

Bolder seeds were produced when the crop was sown in the 1st week of March resulting in higher 1000 seed

Table 1. Dry matter production and leaf area index of sunflower as influenced by sowing dates and levels of N, P and K

Treatment	Dry matter production (g m ²)			Leaf area index (LAI)		
	1996	1997	Mean	1996	1997	Mean
Sowing date						
S ₁	453.8	414.8	434.3	3.42	2.82	3.12
S ₂	358.7	346.4	352.6	2.21	2.31	2.26
CD (P=0.05)	358.7	8.5	-	0.33	0.28	-
NPK Level						
Control	306.3	292.6	299.5	1.68	1.60	1.64
N	414.5	342.7	378.6	3.09	2.91	3.00
P	342.0	337.5	339.8	2.27	2.49	2.25
K	345.7	351.9	348.8	2.29	2.49	2.39
NP	477.7	372.3	425.0	3.31	3.05	3.18
NK	445.0	452.7	448.9	2.91	3.13	3.02
PK	396.7	381.4	389.1	3.06	2.79	2.93
NPK	547.0	494.2	520.6	3.66	3.31	3.49
CD (P=0.05)	36.9	23.4	-	0.31	0.23	-

weight. The 1000-seed weight was found to be maximum with the combined application of NPK as compared to all the other treatments. This may be due to better metabolism of carbohydrate as well as translocation of assimilates.

Sunflower sown in 1st week of March produced higher seed yield, as compared to crop sown at the later dates. NP, NK and PK applications resulted in higher seed yield when compared with their individual applications. This is in line with the work of Rao and Soren (1991). Application of NPK together gave rise to the highest seed yield of sunflower which was due to better seed filling and

higher number of seeds head⁻¹. Combined application of NPK produced 7.5, 11.1 and 26.5% higher yield as compared to NP, NK and PK applications, respectively (Table 2). Similar findings have been reported by Shelka *et al.* (1988).

Results from the experiment indicate that sowing sunflower in the 1st week of March is beneficial. Further, combined application of N, P and K resulted in better growth and higher yield as compared to all other combinations.

Table 2. Number of filled seed head⁻¹, 1000-seed weight and seed yield of sunflower as influenced by sowing dates and levels of N, P and K

Treatment	Number of filled seed head ⁻¹			1000-seed weight (g)			Seed yield (kg ha ⁻¹)		
	1996	1997	Mean	1996	1997	Mean	1996	1997	Mean
Sowing date									
S ₁	438	440	439	50.9	53.2	52.1	155.7	1808	1683
S ₂	338	389	393	44.5	48.7	46.6	149.3	1808	1390
CD (P=0.05)	17	12	-	2.4	2.4	-	20.9	23.9	-
NPK Level									
Control	325	304	315	45.6	43.7	44.7	958	1068	1013
N	439	411	425	52.1	53.2	52.7	1383	1562	1473
P	390	402	396	49.5	52.2	50.9	1300	1524	1412
K	394	405	400	50.2	52.5	51.4	1376	1542	1459
NP	480	469	475	53.1	55.1	54.1	1679	1954	1817
NK	453	408	431	52.0	54.2	53.1	1669	1850	1760
PK	389	405	397	48.7	53.3	51.0	1471	1620	1546
NPK	511	509	510	56.1	56.9	56.5	1896	2013	1955
CD (P=0.05)	15	18	-	1.8	2.8	-	60.7	121.1	-

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REFERENCES

- Bhan, S. (1976). Agronomic practices for sunflower in Uttar Pradesh. *Indian Farming* **26**: 21-22.
- Pol, P.S. Patil, S.D. and Shinde, S.H. (1990). Yield and Yield attributes of *summer* sunflower varieties as influenced by seeding period. *J. Maharashtra Agril. Univ.* **15**: 106-107.
- Rao, S.V.C.K. and Soren, G. (1991). Response of sunflower cultivars to planting density and nutrient application. *Indian. J. Agron.* **36**: 95-98.
- Shelka, V.B., Shinde, V.S. and Dhipale, V.V. (1988). Effect of nitrogen, phosphorus and potassium on growth and yield of *rabi* sunflower. *Crop Res. Hissar* **8**: 85-88.