

## EFFECT OF N AND P ENRICHED SUNFLOWER STALK ON CROP YIELD, OIL CONTENT AND SOIL FERTILITY

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### ABSTRACT

Field experiments were conducted at Agricultural Research Station, Bhavanisagar to find out the efficiency of N and P<sub>2</sub>O<sub>5</sub> enriched sunflower stalk along with N/P<sub>2</sub>O<sub>5</sub> fertilizers on yield of sunflower (Morden). The 5% P<sub>2</sub>O<sub>5</sub> enriched sunflower stalk at the rate of 60 kg P<sub>2</sub>O<sub>5</sub> as basal dressing along with 40 kg N through urea recorded a seed yield increase of 18.4% over the same quantity of N and P<sub>2</sub>O<sub>5</sub> applied through inorganic fertilizers. The physical condition and fertility status of the soil were also improved by the addition of enriched sunflower stalk.

Key words: N and P, enriched, sunflower stalk, crop yield, soil fertility.

Inorganic fertilizers are becoming scarce and costly. Utilisation of crop wastes will solve this problem to a considerable extent. Among the crop residue, sunflower stalk which contains about 0.31% N and 0.12% P<sub>2</sub>O<sub>5</sub> constitutes a valuable renewable source of plant nutrients and organic carbon, but not systematically utilised so far. An estimated loss of 8 lakh tonnes of NPK nutrient could be prevented if it is properly utilized for crop production after enrichment. Hence, an attempt was made to study the effect of sunflower var. Morden.

### MATERIALS AND METHODS

Four field experiments were conducted during summer and kharif seasons of 1986 and 1987 in red soils (Alfisol) of Agricultural Research Station, Bhavanisagar. The soils of the experimental fields were free from salt hazards and neutral in reaction. The available nutrient contents were low in N (144 to 175 kg/ha) and P (5.2 to 7.0 kg/ha) and high in available K (450 to 580 kg/ha). The following were the treatments each replicated three times in a randomised block design.

### TREATMENTS

T<sub>1</sub> -Control (No fertilizer)

T<sub>2</sub> -40 kg N + 60 kg P<sub>2</sub>O<sub>5</sub> through inorganics.

T<sub>3</sub> -40 kg N through stalk + 60 kg P<sub>2</sub>O<sub>5</sub> through inorganics.

T<sub>4</sub> -40 kg N through urea + 60 kg P<sub>2</sub>O<sub>5</sub> through stalk.

T<sub>5</sub> -40 kg N through enriched stalk (5% N) + 60 kg P<sub>2</sub>O<sub>5</sub> through inorganics.

T<sub>6</sub> -40 kg N through enriched stalk (10% N) + 60 kg P<sub>2</sub>O<sub>5</sub> through inorganic.

T<sub>7</sub> -40 kg N through urea + 60 kg P<sub>2</sub>O<sub>5</sub> through enriched stalk (5% P<sub>2</sub>O<sub>5</sub>).

T<sub>8</sub> -40 kg N through urea + 60 kg P<sub>2</sub>O<sub>5</sub> through enriched stalk (10% P<sub>2</sub>O<sub>5</sub>).

**Process of enrichment:** The sunflower stalk was chopped into pieces of 0.5 to 1.0 cm size. Thirty kg of single super phosphate was added for every 100 kg of chopped material to get 5 per cent P<sub>2</sub>O<sub>5</sub> enriched straw. The material was mixed thoroughly with super phosphate. Enough quantity of water was sprinkled over the chopped material so that it becomes moist throughout and again it was mixed well before composting. The material was composted under anaerobic condition for 50-60 days. The composted material was shade dried and used as enriched organic manure.

Sunflower variety Morden was the test crop. Usual cultural practices were followed in raising the crop. Plant height, head diameter and seed test weight besides seed yield were recorded at maturity. Treatmentwise seed samples were analysed for oil content and per hectare oil yield

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Table 1. Effect of enriched sunflower stalk on yield attributes and seed yield of sunflower

Treatments	Head diameter (cm)	Seed filling (%)	1000 seed weight (g)	Seed yield (kg/ha)				Available N and P status of soil (kg/ha) (mean of 4 seasons)		
				1986		1987			Mean	
				Summer	Kharif	Summer	Kharif			
T1	12.6	86.4	49.0	896	1115	837	897	936	131	5.1
T2	13.2	89.2	52.1	1024	1411	1123	909	1117	140	6.0
T3	13.3	89.7	52.4	986	1403	1111	990	1123	135	5.6
T4	13.5	90.7	51.5	673	1469	1173	1025	1085	140	6.2
T5	13.7	89.7	55.0	928	1494	1161	1033	1154	153	6.5
T6	13.5	90.1	54.6	1194	1539	1185	1027	1236	154	6.3
T7	14.5	90.3	55.4	1234	1659	1275	1123	1323	150	7.6
T8	14.2	92.4	55.6	1108	1605	1222	1066	1250	148	7.5
SE	0.4	0.9	1.2	117	89	105	45	66	4.4	0.3
CD at 5%	0.7	1.8	2.5	251	192	223	96	138	9.2	0.6

computed. Post harvest soil samples were analysed for available N, P and Organic Carbon content and the soil physical parameters were determined.

## RESULTS AND DISCUSSION

### Yield and yield attributes

The result on biometric attributes (Table 1) revealed that head diameter, seed filling and seed test weight were significantly influenced by the addition of P<sub>2</sub>O<sub>5</sub> enriched stalk when compared to the inorganic fertilizer treatment and it was on par with the N enriched stalk treatments.

The differences in the seed yield due to various treatments were significant in all the four seasons (Table 2). The 5% P<sub>2</sub>O<sub>5</sub> enriched stalk treatment performed better than 10% P<sub>2</sub>O<sub>5</sub> enriched stalk treatment and N (5 and 10 %) enriched stalk treatments. The pooled data revealed that a maximum seed yield of 1323 kg/ha was recorded in 5% P<sub>2</sub>O<sub>5</sub> enriched stalk treatment against 1117 kg/ha under inorganic fertilizer treatment. The increase in seed yield being 18 per cent over inorganic fertilizer treatment. The increased yield recorded in the P<sub>2</sub>O<sub>5</sub> enriched stalk treatment could be attributed to the corresponding increase in the yield attributes viz., head diameter, seed filling and seed test weight, and also due to the favourable soil physico-chemical conditions that prevailed during the crop growth period, which ultimately resulted in higher seed yield. Similar trend of increased groundnut pod yield due to incorporation of straw in a sandy loam alluvial soil was reported by Gaur and Ramendra Singh (1982).

### Oil content and oil yield

The difference in oil content was significant in one (Kharif 1986) out of four seasons. The pooled data revealed that enriched stalk treatments recorded higher oil content over control.

However, the oil content was enhanced to 40.0% in P<sub>2</sub>O<sub>5</sub> enriched stalk treatment from 39.3% in inorganic fertilizer treatment. Gaur and Ramendra Singh (1982) were also of the opinion

that addition of straw @ 10 t/ha increases the oil content in groundnut.

The difference in oil yield due to treatments was significant in all the four seasons. The maximum oil yield of 535 kg/ha was recorded in 5% P<sub>2</sub>O<sub>5</sub> enriched stalk treatment registering 22.9% increase over the same quantity of P<sub>2</sub>O<sub>5</sub> added through inorganic fertilizer. However, it was on par with the other enriched stalk treatments. The increase in oil yield could be attributed to the corresponding increase in seed yield recorded in the P<sub>2</sub>O<sub>5</sub> enriched stalk treatment.

### Soil physical condition and fertility build up

Application of enriched sunflower stalk did not alter the physical parameters of the soil much probably due to the fact that the incorporation of stalk for one or two seasons is insufficient to result in marked improvement.

Addition on N enriched stalk (5 and 10% N) along with 60 kg P<sub>2</sub>O<sub>5</sub> enhanced the available N status of soil. Similarly, P<sub>2</sub>O<sub>5</sub> enriched stalk (5 and 10% P<sub>2</sub>O<sub>5</sub>) along with 40 kg N increased the available P status of soil. Favourable effect of straw incorporation on soil available N and P content was reported by Ramasamy (1979) and (1982). The soil reaction and organic carbon content of the soil were not influenced by the addition of N or P<sub>2</sub>O<sub>5</sub> enriched sunflower stalk.

From the above result, it could be concluded that the P<sub>2</sub>O<sub>5</sub> enriched sunflower stalk can be used as an organic manure without any adverse effect to soil physical condition and fertility status. This will help to conserve the available nutrient elements present in the sunflower stalk through recycling.

## REFERENCES

- GAUR, A.G. and RAMENDRA SINGH, 1982. Integrated nutrient supply system. *Fert. News.*, 27: 87-98.
- RAMASAMY, P.P. 1979. Economic recycling of crop residues for soil fertility improvement. *Madras agric. J.* 66: 737-743.
- RAMASAMY, V. 1982. Effect of recycling of organic residues in low land rice. M.Sc. Thesis submitted to TNAU, Coimbatore.