NPK CONTENT AND UPTAKE BY SEED AND STALK AND QUALITY PARAMETERS OF SUNFLOWER (*HELIANTHUSANNNUUS* L.) AS INFLUENCED BY APPLICATION OF DISTILLERY BIO-COMPOST

T.K.ROOPA,BHASKAR.S.RADHA T.K.

Abstract: With deterioration of soil health due to indiscriminate use of chemical fertilizers, there is a great deal of concern for integrated nutrient management in agriculture. Presently, it is mandatory for all the distilleries to use spent wash for beneficial purposes as indiscriminate and unscientific disposal has resulted in soil and ground water pollution. One of the ways of disposing spent wash is to go for production of bio-compost using press mud as a raw material. Press mud has been well recognized as organic manure and is being utilized by farmers thereby helping easy disposal of press mud. One of the major reasons for the low productivity is poor nutrient management play an important role in improving the productivity. . Use of organics in combination with appropriate ratio of fertilizers may be beneficial in increasing the crop yield and maintain soil health. Keeping afore said field experiment was conducted at GKVK, Bangalore to know the "**NPK Content (%) and Uptake by Seed and Stalk and Quality parameters of Sunflower (*Helianthus annnuus* L.) as influenced by application of Distillery Bio-Compost**" at University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore. The application of 1.5 times recommended P_2O_5 through distillery bio-compost recorded significantly higher nutrient content (N, P and K) of seed and stalk and quality parameters like oil content, oil yield, protein content and protein yield followed by treatment received with the application of recommended P_2O_5 through distillery bio-compost (T_4) which was on par with recommended P_2O_5 through SSP (T_5). Lower the parameters recorded with treatment receiving recommended P_2O_5 through FYM.

Key words: Distillery Bio-compost, FYM, NPK content, SSP.

Introduction: Oilseed crops play an important role in the national economy and ranks second after food grains. Oilseed, not only form an essential part of the human diet but also serve as an important raw material for the agro-based industries. Sunflower (*Helianthus annuus* L.) is the second important oil seed crop of the world which contains 42 to 44 per cent oil. It also serve as an important raw material for the agro-based industries. Chemical fertilizers are playing a crucial importance of organic manures in promoting soil health and better plant nutrition has gained recognition again in the world as a whole in recent years. It also improves the physico-chemical properties of soil, besides improving the efficiency of applied fertilizers. Bio-compost is a commercially available press mud based organic manure and is a good source of plant nutrients. It has 2.40 per cent of nitrogen, 1.47 per cent of phosphorous and 1.31 per cent of potassium when produced using molasses from sulphitation process.

Material and Methods: The experiment was conducted at the University of Agricultural Sciences, Gandhi Krishi Vignana Kendra, Bangalore during *kharif* season of year 2004. The soil was slightly acidic in reaction (6.3) and had available N, P_2O_5 and K_2O of 215.6, 30.5 and 228 kg/ha, respectively. The experiment was laid out in randomized complete block design with four replications and six treatments. The treatments include T_1 - recommended P_2O_5 through FYM, T_2 – 1.5 times recommended P_2O_5 through FYM, T_3 – recommended P_2O_5 through distillery bio-compost (balance N through chemical fertilizers), T_4 – 1.5 times recommended P_2O_5 through distillery bio-compost, T_5 – recommended P_2O_5 through SSP (balance N and K through chemical fertilizers), T_6 – 50% recommended P_2O_5 through distillery bio-compost + 50% recommended P_2O_5 through SSP (balance N and K through chemical fertilizers).

NPK Content of Seed and Stalk: NPK Content of Seed and Stalk are presented in Table 1. Significantly higher nitrogen content (1.22%) in seed and Stalk (0.6%) was recorded with application of 1.5 times recommended P_2O_5 through distillery bio-compost which was on par with T_3. The lower nitrogen content of seed and stalk was noticed with the application of 1.0 P_2O_5 through FYM (T_1).

Significantly higher potassium content in seed (2.1%) and stalk (3.2 %) was with application of 1.5 times recommended P_2O_5 through distillery bio-compost (T_4). The application of 1.0 P_2O_5 through FYM (T_1) recorded lowest potassium content of seed and stalk (Table 3).Total uptake of Nitrogen, Phosphorus and Potassium by sunflower significantly differed due to different treatments presented in Table 1, 2 and 3 respectively. The lowest total uptake of nitrogen (29.5 kg/ha), phosphorus (6.80 kg/ha) and was (65.3 kg/ha) was noticed in T_1. Application of 1.5 times

recommended P_2O_5 through distillery bio-compost recorded significantly higher total uptake of nitrogen (49.3 kg/ha), Phosphorus (20.00 kg/ha) and Potassium (165.4 kg/ha compared with other treatments. Higher the uptake of nutrients greater the efficiency of plant to utilize them for dry matter production through higher photosynthesis. [5] reported that the application of bio-digested press mud at10 t/ha with the recommended dose of fertilizer N for medium and short duration rice varieties showed favourable influence on nutrient uptake of crop due to press mud containing higher **Quality** Parameters: Quality parameters like Oil Content, Oil yield, Protein Content and Protein Yield are presented in Table 4

Table1: Nitrogen content (%) and Total Uptake (kg/ha) by seed and stalk of crop as influenced by application of distillery bio-compost

Treatment	Nitrogen content (%)		Total uptake (kg/ha)
	Seed	Stalk	
T_1	1.03	0.46	29.5
T_2	1.16	0.54	40.2
T_3	1.20	0.59	45.3
T_4	1.22	0.60	49.3
T_5	1.17	0.57	43.6
T_6	1.13	0.52	36.0
S.Em±	0.014	0.02	1.40
C.D. at 5%	0.04	0.08	4.23

T_1	:	Recommended P_2O_5 through FYM
T_2	:	1.5 times recommended P_2O_5 through FYM
T_3	:	Recommended P_2O_5 through distillery bio-compost (balance N through chemical fertilizers)
T_4	:	1.5 times recommended P_2O_5 through distillery bio-compost
T_5	:	Recommended P_2O_5 through SSP (N and K through chemical fertilizers)
T_6	:	50% recommended P_2O_5 through distillery bio-compost + 50% recommended P_2O_5 through SSP (balance N and K through chemical fertilizers)
FYM	:	Farm yard manure
SSP	:	Single super phosphate

Significantly higher potassium content in seed (2.1%) and stalk (3.2 %) was with application of 1.5 times recommended P_2O_5 through distillery bio-compost (T_4). The application of 1.0 P_2O_5 through FYM (T_1) recorded lowest potassium content of seed and stalk (Table 3).Total uptake of Nitrogen, Phosphorus and Potassium by sunflower significantly differed due to different treatments presented in Table 1, 2 and 3 respectively. The lowest total uptake of nitrogen (29.5 kg/ha), phosphorus (6.80 kg/ha) and was (65.3 kg/ha) was noticed in T_1. Application of 1.5 times recommended P_2O_5 through distillery bio-compost recorded significantly higher total uptake of nitrogen (49.3 kg/ha), Phosphorus (20.00 kg/ha) and Potassium (165.4 kg/ha compared with other treatments. Higher the uptake of nutrients greater the efficiency of plant to utilize them for dry matter production through higher photosynthesis. [5] reported that the application of bio-digested press mud at10 t/ha with the recommended dose of fertilizer N for medium and short duration rice varieties showed favourable influence on nutrient uptake of crop due to press mud containing higher percentage of nutrients. Similar results finding by [6] who observed that higher total uptake of N was recorded with 50% N substitution through solid effluent + 50% N substitution through inorganic source due to higher availability of N in soil. The results are in accordance with the results of [4] who indicated that nitrogen uptake by wheat was

maximum with higher levels of nitrogen than with lower levels because of higher availability in soils. Increased uptake may be attributed to cumulative effect of increased content and highest dry matter production.

Quality Parameters: Quality parameters like Oil Content, Oil yield, Protein Content and Protein Yield are presented in Table 4.

Oil Content (%) and Oil Yield (kg/ha): The treatments did not differ significantly in respect oil percentage. However, higher oil content (34.62%) and oil yield (269.9 kg/ha) was recorded with the application of 1.5 times recommended P_2O_5 through distillery bio-compost (T_4). The lower oil content (T_5) (32.42%) and oil yield (184.07 kg/ha) was recorded with the application of 1.0 P_2O_5 through FYM (T_1). Similarly when higher dose of Press mud was applied in integration with inorganic fertilizers (in T3), it increased total soluble solids, sucrose, purity, CSS and sugar recovery of juice by 7.83 %, 10.42 %, 2.80 %, 12.06 %, and 12.07 %, over the control (T1) [2].

Table 2: Phosphorus content (%) and Total uptake (kg/ha) by seed and stalk of crop as influenced by application of distillery bio-compost

Treatment	Phosphorus content (%)		Total uptake (kg/ha)
	Seed	Stalk	
T_1	0.02	0.22	6.80
T_2	0.06	0.33	12.20
T_3	0.08	0.42	17.20
T_4	0.12	0.44	20.00
T_5	0.08	0.40	16.60
T_6	0.04	0.31	10.20
S.Em ±	0.0074	0.013	0.50
C.D. at 5%	0.02	0.04	1.52

T_1	:	Recommended P_2O_5 through FYM
T_2	:	1.5 times recommended P_2O_5 through FYM
T_3	:	Recommended P_2O_5 through distillery bio-compost (balance N through chemical fertilizers)
T_4	:	1.5 times recommended P_2O_5 through distillery bio-compost
T_5	:	Recommended P_2O_5 through SSP (N and K through chemical fertilizers)
T_6	:	50% recommended P_2O_5 through distillery bio-compost + 50% recommended P_2O_5 through SSP (balance N and K through chemical fertilizers)
FYM	:	Farm yard manure

Table 3: Potassium content (%) and Total uptake (kg/ha)
eed and stalk of crop as influenced by application of distillery bio-compost

Treatment	Potassium content (%)		Total uptake (kg/ha)
	Seed	Stalk	
T_1	1.2	1.6	65.3
T_2	1.7	2.8	126.6
T_3	1.8	3.0	147.6
T_4	2.1	3.2	165.4
T_5	1.8	2.9	148.6
T_6	1.5	2.4	109.3
S.Em±	0.07	0.15	10.0
C.D. at 5%	0.22	0.47	30.2

..

T_1	:	Recommended P_2O_5 through FYM
T_2	:	1.5 times recommended P_2O_5 through FYM
T_3	:	Recommended P_2O_5 through distillery bio-compost (balance N through chemical fertilizers)
T_4	:	1.5 times recommended P_2O_5 through distillery bio-compost
T_5	:	Recommended P_2O_5 through SSP (N and K through chemical fertilizers)
T_6	:	50% recommended P_2O_5 through distillery bio-compost + 50% recommended P_2O_5 through SSP (balance N and K through chemical fertilizers)
FYM	:	Farm yard manure
SSP	:	Single super phosphate

Table 4: Quality parameters of Sunflower as influenced by application of Distillery Bio-compost

Treatments	Oil content (%)	Oil yield (kg/ha)	Protein content (%)	Protein yield (kg/ha)
T_1	33.00	184.07	6.43	35.7
T_2	33.05	213.03	7.42	46.3
T_3	32.50	241.40	7.49	55.7
T_4	34.62	269.92	7.62	59.8
T_5	32.42	222.03	7.31	50.2
T_6	32.97	207.88	7.05	44.8
S.Em±	0.73	20.2	0.08	4.55
C.D. at 5%	NS	NS	0.27	13.73

T_1	:	Recommended P_2O_5 through FYM
T_2	:	1.5 times recommended P_2O_5 through FYM
T_3	:	Recommended P_2O_5 through distillery bio-compost (balance N through chemical fertilizers)
T_4	:	1.5 times recommended P_2O_5 through distillery bio-compost
T_5	:	Recommended P_2O_5 through SSP (N and K through chemical fertilizers)
T_6	:	50% recommended P_2O_5 through distillery bio-compost + 50% recommended P_2O_5 through SSP (balance N and K through chemical fertilizers)
FYM	:	Farm yard manure
SSP	:	Single super phosphate

Protein Content (%) and Protein Yield (kg/ha): The data on protein content and protein yield are presented in Table 4. Protein content differed significantly due to various treatments. The application of 1.5 times recommended P_2O_5 recommended through distillery bio-compost (T_4) recorded highest protein content (7.6%) and it was on par with T_3 (7.4%). FYM at higher doses and bio-distillery compost both at 1.0 and 1.5 times recommended P_2O_5 had produced about 1% extra protein content in the seed. The lowest protein yield (35.7 kg/ha) was recorded with the application of 1.0 P_2O_5 recommended through FYM (T_1). The press mud application increased the protein, sugar and starch content in rice crop [1].

Significantly highest protein yield (59.8 kg/ha) was recorded with the application of 1.5 times recommended P_2O_5 recommended through distillery bio-compost (T_4) and it was on par with T_3 (55.7 kg/ha). Lower protein content (6.4%) was recorded with the application of 1.0 P_2O_5 recommended through FYM (T_1). Similar results have been reported by [3] who observed that increased crude protein content of mulberry leaves (17.81%) in treatment

receiving the application of enriched press mud with 5 per cent NPK each plus 100 per cent recommended fertilizers than absolute control (15.69%) which is attributable to higher nitrogen content of press mud enriched with 5 per cent level in form of urea, thus the readily available nitrogen has contributed to increased uptake and the crude protein content.

References:

1. M. N. Abubacker, and G. R. RAO, , Effect of press mud on rice, 1995, *J. Indian Soc. Soil Sci*., **43**(2): 300-302.
2. Muhammad Aleem Sarwar1, Muhammad Ibrahim, Muhammad Tahir, Kafeel Ahmad, Zafar Iqbal Khan and Ehsan Elahi Valeem, Appraisal of press mud and inorganic fertilizers on soil properties,
4. I. B Pandey, S. S Mishra and Singh, S. R. Effect of seed furrow mulching nitrogen rates and weed management on seedling emergence and yield of late sown wheat (*Triticum aestivum*). 1998, *Indian J. Agron*., **43**: 657-667.
5. K Subramaniyan and K. Wahab, Effect of organic manures and fertilizers N on post harvest soil yield and sugarcane quality, 2010, *Pak. J. Bot*., **42**(2): 1361-1367.
3. S. Mutharaju, Use of enriched pressmud as a source of organic manure for irrigated Mulberry crop. 1997, M.Sc.(Agri.) Thesis, University of Agricultural Sciences, Bangalore .

   nutrient status, nutrient uptake and yield of transplanted rice. 1997, *Madras Agric. J.*, **84**(2): 78-81.
6. T. S. Sukanya, and S. S. Meli, Distillery effluents effect on nutrient content in plant, nutrient availability in soil of maize (*Zea mays* L.) 2004, *Crop Res*., **27**(2&3): 192-199.

***

Depat of Agronomy, Veterinary College, Hassan 573 202
Professor of Agronomy, UAS, GKVK, Bangalore 560065
Indian Institute of Soil Sciences, Nabibagh, Bhopal
Corresponding Author: tkroopa111@yahoo.com