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Site specific nutrient management for improved and sustained safflower yields under Dryland ecosystem of Karnataka

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Abstract
The soil is clayey in texture (Vertisol) with pH 7.95, bulk density 1.27 dS/m, available nitrogen, phosphorus and potassium of 224, 20.8 and 342 kg per ha, respectively. The experiment included two factors. The main factor had two levels of manure treatments (M_1-no manure and M_2-FYM at 5 t/ha) and the sub-factor had five levels of fertilizers (F_1-no fertilizer, F_2-recommended NPK @ 40:40:12 kg per ha, F_3-SSNM based on STCR equation, F_4- F_3 + micronutrients @ Zn @25 kg/ha+S@10 kg/ha and F_5 - F_3+if soil is deficient add 25 % more than F_2 and if soil is medium apply 25% less than recommended). The experiment was laid out in split-plot design with three replications at fixed site during both the years.

Keywords: specific, sustained, Dryland ecosystem, nutrient

Introduction
Safflower is an important oil seed crop of *rabi* season in India mainly grown in semi-arid regions for vegetable and industrial oil purpose, although elsewhere it's seeds are used as bird feed, young plants as forage plant and florets for preparing textile dyes [4]. Safflower seed contains around 28 to 34 per cent of oil with high levels of linoleic acid, which is known to reduce blood cholesterol content [7].

Safflower crop, like other crops, requires balanced nutrition, including secondary/micro nutrients and adequate moisture to realize higher seed and oil yield. Despite the fact that safflower is a drought tolerant crop [3] this crop often experiences moisture stress due to dry and hot weather prevalent during post-rainy season. Further, non-application of balanced nutrition based on the site-specific soil nutrient status is also another reason for lower safflower yields. Hence there was a need to test if site-specific nutrient management (SSNM) techniques in safflower crop help improve yield. In addition application of FYM or organic residues would enhance SOM which in turn, help improve water holding capacity of soils. Therefore, combined application of organic and chemical nutrient elements based on site-specific nutrient status may not only enhance safflower yields but also help build drought resilience in the soil in the long-run [10, 11].

Material and Methods
This study was conducted at Agriculture Research Station, Annigeri, University of Agricultural Sciences, Dharwad during *rabi* seasons of 2014-15 and 2015-16 under rainfed condition. The station is located in Northern Dry Zone (Zone-3) of Karnataka at a 15^0 8" N, 75^0 7" E with an altitude of 624.8 amsl. The soil is clayey in texture (Vertisol) with pH 7.95, bulk density 1.27 dS/m, available nitrogen, phosphorus and potassium of 224, 20.8 and 342 kg per ha, respectively.

The experiment was laid out in split-plot design with three replications at fixed site during both the years. It included two factors, the main factor had two levels of manure treatments (M_1-no manure and M_2-FYM at 5 t/ha) and the sub-factor had five levels of fertilizers (F_1-no fertilizer, F_2-recommended NPK @ 40:40:12 kg per ha, F_3-SSNM based on STCR equation, F_4- F_3 + micronutrients @ Zn @25 kg/ha+S@10 kg/ha and F_5 - F_3+if soil is deficient add 25% more than F_2 and if soil is medium apply 25% less than recommended).

Results and Discussion

The year 2015 received more and uniform distributed rainfall than 2016 as the latter year received no rain after sowing, thus crop experienced extremely dry and hot climate. Hence yield in 2016 was much lower than in 2015. However, pooled data analysis doesn't show this contrast (Table 2).

Table 1: Rainfall during *kharif* 2015-16 at ARS, Annigeri

Months	Rainfall		
	Avg. of 33 years	2015	2016
January	1.5	0.0	0.0
February	0.8	0.0	0.0
March	11.8	70.8	3.8
April	39.5	40.2	27.0
May	64.4	118.8	60.3
June	94.6	105.4	92.2
July	75.9	21.4	79.6
August	87.2	35.8	32.6
September	145.2	149.2	54.0
October	101.2	38.4	61.2
November	39.4	0.0	0.0
December	4.0	0.0	2.0
Total	665.5	580.0	412.0

Table 2: Growth and yield of safflower as influenced by the organic manure and fertilization based on SSNM principle (pooled data of 2015 and 2016 years)

Treatment	Plant height (cm)	No of branches per plant	No. of capitula per plant	100 seed weight (g)	Seed yield (kg per ha)
Main plots (Organic manure)					
M_1	60.51	7.36	23.27	5.58	1343
M_2	63.38	8.21	25.54	5.78	1461
S.Em.	0.89	0.25	0.63	0.13	35.20
CD (P=0.05)	2.57	NS	1.05	NS	105.13
Sub plots (fertilizer levels)					
F_1	59.21	7.20	21.54	5.51	1293
F_2	62.96	8.10	25.78	5.72	1421
F_3	62.79	7.51	24.49	5.79	1445
F_4	62.93	7.59	24.74	5.83	1462
F_5	63.04	8.50	25.19	5.84	1476
S.Em,	1.21	0.39	0.93	0.10	46.4
CD (P=0.05)	NS	NS	2.81	0.28	131.00
Interaction (Manure x Fertilizer)					
M_1F_1	58.43	6.89	21.68	5.36	1272
M_1F_2	61.40	7.43	23.40	5.59	1377
M_1F_3	60.90	7.55	21.70	5.62	1296
M_1F_4	60.83	7.65	22.45	5.60	1352
M_1F_5	61.15	7.84	23.15	5.72	1418
M_2F_1	59.99	7.50	23.45	5.67	1345
M_2F_2	64.57	8.27	27.10	5.74	1456
M_2F_3	62.68	7.92	26.33	5.85	1475
M_2F_4	64.63	8.18	26.83	5.87	1480
M_2F_5	65.08	8.20	26.98	5.90	1511
S.Em.	2.55	0.64	1.12	0.17	78.50
CD (P=0.05)	NS	NS	3.14	0.49	NS

Plant height (cm)

Application of FYM @ 5 t ha^{-1} increased significantly plant height (63.38 cm) as compared no FYM application. The application of fertilizer either based on STCR or NPK combined with micro nutrients and interaction between manure and fertilizers were found to be non-significant [1, 2].

Number of branches (per plant)

Application FYM fertilizer and interaction between FYM and fertilizer did not show any significant differences. These results are in confirmed with [5, 6].

Number of capita per plant

Application of FYM 5t ha^{-1} recorded significantly higher number of capitula (25.54/plant) as compared to no FYM application. Application of fertilizer (F_4) combination recorded significantly higher number of capitula (25.19/plant) as compared to (F_1) combination. However combined application of manures and fertilizer showed significant difference. Application of (M_2FS) treatment combination recorded significantly higher capitula (26.98/plant) as compared other treatments combination. These results are in confirmed with [8, 9].

100 seed weight (g)

Application (F_5) recorded significantly higher 100 seed weight (5.84g) as compared to (F_1) with respect to combined application of (M_2F_5) recorded significantly higher 100 seed weight (5.9g) as compare to (F_1). These results on in confirmed with [12].

Seed yield (kg/ha)

Application of FYM @ 5t ha^{-1} recorded higher seed yield (1461 kg/ha) as compared no FYM application. However, application of fertilizer (F_5) recorded significantly higher seed yield (1476kg/ha) as compared to other treatment combinations. The interaction between manure and fertilizers combination did not showed any significant difference. These results are in confirmed with [13, 14].

Conclusion

This study is an on-going long-term fixed site experiment, but initial results from two years do suggest the beneficial effect of FYM @ 5t per ha and optimized and balanced fertilization on safflower yield. However, actual effect of FYM and balanced nutrition based on STCR can be realized after few more years' of study.

References

1. Ali EA, Mahmoud AM. Effect of combination between organic and mineral fertilization on productivity of some safflower genotypes. World J Agril. Sci. 2012; 8(2):134-140.
2. Biradar SA. *In-situ* green manuring of intercropped legumes on the performance of maize chickpea/safflower cropping system under rainfed condition. Ph. D. Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India), 2008.
3. Bitarafan Z, Shirani AH, Delkhosh B. Nitrogen rates and sowing date effect on yield and oil content of spring safflower. International Journal of Science and Advanced Technology. 2011; 1(6):25-30.
4. Dordas C, Sioulas C. Safflower yield, chlorophyll content, photosynthesis, and water use efficiency response to nitrogen fertilization under rainfed conditions. Indian Crop Production. 2008; 27:75-85.
5. Golzarfar M, Shirani Rad AM, Delkhosh B. Nitrogen and phosphorus rates effect on yield and oil content of safflower in two growing season. Intl. J Sci. Adv. Technol. 2011; 1(7):60-64.
6. Hebbi BS. Influence of in situ moisture conservation practices in sunnhemp green manururing and levels of nitrogen on *rabi* sorghum. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India), 2000.
7. Kadu PS, Ismail S. Impact of organics and biofertilizers on yield, quality and uptake of major nutrients by safflower grown on vertisols. Annals of Plant Physiology. 2008; 22(2):214-216.
8. Mohamed SJ, Jellings AJ, Fuller MP. Effect of nitogen on safflower physiology and productivity. African Crop Sci. J. 2012; 20(4):225-237. Rev., 2: 1106-1116.
9. Suresh G, Padmavathi P, Murthy IYLN, Ramesh P. Crop productivity and soil biological activity under different nutrient management practices in mungbean-safflower cropping system. J Oilseeds Res. 2012; (29, special issue):318-320.
10. Weiss EA. Safflower: Oilseed Crops, 93-129, Blackwell Sci. Ltd., Victoria, Australia, 2000, pp.606.
11. Yogesh TC. Effect of In-situ green manuring of legumes, NP levels and organic manures on growth, yield and quality of safflower. Ph.D. Thesis, Univ. Agric. Sci. Dharwad, Karnataka (India), 2013.
12. Yogesh TC. Effect of In-situ green manuring of legumes, NP levels and organic manures on growth, yield and quality of safflower. Ph. D. Thesis, Univ. Agric. Sci., Dharwad, Karnataka (India), 2013.
13. Zareie S, Golkar P, Mohammadi NG. Effect of nitrogen and iron fertilizers on seed yield and yield components of safflower genotypes. African J Agric. Res. 2011; 6(16):3924-3929.
14. Zareie S, Golkar P, Mohammadi NG. Effect of nitrogen and iron fertilizers on seed yield and yield components of safflower genotypes. African J Agric. Res. 2011; 6(16):3924-3929.