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Effect of integrated nutrient management practices on growth and yield of rainfaid maize in sigehadlu micro watershed of Chikkamagaluru district

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Abstract
A field experiment was conducted at Sigehadlu micro watershed in the farmer's field during *kharif 2017*, to know the effect of integrated nutrient management practices on growth and yield of rainfaid maize in Sigehadlu micro watershed of Chikkamagaluru district. Sigehadlu micro watershed under the Bilvala sub watershed Kadur taluk, Chikkamangluru district. The experiment was laid out in randomized block design with three replications and 9 treatments. The results of the present investigation indicated that that significantly higher plant height, number leaves, cob length, cob girth, grain yield and stover yield was recorded in (T_7) which received 100% N through fertilizer+ 25% through FYM+25% through vermicompost and this was on par with treatment (T_6) which received 75% N through fertilizer + 25% N through FYM+25% N through vermicompost and lowest was record in treatment T_2 which received 100% recommended N through a fertilizer.

Keywords: Integrated nutrient management, growth, yield, rainfaid maize, sigehadlu micro watershed

Introduction
Maize (*Zea mays* L.) is the third important cereal crop next to rice and wheat in the world. Maize has been an important cereal crop because of its high production potential compared to any other cereal crop and better adaptability to wide range of environments. Since the crop has very high genetic yield potential, it is called as the "Queen of cereals". Maize being a C4 plant has higher yield potential which also depends on nutrient supplying capacity of the soil. However, its potential could not be utilized fully due to lack of proper agronomic management practices like efficient nutrient management and good quality variety. Intensive crop rotation and imbalance fertilizer use have resulted in a wide range of nutrients deficiency in fields. For intensive cropping systems, the current recommended fertilizers rates need revision upwards with in balance ratio of vital micronutrients specific to crop to enhance stagnant yields. The productivity of maize is largely dependent on its nutrient management. It is well known that maize is a heavy feeder of nutrients. The INM is a strategy for advocating judicious and efficient use of chemical fertilizers with matching addition of organic manures. Ponusamy, *et al.* stated that integration of organic and inorganic manures will go a long way in maintaining sustainable crop production and enhancing soil fertility through their complementary effects [4]. Fertilizer management plays an important role for obtaining satisfactory yield. In order to increase crop productivity nutrient management may be achieved by the contribution of

Organic sources like press mud compost, vermin compost, coirpith compost and enriched farm yard manure. There- fore, the present study was executed to evaluate the effect of integrated nutrient management practices on growth and yield of rainfaid maize in Sigehadlu micro watershed of Chikkamagaluru district.

Material and Methods

A field experiment was conducted at Sigehadlu micro watershed in the farmer's field during *Kharif 2017*, to effect of INM practices on distribution of different nitrogen fractions (mg kg^{-1}) in by maize crop in Sigehadlu micro watershed. Sigehadlu micro watershed under the Bilvala sub watershed Kadur taluk, Chikkamangluru district, experimental site situated at 13.36° 49.978" North latitude, 76.00° 11.290" East longitude, at an altitude of 702 meters above mean sea level. The average rainfall of the zone is 600 mm. The experiment consisting of the 9 treatment with the three replications. Details of initial soil properties are presented in Randomized Block design (RCBD) was followed. Maize was used (*Zea mays* L.) as a test crop variety CP 818, The details of the treatments are follows plot size was 5.4 m ×3.6 m and net plot size was 3.6 m ×2.4 m, the fertilizer recommendation is 150:75:40 $N:P_2O_5:K_2O$ kg ha^{-1}.

Treatment details

T_1-Absolute control
T_2-100% recommended N through a fertilizer
T_3-125% recommended N through fertilizer
T_4-150% recommended N through fertilizer
T_5-50% N through fertilizer + 25% N through FYM + 25% N through Vermicompost
T_6-75%N through fertilizer + 25% N through FYM + 25% N through Vermicompost
T_7-100% N through fertilizer + 25% N through FYM+25% N through Vermicompost
T_8-50% N through fertilizer +50% N through FYM
T_9-50% N through fertilizer + 50% N through Vermicompost

(Note: Recommended P and K applied are common to all treatments except absolute Control)

Results and Discussion

Plant height and number of leaves per plant of maize

Results presented in Table 1 indicated that a significant increase in plant height was noticed due to the treatment which received (T_7) 100% N applied through fertilizer + 25% N applied through FYM + 25% N applied through vermicompost during all growth stages of maize as compared to other treatments. The maximum plant height of 199.67 cm was recorded at harvest of the crop by above treatment and this was on par with treatment T_6 (75% N through fertilizer + 25% N through FYM + 25% N through vermicompost) which recorded a plant height 198.33 cm at harvest of the crop. Further, the treatments which received nitrogen (100, 125 and 150%) in integrated form were found to be significantly superior in increasing the plant height as compared to the treatments which received nitrogen 100, 125 and 150 per cent only through fertilizers. Similarly, imposition of integrated nutrient management practices significantly increased the number of leaves per plant as compared to the other treatments (T_2, T_3, and T_4) which received nitrogen only through fertilizers. The maximum numbers of leaves per plant (11.91) were recorded at the harvest stage of crop by treatment T_7 (100% N through fertilizer+ 25% N through FYM+25% N through vermicompost) as compared to other treatments. But, the treatments which received nitrogen in integrated form significantly superior as compare to that of the treatments which received nitrogen only applied through fertilizers with respect to plant height and number of leaves**.**

The results clearly indicated that integrated treatments recorded significantly higher plant height and more number of leaves per plant as compared to the treatments which received nitrogen only applied through fertilizers. This may be attributed to the increased availability of primary nutrients particularly nitrogen due to its addition through fertilizers and organics and other nutrients in soil due to increased biological activity in soil and improvement in physical and fertility status of the soil. An increase in supply of nutrients to plants might have accelerated the activities of enzymes involved in photosynthesis, carbohydrate metabolism, and protein synthesis, synthesis of growth promoting substances, cell division and cell elongation which resulted in increase in plant height and plant growth and other parameters. Further, the improvement in plant height and number of leaves per plant due to imposition of the treatment T_7 (100% N applied through fertilizer + 25% N applied through FYM + 25% N applied through vermicompost) might be attributed to proper nourishment of crop and optimum crop growth, because the crop requirement for the major nutrients was met by this treatment. These results are confirmed by the findings of Rameshwar and Singh (1998) [4].

Cob length, cob girth of Maize

Results presented in Table 2 indicate that a significant increase of cob length and cob girth of maize over control due to the imposition of the different treatments. Among the treatments, cob length and cob girth were significantly higher obtained in by T_7 treatment (100% N applied through fertilizer + 25% N through applied FYM + 25% N applied through vermicompost) (21.30 and 19.83 cm) as compared to T_2 treatment (100% Recommended N applied through a fertilizer) (13.44 cm and 1.46 cm, respectively). However, it was on par with T_6 treatment (75% N through fertilizer + 25% N through FYM +25% N through vermicompost) (18.24 and 17.97 cm) respectively. Further integrated treatments recorded significantly higher cob length, cob girth as compared to the treatments which received nitrogen only through fertilizers. The longer cobs and cob girth length might be due to increase in supply of nutrients to plants might have accelerated the activities of enzymes involved in photosynthesis, carbohydrate metabolism, protein synthesis, synthesis of growth promoting substances, cell division and expansion which resulted in increase in length and cob girth of maize. The similar result was also reported by Rameshwar and Singh (1998) [4].

Grain and stover yield of maize

Results presented in Table 3 indicate that a the maximum of 65.21 q ha^{-1} grain yield was recorded by the treatment (T_7) which received 100% N applied through fertilizer + 25% applied through FYM + 25% applied through vermicompost followed by T_6 (75% N through fertilizer + 25% through FYM + 25% through vermicompost) which recorded the grain yield of 63.12 q ha^{-1} and lower grain yield was recorded in T_2 treatment (52.13 q ha^{-1}) as compared to other treatments Among the treatments T_2, T_3, and T_4 which received nitrogen only fertilizers recorded significantly lower grain yield as compared to other treatments. Further, it was noticed that all treatments which received nitrogen in integrated form of

fertilizers and organics significantly increased the grain yield. However, It was noticed that a magnitude of variation in the grain yield was proportional to the variation in the yield attributing parameters like cob length, cob girth and test weight of grains and their variation was attributed to the availability of nutrients in soil as indicated by significant and positive correlation observed between grain yield and available nitrogen status in soil. Further, all those treatments which received nitrogen in integrated form recorded significantly higher grain yield as compared to the treatments which received nitrogen only through fertilizers. Among the treatments, the treatments T_7 and T_6 recorded higher grain yield as compared to other treatments probably because of optimum supply of nutrients at right time of crop requirement of maize responds well to fertilizer application as a result of its well-developed root system, crop absorbed required nutrients from soil for effective dry matter production and translocation of photosynthates from leaves to the sink for better development of grains. This is in conformity with the work of Kamalakumari and Singaram (1996) [1] (Table 3).

Similarly, the maximum stover yield (84.30 q ha^{-1}) was recorded in the treatment T_7 (100% N applied through fertilizer+ 25% applied through FYM+25% through applied vermicompost) and followed by treatment T_6 (75% N applied through fertilizer + 25% applied through FYM + 25% applied through vermicompost) which recorded the stover yield of 81.24 q ha^{-1} and lower stover yield was recorded in T_2 treatment (100% Recommended N applied through a fertilizer (62.96 q ha^{-1}) as compared to all other treatments. Among the treatments the treatments T_2, T_3, and T_4 which received only nitrogen through fertilizers recorded significantly lower grain and stover yield over other treatments. Further, it was noticed that all treatments which received nitrogen in integrated form of fertilizers and organics significantly increased the stover yield over the treatments which received nitrogen only applied through fertilizers. These results indicated that the variation and magnitude of increase in stover yield was related to the availability of nutrients in soil particularly nitrogen as indicated by positive and significant correlation observed between stover yield and availability of nutrients in soil Owing to their addition through NPK, FYM and vermicompost and release of nutrients from the native sources in soil due to high biological activity in soil particularly under the treatment T_7 (100% N through fertilize + 25% through FYM+25% through vermicompost) resulted in higher dry matter production as indicated by plant height, number of leaves per plant which ultimately increased the stover yield of maize. Similar findings were also reported by Sharma *et al*. (1987) [6], who indicated that application of organic manures along with NPK fertilizers leads to improvement in the soil fertility due to increase in the population of beneficial microflora in soil in addition to the improvement physical properties of soil (Table 3).

Table 1: Effect of integrated nutrient management practices on plant height and number of leaves per plant at different growth stages of maize

Treatments	Plant height (cm)			Number leaves per plant		
	30DAS	60 DAS	Harvest	30 DAS	60 DAS	Harvest
T_1:Absolute Control	23.72	119.07	130.00	4.24	5.80	8.76
T_2:100% Recommended N through a fertilizer	33.67	159.63	171.12	5.12	6.59	9.96
T_3:125% Recommended N through fertilizer	36.67	164.33	180.33	5.88	8.40	10.37
T_4:150% Recommended N through fertilizer	37.33	165.67	184.67	6.52	9.33	10.51
T_5:50% N through fertilizer +25% N through FYM+25% N through vermicompost	49.78	183.00	189.33	8.60	10.34	10.59
T_6:75% N through fertilizer + 25% N through FYM+25% N through vermicompost	54.41	196.89	198.33	9.34	11.67	11.43
T_7:100% N through fertilizer+ 25% N through FYM+25% N through vermicompost	55.33	198.21	199.67	10.20	12.33	11.91
T_8:50% N through fertilizer +50% N through FYM	48.33	181.33	188.67	8.41	9.42	10.25
T_9:50% N through fertilizer + 50% N through vermicompost	47.00	176.00	186.67	7.48	9.39	10.67
SEm ±	1.91	3.82	2.01	0.38	0.54	0.30
CD at 5%	5.68	11.44	6.03	1.13	1.61	0.91

Note: 100% P & K is common applied to all treatments except absolute control.

Table 2: Effect of integrated nutrient management practices on cob length, cob girth test weight and dry matter accumulation of maize

Treatments	Cob length (cm)	Cob girth (cm)
T_1:Absolute Control	10.31	9.80
T_2:100% Recommended N through a fertilizer	13.44	11.46
T_3:125% Recommended N through fertilizer	13.47	11.97
T_4:150% Recommended N through fertilizer	14.96	12.90
T_5:50% N through fertilizer +25% N through FYM+25% N through vermicompost	17.16	14.01
T_6:75% N through fertilizer + 25% N through FYM+25% N through vermicompost	18.24	17.97
T_7:100% N through fertilizer+ 25% N through FYM+25% N through vermicompost	20.77	18.65
T_8:50% N through fertilizer +50% N through FYM	16.61	15.58
T_9:50% N through fertilizer + 50% N through vermicompost	16.82	15.15
SEm ±	0.70	0.80
CD at 5%	2.10	2.40
Treatments	Cob length (cm)	Cob girth (cm)
T_1:Absolute Control	10.31	9.80
T_2:100% Recommended N through a fertilizer	13.44	11.46
T_3:125% Recommended N through fertilizer	13.47	11.97
T_4:150% Recommended N through fertilizer	14.96	12.90
T_5:50% N through fertilizer +25% N through FYM+25% N through vermicompost	17.16	14.01
T_6:75% N through fertilizer + 25% N through FYM+25% N through vermicompost	18.24	17.97
T_7:100% N through fertilizer+ 25% N through FYM+25% N through vermicompost	20.77	18.65
T_8:50% N through fertilizer +50% N through FYM	16.61	15.58

T_9:50% N through fertilizer + 50% N through vermicompost	16.82	15.15
SEm ±	0.70	0.80
CD at 5%	2.10	2.40

Note: 100% P & K is common applied to all treatments except absolute control

Table 3: Effect of integrated nutrient management practices on grain yield and stover yield of maize

Treatments	Grain yield (q ha^{-1})	Stover yield (q ha^{-1})
T_1:Absolute Control	25.32	31.32
T_2:100% Recommended N through a fertilizer	52.13	62.96
T_3:125% Recommended N through fertilizer	53.28	66.07
T_4:150% Recommended N through fertilizer	55.01	70.19
T_5:50% N through fertilizer +25% N through FYM+25% N through vermicompost	60.34	75.59
T_6:75% N through fertilizer + 25% N through FYM+25% N through vermicompost	63.12	81.24
T_7:100% N through fertilizer+ 25% N through FYM+25% N through vermicompost	65.21	84.30
T_8:50% N through fertilizer +50% N through FYM	60.58	71.34
T_9:50% N through fertilizer + 50% N through vermicompost	59.31	70.42
SEm ±	0.96	1.44
CD at 5%	2.86	4.33

Note: 100% P & K is common applied to all treatments except absolute control

Conclusion

The study was carried out to evaluate the effect of integrated nutrient management practices on growth and yield of rainfaid maize in Sigehadlu micro watershed of Chikkamagaluru district. Based on the results of the experiments, it can be concluded that the application of 100% N applied through fertilizer+ 25% applied through FYM+25% through applied vermicompost) and followed by treatment T_6 (75% N applied through fertilizer + 25% applied through FYM + 25% applied through vermicompost were found to be the most efficient, economically feasible, scientifically sound, ecologically desirable and practically appreciable. These practices also resulted in the highest cob length, cob girth, grain yield and stover yield of the rain faid maize.

References

1. Kamalakumari K, Singaram P. Effect of continuous application of FYM and NPK on fertility status of soil yield and nutrient uptake in maize. Madras Agric. J. 1996; 83:181-184.
2. Pinjari SS. Effect of integrated nutrient management and polythene mulch on the performance of sweet corn under Laterate soils of Konakan Ph. D (Agri) Thesis Dr. Balasaheb Sawant Konakan Krish Viadeeth, 2007.
3. Rajeshwari RS, Hebsur NS, Pradeep HM, Haramagowdar TD. Effect of integrated nitrogen management on growth and yield of maize. Karnataka**.** J Agric. Sci. 2001; 20(2):399-400.
4. Rameshwar, Singh GM. Effect of FYM and fertilizer on the growth and development of maize and wheat in sequence. Indian J Agric. Sci, 1998, 365-70.
5. Ravi N, Basavarajappa R, Chandrashekar CP, Harlapur SI, Hosamani MH. Effect of integrated nutrient management on growth and yield of quality protein maize. Karnataka journal of agricultural sciences. 2012; 25(3):395-396.
6. Sharma RC, Banik P. Effect of integrated nutrient management on baby corn–rice cropping system: economic yield, system productivity, nutrient-use efficiency and soil nutrient balance. Indian Journal of Agricultural Sciences, 2012, 220-224.
7. Thavaprakaash N, Velayudham K, Muthukumar VB. Effect of Crop Geometry, Intercropping System and Integrated Nutrient Management Practices on Productivity of Baby Corn (*Zea mays* L.) Based Intercropping Systems. Research Journal of Agricultural and Biological Sciences. 2005; 1(4):295-302.