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Effect of organic manures and iron on growth and yield of Babycorn (*Zea mays* L.)

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Abstract
To study the influence of organic manures and iron on growth and yield of Babycorn, an experiment was carried out in *Kharif*-2021, crop research farm of SHUATS. The treatments consist of 3 different levels of organic manures with combination of different levels of iron foliar spray at 20DAS. The experiment was laid out in randomized block design with nine treatments each replicated thrice. The result showed that *viz:* Plant height (176.75cm), number of leaves per plant (11.35) and dry weight (88.42 g/plant) was recorded significantly higher with application of vermicompost 3t/ha + Iron 0.3% foliar spray. Length of cob (17.89cm), cob weight with husk (47.57g/cob) cob yield with husk (9.65 t/ha), cob yield without husk (2.71 t/ha).

Keywords: Babycorn, FYM, vermicompost, neemcake, iron, foliar spray

Introduction
Baby corn (*Zea mays* L.) is typically a maize ear produced from regular corn plants which are harvested earlier, particularly when the silks have the size of 1-3 cm (Thavaprakaash *et al.*, 2005) [11]. The judicious uses of nutrients from different source like chemical, organic as well as biofertilisers will maintain the environmental sustainability for generations (Dadarwal *et al.*, 2009) [3]. FYM seems to act directly by increasing crop yield by acceleration of respiratory process or by cell permeability or by hormonal growth action. Under organic management, nutrients release and crop demand synchrony is very much required; hence, a thorough understanding of nutrients release pattern from organic sources is essential to avoid nutrients stress. Vermicomposting is the process of producing compost by utilizing earthworms to turn the organic waste into high-quality compost that consists mainly of worm cast in addition to decayed organic matter (Ismail 2005, Devi and Prakash, 2015) [6, 4]. In plants, iron is involved in the synthesis of chlorophyll, and it is essential for the maintenance of chloroplast structure and function. Foliar feeding is a new and controversial technique of feeding plants by applying liquid fertilizer directly to their leaves (Rout and Sahoo, 2015) [9]. Keeping the points in view an experiment was conducted to study the influence of organic manures and iron on growth regulators on growth and yield of Babycorn.

Materials and Methods
The experiment was conducted during the *Kharif* 2021, at the crop research farm, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P.) The soil of the experimental field constituting a part of central Gangetic alluvium is neutral and deep. The soil of experimental plot was sandy loam in texture, nearly neutral in soil reaction (pH 7.3), low in organic carbon (0.57%), available N (230kg/ha), available P (32.10kg/ha) and available K (235kg/ha). The treatments consist of 3 different levels of organic manures with combination of different levels of iron foliar spray at 20DAS. The experiment was laid out in randomized block design with nine treatments each replicated thrice. T_1: Farm yard manure (FYM) 5 t/ha + Iron 0.1% foliar spray, T_2: Farm yard manure (FYM) 5 t/ha + Iron 0.2% foliar spray, T_3: Farm yard manure (FYM) 5 t/ha + Iron 0.3% foliar spray, T_4: Vermicompost 3 t/ha + Iron 0.1% foliar spray, T_5: Vermicompost 3 t/ha + Iron 0.2% foliar spray, T_6: Vermicompost 3 t/ha + Iron 0.3% foliar spray, T_7: Neemcake 2 t/ha + Iron 0.1% foliar spray, T_8: Neemcake 2 t/ha + Iron 0.2% foliar spray, T_9: Neemcake 2 t/ha + Iron 0.3% foliar spray. All agronomic practices are kept in order in the cropping period. Experimental data collected was subjected to statistical analysis by adopting Fishers method of Analysis of variance (ANOVA) as outlined by Gomez and Gomez (1984). Critical Difference (CD) values were calculated the 'F' test was found significant at 5% level.

Results and Discussion

Growth parameters

The one season experimental data (Table 1) revealed that growth and yield parameters of babycorn were significantly influenced by the treatments. significantly higher plant height (176.75 cm) recorded with application of vermicompost 3t/ha + Iron 0.3% foliar spray, which is statistically at par with application of vermicompost 3t/ha + Iron 0.2% foliar spray (174.60 cm) and vermicompost 3t/ha + Iron 0.1% foliar spray (170.73 cm). Maximum number of leaves per plant (11.35) application of vermicompost 3t/ha + Iron 0.3% foliar spray. Vermicompost 3t/ha + Iron 0.2% (11.24), neemcake 2t/ha + Iron 0.3% (11.12) and FYM 5t/ha + Iron 0.3% (11.22) treatments recorded statistically at par with vermicompost 3t/ha + Iron 0.3% foliar spray treatment. highest dry matter accumulation (88.42 g/plant) was observed vermicompost 3t/ha + Iron 0.2% foliar spray, which was significantly superior over rest of the treatments and the lowest dry matter accumulation was obtained in FYM 5t/ha + Iron 0.1% foliar spray (71.02 g/plant). However, vermicompost 3t/ha + Iron 0.2% foliar spray (86.39 g/plant) treatments stood statistically at par with vermicompost 3t/ha + Iron 0.2% foliar spray. Significant increase in plant height was observed due to soil and foliar application of zinc and iron along with RDF was probably due to increase in cell, cell enlargement, internodal elongation and plant metabolism there by promoting vegetative growth which is positively correlated to the productive potentiality of plant and corroborates with the results of Rakeshkumar and Bohra (2014) [8]. Organic manure supply essential nutrient elements to promote vigorous growth and physiological activities in the plant system. Organic sources of nutrition significantly increased the plant growth. (Choube, 2007) [2] reported that application of organic manures increased the plant height and dry weight. Similar observation was also reported by (Akongwubel *et al*., 2012) [1]. They observed significant improvement on plant height and leaf area index in corn with ultimate increase in organic manure rates.

Yield parameters

The pertaining data (Table 2) revealed that the highest number of cobs (2.64) were recorded superior in vermicompost 3t/ha + Iron 0.3% foliar spray. And lowest number of cobs (2.01) obtained neemcake 2t/ha + Iron 0.1% foliar spray. Length of cob (17.89 cm) recorded significantly superior in vermicompost 3t/ha + Iron 0.3% foliar spray. However, vermicompost 3t/ha + Iron 0.2% foliar spray (17.61 cm) treatment stood statistically at par with vermicompost 3t/ha + Iron 0.3% foliar spray. significantly higher cob weight with husk was obtained (47.57 g/cob) in vermicompost 3t/ha + Iron 0.3% foliar spray, vermicompost 3t/ha + Iron 0.2% foliar spray (47.51 g/cob) stood statistically at par with vermicompost 3t/ha + Iron 0.3% foliar spray. The significantly higher cob yield with husk was observed (9.65 t/ha) in vermicompost 3t/ha + Iron 0.3% foliar spray, vermicompost 3t/ha + Iron 0.2% foliar spray (9.46 t/ha) and FYM 5t/ha + Iron 0.3% (9.22 t/ha) treatments stood statistically at par with vermicompost 3t/ha + Iron 0.3% foliar spray. significantly maximum cob yield with husk was observed (2.71t/ha) in vermicompost 3t/ha + Iron 0.3% foliar spray, rest of all treatments stood statistically at par with FYM 5t/ha + Iron 0.2% foliar spray (2.25 t/ha), FYM 5t/ha + Iron 0.3% foliar spray (2.44 t/ha), vermicompost 3t/ha + Iron 0.1% foliar spray (2.28 t/ha), vermicompost 3t/ha + Iron 0.2% foliar spray (2.60 t/ha) and neemcake 2t/ha + Iron 0.3% foliar spray (2.43 t/ha). The increase in the yield could be due to favourable nutritional environment in rhizosphere and continuous supply of micronutrients (Zn and Fe) to the crop and higher absorption of nutrients by plant (Yadav and Chhipa, 2007) [12] which influence photosynthesis, assimilation and translocation of photosynthates from source (leaves) to sink (cob). According to Mullaimaran *et al.* (2019) [7] vermicompost acts as a good medium for growth and development of microbes in the soil and made the nutrients available for the uptake by plants. The higher nutrient uptake of the plants treated with vermicompost might be the reason for the better exhibit of yield attributing characters and yield. While N promoted the vegetative growth, P probably influenced root growth in a positive manner which could have helped better absorption and transformation of nutrients from source to sink capacity of plants. Better root growth would have helped to divert photo assimilates to more economic yield. Higher uptake of nutrients would have helped to produce more vegetative growth and more number of cobs per plant. According to Singh and Chanda (2011) [10] vermicompost is capable of supplying growth hormones, enzymes and minerals which are very much helpful for the fruit and seed development. Higher and ready availability of nutrients at the right time might be the reason for higher nutrient uptake and simultaneously increased the yield.

Table 1: Influence of organic manures and iron on growth parameters of babycorn

Treatment	Plant height (cm) At harvest	Number of leaves/plant At harvest	Dry weight (g/plant) at harvest
T_1: FYM 5t/ha + Iron 0.1% foliar spray	164.02	9.16	71.02
T_2: FYM 5t/ha + Iron 0.2% foliar spray	162.26	10.19	75.09
T_3: FYM 5t/ha + Iron 0.3% foliar spray	165.02	11.22	83.31
T_4: Vermicompost 3t/ha + Iron 0.1% foliar spray	170.73	10.60	78.13
T_5: Vermicompost 3t/ha + Iron 0.2% foliar spray	174.60	11.24	86.95
T_6: Vermicompost 3t/ha + Iron 0.3% foliar spray	176.75	11.35	88.42
T_7: Neemcake 2t/ha + Iron 0.1% foliar spray	165.89	10.05	71.31
T_8: Neemcake 2t/ha + Iron 0.2% foliar spray	164.94	10.14	73.61
T_9: Neemcake 2t/ha + Iron 0.3% foliar spray	164.45	11.12	80.28
S.Em (±)	2.16	0.21	0.68
CD (5%)	6.46	0.64	2.03

Table 2: Influence of organic manures and iron on yield and yield parameters of babycorn

Treatment	Number of cobs/plant	Length of cob (cm)	Cob weight with husk (g)	Cob yield with husk (t/ha)	Cob yield without husk (t/ha)
T_1	2.23	14.46	40.84	6.57	1.49
T_2	2.34	16.02	43.45	7.90	2.25
T_3	2.44	16.90	45.88	9.22	2.44
T_4	2.35	16.19	43.57	8.27	2.28
T_5	2.51	17.61	47.51	9.46	2.60
T_6	2.64	17.89	47.57	9.65	2.71
T_7	2.01	15.07	42.54	8.20	1.79
T_8	2.30	15.65	42.84	7.54	1.84
T_9	2.36	16.39	45.57	8.53	2.43
S.Em (±)	0.15	0.26	0.31	0.43	0.18
CD (5%)	-	0.78	0.93	1.29	0.53

Conclusion

It is concluded that application of Vermicompost 3t/ha + Iron 0.3% foliar spray recorded significantly higher cob yield without husk (2.71 t/ha) and cob yield with husk (9.65 t/ha). These findings are based on one season; therefore, further trails may be required for further confirmation.

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