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Response of different Pre-sowing Seed Treatments with Organic on Growth, Yield and Yield Attributing Traits in Baby Corn (*Zea mays* L.)

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ABSTRACT: To study the response of different organic pre-sowing seed treatments on growth, yield and yield attributing traits in Babycorn. The seeds are treated in Panchagavya, Jeevamruth, Beejamruth liquid formulations. The treatments are as follows, T_0- Control, T_1, T_2, T_3, T_4 - Panchagavya @ 1%, 3%, 5%, 7%, T_5, T_6, T_7, T_8 - Jeevamruth @ 1%, 3%, 5%, 7%, T_9, T_{10}, T_{11}, T_{12} – Beejamruth @ 1%, 3%, 5%, 7% respectivelyusing Shine-60 variety (Babycorn). The experiment was laid out in Randomized Block Design with thirteen treatments including control which were replicated thrice. The experiment results revealed that seeds treated with Panchagavya @ 7% gave better than other treatments *viz.*, plant height (145.31 cm), lower days to 50% tasselling (47 DAS number of cobs per plant (2.78 cobs), cob length (10.45 cm), cob weight (with husk) - (31.60 g), cob weight (without husk) - (14.65 g), cob yield per plant (99.48 g), cob yield per plot (1.48 kg), biological yield (0.88 kg) were recorded significantly higher compared to other treatments.

Keywords: Baby corn, Panchagavya, Jeevamruth, Beejamruth, Seed priming.

INTRODUCTION

Baby corn, sometimes referred to as baby corn, micro corn, or candle corn, is the young, unfertilized ear of maize (*Zea mays* L.), which is picked before the silks have fully developed or have just begun to do so. One of the most significant year-round crops in India that serves two purposes is baby corn (Rajanna *et al.*, 2011). Baby corn has significant processing and export potential and is growing in popularity on both domestic and international markets. Growing maize for vegetables is a fascinating recent phenomenon. Right now, China and Thailand produce the most baby corn worldwide (Vimalendran and Wahab 2013). Meghalaya, Western Uttar Pradesh, Haryana, Maharashtra, Karnataka, and Andhra Pradesh are among the Indian states where baby corn is grown. Baby corn is one of the most important dual-purpose crops grown. Currently, Thailand and China are the world leaders in baby corn production. In India; recently baby corn has gained popularity as valuable vegetable in Delhi, Uttar Pradesh, Haryana, Maharashtra, Karnataka, Andhra Pradesh, Rajasthan and Meghalaya. In India, it is grown on 8.49 m ha with the production and productivity of 21.28 mt and 2507 kg ha^{-1}, respectively. Rajasthan state was first in respect of area, wherein this crop occupies 10.50 lakh ha area (12.93 per cent) with production of 19.54 lakh tons and productivity of 18.60 q ha^{-1}. Out of total production, 45 per cent is consumed as a staple food in various forms *viz.*, bread, biscuits, cookies or transformed into corn flakes, soups, fresh-roasted sweets, boiled cobs and vegetables etc. (FAO, 2020). In recent times, baby corn has become popular at regular urban vegetable markets. However, considering the nutritional value of baby corn, it needs to be more widely disseminated in other rural and urban areas. Although baby corn is sold in the domestic market, it is sold unprocessed. This leads to a significant reduction in the quality of the ear. This is mainly due to farmers' lack of awareness and lack of proper storage facilities and the location of farms far from the market. Therefore, it is necessary to develop the right entrepreneurship and establish appropriate storage and marketing facilities and popularize the cultivation of young maize in peri-urban agriculture. However, this depends on the organization of the market and the support of government sectors Sreethu and Singh (2020). When young corn is grown for later market and export, extra care is needed in handling the cobs and can be harvested within two to three hours of harvest. Otherwise, they will lose their nutritional value. Pre-sowing seed treatment techniques have been used as an alternative approach to overcome the adverse effects of abiotic stress on agricultural production due to their low cost and risk. The pre-planting seed treatment technology is a hydration of control seeds in a solution containing organic or inorganic solutes, followed by a new desiccation, which allows metabolic activities before germination but prevents the emergence of roots. The primer/hardened seed treatments have been shown to improve vigour better than traditional soaking (Priyanka *et al.*, 2020). The

primer/hardened seed treatments improve seed vigour by protecting the plasma membrane structure from injury from environmental stress. Pre-soaking seeds with an optimal concentration of phytohormones improves their germination, growth and yield under stressful conditions by increasing the mobilization of nutrient reserves through increased physiological activities and root proliferation (Rameshwar *et al.*, 2011). Soaking seeds in organic solutions can enhance plant growth and germination, and aid disease resistance during the germination period (Kumar *et al.*, 2022). Hence, the present study were planned with objective to determine the effect of pre sowing seed treatment of Panchgavya, Beejamurtha and Jeevamrutha on growth, yield and yield attributing traits of Babycorn.

MATERIAL AND METHODS

The field experiment was conducted during *Rabi* season 2021 at the Field Experimentation centre, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj, U.P. The seeds are treated in Panchagavya, Jeevamruth, Beejamruth liquid formulations. The observations that are undertaken in the study are ***viz.,*** Field emergence, plant height, days to 50% tasseling, days to 50% silking, days to Maturity, number of leaves per plant, number of cobs per plant, length of cob per plant, cob weight (with husk, without husk), cob yield per plant, cob yield per plot, harvest index in Baby corn crop. The experiments were conducted on Shine-60 variety.

RESULTS AND DISCUSSION

Growth parameters: A significantly higher field emergence can be obtained in seeds treated with Panchagavya @ 7% (T4) with 95.55% at 10 DAS and T_8 with 91.18% is statistically at par with T_4 and with 84.50% control recorded the lowest field emergence proved that as panchagavya an organic liqueous formulation seeds when soaked gets the seed coat ruptured. Panchagavya contains many micronutrients, vitamins and essential amino acids, growth promoting factors and beneficial microbes which are provided to the seedling when erupted from the seed ensuring better germination and resistance against soil pathogens and borne diseases the results are acceptance with Loganathan *et al.* (2014). Seeds treated with Panchagavya (7%) in T_4 varied significantly and recorded higher plant height among other treatments with 145.31 cm at 45 DAS and statistically at par values were observed in T_8 (136 cm). The lowest was observed in control with 95.25 cm. The growth enzymes present in Panchagavya may have promoted rapid cell division and proliferation due to higher growth characteristics and increased plant height. Beneficial microorganisms from Panchagavya and their presence in the rhizosphere's rhizosphere environment affect plant growth. The results are acceptance with Rajanna *et al.* (2011). As per the data pertained in Table 3 a significantly early days to 50% tasselling was seen in seeds treated with Panchagavya @ 7% with 47 DAS and T_8 which is statistically at par with T_4 also recorded same as T_4 with 47 DAS for 50% tasselling and the highest days to 50 % tasselling can be seen in Beejamrutha @ 1% with 49 DAS. Panchagavya plays an important role in root development and proliferation resulting in better root growth and absorption of nutrients and water from the rhizosphere resulting in early growth and early maturity in Sweet corn. Similar results were found by Rameshwar *et al.*, (2011). Table 3 shows that a nonsignificant data was observed in days to 50% silking in which lower days to 50% silking can obtained in Panchagavya @ 1% with 51.33 DAS. Statistically at par values were observed in Jeevamrutha @ 3% with 51.33 DAS. Higher days to 50% silking is obtained by Panchagavya @ 7% with 53 DAS. This is due to significant translocation and storage of photosynthates from source to sink, which resulted significantly on enhancement of cell division and early growth over other treatments. The results are in accordance with Sreethu and Singh (2020). As per the data shown in Table 3, it can be observed that seeds primed with (T_6) Jeevamrutha @ 3% varied significantly and matured earlier with 56.00 DAS and statistically at par values were observed in T_4 with 56.67 DAS and highest days to maturity was observed in T_7 (Jeevamrutha @ 5%) with 59.33 DAS. The abundant supply of mineral nutrients and organic manure were directly involved in the protoplasmic constituents and accelerate the process of cell division and elongation which in turn resulted in decreased days to maturity. The results are acceptance with Rameshwar *et al.* (2011). Treatments varied significantly in terms of number of leaves per plant. The seeds treated with Panchagavya @ 7% recorded higher number of leaves per plant with 12 leaves and statistically at par values were obtained by T_3 (Panchagavya @ 5%) with same as T_4 with 12 leaves. And the lower number of leaves per plant can be seen in control and T_1 with 9.00 leaves per plant. The application of panchagavya through seed treatment had enhanced the growth factors there by influencing the leaves per plant through the increased flow of nutrients and increased biochemical activities in the plant. The results are acceptance with Vimalendran and Wahab (2013).

Yield parameters: Significantly higher number of Cobs per plant were obtained in (T_4) Panchagavya @ 7% with 2.78 cobs and statistically at par values were observed in T_3 with 2.65 cobs and lowest number of cobs per plant were observed in control with 1.14 cobs. The data pertaining can be observed in Table 3. Higher number of cobs per plant might have been possible due to more vigour and strength attained by the plant as a result of better photosynthetic activities with sufficient availability of nutrients from the seed treatment during the growth stages The results are acceptance with Sreethu and Singh (2020). As per the data pertained in Table 3 significantly higher cob length was observed in T_4 Panchagavya @ 7% with 10.45 cm and statistically at par values were observed in T_8 with 10.31 cm and lower cob length was obtained in control with 8.24 cm. Better availability of nutrients during the vegetative, reproductive stages and sufficient availability of micronutrients such as Zn, Cu, Mn present in Panchagavya and other latent micronutrients. The results are acceptance with Loganathan *et al.* (2014). From the data shown in Table 3 it is clear that Cob

weight (with husk) in T_4 Panchagavya @ 7% is significantly higher over all other treatments with 31.60 g and statistically at par values were observed in T_8 with 31.60 g and lowest was observed in control and T_1 with 12.85 g. Due to the increased biochemical activities and the movement of photosynthates and reserve food materials from the leaf to the stem there is a rapid cell division and the seed production increases resulting in the higher production and productivity. Similar results were found by Kumar *et al.*, (2022). As per the data shown in Table 3 it is clear that cob weight (without husk) in T_4 Panchagavya @ 7% is significantly higher over all other treatments with 14.65 g and statistically at par values were observed in T_8 with 14.65 g and lowest was observed in control and T_1 with 3.35 g. From the data shown in Table 3, it is clear that T_4 Panchagavya @ 7% had performed better and is significantly higher (99.48 g) over all other treatments and statistically at par values were obtained in T_8 with 97.28 g per plant and the lowest cob yield per plant was observed in control with 40.79 g per plant. Due to the increased cell division and higher production of seeds at regular intervals increase the production of growth regulators in the cell. This inturn enhances the growth of new seeds. The results are in acceptance with Kumar *et al.*, (2022). As per the data pertained in Table 3 the seed treatments varied significantly among them. The seeds treated with Panchagavya @7 % was significantly higher among all other treatments with 1.48 kg and T_8 was statistically at par with T_4 (1.34 kg). The lowest Cob yield per plot was obtained in control with 0.54 kg. Levels of IAA and GA present in Panchagavya may generate stimuli in the plant system and increase the production of growth regulators in the cell line, and the action of growth regulators in the plant line is per sheath. Stimulates the required growth and development of seeds. Significantly higher biological was obtained in T_4 @ Panchagavya 7 % with 0.88 kg and statistically at par values were obtained in T_8 with 0.81 kg and control with 0.53 kg is the lowest among all other treatments. The data pertained to biological yield (kg) was depicted in Table 3. The increased biochemical activities in the plant and regular rapid cell elongation has increased the plant height and number of leaves per plant. As the IAA and GA in Panchagavya present in enhanced the crop production by increasing the cob yield. There by increasing the biological yield. The results are acceptance with Priyanka *et al.* (2020). From the data shown in table 3 it is clear that the treatment varied non significantly with lowest harvest index recorded in T_{11} @ Beejamrutha 5% with 37.15% and statistically at par values were obtained in T_4 with 37.21 % and the highest Harvest index was observed in control with 49.53 %.

Table 1: Analysis of Variance on Influence of Organic Seed Priming on Seedling Quality Parameters of Baby Corn.

Sr. No.	Characters	Mean sum of squares		
		Replication (d.f =2)	Treatments (d.f=12)	Error(d.f=24)
1.	Field emergence(%) at 4DAS	0.961	20.719*	4.805
2.	Field emergence(%) at 7DAS	24.874	28.196*	9.951
3.	Field emergence (%) at 10DAS	22.302	25.971*	11.12
4.	Plant height at15DAS	10.909	289.231*	14.196
5.	Plant height at 30 DAS	31.429	286.439*	35.598
6.	Plant heightat45 DAS	48.807	827.713*	94.255
7.	Days to50% tasseling	1.615	1.415*	0.421
8.	Days to 50% Silking	0.692	0.936*	0.526
9.	Number of leaves per plant	0.127	3.699*	0.219
10.	Days to Maturity	1.718	2.41*	1.218
11.	Number of cobs per plant	0.008	0.945*	0.038
12.	Cob length	0.398	1.381*	0.199
13.	Cob weight (with husk)	0.431	149.392*	1.626
14.	Cob weight (without husk)	0.507	47.379	0.328
15.	Cob yield per plant	1.621	1508.461*	40.905
16.	Cob yield per plot	-	0.288*	0.002
17.	Biological yield	0.03	0.00*	0.00
18.	Harvest Index	74.76	1.17	1.50

*indicates significance at 5% level of significance.

Table 2: Treatments details.

Sr. No.	Treatments	Concentration	Duration
T_0	Control	-	-
T_1	Panchagavya	1%	12 hours
T_2	Panchagavya	3%	12 hours
T_3	Panchagavya	5%	12 hours
T_4	Panchagavya	7%	12 hours
T_5	Jeevamruth	1%	12 hours
T_6	Jeevamruth	3%	12 hours
T_7	Jeevamruth	5%	12 hours
T_8	Jeevamruth	7%	12 hours
T_9	Beejamruth	1%	12 hours
T_{10}	Beejamruth	3%	12 hours
T_{11}	Beejamruth	5%	12 hours
T_{12}	Beejamruth	7%	12 hours

Table 3: Evaluation of Baby corn on Seed priming through Panchagavya, Jeevamruth, Beejamruth.

Treatments	Rate of Field Emergence	Plant Height	Days To 50% Tasseling	Days To 50% Silking	Days to Maturity	Number of leaves per plant	Number Of Cobs Per Plant	Cob Length (Cm)	Cob Weight (With Husk)	Cob Weight (Without Husk)	Cob Yield Per Plant (Gm)	Cob Yield Per Plot (Kg)	Biological Yield (Kg)	Harvest Index (%)
T0	2101	95.25	47.00	52.67	57.33	9.00	1.14	8.24	12.85	3.35	40.79	0.54	0.53	49.53
T1	2150	96.50	47.00	51.33	58.00	9.00	1.26	8.89	12.85	3.35	42.09	0.57	0.55	49.44
T2	2322	130.19	48.00	52.33	56.67	11.00	2.36	9.70	25.45	9.45	87.31	1.13	0.67	37.33
T3	2387	135.30	47.67	52.67	57.67	12.00	2.65	10.28	30.40	12.30	97.07	1.26	0.76	37.65
T4	**2629**	**145.31**	**47.00**	**53.00**	**56.67**	**12.00**	**2.78**	**10.45**	**31.60**	**14.65**	**99.48**	**1.48**	**0.88**	**37.21**
T5	2171	96.84	47.67	53.00	57.33	10.00	1.49	8.92	13.70	4.45	44.03	0.57	0.56	49.7
T6	2305	115.80	48.67	51.33	56.00	10.00	1.86	9.24	20.30	6.75	72.72	0.95	0.62	39.44
T7	2292	117.02	47.67	52.67	59.33	11.00	2.02	9.25	24.10	7.35	77.48	0.97	0.62	39.13
T8	2438	136.00	47.00	52.33	58.33	12.00	2.69	10.31	31.60	14.65	97.28	1.34	0.81	37.83
T9	2262	113.71	49.00	52.33	57.00	10.00	1.73	9.06	18.85	6.00	58.85	0.80	0.59	42.58
T10	2236	114.56	48.33	52.00	58.67	10.00	1.83	9.17	19.55	6.45	59.04	0.80	0.58	42.27
T11	2330	130.74	48.00	53.00	57.67	11.00	2.38	9.87	25.90	11.15	87.96	1.17	0.69	37.15
T12	2354	132.81	47.00	52.33	57.67	12.00	2.63	10.16	30.10	11.20	95.27	1.18	0.73	38.34
F-test		S	S	S	S	S	S	S	S	S	S	S	S	NS
SEm±		5.61	0.37	0.42	0.64	0.27	0.11	0.26	0.74	0.33	3.69	0.03	0.01	0.71
CD(P=0.05)		16.36	1.09	1.22	1.86	0.79	0.33	0.75	2.15	0.97	10.78	0.08	0.03	2.06

CONCLUSION

It is concluded that pre-sowing seed treatments showed greater enhancement of selected organics on growth, yield, yield attributing traits of baby corn. Study revealed that plants respond diversely to pre-sowing seed treatment with panchagavya @ 7% was found desirable for baby corn crop.

From the experiments conducted and the observations taken in the filed trails, it is concluded that seed priming with Panchagavya @ 7% was found to be more desirable for producing significantly higher plant height (145.31 cm), lower days to 50% tasseling (47 DAS), number of cobs per plant (2.78 cobs), cob length (10.45 cm), cob weight (with husk) - (31.60 g), cob weight (without husk) - (14.65 g), cob yield per plant (99.48 g), cob yield per plot (1.48 kg), biological yield (0.88 kg). Findings are based on research done in one season in Prayagraj (Allahabad) U.P. further trails may be required for considering it for the recommendation.

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Conflict of Interest. None.

FUTURE SCOPE

In todays, day to day life demand for the organics over inorganics has peaked a lot. One of such organics Panchagavya is known to increase the crop production by 20% from previous studies. As such experiment has been conducted and was expected to be a one step forward in the ongoing experiments throughout the world.

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