Original Research Article

IMPACT OF DIFFERENT SEED PRIMING METHODS WITH BIO FRETILIZERS AND BOTANICALS ON GROWTH, YIELD AND YIELD ATTRIBUTING TRAITS OF SWEER CORN (Zea mays L.)

ABSTRACT

Sweet corn (*Zea Mays* L.) is the world's most widely cultivated food crop. Maize is the third most important cereal crop in the world after rice and wheat. It is called as miracle crop and queen of cereals due to its high productivity. With a view to find out the suitable seed priming method for Sweet corn with bio fertilizers and botanicals on growth, yield and yield attributing traits, a field experiment was conducted based on the complete Randomized Block Design during Rabi season of 2021-2022 at Crop Research Farm of Department of Genetics and Plant Breeding, SHUATS, Prayagraj, U.P. For this purpose, 13 priming treatments including control were used to study under field conditions. The results showed that, when compared to other treatments, Azospirillum at 30g (12 hours) primed seeds recorded the highest field emergence percentage, Plant height (30, 45 & 60 DAS, at harvest), days to 50% Tasselling, days to 50% silking, days to maturity, cob length (cm), cob girth (cm), Number of cobs/plant, Number of rows/cob, Number of grains/row, seed index (g), seed yield/plant (g), seed yield/plot (t/ha), Stover yield (t/h), biological yield (t/ha) and harvest index (%). Azospirillum at 20g (12 hours) was found equally good.

Keywords: Sweet corn, Seed priming, Azospirillum, Moringa leaf extract, yield attributes

1. INTRODUCTION

Maize (Zea mays L.) is a C4 plant and has high yielding potential. This crop is called as miracle crop and queen of cereals due to its high productivity (**lkramulla et al., 2011)**. It is third most important cereal crop after rice and wheat and is being grown throughout the year but mainly as Kharif crop. In India maize is grown in 9.86 M ha area with a production and productivity of 31.51 million tones and 3,195 kg/h respectively contributing 2.53% share over world's production **(Directorate of Economics and Statistics 2021).**

Since, maize is an industrial important crop, the demand for maize seed is more. On realizing the importance of maize in seed industry, the private seed companies are now concentrating more on maize hybrid development and because of continuous research many hybrids were also developed. Among various specialty corns, Sweet corn (Zea mays L.) is a mutant type with one or more recessive alleles in homozygous condition, which enables the endosperm to accumulate twice the sugar content as that of seed corn and controls the conversion of sugar into starch inside the endosperm of kernel. Its consumption at immature stage as roasted and boiled ears is a popular practice as the kernels are sweet (content 12–20% sugar), creamy, tender and crispy. After harvesting green cobs, the plants of sweet corn are used as green fresh or dry fodder. This specialty corn with its high market value is gaining popularity and now a day's its cultivation is the first choice of the farmers **(Suthar et al., 2014)**. Sweet corn can be grown all-round the year under irrigated condition, enabling it to fit in intensive cropping systems.

For existence of any variety or hybrid, timely supply of quality seed is foremost requirement. Good quality seed is the key for successful agriculture to produce a vigorous seedling ensuring higher yield **(Kishore Varma *et al.*, 2017)**. In this context, agricultural practices are shifting towards a more sustainable approach of using transgenic plants, plant growth-promoting bacteria, nano formulations, bio fertilizer, and bio control agents for enhancing crop productivity **(Berg et al. 2010; Adesemoye** and **Egamberdieva 2013; Mishra et al. 2014).**

Seed priming technique is used for improving the vigor, establishment, and efficiency of seedlings in the fields. The early stage of seed germination requires suitable conditions; however, various biotic and a biotic factors hinder the process of germination. Seed biopriming using beneficial and eco-friendly biological agents could lead to improved physiology of seeds resulting into enhanced vigor of the seedlings **(Ghassemi-Golezani 2008)**. Nitragin (Azotobacter, Azospirillum, Pseudomonas) inoculation seeds have 44%

higher LAI and 61% higher leaf chlorophyll index and 24% increase in ear dry weight **(Kouchebagh *et al.*, 2012).** *Moringa oleifera* has attained enormous attention because it is considered to be rich in a variety of natural plant growth regulators such as zeatin which belongs to class of cytokinins and thus can be used as a source of cytokinins. It is also enriched with various macro-nutrients such as phosphorous and potassium along with micro-nutrients **(Yasmeen, 2011)**. **(Eman 2013)** suggested that *Lantana camara* aqueous extract could be used as a potential allelopathic substance for some weed bio-control.

2. MATERIALS AND METHODS

The experiment was carried during Rabi 2021-2022 in crop research farm, department of Genetics and Plant Breeding, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj, U.P. with the view to find out suitable seed priming methods with bio fertilizers and botanicals on Sweet corn (SUGAR-75), The experiment was laid out in Randomized Block Design with 13 treatments replicated thrice. The experiment comprising 13 possible treatments viz.,T_0- control,T_1-Azotobacter @ 10g for 12 hours, T_2- Azotobacter @ 20g for 12 hours, T_3- Azotobacter @ 30g for 12 hours, T_4- Azospirillum @ 10g for 12 hours, T_5- Azospirillum @ 20g for 12 hours, T_6- Azospirillum @ 30g for 12 hours, T_7- Moringa leaf extract @ 5% for 12 hours, T_8- Moringa leaf extract @ 10% for 12 hours, T_9- Moringa leaf extract @ 15% for 12 hours, T_{10}- Lantana leaf extract @ 5%for 12 hours, T_{11}- Lantana leaf extract @ 10% for 12 hours, T_{12}- Lantana leaf extract @ 15% for 12 hours. Field observations regarding growth and seed yield were recorded during experimentation.

3. RESULTS AND DISCUSSIONS

3.1 Growth attributes:

The results in table 1 depicts that the mean performance of Different seed priming methods with biofertilizers and botanicals on pre harvest parameters. The Maximum field emergence percentage (92.22)(%), Plant height (227.3)(cm), early Days to 50% Tasselling (53.33), early days to 50% silking (60.67), early days to Maturity (81), were shown by seed priming with T6 Azospirillum @ 30g for 12 hours, followed by T5 Azospirillum @ 20g for 12 hours,T4 Azospirillum @ 10g for 12 hours. Similar findings were recorded by Fernando *et al.* (2019).

3.2 Yield attributes:

The results in table 2 depicts that the mean performance of Different seed priming methods with biofertilizers and botanicals on post harvest parameters. The maximum Cob length (21.73)(cm), cob girth (17.46)(cm), Number of cobs per plant (2.13), Number of rows per cob (18), Number of grains per row (37.33), seed index (25.8)(g) were recorded in Seed priming with T6 Azospirillum @ 30g for 12 hrs. T5- Azospirillum 20g for 12 hrs, found equally good followed by Azospirillum 10g for 12hrs. Similar findings were observed by Kharusto *et al.* (2016).

The results in table 3 depicts that the mean performance of Different seed priming methods with biofertilizers and botanicals on yield parameters. The maximum seed yield per plant (220.03)(g), seed yield per plot (6.6)(t/ha), stover yield (9.7)(t/ha), biological yield (16.3)(t/ha), harvest index (40.49)(%) were recorded in Seed priming with T6 Azospirillum @ 30g for 12 hrs. T5- Azospirillum 20g for 12 hrs, found equally good followed by Azospirillum 10g for 12hrs. All treatments showed significant difference in all parameters over lantana leaf extract. Similar findings were observed by Suthinraj *et al.* (2017).

Table 1: Mean performance of different seed priming methods for pre harvest characters in Sweet corn (*Zea mays* .L)

Symbols	Treatments	Field emergence %			Plant height (cm)				Days to 50% Tasselling	Days to 50% silking	Days to maturity
		4 DAS	7 DAS	10 DAS	30 DAS	45 DAS	60 DAS	At harvest DAS			
T_0	Control	33.33	60	83.33	32.6	85.03	137.86	174.56	59.33	66.33	85.67
T_1	Azotobacter	36.66	63.33	86.66	34.77	100.97	170.55	203.03	58	63.67	84.33
T_2	Azotobacter	37.77	64.44	87.77	35.77	102.87	172.35	204.86	57	64	83
T_3	Azotobacter	38.88	65.55	88.89	36.2	103.27	175.45	206.96	56	62.33	83.33
T_4	Azospirillum	40	66.66	90.00	36.2	104.23	176.33	209.8	55	62	82.67
T_5	Azospirillum	41.11	67.77	91.11	37.77	106.93	177.5	215.56	54	62	82.33
T_6	Azospirillum	42.22	68.88	92.22	38.93	108.67	180.3	227.3	53.33	60.67	81
T_7	Moringa leaf extract	34.44	61.11	84.44	34.43	95.77	158.5	183.06	58.33	65.33	86
T_8	Moringa leaf extract	36.66	63.33	86.66	34.83	101.27	165.9	187.83	58	64.67	85
T_9	Moringa leaf extract	38.88	66.66	90.00	35.63	101.83	169.53	195.16	57.33	65.67	85
T_{10}	Lantana leaf extract	32.22	58.88	82.22	32.93	81.53	137.3	174.73	59.33	66.67	86
T_{11}	Lantana leaf extract	31.11	55.55	76.66	32.4	81.47	133.06	172.06	60	67	86.33
T_{12}	Lantana leaf extract	30	53.33	75.55	31	74.63	131.73	165.83	60.33	67.33	87
	Minimum	30	53.33	75.55	38.93	108.67	180.3	227.3	53.33	60.67	81
	Maximum	42.22	67.77	91.11	31	74.63	131.73	165.83	60.33	67.33	87
	Mean	36.4	67.73	85.8	34.88	96.03	160.49	193.9	57.38	64.43	84.43
	CV	3.71	2.25	1.89	3.04	5.22	2.71	4.14	1.28	1.93	0.76
	SE	0.78	0.81	0.93	0.86	4.09	3.55	6.56	0.6	1.01	0.52
	CD 5%	1.61	1.68	1.93	1.26	5.97	5.18	9.58	0.87	1.48	0.77
	F-Test	S	S	S	S	S	S	S	S	S	S

Table 2: Mean performance of different seed priming methods for pre harvest characters in Sweet corn (*Zea mays* .L)

Symbols	Treatments	Cob Length (cm)	Cob girth (cm)	Number of Cobs / plant	Number of Rows / cob	Number of Grains / row	Seed index (g)
T_0	Control	13.3	11.53	1.26	14	32.6	20.56
T_1	Azotobacter	16.8	14.56	1.73	16.33	34.13	23.13
T_2	Azotobacter	17.46	14.8	1.8	16.66	34.53	24.03
T_3	Azotobacter	18.73	15.16	1.93	17	35.13	24.33
T_4	Azospirillum	19.66	15.3	2.06	17.33	35.46	24.86
T_5	Azospirillum	21.16	16.33	2.06	17.66	36.13	25.7
T_6	Azospirillum	21.73	17.46	2.13	18	37.33	25.8
T_7	Moringa leaf extract	15.26	14.53	1.46	15.67	33.26	23.03
T_8	Moringa leaf extract	16.8	14.66	1.53	16	33.8	23.63
T_9	Moringa leaf extract	16.76	14.63	1.66	16.67	33.86	23.86
T_{10}	Lantana leaf extract	13.03	11.63	1.2	14.33	32.73	19.73
T_{11}	Lantana leaf extract	12.9	11.13	1.13	13.66	32.46	19.06
T_{12}	Lantana leaf extract	12.33	10.3	1.06	13.33	31.86	18.73
	Minimum	12.33	10.3	1.06	13.33	31.86	18.73
	Maximum	21.73	17.46	2.13	18	37.33	25.8
	Mean	16.61	14	1.62	15.89	34.1	22.8
	C.V.	6.22	4.93	11.62	3.92	2.5	3.87
	S.E.	0.84	0.56	0.15	0.5	0.69	0.72
	C.D. 5%	1.23	0.82	0.22	0.74	1.01	1.05
	F- Test	S	S	S	S	S	S

Table 3: Mean performance of different seed priming methods for post harvest characters in Sweet corn (*Zea mays* .L)

Symbols	Treatments	Seed yield / plant (g)	Seed yield / plot (t/ha)	Stover yield (t/ha)	Biological yield (t/ha)	Harvest index (%)
T_0	Control	152.7	2.56	5.7	8.26	30.96
T_1	Azotobacter	189.46	4.83	8.33	13.13	36.77
T_2	Azotobacter	197.86	5.16	8.56	13.73	37.6
T_3	Azotobacter	205.2	5.3	8.7	14	37.69
T_4	Azospirillum	209.63	5.3	8.7	14	37.86
T_5	Azospirillum	214.63	5.63	8.86	14.5	38.84
T_6	Azospirillum	220.03	6.6	9.7	16.3	40.49
T_7	Moringa leaf extract	165.8	3.73	7.73	11.46	32.59
T_8	Moringa leaf extract	169.2	3.96	7.9	11.86	33.45
T_9	Moringa leaf extract	181.53	4.63	8.16	12.8	36.2
T_{10}	Lantana leaf extract	133.96	2.26	5.5	7.76	29.19
T_{11}	Lantana leaf extract	116.63	1.76	4.36	6.13	28.76
T_{12}	Lantana leaf extract	97.03	1.73	4.36	6.1	28.38
	Minimum	97.03	1.73	4.36	6.1	28.38
	Maximum	220.03	6.6	9.7	16.3	40.49
	Mean	173.36	4.11	7.43	11.54	34.52
	C.V.	3.9	9.85	8.56	8.54	4.08
	S.E.	5.53	0.33	0.51	0.8	1.15
	C.D. 5%	8.07	0.48	0.75	1.17	1.68
	F-Test	S	S	S	S	S

4. CONCLUSION

On the basis of one season experimentation it is concluded that among all the seed priming methods, seed priming with T_6-Azospirillum @ 30g for 12 hours was found significantly more productive (6.6 t/ha) followed by T_5- Azospirillum @ 20g for 12 hours in all the growth, yield and yield attributing traits. Therefore further investigation needed to arrive at valid recommendations.

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