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Influence of Chemicals, Biofertilizers, Growth Regulators and Botanicals on Quality Parameters in Pearl Millet (*Pennisetum glaucum*)

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A B S T R A C T

The experiment was conducted in Seed science Post Graduate Laboratory, Department of Genetics and Plant Breeding, SHUATS, Prayagraj, U.P. during Rabi (2020 - 2021), in order to standardize the best treatment with organic priming treatment for specific to pearl millet Method of organic priming were evaluated by screening arrange of durations and concentration viz T_0- Control, T_1- Calcium chloride (5%) for 8hrs, T_2- Potassium nitrate –(5%) for 8 hrs, T_3- *Pseudomonas fluroscens* (4%) for 8 hrs, T_4- Indole acetic acid (4%) for 8 hrs, T_5 – Panchagavya (5%) for 8 hrs, T_6 – Neem leaf extract(5%) for 8 hrs found that all the priming methods showed significance difference with the control and quality parameters the treated seeds have shown the best results T4-Indole acetic acid (4%) seed treatment was reported highest percentage of germination (85%), highest seedling length (25.09 cm) was highest fresh weight (2.16g), highest vigour index-I (2133.33), highest vigour index-II(21.74)was reported T4- Indole acetic acid (4%) and highest shoot length (14.10cm) and highest Root length (cm) was reported in T2- Potassium nitrate(5%), followed by and T2- Potassium nitrate(5%). Seed priming involves taking seed through the early stages of the germination process by exposing the seeds to various abiotic conditions. The study helps to improve the quality of seeds Priming brings all seeds to an equal point of germination, enabling fast and uniform emergence when planted Uniform emergence helps optimize harvesting efficiency which can increase yield potential.

Introduction

Pearl millet, commonly known as Bajra (*Pennisetum glaucum* L.) 2n=14, is the widely grown type of millet belonging to the family Poaceae. It has been grown in Africa and the Indian subcontinent since prehistoric times. The centre of diversity and suggested area of domestication for the crop is in the Sahel zone of West Africa. Pearl millet is widely grown in the north eastern part of Nigeria (especially in Borno and Yobe states). It is a major source of food to the local villagers of that region.

With ovoid grains of 3 – 4 mm length pearl millet has the largest kernels of all varieties of millet (not including sorghum) which can be nearly white, pale yellow, brown, grey, slate blue or purple. The 1000-seed weight can be anything from 2.5 to 14 g with a mean of 8 g. The height of the plant ranges from 0.5 – 4 m.

Organic seed priming provides hardiness to high temperature, low moisture especially in semiarid tropics. It promotes faster germination, higher seedling vigour leading to higher crop productivity. The main benefits of organic seed treatments include increased phosphate levels, nitrogen fixation and root development.

Bio-priming is a process of biological seed treatment that refers to a combination of seed hydration and inoculation of the seeds with beneficial microorganisms. It improves seed viability, germination, vigour indices, plant growth and subsequent protection against diseases and finally enhances crop yield. In most of the cases microbial inoculants such as plant growth-promoting rhizo-microorganisms (bacteria or fungi) are used for the purpose of bio-priming of seeds. It is an environmentally sound ecological approach using selected microorganisms which enhance plant growth by producing plant growth promoting substances or enhancing nutrient uptake or by protecting seedling/plants against soil-/seed-borne plant pathogenic organisms

Priming can be achieved in several ways namely, osmo-conditioning, hydro-priming, solid matrix priming, hormonal priming, bio-priming and on-farm priming. The purpose of priming is increasing germination per cent, decreasing mean of germination time and improving growth and vigour of seedling at very wide favour and un-flavoured environmental conditions. This method is successful in small seed plants

Materials and Methods

The present investigation was entitled "Influence of chemicals, biofertilizers, growth regulators and botanicals on quality parameters in Pearl millet (*Pennisetum glaucum*)"were carried out at Seed testing laboratory at department of genetics and plant breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj during *Rabi* 2021. The experiment was laid out in completely randomized design with four replications having 7 treatments with between the paper of germination method and Total number of seeds per replication 50 seeds were placed in germination paper among that 10 superiority were taken. Method of organic priming were evaluated by screening arrange of durations and concentration *viz* T0-Control, T_1- Calcium chloride (5%) for 8hrs, T_2- Potassium nitrate – (5%) for 8 hrs, T_3- Pseudomonas fluroscens (4%) for 8 hrs, T_4- Indole acetic acid (4%) for 8 hrs, T_5 – Panchagavya (5%) for 8 hrs, T_6 – Neem leaf extract (5%) for 8 hrs. The observations are on germination percentage, root length (cm), shoot length (cm), seedling length (cm), fresh weight of seedling (g), dry weight of seedling (g), seedling vigour index.

Results and Discussion

The present investigation was conducted to study the "Influence of chemicals, biofertilizers, growth regulators and botanicals on quality parameters in Pearl millet (*Pennisetum glaucum*)." at post graduate laboratory of Seed Science at Department of Genetics and Plant Breeding, Naini Agricultural Institute, Sam Higginbottom University of Agriculture, Technology and Sciences, Prayagraj (U.P).The experiment comprised of thirteen treatments of Pearl millet in Completely Randomized Design (CRD) with four replications. Analysis of variance showed significant difference among the priming treatments for the characters studied in the pearl millet which indicates significant effect of the priming on the germination, seedling parameters of the crop. The mean performance of germination percent ranged from 78.5 % to 85 % with mean value of 80.60%. Significantly highest percentage of germination (85%) was reported in T4-Indole acetic acid (4%) % followed by (81.5%) T2-Potassium nitrate (5%) and T1-Calcium chloride(5%) (80.25) minimum germination percent (78.5%) was recorded by T_0 – Control. The mean performance of shoot length ranged from 11.89 cm to 14.10 cm with mean value of 13.11. Significantly highest shoot length (14.10cm) was reported in T4-Indole acetic acid (4%) followed by (13.57) T2-

Potassium nitrate (5%), T5-Panchagavya (5%) (13.33) and Minimum shoot length (11.89cm) was recorded by T_0 – Control. The mean performance of root length ranged from 11.51cm to 9.26 cm with mean value of 10.63 cm. Significantly highest Root length (cm) was reported in T2-Potassium nitrate(5%) followed by (11.51 cm), T4-Indole acetic acid A(4%)(10.99), T5-Panchagavya (5%) (10.95) and Minimum root length (9.26 cm) was recorded by T_0 – Control. The mean performance of seedling length ranged from 21.15 cm to 25.09 cm with mean value of 23.75 cm. Significantly highest seedling length (25.09 cm) was reported in T4-Indole acetic acid (4%) followed by (23.085 cm) T2-Potassium nitrate (5%), T5-Panchagavya (5%) (24.28cm) and minimum seedling length (21.15cm) was recorded by T_0 – Control. The mean performance of fresh weight ranged from 1.435g to 2.16 g with mean value of 1.699g. Significantly highest fresh weight (2.16g) was reported in T4-Indole acetic acid (4%) followed by (1.9g) T2-Potassium nitrate (5%) and (1.785 g) T6-Neem leaf extract(5%). Minimum fresh weight (1.435g) was recorded by T_0 – Control. The mean performance of dry weight ranged from 0.176g to 0.255 g with mean value of 0.221g. Significantly highest dry weight (0.255g) was reported T4-Indole acetic acid (4%) followed by T2-Potassium nitrate (5%)(0.245), T6-Neem leaf extract(5%) (0.230) and minimum dry weight (0.176g) was recorded by T_0 – Control. The mean performance of vigour index-1 ranged from 1659.96 to 2133.33 with mean value of 1915.90. Significantly highest vigour index-1 (2133.33) was reported in T4-Indole acetic acid (4%) followed by (2044.13)T2-Potassium nitrate (5%), T5-Panchagavya (5%) (1940.70). Minimum vigour index-1 (1659.96) was recorded by T_0 – Control.

The mean performance of Seed Vigour Index-II ranged from 13.82 to 21.74 with mean value of 17.89. Significantly highest vigour index-1 (21.74) was reported T4-Indole acetic acid (4%) followed by (20.03) T2-Potassium nitrate (5%) and T6-Neem leaf extract(5%)(18.42). Minimum vigour index-2 (13.82) was recorded by T_0 – Control. (Demir and Oztokat 2003) Also found that root and shoot lengths increased in seeds due to salt priming as compared to nonprimed seeds.

Table.1 Analysis of variance for 8 seedling characters in Pearl millet

Sr. No	Characters	Mean sum of squares	
		Treatments	**Error**
		df (12)	df (39)
1.	Germination%	18.404**	6.89
3.	Shoot length (cm)	1.935**	0.145
4.	Root length (cm)	2.033**	0.359
5.	Seedling length(cm)	7.366**	0.551
6.	Seedling Fresh weight (gm)	0.2773**	0.0201
7.	Seedling Dry weight (gm)	0.00286**	0.00038
8.	Seed Vigour index – I	91224.12**	2941.78
9.	Seed Vigour index – II	26.153**	3.592
	******Significant at 1% level of significance		

Table.2 Mean performance of Pearl millet for 8 seedling characters

Sr.no	Treatment	Germination (%)	Shoot length (cm)	Root length (cm)	Seedling length (cm)	Fresh weight (g)	Dry weight (g)	Vigour index- I	Vigour index- II
1.	T_o	78.5	11.89	9.26	21.15	1.435	0.176	1659.96	13.82
2.	T_1	80.25	12.71	10.68	23.4	1.575	0.204	1877.1	16.42
3.	T_2	81.5	13.57	11.51	25.085	1.9	0.245	2044.13	20.03
4.	T_3	79.25	12.97	10.27	23.25	1.46	0.225	1841.80	17.87
5.	T_4	85	14.10	10.99	25.09	2.16	0.255	2133.33	21.74
6.	T_5	80	13.33	10.95	24.28	1.58	0.211	1940.70	16.96
7.	T_6	79.75	13.23	10.79	24.025	1.785	0.230	1914.27	18.42
Grand Total		**2257**	**367.32**	**297.87**	**665.19**	**47.59**	**6.198**	**53645.23**	**501.14**
F Test		S	S	S	S	S	S	S	S
SE(m)		1.31	0.190	0.299	0.371	0.0709	0.009	0.009	0.947
CV		3.25	2.90	5.63	3.124	8.35	8.809	8.809	10.59
C.D (5%)		3.85	0.560	0.881	1.091	0.208	0.0286	0.0286	2.78

Halo-priming of seeds in pre-sowing treatments in an osmotic solution allows seeds to absorb water, but restricts radicle occurrence through testa until the primed seeds are sown for germination under salt stress conditions. Primed seeds usually show improved germination parameters (Hardegree & Van Vactor, 2000)This might be due to hyper-osmotic stress and toxic effects of sodium and chloride ions on germinating seeds in a saline environment which delay or inhibit germination (Farsiani and Ghobadi, 2009). The decrease in seed germination under salinity is in agreement with Yakubu *et al.*, (2010) in pearl millet and Gill *et al.*, (2003) in sorghum. Similar results were also reported by (Jafar *et al.*, 2012; Ashraf and Rauf 2001; Toklu *et al.*, 2015) also reported to the results regarding root and shoot fresh weights are in agreement with those of who reported that fresh and dry weights of seedlings from haloprimed seeds were significantly higher, as compared to other unprimed seeds.

The present investigation was conducted to study the "Influence of chemicals, biofertilizers, growth regulators and botanicals on quality parameters in Pearl millet (*Pennisetum glaucum*)." on quality parameters the treated seeds have shown the best results T4-Indole acetic acid (4%) seed treatment was reported highest percent of germination (85%), highest seedling length (25.09 cm) was highest fresh weight (2.16g), highest vigour index-I (2133.33), highest vigour index-II (21.74) was reported T4-Indole acetic acid (4%) and followed by highest shoot length (14.10cm) and highest Root length (cm) was reported in T2-Potassium nitrate(5%).

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