www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277- 7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2021; 10(9): 2002-2007

www.thepharmajournal.com
Received: 13-06-2021
Accepted: 28-08-2021

Patil Darshan Deepak
M.Sc. Scholar, Department of GPB, Naini, SHUATS, Prayagraj, Uttar Pradesh, India

AK Chaurasia
Associate Professor, Department of GPB, Naini, SHUATS, Prayagraj, Uttar Pradesh, India

Joy Dawson
Associate Professor, Department of Agronomy, Naini, SHUATS, Prayagraj, Uttar Pradesh, India

Ashish Kumar
M.Sc. Scholar, Department of GPB, Naini, SHUATS, Prayagraj, Uttar Pradesh, India

Corresponding Author:
Patil Darshan Deepak
M.Sc. Scholar, Department of GPB, Naini, SHUATS, Prayagraj, Uttar Pradesh, India

Effect of salinity and efficacy of Panchgavya on seed quality parameters in sorghum (*Sorghum bicolor*)

Patil Darshan Deepak, AK Chaurasia, Joy Dawson and Ashish Kumar

Abstract
Seed priming is a cutting-edge technology that hydrates seeds without using actual germination seeds to increase germination. In the postgraduate laboratory, Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology & Sciences, SHUATS, Naini, Prayagraj, Uttar Pradesh, during the year 2021, a seed priming experiment is carried out in two varieties of Sorghum. SPV 1411 (Parbhani Moti) and M-35-1 (V1- SPV 1411 (Parbhani Moti) (Muguti). Sorghum seedlings are subjected to four halo priming treatments with NaCl and four panchagavya treatments with varying concentrations in order to determine which treatments are the most effective. T0- control, T1- NaCl 3 ds/m, T2- NaCl 5 ds/m, T3- NaCl 9 ds/m, T4- NaCl 15 ds/m, T5- Panchagavya 2 percent, T6- Panchagavya 4 percent, T7- Panchagavya 6 percent, and T8- Panchagavya 8 percent are used to treat seeds. For the purposes of observing germination percentage, root length, shoot length, seedling length, fresh weight of seedling, dried weight of seedling, seed vigour index I, and seed vigour index II, the treated seeds are immersed in the treatments for 12 hours. To find out the data of the results, the between paper approach is employed. In terms of all the factors, Panchagavya 8 percent has the best outcome, followed by Panchagavya 6 percent. All priming treatments were shown to be different from the control.

Keywords: Panchagavya, treatments, priming, parameters

Introduction

The accumulation of salt in soil and water is known as salinity. High quantities of salt have been shown to have a negative impact on plant development, soil structure, water quality, and infrastructure. Soil salinization is one of the most important factors restricting agricultural productivity, especially in arid and semi-arid areas of the world (Ahmed, 2009) [3].

Sorghum is a grain that is used to make bread (*Sorghum bicolor* L.) Sorghum is a significant cereal that ranks fourth in terms of production and fifth in terms of area after wheat, rice, maize, and barley. The word sorghum is derived from the Latin word "Sorgo" which means "rising above." It is a significant cereal that ranks fourth in terms of production and fifth in terms of area after wheat, rice, maize, and barley. It is a major grain and fodder crop for many poor people in the Semi-Arid Tropics (SAT), and it is also known as huge millet because of its larger grain size than other millets. Sorghum is one of the most hardy and flexible crops, able to thrive in a variety of environments (Srinivasa *et al*., 2014) [11]. It's primarily a self-pollinated plant. Sorghum is a member of the Grass family, Panicoidae taxonomic group, Andropogonae tribe, and consequently the Sorghastrae sub tribe.

Sorghum is a major food crop in India's tropical and subtropical regions. Sorghum is cultivated in agricultural territory with water scarcity because it requires less water. Because sorghum is a C4 plant, it efficiently utilises sunrays and water (Godbharle *et al*., 2010) [6]. This crop has successfully adapted to drought-prone areas with inadequate soil. Because sorghum is a drought-tolerant crop, it uses one-third less water than maize (Ahalawat N., 2018) [2]. The raceme and grain properties of the sorghum crop are significantly influenced by environmental factors, hence raceme and grain traits vary by region (Ezeaku *et al*., 1997) [5].

The people of Maharashtra, Karnataka, and Andhra Pradesh eat sorghum as their primary meal. Maharashtra is the most populous state in terms of both area and production. Grain is used to make bread and beer, and fodder is utilised as animal feed in the form of chops, hays, silage, and pasture, among other things. Sorghum grain has a starch content of 56-63 percent, 10-12 percent protein, 72.6 percent carbohydrate, 1.6 percent mineral matter, 1.9 percent fat, and 7.6-9.2 percent dietary fibre. It is critical to the food and fodder security of millions of rural communities in the world's arid and semi-arid regions.

Seed priming is a regulated hydration technique followed by re-drying that allows seeds to assimilate water and initiate internal biological processes required for germination, but not to germinate.

Material and Method

The current research project, named "Effect of Salinity and Efficacy of Panchagavya on Seed Quality Parameters in Sorghum (Sorghum bicolor)," will be conducted in the postgraduate laboratory of Sam Higginbottom University of Agriculture, Science and Technology from 2020 to 2021. Under laboratory conditions, a C.R.D (Completely Randomized design) with four replications and nine treatments using two sorghum varieties [V1- SPV 1411 (Parbhani Moti) and V2- M-35-1 (Muguti)] was used to analyse the lab experiment. T0- control, T1- NaCl 3ds/m, T2- NaCl 5ds/m, T3- NaCl 9ds/m, T4- NaCl 15ds/m, T5- Panchagavya 2 percent, T6- Panchagavya 4 percent, T7- Panchagavya 6 percent, and T8- Panchagavya 8 percent. To access the seed quality parameters, primed seeds are dried back to their original moisture content under controlled conditions. The entire experiment was carried out using the paper method.

Germination percent (ISTA 2004) [8], Root length (cm), Shoot length (cm), Seedling length (cm), Seedling fresh weight (gm), Seedling dry weight (gm), Seed vigour index I and II (Baki and Anderson, 1973) [1] were among the features examined. The experimental data were recorded and statistical analysis was performed to determine the analysis of variance, range, and mean, as well as the critical Difference and coefficient of variation (Fisher, 1936).

Result and Discussion

All the seedling characters are effected by the seed invigoration treatment and show completely significant result. The panchagavya 8% gives better result followed by the Panchagavya 6% in both varieties and among the varieties V_1-SPV 1411 (Parbhani Moti) performed better than Variety V_2-M-35-1 (Muguti).

The effect of salinity (NaCl concentration) on seed germination percentage is shown in Table 1. low level of salinity (3dS/m) increased germination percentage among included salt concentrations. The seed germination percentage decreased because the level of salinity increased. High levels of salinity prohibit the seed germination significantly.

Table 1: Mean performance of SPV 1411 (Parbhani Moti) & M-35-1 (Muguti) variety sorghum seeds

Treatments	Germination percentage		Root length		Shoot length		Seedling length		Fresh weight		Dry weight		Seed vigour index I		Seed vigour index II	
	V_1	V_2	V_1	V_2	V_1	V_2	V_1	V_2	V_1	V_2	V_1	V_2	V_1	V_2	V_1	V_2
T_0	83.25	82.25	13.075	12.25	9.45	7.925	22.475	20.175	0.6375	0.62	0.1875	0.1575	1832.2	1598.9	15.2825	12.48
T_1	79.25	80.25	11.95	11.025	8.375	7.35	20.625	18.35	0.5975	0.575	0.1575	0.145	1635.43	1417.73	12.49	11.21
T_2	77.5	78	11.175	10.225	8.2	6.875	19.325	17.1	0.54	0.5375	0.135	0.125	1473.63	1282.65	10.2875	9.365
T_3	76.25	75	10.075	9.3	7.35	6.525	17.525	15.825	0.505	0.48	0.115	0.1075	1274.43	1135.68	8.3075	7.7025
T_4	72.75	70.75	9.175	8.125	6.55	5.85	15.85	13.975	0.6625	0.445	0.0975	0.09	1069.9	918.325	6.5875	5.895
T_5	84.75	82.75	14.025	13.2	9.85	8.2	24.1	21.4	0.7075	0.65	0.2075	0.1625	2006.78	1706.18	17.2825	12.965
T_6	88	83	14.95	14	10.05	8.725	24.925	22.7	0.7375	0.7075	0.2375	0.1775	2094.23	1816.03	19.9425	14.195
T_7	89.25	84.5	15.85	14.95	11.65	9.325	27.5	24.075	0.7475	0.7475	0.2475	0.1825	2413	1962.43	21.7175	14.8675
T_8	92	87.5	16.975	16.25	12.55	10.45	29.525	26.275	0.8025	0.7775	0.28	0.22	2716.35	2220.8	25.785	18.595
Mean	82.5556	80.4444	13.0278	12.1472	9.36111	7.91389	22.4278	19.9861	0.65972	0.61556	0.185	0.15194	1835.1	1562.08	15.2981	11.9194
Max.	92	87.5	16.975	16.25	12.55	10.45	29.525	26.275	0.8025	0.7775	0.28	0.22	2716.35	2220.8	25.785	18.595
Min.	72.75	70.75	9.175	8.125	3.725	6.55	5.85	15.85	13.975	0.6625	0.445	0.0975	0.09	1069.9	918.325	6.5875
C.V	2.07853	2.71717	4.47456	4.52362	5.18113	4.03085	3.32502	3.23797	3.85073	4.25243	6.78174	7.57306	4.40131	4.42044	7.77168	7.37036
C.D	3.33672	4.25041	1.13355	1.06852	0.94061	0.6203	1.4501	1.2584	0.0494	0.0509	0.0244	0.02238	157.058	134.272	2.3119	1.70829

From Table 1. It can interpreted that the maximum germination percentage is obtained by Panchgavya (8%) V_1- 92%, V_2- 87.5% followed by Panchgavya (6%) V_1- 89.25%, V_2- 84.5%. The maximum root length is obtained by Panchgavya (8%) V_1- 16.975cm, V_2- 16.25cm followed by Panchgavya (6%) V_1- 15.85cm, V_2- 14.95cm. The maximum shoot length is obtained by Panchgavya (8%) V_1- 12.55cm, V_2- 10.45cm followed by Panchgavya (6%) V_1- 11.65cm, V_2- 9.325cm. The maximum Seedling length is obtained by Panchgavya (8%) V_1- 29.525cm, V_2- 26.275cm followed by Panchgavya (6%) V_1- 27.5cm, V_2- 24.075cm. The fresh seedling weight is obtained by Panchgavya (8%) V_1- 0.8025gm, V_2- 0.7775gm followed by Panchgavya (6%) V_1- 0.7475gm, V_2- 0.7475gm. The maximum dry seedling weight is obtained by Panchgavya (8%) V_1- 0.28gm, V_2- 0.22gm followed by Panchgavya (6%) V_1- 0.2475gm, V_2- 0.1825gm. The maximum seed vigour index I is obtained by Panchgavya (8%) V_1- 2716.35, V_2- 2220.8 followed by Panchgavya (6%) V_1- 2413, V_2- 1962.43. The maximum seed vigour index II is obtained by Panchgavya (8%) V_1- 25.785, V_2- 18.595 followed by Panchgavya (6%) V_1- 21.7175, V_2- 14.8575.

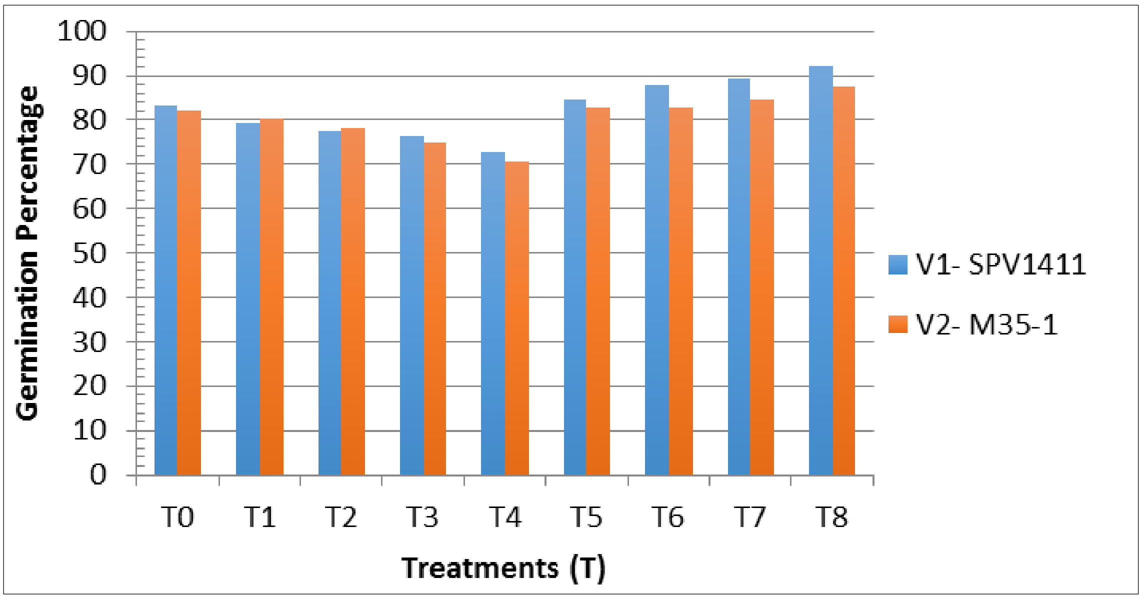

Fig 1: Germination percentage

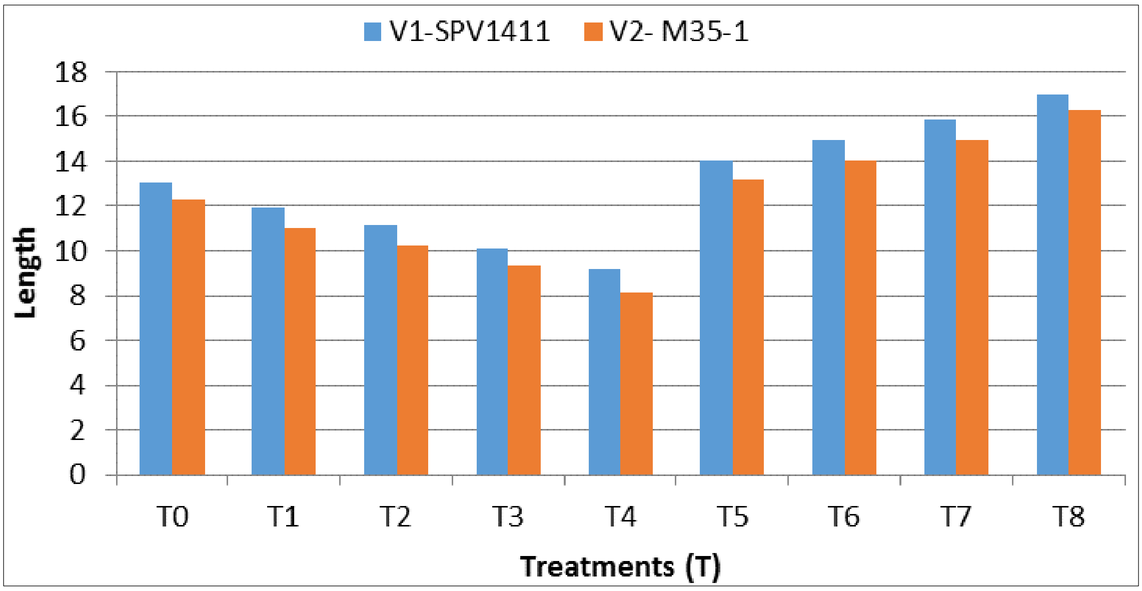

Fig 2: Root length

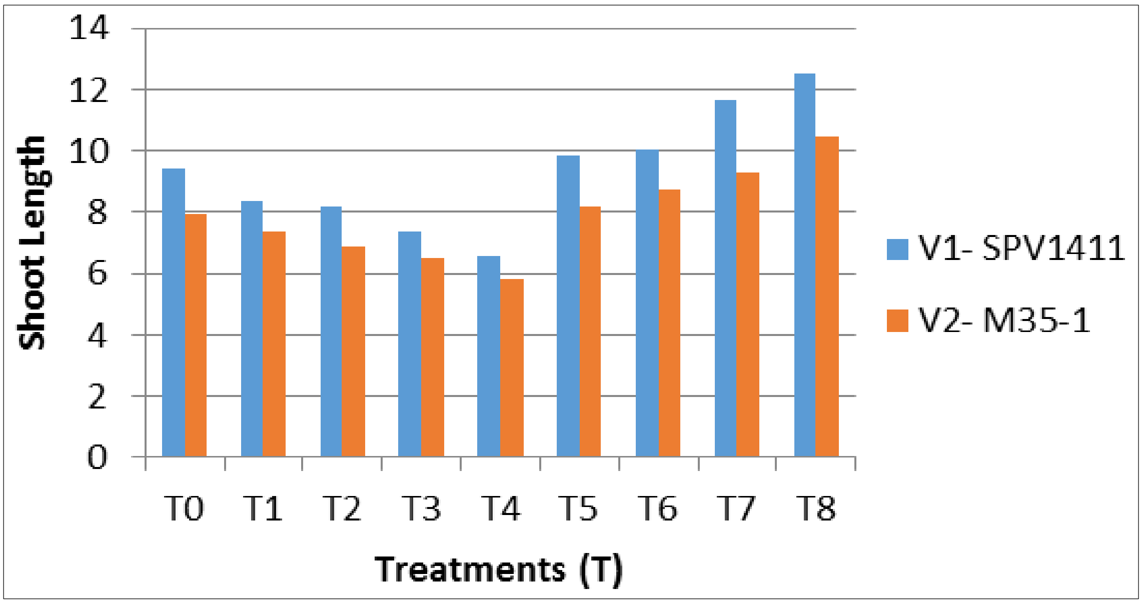

Fig 3: Shoot length

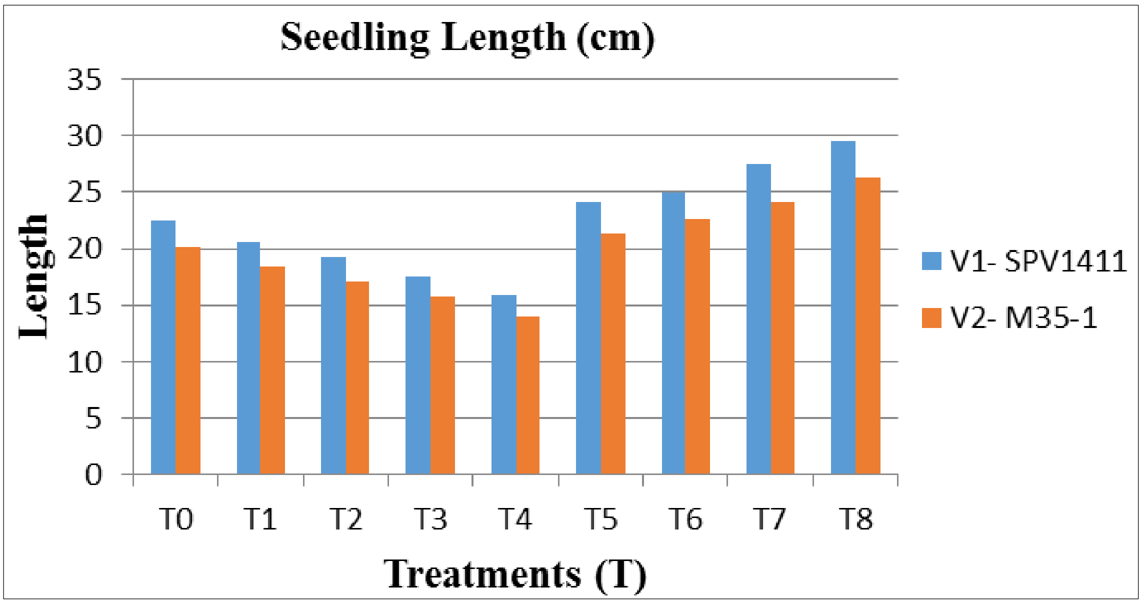

Fig 4: Seedling length

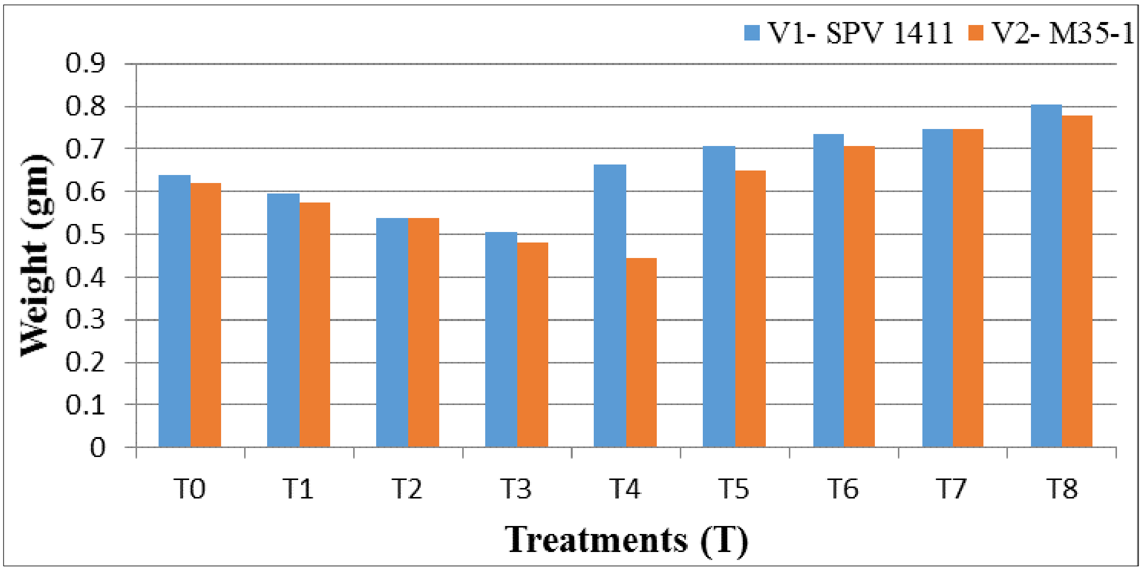

Fig 5: Seedling fresh weight (gm)

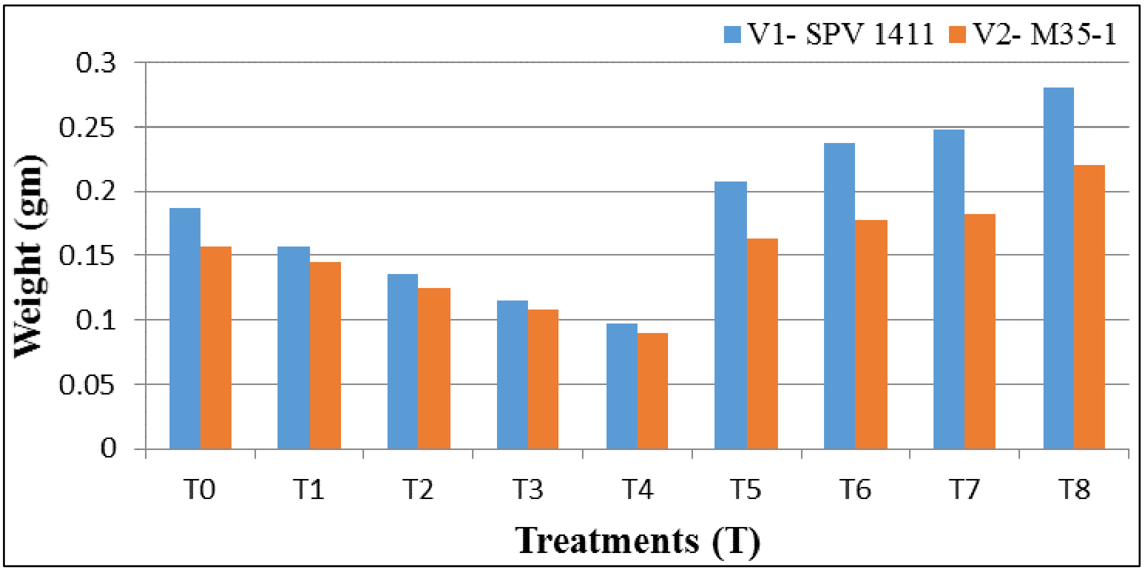

Fig 6: Seedling dry weight (gm)

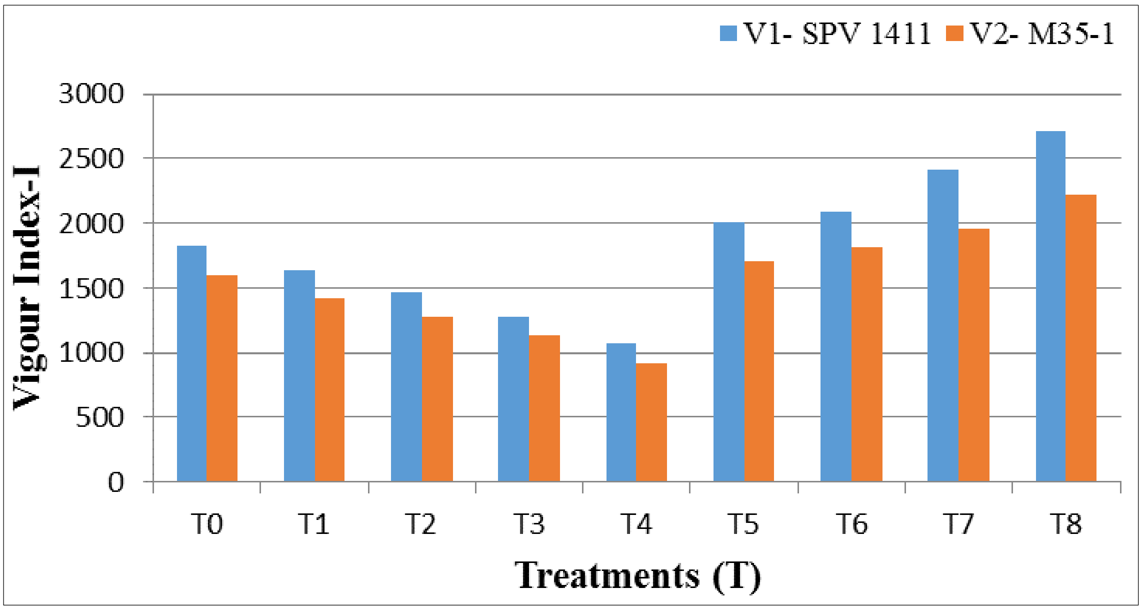

Fig 7: Seed vigour index I

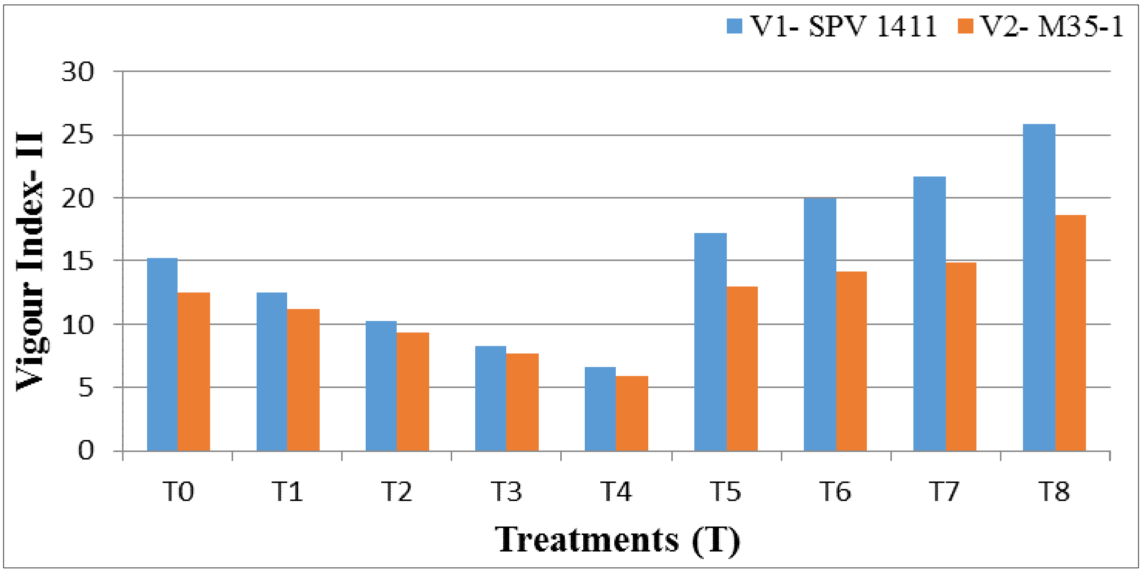

Fig 8: Seed vigour index II

Seed priming is an effective way to alleviate the inhibition of seed germination and seedling growth by salt stress and panchagavaya. These results show that a variety of substances can be used as seed priming agents and can promote seed germination under saline conditions, consistent with the findings of this study. Priming treatments reduced salt stress damage, and it is interesting that their effects on seed germination potential, germination index, and vigour index were greater than their effects on final germination rate, indicating that priming mainly improved seed vigour rather than the number of germinated seeds under salt stress.

Conclusion

It was concluded that all the priming treatments, seed priming with panchgavya (8% solution for 12 hours) performed better among all the different priming treatments. Moreover, priming treatments have more pronounced effect on variety V_1- SPV 1411 (Parbhani Moti) maintained highest seedling parameters in comparison with V_2- M-35-1 (Muguti) of sorghum seeds. The seed germination percentage decreased because the level of salinity increased. High levels of salinity prohibit the seed germination significantly.

The success or failure of priming treatments are influenced by a complex interlinkage of factors including species of the plant, liquid potential of priming agent, time of priming, temperature factor, the vigour of the seed, desiccation and conditions of the storage succeeds the priming. The suggested techniques could be adopted by the producers in order to obtain quick and better emergence, production of elite seedlings, and in turn good crop and yield.

In Future, there is a need for investigating the mechanisms of seed improvement due to salinity stress with different chemical concentrations and biological treatments along with different duration of priming, with these priming techniques, if any in field crops for a better understanding of physiological seed enrichment. It is better to develop a package for on-farm priming that can be adoptable by the farmers for value addition and improved crop performance.

Acknowledgement

The authors are thankful to all members of Seed science and technology, Department of Genetics and Plant Breeding, Sam

Higginbottom University of Agriculture, Technology and Sciences, Naini, Prayagraj, Uttar Pradesh for providing all the necessary facilities and support for research.

Competing interests

Authors have declared that no competing interests exist.

References

1. Abdul-Baki AA, Anderson JD. Vigour determination in soybean by multiple criteria. “Crop Science” 1973;13:630633.
2. Ahalawat NK, Arya VK, Kumar P, Singh SK. Genetic divergence in forage sorghum (*Sorghum bicolor* L. Moench). Journal of Applied and Natural Science 2018;10(1):439-444.
3. Ahmed S. Effect of soil salinity on the yield and yield components of Mungbean. Pak. J. Bot 2009;4(1):263-268.
4. Anonymous. Panchagavya and cow urine: as biopesticides. www.cowindia.org 2014.
5. Ezeaku IE, Gupta SC, Prabhakar VR. Classification of sorghum germplasm accessions using multivariate methods. Afr. Crop Sci. J 1997;7:97-108.
6. Godbharle AR, More AW, Ambekar SS. Genetic Variability and Correlation Studies in elite ‘B’ and ‘R’ lines in Kharif Sorghum. Electronic Journal of Plant Breeding 2010;1(4):989-993
7. Hareesh KK. Studies on seed priming in pigeonpea and chickpea. M. Sc. (Agri.) Thesis, Univ. Agric. Sci., Raichur, India 2014.
8. ISTA. Rules amendments 2001. Seed Science Technology 2004;29(2):132.
9. Kale DB, Rai PK, Kalpande HV, Rai AK. Studies on Organic Priming on Germination and Seedling Vigour in Sorghum [*Sorghum bicolor* (L.)]. Int. J. Pure App. Biosci 2019;7(1):511-519.
10. Powell AA, Mathews SS. Seed treatments: Developments and prospects, crop science and protection departments, School of Agriculture, Aberdeen AB9. IUD, U.K 1988;17:97-103.
11. Srinivasa Rao P, Belum Reddy VS, Nagaraj N, Hari Upadhyaya D. Sorghum Production for Diversified Uses. International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) 2014.