



Effect of Organics and Inorganic on Seed Priming Techniques on Seed quality Parameters in Fenugreek (*Trigonella foenum-graceum*)

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Authors' contributions

This work was carried out in collaboration among all authors. All authors read and approved the final manuscript.

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ABSTRACT

The experiment was following to examine the “Effect of Organics and Inorganics on Seed priming techniques on Seed quality parameters in Fenugreek (*Trigonella foenum-graceum*)” the during of 2020-2021 at the seed testing laboratory department of Genetics and Plant Breeding, Naini, SHUATS, Prayagraj (Uttar Pradesh). Fenugreek seeds treat with a soaked seed that is T₀ (Control). Hydro priming (Soaked with distilled water for 12 hours), Botanical leaf extracts (Neem leaf extract, Moringa leaf extract, Curry leaf extract) soaked for 6 hours, Inorganic (NaCl, KCl, KNO₃) @ 3% for 8 hours with different concentrations, on the seed of Fenugreek. Among these different treatments, all are significant. The result intimate that T₆ KNO₃ @ 3% for 8 hrs got highest and performed well with good Seedling Germination percentage as 96.5%, Root length 8.7 cm, Shoot length 9.3 cm, Seedling length 15.5 cm, Fresh weight of seedlings 1.95g, Dry weight of seedling 0.07 g, Seed vigor Index I 1495.75, Seed vigor Index II 6.755 followed by T₁₂ Moringa leaf extract @ 4% for 6 hrs as compared to other treatments. So, the Seed priming method is a low cost investment. It is beneficial to farmers. It can increase the production of the plants will be gain profit and contribute to the food supply.

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Keywords: Fenugreek; hydro priming; chemicals; botanical leaf extract; duration.

1. INTRODUCTION

Fenugreek (*Trigonella foenum-graceum*) known a 'Methi' in Nepal and Hindi belongs to family leguminosae and is an important medicinal spice used in Nepal and various other Asian, African and European countries from ancient times [1,2], Agarwal et al., 2015.

Fenugreek is a one of the oldest cultivated medicinal plants identified in written history, and further studies evaluated that the seeds and leaves of Fenugreek having antioxidant properties. India is one of the major producers of the *Trigonella foenum-graceum* L. All over the world and the production is approximately 45,000-55,000 tonnes per annum [3-6]. According to historical facts, the classical texts of Ayurveda, Charak Samhita were written around 1000 B.C. and these include 600 medicinal plants along with Therapeutics [7-10]. Fenugreek have originated in the Mediterranean region of the parts of Asia and recently it was suggested so as to Fenugreek originated in turkey. About 260 species are currently available in *Trigonella* genus [11-13]. Most of the species include *Trigonella foenum-graceum* L. are diploids with diploids with $2n=16$ chromosomes but some other species may include 18, 30,32 or 44, 99 chromosomes [14,15].

The protein content was found up to 43.8g/100g endosperm. Fenugreek are also rich in vitamins like pyridoxine, niacin and choline (Sharma et al., 1986). The ascorbic acid was found in Fenugreek which contributes to the antioxidant properties, which have been reported to have various beneficial effects (Blach, 2003; Dixit et al., 2005).

2. MATERIALS AND METHODS

The current study was carried out in 2021 at seed testing laboratory of Department of Genetics and Plant Breeding, Naini Agriculture Institute, Sam Higginbottom University of Agriculture Technology and Sciences, Prayagraj (U.P.). The Fenugreek variety is Co – 1 it was used for experiment with different organic and Inorganic seed treatments T_0 to T_{12} under control. The lab experiment was studied by using C.R.D (Complete Randomized Design) in between paper method and four replications and 13 treatments under laboratory condition with control, one hydro priming, three organic priming

and three botanical leaf extract. So, the organic treatments are soaked for 6 hours with different concentrations and inorganic (chemical) treatments are soaked for 8 hours with different concentrations. After that, the primed seeds were allowed to dry back to their original moisture content under shade to assess the seed quality parameters [16-19]. The seed quality parameters include germination percentage, root length, shoot length, seedling length, seedling fresh weight, seedling dry weight, seed vigour index I, seed vigour index II.

Treatment details:

1. T_0 - control
2. T_1, T_{12} - Moringa leaf extract
3. T_2, T_8 - Neem leaf extract
4. T_3, T_9 - Curry leaf extract
5. T_4, T_{10} - NaCl
6. T_5, T_{11} - KCl
7. T_6, T_7 - KNO_3

Seed quality parameters were determined according to the standard procedures prescribed in the between paper method in germination cabinets with the application of standard temperature of $25\text{ }^{\circ}\text{C}$ for 5 to 10 days with 70% relative humidity (ISTA 2012). Quality parameters like germination percentage, seedling length (cm), dry weight (mg), vigour index are assessed. Lab experiment data. Analysis was done by one-way ANOVA carried out according to procedure of Completely Randomized Design (Fisher, 1970).

3. RESULTS AND DISCUSSION

According to the result, all study Characteristics were affected by the treatments and there was completely significant with soaked seeds. All seedling characters like Germination Percentage, Root length(cm), Shoot length(cm), Seedling length, seedling fresh weight(g), seedling dry weight(mg), Seed vigour index – I, Seed vigour index – II.

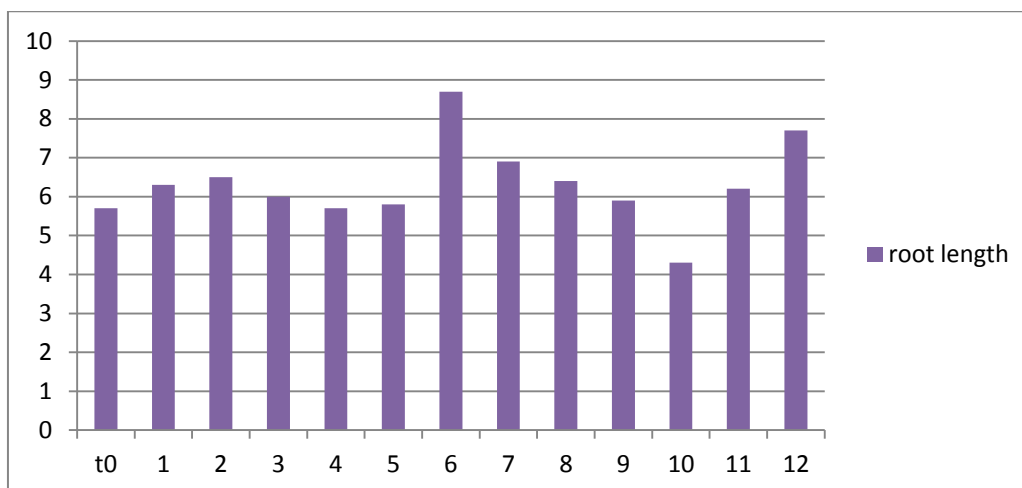
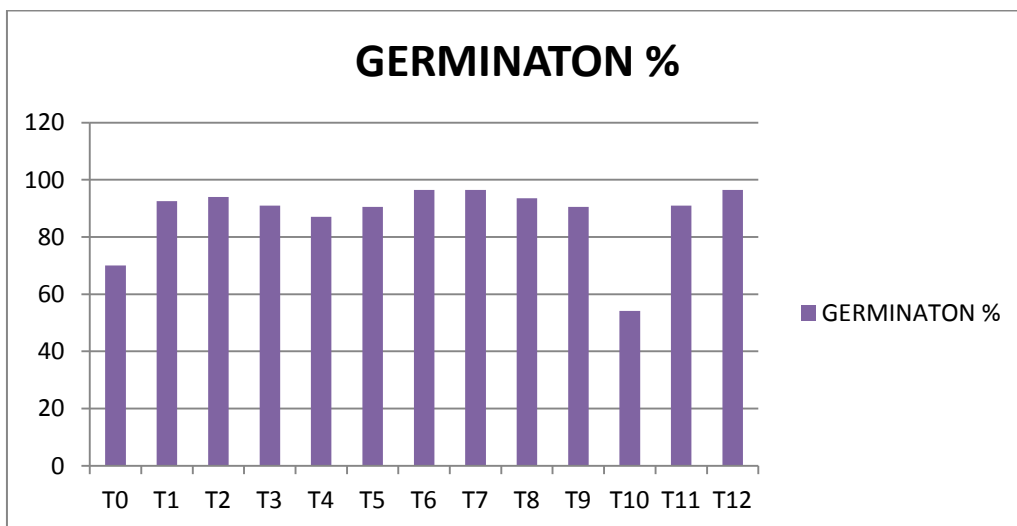
Significantly the higher germination percentage (96.5%) and it is reported in treatment of KNO_3 (3%) and it was followed by (94%) primed with Neem leaf extract (2%). So, the lowest germination percentage was recorded by NaCl 1% (54.1%) followed by control (57%). The Maximum Root length (8.7cm) were recorded by KNO_3 (3%) and it was followed by (7.7cm)

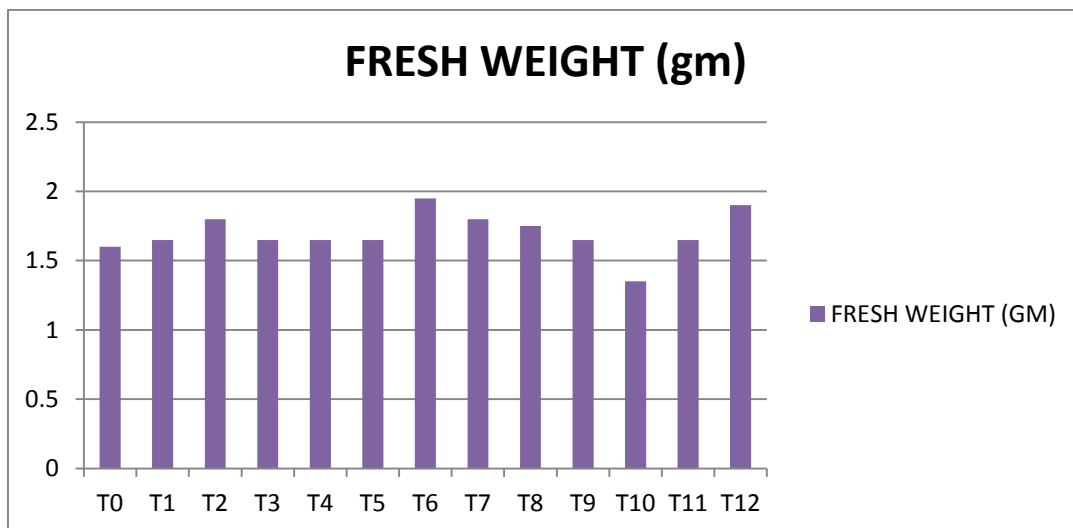
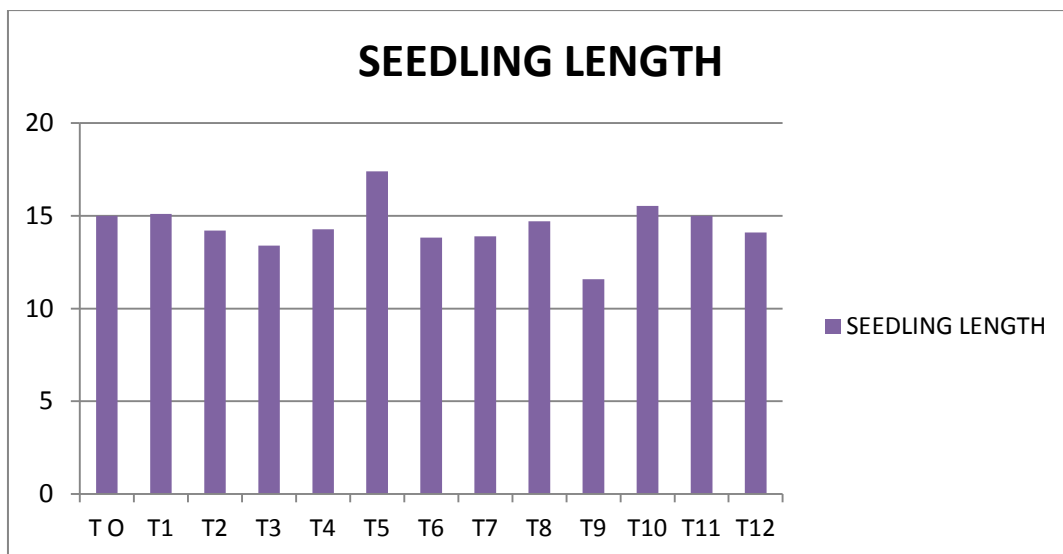
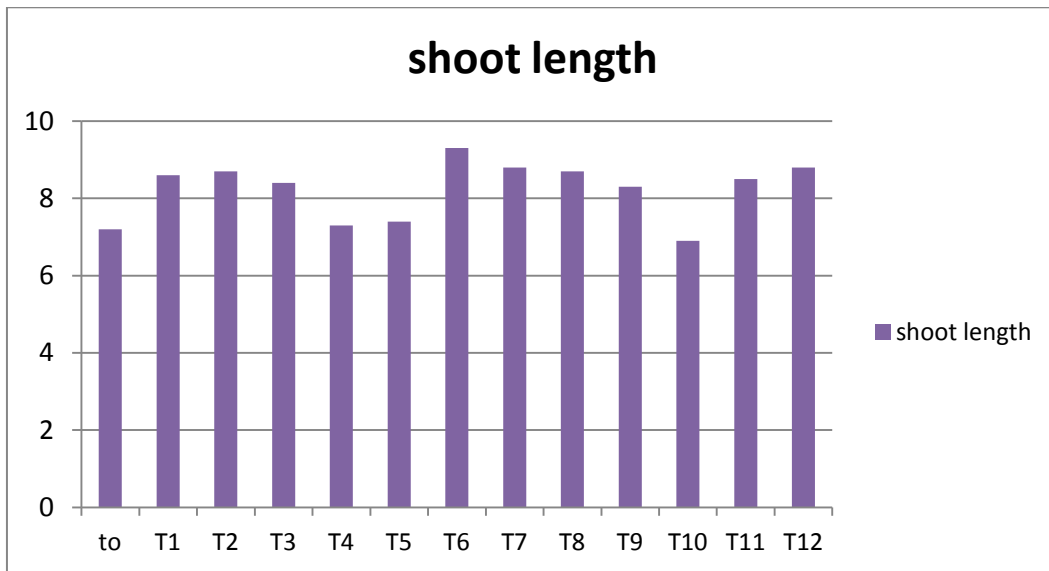
primed with Moringa leaf extract (4%). So, the Minimum root length was recorded by NaCl 1% (4.3cm) because of the salinity content followed by control (5.7cm).The Maximum shoot length (9.3cm) recorded by KNO_3 (3%) followed by (8.8cm) primed with Moringa leaf extract (4%). The Minimum shoot length was recorded by NaCl 1% (6.9) followed by control (7.2cm). The Maximum Total Seedling length (15.5cm) was recorded by KNO_3 (3%) followed by (15.3cm) primed with Moringa leaf extract (4%). The Lowest Total Seedling length was recorded by NaCl 1% (11.5cm) followed by control (12.2cm).The Maximum seedling fresh weight (1.95g) were recorded by KNO_3 (3%) followed by (15.3g) primed with Moringa leaf extract (4%). The Lowest fresh weight of seedling was recorded by NaCl 1% (11.5) followed by control (12.2g).The Maximum Dry weight of seedling

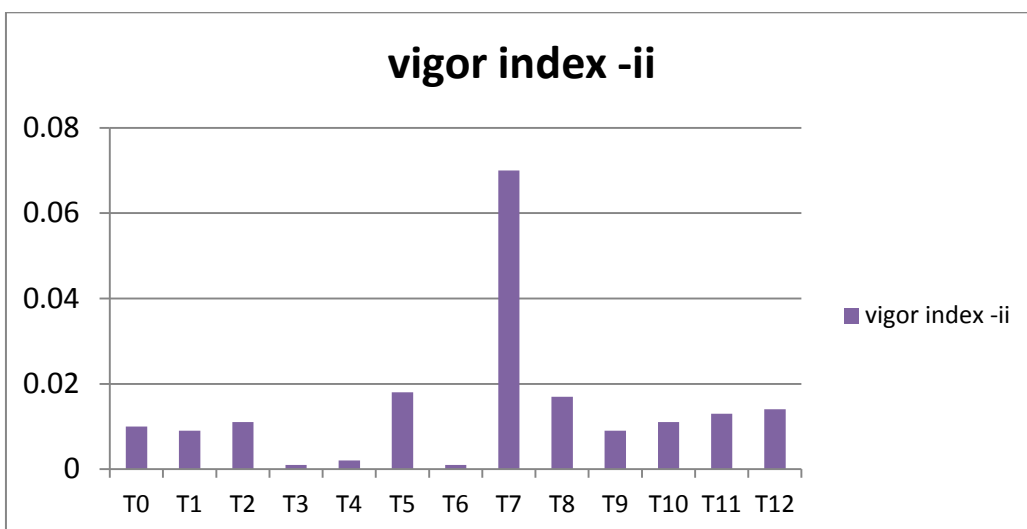
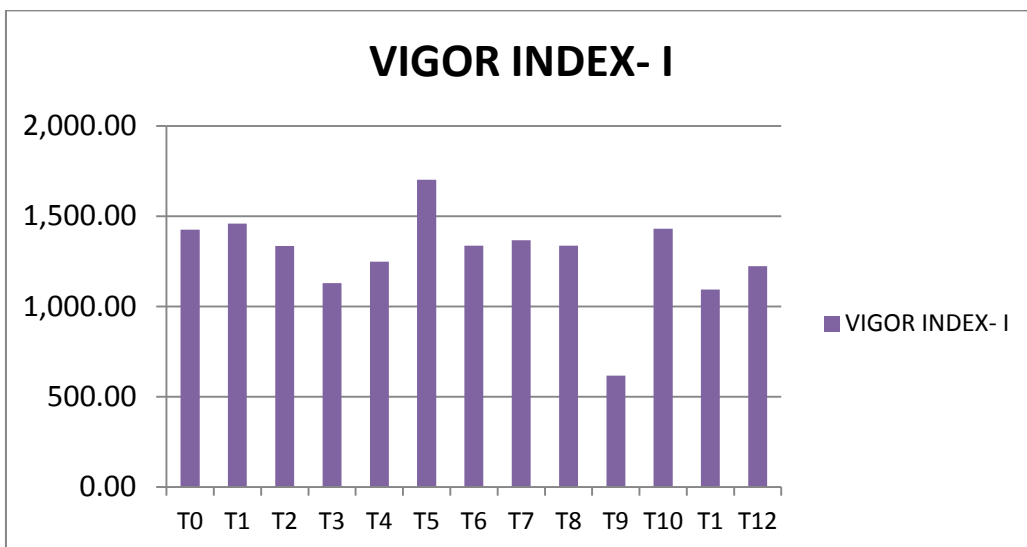
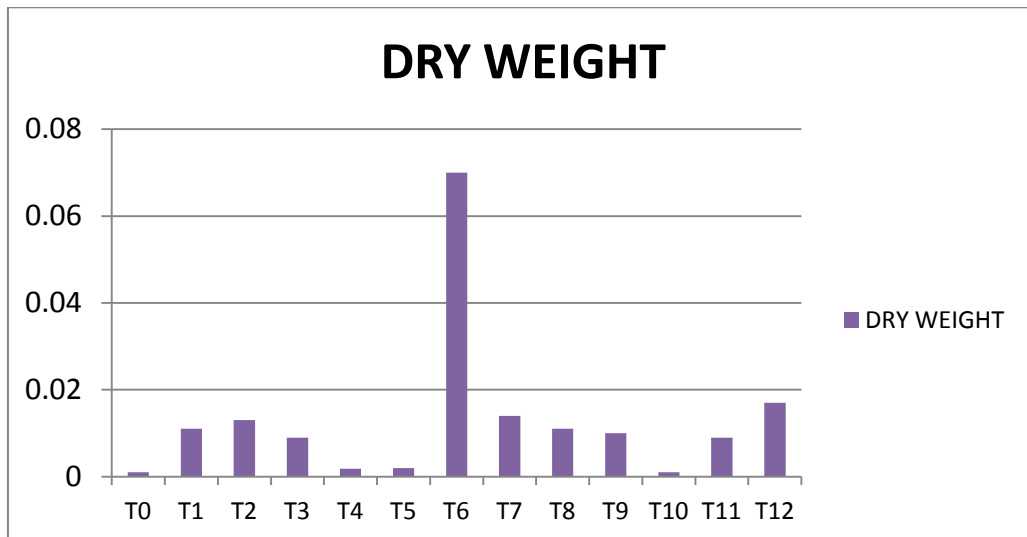
(0.07mg) recorded by KNO_3 (3%) followed by (0.017mg) primed with Moringa leaf extract (4%). The Lowest dry weight of seedling was recorded by NaCl 1% (0.001mg) followed by control (0.001mg). Maximum Seed vigour index I (1495.75) recorded by KNO_3 (3%) followed by (1476.45) primed with Moringa leaf extract (4%). Minimum seed vigour index I was recorded by NaCl 1% (622.15) followed by control (854). The Maximum seed vigour index II (6.755) recorded by KNO_3 (3%) followed by (1.64) primed with Moringa leaf extract (4%). Minimum seed vigour index II was recorded by NaCl 1% (0.0541) control (0.07).

SO, All the treatments has been reported that all primed seeds were showed better good germination percentage and higher in seed vigour quality parameters.

Below Graphs are showing the Influence of different Seed priming Techniques in Fenugreek:







Mean Performance of Fenugreek for 8 Seedling Lab Characters:

S.NO	Treatments	Germination %	Root length (cm)	Shoot Length (cm)	Seedling Length (cm)	Fresh weight of seedling	Dry weight of seedling	Seed vigour index - I	Seed vigour index- II
1	T0	70	5.7	7.2	12.2	1.6	0.001	854	0.07
2	T1	92.5	6.3	8.64	14.3	1.65	0.011	1322.75	1.0175
3	T2	94	6.5	8.7	15.1	1.8	0.013	1419.4	1.222
4	T3	91	6	8.4	14.1	1.65	0.009	1283.1	0.819
5	T4	87	5.7	7.3	13.4	1.65	0.0018	1165.8	0.1566
6	T5	90.5	5.8	7.4	13.7	1.65	0.002	1239.85	0.181
7	T6	96.5	8.7	9.3	15.5	1.95	0.07	1495.75	6.755
8	T7	96.5	6.9	8.8	15.2	1.8	0.014	1466.8	1.35170
9	T8	93.5	6.4	8.7	14.7	1.75	0.011	1367.1	1.023
10	T9	90.5	5.9	8.3	13.9	1.65	0.01	1257.95	0.905
11	T10	54.1	4.3	6.9	11.5	1.35	0.001	622.15	0.0541
12	T11	91	6.2	8.5	14.2	1.65	0.009	1292.2	0.819
13	T12	96.5	7.7	8.8	15.3	1.9	0.017	1476.45	1.6405
Grand Mean		87.969	6.315	8.223	14.084	1.696	0.013	1251.023	1.231
C.D (5%)		0.742	0.068	0.075	0.116	0.016	0.00	33.07	0.033
SE(m)		1.05	0.096	0.106	0.164	0.022	0.00	19.009	0.047
SE(d)		2.132	0.195	0.216	0.332	0.045	0.001	94.954	0.096
C.V.		1.685	2.177	1.832	1.601	1.85	3.963	5.147	5.158
F test		S	S	S	S	S	S	S	S

REASON: In statistical analysis using f test is significant in all parameters because the F (calculated value) is greater than the F (tabular value), so that H_0 (null hypothesis) is rejected.

4. CONCLUSION

It is concluded from the present case study showed by using the different concentrations of priming treatments. The priming treatments were showed significantly effect on seed germination and seed quality parameters on seed in Fenugreek. Priming with the best method is KNO_3 (3%) increases the seed vigour quality parameters in Fenugreek and it is also followed by Moringa leaf extract (4%) in all priming method. So, Chemicals are showed the best result in comparison to botanical priming.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Leela NK, Shafeekh KM. Chemistry of spices, Indian institute of spices research; 2008.
2. Mahesh C. Sharma, Spandan Chaudhary, Pooja shah Chaudary, Surendra K. Chikara. Review of fenugreek and its important secondary metabolic diogenin; 2017.
3. Fazulla Sharif A, Ashok Sajjan S, Ravi Hunje . Effect of botanical seed treatment on seed quality during storability of green gram (*Vigna radiate* L.). Green Farming. 2015;6(4):7121-715.
4. Fakhria A, Abbas-Al, Fatima Jinnah RM. Effect of sorayinf with moringa leaves extract and the soaking solution of fenugreek seeds. Plant Archives. 2019;19, Supplement 2. ISSN: 1973-5210.
5. Wajid HA, Alderfasi AA, Afzal I, Junaid MB, Mahmood A, Ahmad A, Arsal MN, Tahir MU. Evaluating the potential effect of seed priming techniques in improving germination and root shoot length of maize seed. Cercetări Agronomice în Moldova. 2018;LI, No. 2 (174) / 2018:5-15.
6. Hala H. Abou El-Nour, Nabila A. Ewais. Effect of *Moringa oleifera* leaf extract (MLE) on pepper seed germination, seedlings improvement, growth, fruit yield and its quality. Middle East Journal of Agriculture Research.2017;06(02):448-463. ISSN: 2077-4605
7. Nalla Bharath Reddy, Prudvi Raj B, Bineeta M. Bara, Jahnavi K, Abdul Wajid G. International Journal of Current Microbiology and Applied Sciences. 2020; 9(12). ISSN: 2319-7706
8. Premabatidevi RK . Effect of IAA, Moringa leaf extract and Curry leaf extract on nitrate reductase and nitrarte reductase in the leaves of a tree legume. Indian J. Plant Physiol. 2018;3:97-101.
9. Pratima Pandey, Bhanu Prakash K, Umesh. Effect of seed priming on seed germination and vigour on fresh and aged seeds of cucumber (*Cucumis sativus* L.) through coconut water. International Journal of Environment, Agriculture and Biotechnology. 2017;2(4):1457-1463.
10. Sina Fallah, Ali Tadayyon. The effect of halopriming and salicylic acid on the germination of fenugreek (*Trigonella foenum-graceum*) under different concentrations. Notuae Scientia Biologicae; 2015.
11. Azra yasmee, Shahzad Maqsood Ahmed Basara, Abdul Wahid, Wasif Nouman, Hafeez-ur-Rehman. Exploring the potential of *Moringa oleifera* leaf extract (MLE) as a seed priming agent in improving wheat performance Turk J Bot. 2013;37:512-520.
12. Annie Apoorva Joycy J, Gabriel Lal M, Prasanth Kumar Rai. Effect of different priming methods on seedling parameters of Fenugreek (*Trigonella foenum-graceum* L). International Journal of Chemical Studies; 2018. P-ISSN: 2349-8528. E-ISSN:2321-4902.
13. Dhara D. lunagaría, ZinzalaVJ, Mital M. Barvaliya, Dubey PK. Effect of organic on growth, yield, quality and economics of Fenugreek (*Trigonella foenu-graceum* L.) growth under organic farming system. Journal of Phamacognsy Phytochemistry. 2018;7(3):2420-2424.
14. Yusuff AQ, Adedeji MS, Falana AR, Majekodunmi OA. Efficacy of Moringa extract on growth and yield of Okra Journal of Agricultural Research Advances; 2020.
15. Pawar VA, Laware SL. Seed priming: A critical review. International Journal of Scientific Biological Sciences. 2018;5(5): 094-101. E-ISSN: 2347-7520
16. Annie Apoorva Joycy J, Prashant Kumar Rai, Gabriel M. Lal. Effect of different priming methods on seedling parameters

- of fenugreek (*Trigonella foenum-graceum* L.). IJCS. 2018;6(4):202-204.
P-ISSN: 2349-8528 E-ISSN: 2321-4902
17. Kalneni Jahnavi, Abdul Wajid G, Arum Kumar Chaurasia, Prdvi Raj Naidu B, Bharath Reddy N. Comparative effects of organic and inorganic priming on seed quality parameters of Fenugreek (*Trigonella foenum-graceum* L.) International Journal of Current Microbiology and Applied Sciences. 2020; 9(12). ISSN: 2319-7706
18. Mona H. Soliman, Ahlam, H. Hamad. Allelopathic effect of *Moringa oleifera* leaves extract on seed germination and early seedling growth of Faba Bean (*Vicia faba* L.). Journal of Agricultural Technology; 2017.
19. Mathew Aluko, Olufemi J. Ayodele. Seed priming technique to improve germination in onion (*Allium cepa* L.). Middle East Journal of Applied Sciences; 2020.

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