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## Effect of different priming methods on seedling parameters of fenugreek (*Trigonella foenum-graecum* L)

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#### Abstract

The experiment was conducted in Seed science Post Graduate Laboratory, Department of Genetics and Plant Breeding, SHUATS, Allahabad, U.P. during (2017-18), in order to standardize the best method of priming specific to Fenugreek. Four methods of priming *viz.*, hydropriming, Halopriming, Osmopriming and organicpriming were evaluated by screening a range of durations and concentrations *viz.* To-Control, T<sub>1</sub>-Distilled water,T<sub>2</sub>.Nacl (2%), T<sub>3</sub>.Nacl(1%), T<sub>4</sub>.Kcl (2%), T<sub>5</sub>.Kcl (1%), T<sub>6</sub>.Kno3 (2%), T<sub>7</sub>-Kno3(1%),T<sub>8</sub>. Neem leaf extract (2%). T<sub>9</sub>-Moringa leaf extract(3%), T<sub>10</sub>-Curry leaf extract(3%), for 6 hrs found that all the priming methods showed significance difference with the control and the highest germination %, seedling length (cm), seedling fresh weight (gm), seedling dry weight (gm) and vigour index were observed in T<sub>10</sub>. Curaleaf extract 3%. The study helps to improve the quality of seeds with the help of seed organic priming treatments which are cost effective and economic, non-toxic, eco-friendly sources.

**Keywords:** fenugreek, hydro priming, halo priming, osmo and organic priming, curry leaf extract, sodium chloride (Nacl), potassum nitrate (Kno<sub>3</sub>), potassium chloride (Kcl)

## Introduction

Fenugreek (*Trigonella foenum-graecum* L.), commonly called as Greekhayes and also called as methi in Hindi and menthya in Kannada, occupies a prime position among the seed spices grown in India, and is native to South East Europe and West Asia. It is extensively grown in India, Morocco, Australia, Turkey, Bulgaria, Pakistan, Bangladesh, Egypt, China, France, Africa, Lebanon and Ethiopia.

Fenugreek has multifarious uses and is being used from time immemorial by the Indians as a medicine, spice and condiment. The fresh tender leaves and stems are consumed as vegetable alone or in combination with potato and other vegetables. Eating salad of methi leaves increases the memory power.

Priming treatments are successfully applied either to poor germinating seed lots or to seeds which are sown under stress conditions like low temperature, as many priming treatment are effective in improving germination under cold conditions.

Seed priming is a general term that refers to several different techniques used to hydrate seeds under controlled conditions, but which prevents of germination. During priming seeds are able to imbibe or partially imbibe water and achieve elevated seed moisture content. Seeds may be kept for a while to maintain the priming effect or may be dried for long-term storage. Priming temperatures of 15 to 20 °C for several days are most commonly used. Osmotic priming and solid matrix priming techniques are the two types commonly applied to crop seeds. (Fessel *et al.* 2002).

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.

Hydropriming is a special type of seed priming in which seeds are soaked in water followed by drying of seeds, but the emergence of radicle is prevented. This technique is a common method that increases rate, percentage and uniformity of germination of seed. (Farooqi *et al.* 2003).

Botanical seed treatment is extracted from naturally occurring sources based on botanical ingredients. It is a liquid formulation. It has synergistic effect on early and uniform seed germination and enhance tolerance to pest and disease during early crop stage.

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Further, organic seed is a crucial link in the chin from research to organic seed production and ultimate supply of high quality seed at reasonable price to the commercial seed producing farmers for promotion of organic seed production. Hence, the safe and feasible approach is the priming of seeds with organics which are safe, ecofriendly, economical and easily available.

Organic seed priming provides hardiness to high temperature, low moisture especially in semi arid 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.

## **Materials and Methods**

The laboratory experiments were conducted in the Department of Genetics and Plant Breeding, (Naini Agricultural Institute), Sam Higginbottom University of Agriculture Technology & Sciences, Allahabad, Uttar Pradesh, India, during 2017-18 to find out "Effect of Different

priming methods on seedling parameters of Fenugreek" The details of materials used and methods followed during the course of investigation are described in this chapter.

## **Treatment details**

S. No.	Treatment	Treatments Detail
1	T <sub>0</sub>	Control
2	$T_1$	Distilled water
3	$T_2$	Sodium chloride @ 2% for 8 hrs
4	T3	Sodium chloride@ 1% for 8 hrs
5	$T_4$	Potassium chloride@ 2 % for 8 hrs
6	T5	Potassium chloride @ 1% for 8 hrs
7	T <sub>6</sub>	Potassium nitrate@ 2% for 8 hrs
8	T7	Potassium nitrate@ 1% for 8hrs
9	$T_8$	Neem leaf extract @ 2% for 6 hrs
10	T9	Moringa leaf extract @ 3% for 6 hrs
11	T <sub>10</sub>	Curry leaf extract @ 3% for 6 hrs

## **Results and Discussion**

S. No.	Characters	Mean sum of squares				
5. NO	Characters	Treatments (d.f=10)	Error (d.f=33)			
1	Germination percentage	98.277*	15.122			
2	Germination Energy	33.011*	6.544			
3	Speed of germination	10.770*	2.000 0.089			
4	Root length	3.010				
5	Shoot length	1.640	0.074			
6	Seedling length	2.836	0.139			
7	Seedling fresh weight	0.055	0.002			
8	dry weight of seedling	0.003	2.052			
9	Seed vigour index length	36909.90*	1760.75			
10	Seed vigour index mass	2.547	0.135			

Table 4.1: Analysis of variance for 10 seedling characters in fenugreek

\*\* Significant at 5% and 1% level of significance, respectively

S.		Germination	Germination	Speed of	Root	Shoot	Seedling	Fresh Weight	Dry Weight	Seed	Seed
No	Treatments	(%)	Energy	germination	Length	Length	Length	of Seedling	of Seedling	Vigour	Vigour
					(cm)	(cm)	( <b>cm</b> )	( <b>gm</b> )	(g)	Index I	Index II
1	T <sub>0</sub>	66.00	16.00	29.37	3.12	3.14	7.22	1.48	0.015	476.52	0.990
2	$T_1$	75.00	22.00	31.66	3.69	3.81	7.45	1.59	0.018	558.75	1.350
3	T <sub>2</sub>	74.00	23.00	32.59	4.80	4.71	9.52	1.80	0.037	704.48	2.738
4	<b>T</b> <sub>3</sub>	72.00	20.00	30.71	4.50	4.51	9.00	1.76	0.017	648.00	1.224
5	<b>T</b> 4	76.50	19.00	30.85	4.55	4.56	9.11	1.68	0.017	696.91	1.300
6	<b>T</b> 5	69.00	17.00	30.49	4.31	4.46	8.77	1.73	0.012	605.13	0.828
7	<b>T</b> <sub>6</sub>	80.00	21.00	31.62	4.43	4.71	9.14	1.62	0.017	731.20	1.360
8	<b>T</b> <sub>7</sub>	78.00	20.00	31.09	4.63	4.70	9.36	1.75	0.012	730.08	0.936
9	T8	74.00	18.00	32.01	4.24	4.38	8.63	1.63	0.025	638.62	1.850
10	<b>T</b> 9	74.00	22.00	31.26	4.13	4.37	8.51	1.65	0.027	629.74	1.998
11	T <sub>10</sub>	84.00	26.00	35.82	6.65	5.78	10.05	1.90	0.047	844.20	3.948
G. Mean		74.77	20.36	31.59	4.46	4.47	8.79	1.69	0.022	660.33	1.683
C.D. (5%)		5.595	3.684	2.030	0.434	0.391	0.527	0.133	0.005	60.38	0.536
SE(m)		1.944	1.279	0.707	0.148	0.136	0.184	0.070	0.716	20.98	0.181

Mean performance of Fenugreek for 10 seedling characters

All the priming methods have positive influence on seed quality parameters of fenugreek individually but the effect of priming method was found significant. Speed of germination, Germination energy and Germination percentage (35.82, 26.0,84%) respectively and were highest in Curry leaf extract at 3% seeds and it was significantly low in unprimed (control) seeds (29.37,22and 66%). However seedling attributes were also positively influenced by organic priming and highest

seedling length (10.05 cm) and seedling fresh weight (1.90 g per 10 seedlings) and seedling dry weight (0.04g per 10 seedlings) was observed in Curry leaf extract at 3% followed by Sodium chloride 2%. Seeds having seed vigour index-I and seed vigour index-II (844.20 and 3.94 mg) respectively and found to be lowest in unprimed seeds having seedling attributes (476.52 and 0.99 mg respectively).

### Conclusion

On the basis of results obtained from the present experiment, following conclusions are drawn.

It is concluded from the present investigation that different priming treatments showed significant effect on seed germination and vigour for seedling parameters. Organic Priming with Curry leaf extract (3%) increased the germination (%) in Fenugreek seeds when compared to other priming methods like Osmo, Halo and Hydro priming methods. Curry leaf extract (3%) exhibited high mean value for Seedling characters like seed germination percentage (84.00%), germination energy (27%), Speed of germination (35.82), root length (6.65cm), shoot length (5.78cm), seedling length (10.05), seedling fresh weight (1.90m) and seedling dry weight (0.04gm), seed vigour index I (844.20) and seed vigour index II (3.94), in compared with other treatments.

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