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Effect of Seed Priming on Germination and Survival of *Khirni*

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A B S T R A C T

The present experiment entitled "Effect of seed priming on germination and survival of *Khirni*" was carried out at Regional Horticultural Research Station, ASPEE College of Horticulture, Navsari Agricultural University, Navsari, Gujarat during the year 2022. An experiment was laid out in Completely Randomized Design, which included four repetitions and five treatments namely, T_1 - Cow dung slurry 3 %, T_2 - Cow urine 3 %, T_3 – *Bijamrut* 3 %, T_4 – *Amritpani* 3 % and T_5 - Water soaking. The results revealed that seed priming with 3 % *Bijamrut* for 72 hours required minimum days for germination and gave maximum germination percentage at 30 DAS. Whereas, maximum seedling height, seedling girth, number of leave, leaf area, seedling vigour index - I, seedling vigour index - II, germination index and survival percentage were also noted in the same treatment at 45 DAS.

Introduction

The botanical name of *Khirni* is *Manilkara hexandra* (Roxb.) and it belong to the family sapotaceae. It includes about 70 genera and 800 species. Itis locally known as '*Khirni*' or '*Rayan*' bytribal people of the different states of India. *Khirni* is a commercially important tropical fruit tree that provides a considerable source of livelihood and nutritional support for local tribal population. *Khirni* is cultivated in India as an avenue tree in backyards, family gardens, public parks and farmer's fields close to communities because of its economic significance as a fruit tree with health-promoting and therapeutic qualities. *Khirni* is commercially propagated by seeds. To raising the seedlings, seeds are taken from freshly harvested fruits and sown during the rainy season. In India, *Khirni* is commonly used as rootstock for sapota. *Khirni* is recommended as an excellent rootstock for shallow soils with a higher pH as well as porous soils with a low or neutral pH.

The hard seed coat imposed dormancy and

recalcitrant nature of *Khirni* seeds results in low germination. The hard seed coat prevents water absorption and restricts gaseous exchange. The limited shelf life of seeds makes long-term storage impossible, further reducing the supply of bulk planting supplies. Additionally, the *Khirni* seedlings' slow growth rate is a disadvantage in comparison to their rapid and mass multiplication. *Khirni* seeds have very poor germination rates, and seedlings grow slowly, taking two to three years to reach graftable size. Hence, there is a need for standardizing the method of raising the seedling as well as improving the growth of seedlings. Various pre-sowing seed treatments to improve germination and reduce germination time have been widely investigated in tree species (Prasad *et al.*, 2011).

Seed priming with organic substances acts as an anti-bacterial, anti-fungal and anti-viral diseases. Seed priming plays an important role in promoting germination, roots protection, gives high strength to the seeds. During seedling stages, it can add strength to nursery during transplanting. Beneficial microorganisms present in cow dung slurry, cow urine, *Amritpani* and *Bijamrut* protects the seed from seed borne and soil borne pathogens.

Materials and Methods

The present experiment entitled"Effect of seed priming on germination and survival of *Khirni*"was carried outat Regional Horticultural Research Station, ASPEE College of Horticulture, Navsari Agricultural University, Navsari, Gujarat during the year 2022. An experiment was laid out in Completely Randomized Design, which included four repetitions and five treatments namely, T_1 - Cow dung slurry3 %, T_2 - Cow urine3 %, T_3 - *Bijamrut*3 %, T_4 - *Amritpani*3 %and T_5 - Water soaking. Seeds were soaked for 72 hours as per treatment. The significance levels of generated data were decided using method of Panse and Sukhatme (1985).

Results and Discussion

A perusal of data presented in Table 1 clearly revealed that, the days (9.00) taken for germination was significantly reduced by 3 % *Bijamrut* (T_3). This might be due to *Bijamrut* contains macro and essential micro nutrients, many vitamins, essential amino acid, growth promoting substances like Indole Acetic acid (IAA), Gibberellic Acid (GA) and beneficial microorganisms (Palekar, 2006 and Sreenivasa *et al.*, 2010). *Bijamrut* also help in increase general metabolic activities and initiates the occurrence of seedling from embryo (Subramaniyan and Malliga, 2016).

The data presented in Table 1 clearly indicated that there was significant effect on germination percentage by different seed priming treatments. After 30 days of sowing, the maximum germination (92.16 %) was recorded in T_3 treatment which was statistically at par with T_1 treatment (89.66 %). The remarkable effect of *Bijamrut* on maximum seed germination might be due to the presence of useful bacteria in *Bijamrut*, which may produce Indole Acetic Acid (IAA) and Gibberellic Acid (GA) as reported by Sreenivasa *et al.*, (2009). Shakuntala *et al.*, (2012) observed that the *Bijamrut* treated seeds recorded more amylase enzyme activity due to that they found high germination percentage.

It is evident from the data presented in Table 1 that seed priming treatments had significant effect on seedling height and girth. The maximum seedling height and girth (5.42 cm and 1.64 mm, respectively) was recorded in T_3 treatment.

The increased in seedling height and girth by *Bijamrut* treatment might be due to the fact that macro and micro nutrients help to increase vigour of seedlings, which increased height of seedling. *Bijamrut* contain beneficial biochemical groups such as free living N_2- fixers, P-solubilizers and bacteria producing plant growth promoting substance as well as bacteria having biological deterrent activities. Presence of such beneficial microbial biomass and nutrients status might have resulted in increased seedling length (Sreenivasa *et al.*, 2009).

A perusal of data presented in Table 1 clearly indicated that the maximum number of leaves/seedling (3.50) were observed in T_3 treatment

at 45 DAS. The increased in number of leaves as result of *Bijamrut* might be due to activity of growth hormones which increased at the apical meristem resulting in more synthesis of nucleoprotein responsible for increasing leaf initiations. *Bijamrut* also help in increases plant vigour which resulted more number of branches which facilitates to produce more number of leaves (Nikwade, 2019).

The data presented in Table 2 clearly indicated that there were significant effect on leaf area by different seed priming treatments. The maximum leaf area (8.48 cm^2) was observed in T_3treatment at 45 DAS.

The maximum leaf area was observed in *Bijamrut* treatment might be due to the maximum number of leaves was recorded in same treatment which leads to increased photosynthetic activity which ultimately increased the leaf area.

It is evident from the data presented in Table 2 that seed priming treatments had significant effect on seedling vigour index - I. The maximum seedling vigour index - I (500.22 cm) of *Khirni* seedling was recorded in T_3treatment which was statistically at par with T_1treatment (463.80 cm). The increased in vigour index - I might be due to the *Bijamrut* treated seeds also recorded beneficial biochemical groups such as free living N_2- fixers, P-solubilizers and bacteria producing plant growth promoting substance, more amylase enzyme activity and macro and micro nutrients help to increase vigour of seedlings, which leads to high germination percentage and maximum seedling height, which turns to increases in seedling vigour index - I (Devakumar *et al.*, 2014).

Table.1 Effect of seed priming on germination and seedling growth of *Khirni* seeds

Treatments	Days required for germination	Germination (%) at 30 DAS	Seedling height (cm) at 45 DAS	Seedling girth (mm) at 45 DAS	No. of leaves at 45 DAS
T_1	9.50	89.66	5.21	1.53	3.40
T_2	11.25	79.16	4.89	1.45	3.10
T_3	9.00	92.16	5.42	1.64	3.50
T_4	11.00	83.99	5.15	1.45	3.20
T_5	13.00	73.83	4.85	1.42	3.05
S.Em. ±	0.25	1.82	0.09	0.03	0.07
CD at 5 %	0.75	5.49	0.27	0.08	0.20
CV %	4.65	4.35	3.55	3.67	4.12

Table.2 Effect of seed priming on germination, seedling growth and survival of *Khirni* seeds

Treatments	Leaf area (cm^2) at 45 DAS	Seedling vigour index- I (cm)	Seedling vigour index- II (g)	Germination index	Survival (%) at 45 DAS
T_1	8.06	463.80	12.28	684.75	74.83
T_2	7.75	387.68	9.64	598.75	51.33
T_3	8.48	500.22	13.20	783.00	80.33
T_4	7.96	432.70	10.76	626.00	62.50
T_5	7.55	358.87	8.44	569.00	42.50
S.Em. ±	0.13	12.84	0.31	17.48	1.17
CD at 5 %	0.39	38.72	0.95	52.71	3.53
CV %	3.28	5.99	5.81	5.36	3.76

The result presented in Table 2 clearly indicated that the maximum seedling vigour index - II (13.20 g) of *Khirni* seedling was recorded in T_3treatment which was at par with T_1 treatment (12.28 g). This might be due to the *Bijamrut* treated seeds also recorded having beneficial biochemical groups such as free living N_2-fixers, P-solubilizers and bacteria producing plant growth promoting substance, more amylase enzyme activity, which leads to high germination percentage. Macro and micro nutrients help to increase vigour of seedlings by increased height and girth of seedlings, which leads increased dry weight of seedlings, it turn to increases in seedling vigour index - II (Devakumar *et al.,* 2014).

A perusal of data presented in Table 2 clearly indicated that the maximum germination index (783.00) was observed in T_3 treatment. The increased in vigour index - II might be due to the minimum days required for germination and maximum germination percentage was observed in same treatments which ultimately help to increase the germination index.

Bijamrut contains macro and essential micro nutrients, many vitamins, essential amino acid, growth promoting substance like indole acetic acid (IAA), gibberellic acid (GA) and beneficial microorganisms also help in increase general metabolic activities and initiates the occurrence of seedling from embryo which leads to reducing days of germination and increased germination percentage which turns to increase the germination index (Palekar, 2006). The data presented in Table 2 clearly indicated that there were significant effect on survival percentage by different seed priming treatments. The maximum survival (80.33 %) was recorded when the seed of *Khirni* were soaked in *Bijamrut* for 72 hours (T_3) treatment.

A possible reason for such higher survival percentage of *Khirni* seedlings might be due to maximum germination percentage, seedling height, seedling girth, number of leaves, leaf area were observed in same treatments which ultimately help to increased survival percentage of seedling. The soaking of seed in *Bijamrut* helps to protect the seed from seed born and soil borne pathogens during monsoon periods and microorganisms associated with it thus, high survival (Kruppaswamy and Peruma, 2013).

References

Devakumar, N.; Shubha, S.; Gowder, S. B. and Rao, G. G. E. 2014. Microbial analytical studies of traditional organic preparations *Beejamrutha* and *Jeevamrutha*. *Building Organic Bridges*, pp. 639-642. https://doi.org/10.3220/REP_20_1_2014

Kruppaswamy, Chitra Devi and Perumal, Malliga. 2013. Analysis of biochemical Parameters of *subra* during seed germination using $CaCl_2$, *Bijamrita* and Cyanospray. *Global J. Sci. Frontier Res*., 13(2): 11-20.

Nikwade, P. V. 2019. Effect of *Bijamruta* and other organic liquid treatments on seed germination and seedling growth of legumes crops. *Int. Interdisciplinary Res. J*., 9(3): 59-68.

Palekar, S. 2006. Text book on Shoonya Bandovalada Naisargika Krushi. *Agri Prakashana*, Bangalore.

Panse, V. G. and Sukhatme, P. V. 1985. "*Statistical Methods for Agricultural Workers*". Indian Council of Agricultural Research, New Delhi, India,152-161p.

Prasad, B.; Prasad, B. and Shah, V. K. 2011. Pre-sowing seed treatment of bioagents on seed germination and seedling vigour of Baja Oak. *Indian J. Fort.*, 34(1): 71-74.

Shakuntala, N. M.; Vasudevan, S. N.; Patil, S. B. Doddagoudar, S. R.; Mathad, R. C.; Macha, S. I. and Vijaykumar, A. G. 2012. Organic bio priming on seed vigour including enzyme in paddy an alternative to inorganics. *Ecoscan*,1: 251-257.

Sreenivasa, M. N.; Naik, N. M. and Bhat, S. N. 2010. *Beejamrith* A source for beneficial bacteria. *Karnataka J. Agric Sci.*,17(3): 72-73.

Sreenivasa, M. N.; Naik, N. M. and Bhat, S. N.

2009. *Beejamrith* A source for beneficial bacteria. *Karnataka J. Agric Sci.*,22(5): 1038-1040.

Subramaniyan, V. and Malliga. P. 2016. Determination of seed germination ability and metabolic changes on *Zea mays* L. by the treatment of chemical, *Bijamrut* and the cyano bacterial biofertilizer extract (Cyanospray). *Int. J. Current Sci. Res*.,2(5): 668-676.

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