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Influence of priming on germination of khirni seedlings (*Manilkara hexandra* L.)

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Abstract
The field trial was conducted at the Nursery and Research Farm, Department of Horticulture, College of Agriculture, Dhule during 2021-22, to study the influence of priming on germination of khirni seedlings (*Manilkara hexandra* L.). The experiment was laid out in a Complete Randomized Block Design with ten treatments *viz.*, T_1 (GA_3 @ 50 ppm), T_2 (GA_3 @ 75ppm), T_3 (GA_3 @ 100 ppm), T_4 (GA_3 @ 200 ppm), T_5 (NAA @ 100 ppm), T_6 (KNO_3 @ 1%), T_7 (Cow urine @ 10%), T_8 (Cow urine 100%), T_9 (Cow dung slurry) and T_{10} Control (Distilled Water) with three replications. The treatment T_4 (GA_3 @ 200 ppm) resulted, the minimum days required for germination (30.33), however maximum number of seedlings germinate (42.33) at 15 days after sowing and germination percentage (84.67%) at 15 days after sowing observed in the treatment T_9 (cow dung slurry). Hence, it can be concluded that, the cow dung slurry were beneficial for increasing germination parameters as compared to other treatments under Khandesh region of Maharashtra.

Keywords: Seedlings, germination, soaking treatments, khirni

Introduction
Khirni (*Manilkara hexandra* Roxb.) commonly known as "Rayan," or "Ranjana." The South East Asia was native place of Khirni in central and peninsular India. Tropical fruit crop grown commercially in India. The tree is about 15-18 metre tall with grey bark, glabrous branchlets, leaves 5-13 cm long, shiny, alternate leaves that are sometimes crowded together at the ends of branchlets and prominent scars. (Sanjay *et al.*, 2017) [22]. Mostly seeds are used to propagate khirni. It is a slow-growing plant that can withstand drought. Fruits of khirni have high economical value as mature fresh fruits which are sweet and a good source of iron, minerals, sugars, protein, carbohydrate and vitamin A (Pareek *et al.*, 1998 and Singh *et al.*, 2006) [16, 6]. The different parts of this plant find their use in treatment of ulcers, dyspepsia, opacity of the cornea, bronchitis, urethrorrhea, leprosy, etc. (Anonymous, 1962; Pareek *et al.* 1998; Hoareau, 1999; Raju and Reddy 2005; Chanda and Parekh 2010) [2, 16, 8, 20, 4]. The seeds contain approximately 25 % oil, which is used for cooking purpose. The bark also contains 10% tannin, which is used for treatment of fever and may be utilized in tanning purpose (Anonymous, 1962) [2].

Propagation through seeds is considered to be one of the most reliable, efficient and universally applied method for raising seedlings (Hartmann *et al.*, 1990). The growing medium influences the quality of seedlings produced in a nursery, which in turn affects the re-establishment in the main field (Agbo and Omaliko, 2006) [1]. The influence of the medium is felt even before the plant sprouts because of its water retention and aeration properties. Media composition used as a source of plant nutrients influences the quality of seedling to a considerable extent (Wilson *et al.*, 2001) [29]. It directly affects the development and maintenance of the extensive functional root system. Proper media management is imperative to the production of quality seedlings since vigorous growth is required to face the seasonal hazards encountered on the main field (Khan *et al.*, 2006) [11]. Khirni seeds have a hard seed coat and are recalcitrant in nature, therefore utmost care has to be taken for enhancing its germination percentage (Samir *et al.*, 2015) [21].

The quality of seedlings obtained from a nursery affects their establishment in the main field and the ultimate productivity of an orchard. Various pre-sowing seed treatments to improve germination and to reduce germination time have been widely investigated in tree species (Prasad and Prasad 2009, Prasad *et al.* 2011) [17, 18, 19]. Several efforts like treatment with chemicals, growth regulators, hot water, cattle urine and cow dung slurry have been used to overcome hard seed coat dormancy.

Use of plant growth regulators in enhancing seedling growth of numerous plant species is well known (Marler and Mickelbart, 1992 and Hazrat *et al*., 2006) [13, 7]. Khirni seeds have very weak germination rates, and their following growth is also quite little. Khirni seedlings need a lot of time to grow to the right height and vigour for grafting. Improvements have already been made to the khirni seeds germination and subsequent development. It is generally known that bioregulators can improve seed germination and seedling growth in a variety of plant species (Malshe *et al.*, 2014) [12]. In addition, it is known that synthetic chemicals (Vachhani *et al.*, 2014; Jadhav *et al.* 2015) [28, 10] and other naturally occurring bio-products of organics (cow-dung, cow urine) contain essential plant growth substances that promote plant growth and development (Anonymous, 1993; Shirol *et al.*, 2005; Shinde and Malshe, 2015) [3, 25, 24]. To study the impact of various chemicals, plant growth regulators, cow dung slurry, and cow urine on the germination, growth, and development of khirni seedlings.

Materials and Methods

An experiment on khirni seeds was conducted at the Nursery and Research Farm, Department of Horticulture, College of Agriculture, Dhule during the year 2021-22. The experiment was laid out in a Complete Randomized Block Design with ten treatments *viz*., T_1 (GA_3 @ 50 ppm), T_2 (GA_3 @ 75ppm), T_3 (GA_3 @ 100 ppm), T_4 (GA_3 @ 200 ppm), T_5 (NAA @ 100 ppm), T_6 (KNO_3 @ 1%), T_7 (Cow urine @ 10%), T_8 (Cow urine 100%), T_9 (Cow dung slurry) and T_{10} Control (Distilled Water) with three replications under 50% shade net condition. The sowing was done in black polythene bags (8'' x 6'') filled with soil and FYM (3:1) in July, 2021. The statistical analysis of the data in respect of germination was done according to the standard procedure given by Panse and Sukhatme (1984) [15].

Result and Discussion

Influence of priming on germination parameters of khirni seedlings

It is revealed from the data (Table 1 and Fig. 1-3), the significantly minimum days required for germination (30.33) recorded in treatment T_4 (GA_3 @ 200 ppm) which was at par with the treatment T_3 (GA_3 @ 100 ppm) 31.33, T_9 (Cow dung slurry) 31.67, T_8 (Cow urine @ 100%) 32.00, T_5 (NAA @ 100 ppm) 32.33, T_2 (GA_3 @ 75 ppm) 33.00 and T_7 (Cow urine @ 10%) 33.33 However, the maximum number of seedlings germinate (42.33) recorded in treatment T_9 (Cow dung slurry) which was at par with the treatment, T_8 (Cow urine @ 100%) 41.67, T_4 (GA_3 @ 200 ppm) 40.33 and T_3 (GA_3 @ 100 ppm) 39.33. at 15 days after sowing and germination percentage (84.67%) at 15 days after sowing recorded in the treatment T_9 (cow dung slurry) which was statistically at par with the treatment, T_8 (Cow urine @ 100%) 83.33%, T_4 (GA_3 @ 200 ppm) 80.67% and T_3 (GA_3 @ 100 ppm) 78.67%.

The minimum days required for initiation of germination in treatment GA_3 might be due to the seed treatment with gibberellic acid (GA_3) control mobilization of starch which acts as a respiratory substrate leading to immediate enhancement in cell elongation (Shah, 2007). GA_3 regulator helps to increase the activities of hydrolyzing enzymes and alpha amylase at initial stage of seed germination and thus facilitated the germination process. These findings are in accordance with the results obtained by Singh *et al*. (1979) [27] in citrus, Hore and Sen (1994) [9] in ber, Pampanna and Sulikeri (2001) [14] and Desai *et al*. (2017) [5] in papaya. The higher number of seedling germinate and germination percentage in cow dung slurry treatment may be attributed to the presence of growth promoting substances (auxins) and NPK nutrients in cattle cow dung. These results are in agreement with the findings of Shirol *et al.* (2005) [25] in khirni rootstock.

Table 1: Influence of priming on germination parameters of khirni seedlings.

Treatments		Days required for germination	Numbers of seedling germinate at 15th DAS	Germination percentage (%) at 15th DAS
T_1	GA_3 @ 50 ppm	36.33	36.00	72.00
T_2	GA_3 @ 75ppm	33.00	37.67	75.33
T_3	GA_3 @ 100 ppm	31.33	39.33	78.67
T_4	GA_3 @ 200 ppm	30.33	40.33	80.67
T_5	NAA @ 100 ppm	32.33	38.00	76.00
T_6	KNO_3 @ 1%	35.00	32.67	65.33
T_7	Cow urine @ 10%	33.33	36.33	72.67
T_8	Cow urine @ 100%	32.00	41.67	83.33
T_9	Cow dung slurry	31.67	42.33	84.67
T_{10}	Control (Distilled water)	46.00	29.67	59.33
S.E.±		1.02	1.09	2.18
C.D at 5%		3.00	3.22	6.43

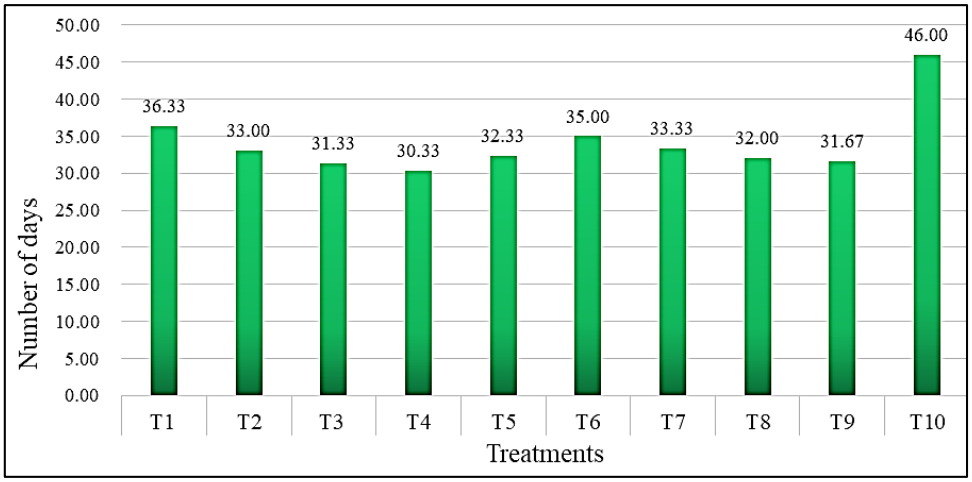

Fig 1: Effect of priming on days required for initiation of germination of khirni.

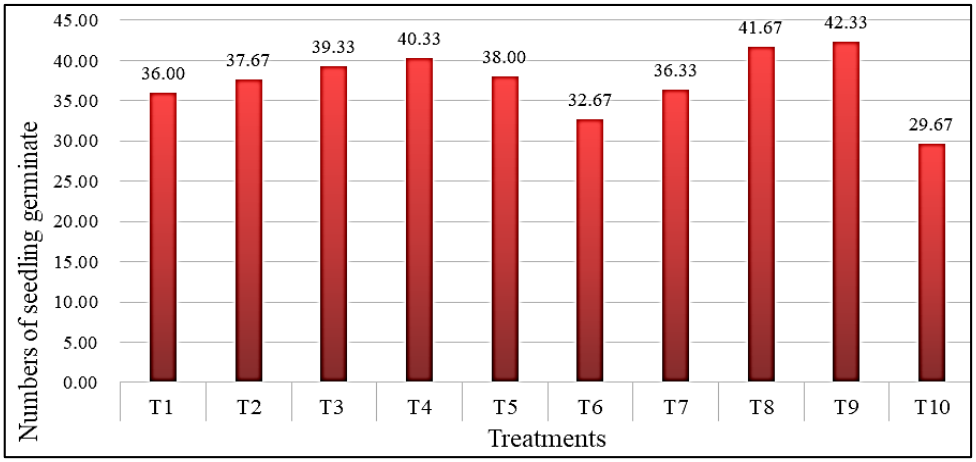

Fig 2: Effect of priming on numbers of seedling germinate of khirni.

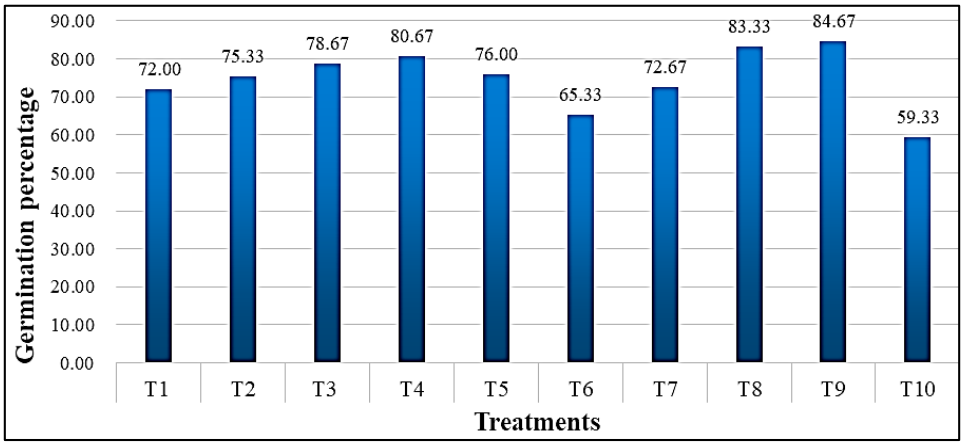

Fig 3: Effect of priming on germination percentage of khirni.

Conclusion

The treatment cow dung slurry were found beneficial for increasing the number of seedling germination and percentage in khirni seedlings under Khandesh region of Maharashtra.

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