Effect of stratification on seed germination and seedling performance of wild pomegranate

J. M. S. Rawat*, Y. K. Tomar and Vidyawati Rawat
Department of Horticulture, Chauras Campus, HNB Garhwal University, Srinagar (Garhwal), 246174, Uttarakhand, India, jms_rawat99@yahoo.co.in

Abstract: The germination response of *Punica granatum* seeds to different stratification periods was studied. The germination of *P. granatum* significantly improved with increasing stratification periods. Stratification for 30 days at 5^0C showed highest germination percentage, longest radicle, maximum root and shoot length, number of leaves and highest survival of seedlings. The longest plumule, maximum collar diameter, highest shoot and root dry weight were recorded with 25 days of stratification. Thus the results of present investigation clearly reveal that 25 to 30 days stratification of *P. granatum* seeds was more suitable for uniform and faster germination as well as best growth in early stage of seedlings as compared to the control. [Journal of American Science 2010;6(5):97-99]. (ISSN: 1545-1003).

Keywords: wild pomegranate, Stratification, germination, survival per cent, radical and plumule length

1. Introduction

Wild pomegranate (*Punica granatum*), a large deciduous shrub is member of punicaceae growing wild in the sub tropical tracts of north western India, in the foot hills up to 1800 m in the western Himalaya. Pomegranate is a good source of carbohydrates, minerals and moderate source of pectin. The commercial source of *Anardana* is said to be the wild trees of pomegranate (Pujari, 1983). *Anardana* is used as an acidulant in curies, chutneys and *pakora*. Thus, it can play an important role in pushing up the economy of rural poor farmers, where the cultivation of other fruit crops is arduous or less profitable. Regular harvesting of fruits from forests for anardana with negligible planting makes the condition critical for its existence. Research on the germination and growth of selected edible species would provide a basis for their inclusion in afforestation/agroforestry programs and also contribute circa *situ* conservation for certain threatened species (Hebert and Jack, 1998).

Seedling rootstocks are still the most commonly used as they provides deep root system resulted in better outputs. It is therefore necessary to define the physical requirements of seed germination of this species. So this study was under taken to examine the effect of various stratification periods on germination of seeds and seedling performance which facilitates its supply from nursery.

2. Material and Methods

Ripe fruits of *Punica granatum* were collected in the month of August from its natural habitats. After collection, seeds were depulped by washing with water, dried in the shade and stored in polythene bags till the experiment starts. The imbibed seeds were placed between layers of moist peat moss and exposed to chilling temperature (5^0C) in refrigerators for 5 days interval upto 30 days. Germination was carried out under laboratory conditions. Three replicates of 20 seeds for each treatment were allowed to germinate in 9 cm petri dishes on 2-layer filter paper (Whatman No. 1), kept moistened with distilled water. The untreated seeds were used as control. The germination count was made daily for 21 days after sowing and emergence of radical was adopted as a criterion of germination. The plumule and radical length were measured. After 21 days seedlings were planted in previously filled perforated white polythene bags of 2 kg capacity with soil mixture (1:2:1). Survival percentage, shoot and root length, and collar diameter were measured after three month in field conditions. Shoot and root dry weights of the seedlings were estimated after drying at 103 $\pm$ 3^0C as per ISTA (1999) rules.

3. Results and Discussion

Increased time of stratification resulted in higher total seed germination (Table 1). Seeds of *P. granatum* showed best germination (91.66%) when stratification period was 30 days as compared to the control and other treatments. Total seed germination did not differ significantly between 30 days and that of 25 & 20 days but with 10 and 15 days stratification had significantly the lowest germination. For successful germination a population of a cool

climate needed a long stratification (Seneca and Cooper, 1971). Longest radicle (3.96 cm) and maximum survival (83.33%) were also found with 30 days of stratification. Results of the present investigation clearly indicated that the germination per cent of *P. granatum* significantly increased with the increased duration of stratification (Table 1). The maximum germination with longest stratification period is attributed to the reduction of germination inhibitors present in seeds during stratification. It is also showed by the data of mean germination time and germination index (Fig. 1).

Table 1. Effect of different stratification periods on germination and physiological parameters of seedling in wild pomegranate in under laboratory condition

Stratification periods	At the end of test under laboratory condition			
	G %	P L (cm)	R L (cm)	SVI
10 days	51.66^{bc}	1.28^{b}	2.71^{b}	139.99^{cd}
15 days	56.66^{bc}	1.74^{ab}	2.19^{b}	124.08^{cd}
20 days	77.5^{ab}	2.27a	3.09^{ab}	239.47^{bc}
25 days	81.66^{a}	**2.31^{a}**	3.79^{a}	309.49^{ab}
30 days	**91.66^{b}**	2.18^{a}	**3.96^{a}**	**362.97^{a}**
Control	39.99^{b}	2.11^{a}	2.60^{b}	103.97^{d}
SEM ±	**5.94**	**0.26**	**0.38**	**44.8**
CD at 5%	**18.72**	**0.83**	**1.21**	**117.80**

Means followed by same letter within each column are not significant (P<0.05)
Highest value of a parameter in bold

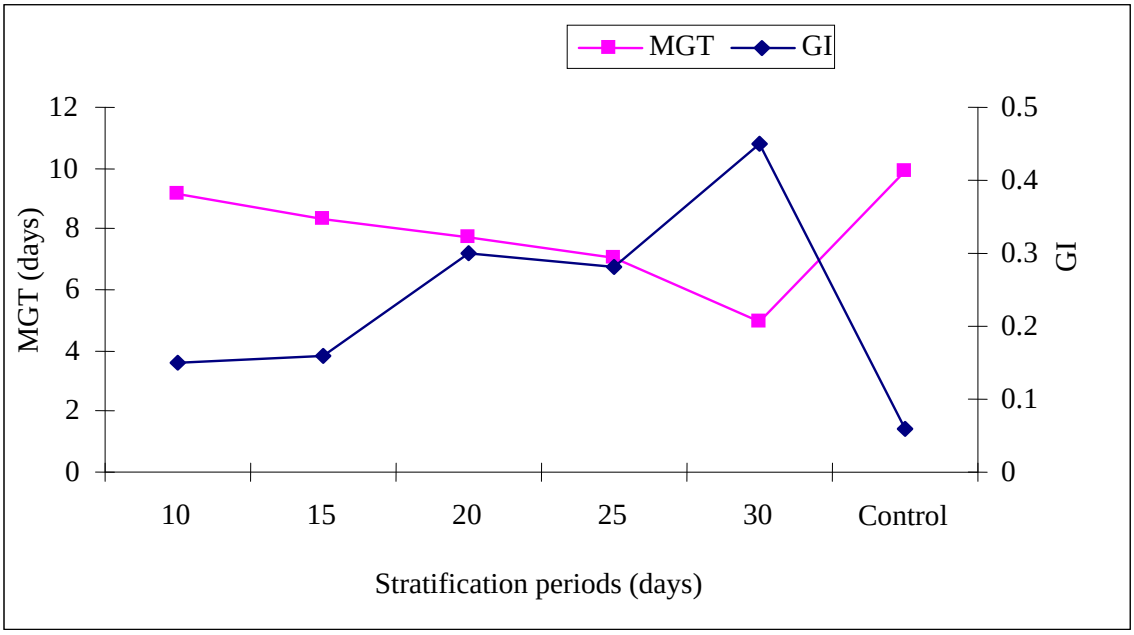

Fig. 1. Effect of stratification periods on MGT and GI of wild pomegranate seeds

The mean germination time was also decreased with increasing stratification and the germination index was increased with increasing stratification periods. Early germination may results into longest radicle, which helps in early establishment of new seedling to produce maximum food material with the help of photosynthesis that resulted into the maximum survival of seedlings. The results are in close in conformity with the results of Bose and Mitra (1991) in apricot and Bhatt *et al.* (2000) in *Myrica esculenta*. Stratification for 25 days gave the maximum plumule length (2.31cm), followed by 20 and 30 days of stratification. The maximum shoot length (8.49 cm), root length (35.14 cm) and number of leaves (32.21) were also produced by 30 days of stratification. The maximum shoot dry weight (0.24 g), root dry weight (0.25 g) and collar diameter (0.24 cm) were produced by 25 days of stratification (Table 2).

Table 2. Effect of different stratification periods on germination and physiological parameters of seedling in wild pomegranate in under field condition

Stratification periods	After three months in the						
	Survival %	S L (cm)	R L (cm)	NOL	SDW (g)	RDW (g)	CD (cm)
10 days	68.33[a]	5.54[c]	26.23[bc]	18.93[b]	0.12[d]	0.11[d]	0.20[b]
15 days	68.33[a]	5.68[c]	27.14[b]	20.00[b]	0.08[e]	0.05[e]	0.20[b]
20 days	79.99[ab]	5.86[bc]	29.07[b]	26.23[ab]	0.15[c]	0.14[c]	0.20[b]
25 days	81.66[a]	6.82[b]	31.97[ab]	27.36[a]	**0.24[a]**	**0.25[a]**	**0.24[a]**
30 days	**83.33[a]**	**8.49[a]**	**35.14[a]**	**32.21[a]**	0.20[b]	0.21[b]	**0.24[a]**
Control	69.99[a]	5.04[c]	22.26[c]	18.33[b]	0.11[d]	0.09	0.13[c]
SEM ±	**7.90**	**0.33**	**1.91**	**2.63**	**0.01**	**0.01**	**0.06**
CD at 5%	**24.91**	**1.03**	**6.02**	**8.31**	**0.03**	**0.03**	**0.03**

Means followed by same letter within each column are not significant (P<0.05)
Highest value of a parameter in bold

Corresponding Author:

JMS Rawat
Department of Horticulture
HNB Garwhal University, Srinagar Garhwal,
Uttarakhnad, India
Email: jms_rawat99@yahoo.co.in

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12/1/2009