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Short communication

Effect of seed priming on peach, plum and apricot germination and subsequent seedling growth

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ABSTRACT

Seed priming was done in peach, plum and apricot using water soaking (WS), GA_3 (500, 1000, 1500 and 2000 ppm) and various combinations of GA_3 + water soaking treatments. Among various treatments highest per cent germination in peach (31.33), plum (75.33) and apricot (73.33) was obtained by soaking the seeds in water for 9 days followed by treating with GA_3 2000 ppm for 24 h, *i.e*. T_9 and it was at par with T_8 (WS 9D + GA_3 1500 ppm) in peach, whereas, in plum and apricot, T_8 proved to be the second best treatment. Peach, plum and apricot seeds receiving no treatment (control) recorded minimum germination (2.66, 18.00 and 15.33%, respectively). Seeds soaked in water for 9 days and treated with 2000 ppm GA_3 for 24 h recorded the maximum seedling height and girth in peach (83.96 cm, 6.63 mm), plum (90.94 cm, 8.04 mm) and apricot (93.80 cm, 8.12 mm) after 120 days of germination.

Keywords: Seed priming, peach, plum, apricot and seedling growth.

Prunus is a large, diverse genus in Rosaceae commonly referred to as stone fruits. Principle commercial crops in this genus include peaches, nectarines, plums, prunes, pluots, apriums, apricots, cherries and almonds. Seeds of stone fruits do not germinate immediately after harvest and a period of after ripening is essential for certain chemical and other changes to take place in the seed and for dormant embryo to grow. Garcia *et al.* (4) reported two independent dormancies in seeds of stone fruit a physical (external) and embryo (internal) dormancy which are essential for better survival and establishment of seedlings in the field. Various methods have been tried to overcome dormancy of stone fruits. Stratification has been used traditionally to break seed dormancy in *Prunus* sp. (Finch-Savage and Leubner-Metzger 2; Seeley *et al*., 7). Mechanical removal of endocarp reduces the time taken for germination of stratified seeds. Plant growth regulators and chemicals have also been tried to promote initiation of seed germination and seedling growth. Keeping in view all the studied factors and existing gap, the present study was undertaken to determine the combinational effect of GA_3 and water soaking on seed germination and subsequent seedling growth is some stone fruits.

Experiment was carried out at Fruit Plant Nursery, Sher-e-Kashmir UAST-J, Udheywalla during the year 2010-2011. Fruits from healthy, disease-free peach, plum and apricot plants (local cultivars) growing at subtropics were collected and the seeds were extracted. The different presowing treatments applied to peach, plum and apricot were T_1 (water soaking for 9 days), T_2 (GA_3 500 ppm), T_3 (GA_3 1000 ppm), T_4 (1500 ppm), T_5 (GA_3 2000 ppm), T_6 (water soaking for 9 days + GA_3 500 ppm), T_7 (water soaking for 9 days + GA_3 1000 ppm), T_8 (water soaking for 9 days + GA_3 1500 ppm), T_9 (water soaking for 9 days + GA_3 2000 ppm) and T_{10} control (No treatment). Seeds of stone fruits were dipped in water for duration of nine days and removed from the water at the end of specified duration and air dried in shade. Subsequently, different concentrations of GA_3 (500, 1000, 1500 and 2000 ppm) were applied by dipping in solution for 24 h.

Seed sowing was done on raised beds. The experiment was laid out in randomized block design and each treatment was replicated thrice. Fifty seeds were sown in each treatment. After sowing, the beds were covered with paddy straw mulch. Regular weeding was done and the beds were kept moist by providing light irrigations as and when required. The data regarding the germination of seeds was recorded (4 month after sowing) from the start of germination till five months after sowing at five days interval. Height and girth of seedlings was recorded one month after germination till the attainment of buddable size at monthly interval. The plant height and diameter was measured. Per cent buddable seedlings were recorded after four months of seed germination (8 months of sowing). The seedlings having the diameter of 5 mm or above were considered buddable and

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proportions of such seedlings were calculated on per cent basis.

The results obtained in the present studies recreated in Table 1 revealed germination of seeds increased with increasing concentration of GA_3.The highest germination 31.33, 75.33 and 73.33% was obtained in peach, plum and apricot, respectively treated with T_9 (WS9D + GA_3 2000 ppm). GA_3 treatment combined with water soaking for 9 days showed significant improvement in germination from T_6 (WS9D + GA_3 500 ppm) to T_9 (WS9D + GA_3 2000 ppm) and it increased from 22.0 to 31.33% in peach, 52.66 to 75.33% in plum and 48.66 to 73.55% in apricot. Treatment T_{10} (control) showed the lowest germination (2.66, 18.00 and 15.33% in peach, plum and apricot, respectively). The germination percentage increased from T_2 (GA_3 500 ppm) to T_5 (GA_3 2000 ppm) in all the three crops. These results are in accordance with the results obtained by Bambhota and Kaul (1). GA_3 increases the growth potential of the embryo and promotes germination, it is also necessary to overcome the mechanical restraint conferred by the seed covering layers by weakening the tissues surrounding the radicale. Hussain *et al*. (5) reported highest germination percentage in three peach cultivars after 1 week of soaking in water. Mabundza *et al*. (6) have also recorded similar observations in passion fruit where seed soaking for 7 days in tap water had significantly higher germination percentage compared to control. Soaking of seeds in water results into leaching of germination inhibitors and also improves absorption of GA_3.

Maximum shoot length and shoot girth (Figs. 1-3) were recorded in peach (83.96 cm, 6.63 mm), plum (90.94 cm, 8.04 mm) and apricot (93.80 cm, 8.12 mm), respectively after 120 days of germination in plants obtained from seeds treated with T_9 (WS9D + GA_3 2000 ppm). However, minimum height and girth was recorded in control at all the observation dates and it was (52.38 cm; 4.93 mm) in peach, (53.85 cm; 5.22 mm) in plum and (60.65 cm; 5.54 mm) in apricot, respectively after 120 DAG. All the seedlings were more than 5 mm in girth after 120 DAG and hence buddable, irrespective of the treatments and rootstock (Figs. 4-6). However, in plum and apricot all the seedlings were buddable after 90 DAG except the seedlings of the treatment T_1 (WS9D), T_2 (GA_3 500 ppm), T_{10} (control), which became buddable after 120 DAG .The increase in vigour with increase in concentration of GA_3 may be due to the vigorous growth of root system which provided the required amount of nutrients and hence increased the chance of seedling survival (Gul *et al*., 4). GA_3 increases the leaf number this might have resulted into more manufacture of food (photosynthates), which were translocated towards the roots causing overall increase in growth. These results corroborate with the findings of Tripathi *et al*. (8) who reported increase in seedling height of walnut seedlings with the increase in GA concentration. It is thought that GA_3 may possibly lower activity of IAA-oxidase to increase the auxin level in plants.

The increase in plant height was attributed to the fact that gibberellins increases cell division and cell elongation when applied at proper concentration (Gul *et al*., 4). The increase in girth is evidently brought about by an increase in the dimension of the individual cell both in pith and cortex regions rather than in the number of cells per unit area indicating thereby the

Table 1. Effect of different treatments on germination of peach, plum and apricot seeds.

Treatment	Seed germination (%)		
	Peach	Plum	Apricot
T_1 = Water soaking for 9 days	14.00	32.66	30.00
T_2 = GA_3 500 ppm	08.00	41.33	40.00
T_3 = GA_3 1000 ppm	09.33	62.66	60.00
T_4 = GA_3 1500 ppm	12.00	64.66	64.00
T_5 = GA_3 2000 ppm	15.33	74.00	69.33
T_6 = Water soaking for 9 days + GA_3 500 ppm	22.00	52.66	48.66
T_7 = Water soaking for 9 days + GA_3 1000 ppm	26.00	63.33	62.00
T_8 = Water soaking for 9 days + GA_3 1500 ppm	29.33	69.33	67.33
T_9 = Water soaking for 9 days + GA_3 2000 ppm	31.33	75.33	73.33
T_{10} = Control	02.66	18.00	15.33
$CD_{0.05}$	3.91	3.04	3.41

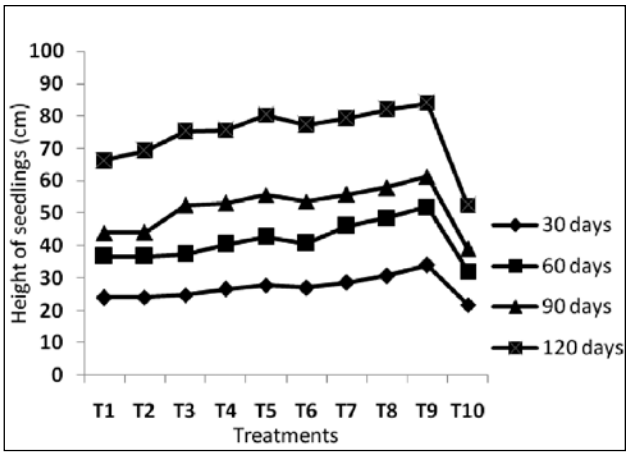

Fig. 1. Effect of different treatments on the height of peach seedlings at various intervals after germination.

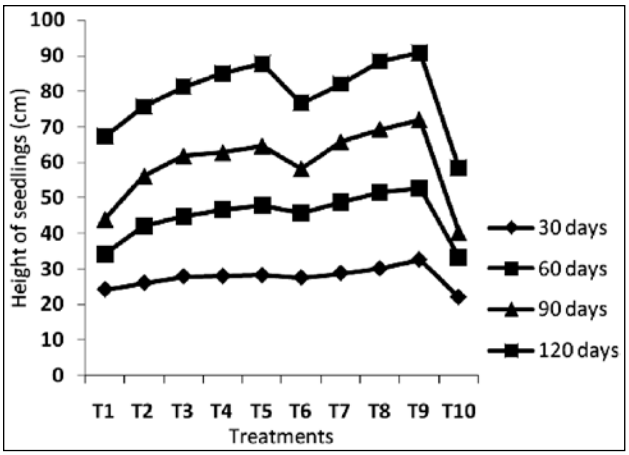

Fig. 2. Effect of different treatments on the height of plum seedlings at various intervals after germination.

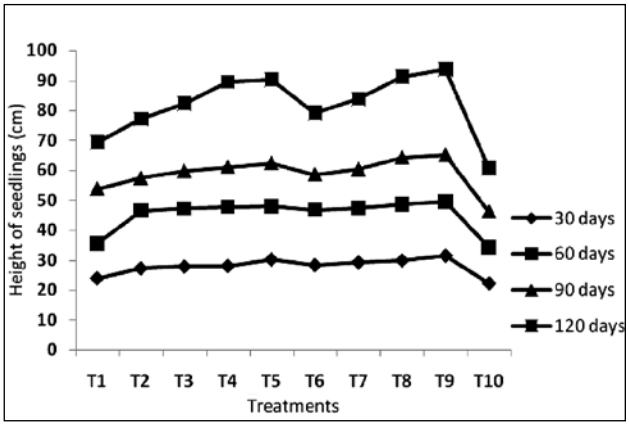

Fig. 3. Effect of different treatments on the height of apricot seedlings at various intervals after germination.

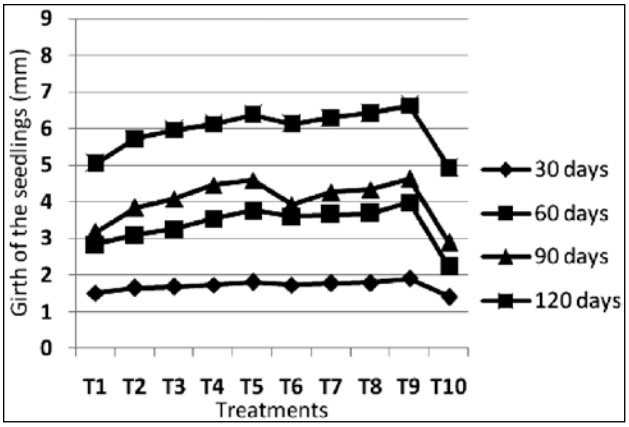

Fig. 4. Effect of different treatments on the girth of peach seedlings at various intervals after germination.

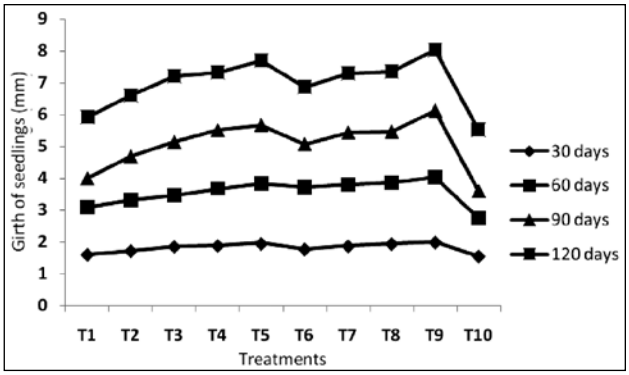

Fig. 5. Effect of different treatments on the girth of plum seedlings at various intervals after germination.

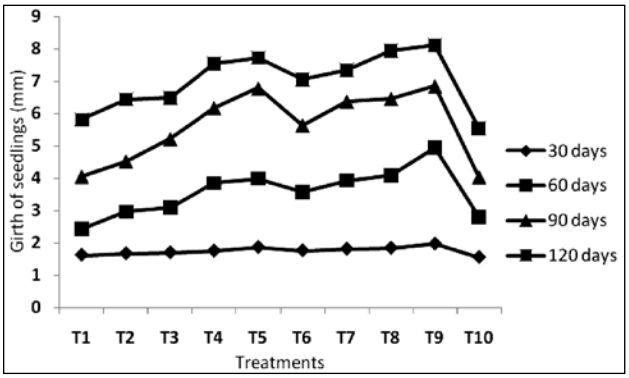

Fig. 6. Effect of different treatments on the girth of apricot seedlings at various intervals after germination.

absence of any enhancement in the cell division, this confirms to the conclusion drawn by (Bhambota and Kaul, 1).

From the present study, it was found that seed priming is helpful in enhancing germination and subsequent seedling growth in stone fruit seeds.

Thus it was concluded that seeds of peach, plum and apricot should be soaked in water followed by GA_3 treatment for better uniform germination and maximum seedling growth.

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