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Short Communication

Seed priming treatments to enhance seed quality of various genotypes of chilli (*Capsicum annuum*)

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Chilli (*Capsicum annuum* L.), commonly known as hot pepper, an important spice as well as vegetable crop, have tremendous export potential. Success of crop production commences with the use of high quality seed which is a pre-requisite for successful cultivation of any crop. There are various factors influencing the seed quality *e.g.* genotypic variations, different maturity stages along with other factors like nutrition, etc. Among the modern approaches (Physiological treatments) to improve seed quality and vigour. Seed priming is known to promote the rate and uniformity of germination in majority of the crops [1, 2, 3]. The plant growth regulators used during priming have shown positive effects on vegetable crops for different parameters as studied by earlier workers [4, 5]. Keeping into consideration, different factors influencing seed quality of chilli, present investigations were planned with the objective to quantify genotypic response with respect to seed quality and to enhance seed quality using different seed priming treatments.

The present investigations were carried out at the Research Farm of Punjab Agricultural University, Ludhiana during 2009, 2010 and 2011. Different genotypes used were: LLS, Punjab Surkh, Punjab Guchhedar, PBC-535 and MS-12. There were four seed priming treatments *viz.* hydration for 2-4 hr followed by air-drying at room temperature (T_1), T_1 + dry dressing with Thiram @0.2% (T_2), GA_3 @ 50 ppm for 2-4 hr followed by air-drying at room temperature (T_3) and KNO_3 @2% for 2-4 hr followed by air drying at room temperature (T_4) and Control (T_0). The seeds were planted at a spacing of 75 x 60 cm in field. The recommended package of practices [6] was followed for raising the crop.

Three replicates of 100 seeds each were taken for standard germination test following ISTA rules [7]. Seedling length was determined by taking ten normal seedlings at random, from each replication of germination test, for root and shoot length measurement. The vigour index was computed as suggested by Abdul-Baki and Anderson [8]. To calculate seedling dry weight, ten normal seedlings were dried at 110ºC for 17 hr and weighed. Speed of germination was computed using 100 seeds, in triplicate using Petri dishes. Daily observations of emerged seedlings were recorded until the final count. The speed of germination was calculated as suggested by Maguire [9].

Per cent field emergence was computed using three replications of 100 seeds each sown in sterilized moist sand for two weeks under laboratory ambient temperature.

Perusal of data established that significant differences existed among the different cultivars in response to different seed priming treatments (Table 1). Among different treatments GA_3 and KNO_3 indicated superiority in seed germination (83.1% and 79.6%, respectively). Gibberellins trigger hydrolysis of storage nutrients in seeds with a

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direct effect on the growth of embryo causing enhanced per cent germination with GA_3 treatment [10]. Similar findings were also reported by Reddy and Khan [11] in Khirni, Natesh *et al.* [12] in chilli. Jagadish and Mahadevappa [13] studied influence of different pre-sowing seed treatments (GA_3, kinetin, KNO_3 and hydration) in different vegetable crop seeds including capsicum and reported that all the treatments enhanced germination rate, germination percentage and emergence per cent. Results also indicated that Pb. Surkh (80.0%) and MS-12 (76.8%); and Pb. Guchhedar (65.8%) and PBC-535 (66.3%) were at par with each other in terms of germination per cent, whereas LLS showed a minimum germination (60.2%).

Enhanced field emergence per cent with GA_3 treatment was registered in variety Pb. Surkh (77.4%) followed by that in MS-12 (76.2%). Genotypes Pb. Guchhedar (52.8%) and PBC-535 (52.0%) showed nearly similar results. GA_3 treatment enhances amylase synthesis that helps in conversion of reserve food material into amino acids and their translocation *via* phloem into the young root and shoots causing rapid rate of emergence. Similar findings were reported by Singh and Afria [14] for enhanced emergence percentage with GA_3 by Kumar *et al.* [15] in okra.

Priming treatments with GA_3 and KNO_3 indicated similar results in terms of speed of germination *i.e.* 5.96 and 5.78, respectively. However, Pb. Surkh registered maximum speed of germination (5.88), followed by that in MS-12 (5.51), whereas LLS showed minimum speed of germination (3.49). Higher speed of germination with GA_3 treated seeds may be due to the increased metabolic activities during the germination. Watkins and Cantliffe [16] reported increase in speed of germination in pepper with gibberellins treatment. Jagadish & Mahadevappa [13] and Jagadish [17] reported that pre-sowing seed treatment in tomato, capsicum and onion seed with different concentrations of GA_3 enhanced rate of germination, hypocotyl length and field emergence compared to untreated seeds.

Significantly more seedling length was observed in the seeds treated with GA_3 (8.44 cm) followed by that with KNO_3 (8.06 cm). The increase in seedling length can be attributed to the fact that GA_3 has increased the enzymatic activities during germination and hence increased the seedling length. Similar results were reported by Reddy and Khan [11] in Khirni, and Jagadish [17] in tomato, capsicum and onion.

Vigour index determines the state of the health of seedlings and ultimately the state of the productivity of the plant. Higher the vigour index, better will be the performance of the plant. The increased vigour index is also attributed to higher values recorded with respect to seedling length. Vigour index-I indicated that among the five seed priming treatments GA_3 seed treatment (637.52) exhibited significantly higher value followed by KNO_3 (576.67). Priming causes *de novo* synthesis of α-amylase [18] increasing metabolic activities in seeds resulting into higher seed vigour. Similar findings were reported by Shaikh *et al.* [19] in onion, Reddy and Khan [11] in Khirni (*Mimusops hexandra*). Amongst varieties Pb. Surkh (7.68 cm) had maximum seedling length followed by that in MS-12 (7.57 cm). A

Table 1. Effect of different seed priming treatments on seed quality of chilli

Treatment	Germination (%)	Emergence (%)	Speed of germination	Seedling length (cm)	Vigour index-I
Hydration	73.6	59.3	5.41	7.57	557.15
Hydration + thiram	76.4	61.8	5.59	7.79	595.16
GA_3	83.1	77.4	5.96	8.44	701.36
KNO_3	79.6	64.1	5.78	8.06	641.58
Control	68.1	56.1	5.28	7.01	477.38
Mean	76.16	63.74	5.60	7.77	594.53

similar trend of maximum vigour index-I was registered in Pb. Surkh (564.03) followed by MS-12 (533.26).

Seed treatment with GA_3 showed significantly better seed quality parameters followed by that with KNO_3 among the different seed priming treatments. Whereas hydration and hydration+ thiram were at par with each other in improving vigour index-II and speed of seed germination (Table 1).

From these studies, it was inferred that among the five genotypes, Pb. Surkh was best in terms of germination percentage, per cent field emergence, speed of germination, seedling length and vigour index followed by MS-1. Whereas, all the parameters were minimum in LLS, hence least promising genotype. PBC-535 and Pb. Guchhedar were at par with each other in all seed quality parameters. It was inferred that among the genotypes Pb. Surkh exhibited better quality seeds, if primed with GA_3.

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