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Effect of Seed Priming on Seed Quality of Tomato (*Solanum lycoperscium* L.)

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Abstract
The present investigation was carried out to assess the effects of different priming treatments on seedling characters on two variety of tomato (Navodya and S-22) in the Seed Testing Laboratory of the Department of Genetics and Plant Breeding, Sam Higginbottom Institute of Agriculture, Technology & Sciences, Allahabad during 2015-16. The two varieties (Navodya and S-22) are conducted in Complete Randomized Block Design (CRBD) having four replications treated with Distilled Water @100 ml., Sodium Chloride and Potassium Nitrate @1% solution (Halo-priming) at different period interval ie. at 12hour, 24hour and 36hour respectively. The variety S-22 was identified as the best for the seed quality parameters and vigour parameters *viz.* germination percentage (91.75%*)*,Vigour index length(1957.52), Vigour index mass(9.083), Seed metabolic efficiancey (0.188), Electrical conductivity of seed leachates(dsm-1)(91.59), while Navodya was found superior for germination percentage. The variance revealed presence of considerable variability among the genotypes for all the characters. The variety S-22 can be beneficial for the farmer as its germination percentage is good it may be grown in farmer field so that they can get more production.

Keywords: Halo Priming, Seed Quality, Seed Vigour, Tomato (*Solanum lycopersicum* L.)

Introduction

Grafting in vegetables was first performed in Korea and Japan in the late 1920's and has been a widely used technique in vegetable seedling production in order to get the advantages of rootstock such as resistance to diseases, robust growth, nematode resistance, higher yield and plant development (Yetisir and Sari, 2003; Passam *et al*, 2005) [17-18]. Tomato is one of the preferred targets for metabolic engineering because it is consumed widely in many Western countries, which makes it one of the principal sources of phytonutrients (Canene-Adams *et al,* 2005) [5], and it is amenable to biotechnological modifications. In tomato fruits, the main carotenoid is lycopene. Phenolics are represented by a wide variety of compounds, including chlorogenic acid isomers (Niggeweg *et al*, 2004) [16]. Flavonoids, mainly represented by naringenin chalcone and rutin, are found in the skin in relatively small amounts (Bovy *et al*, 2002) [4]. It is widely employed in cannery and made into soups, conserves, pickles, ketchup, sauces, juices etc. Tomato juice has become an exceedingly popular appetizer and beverage. The well ripe tomato (per 100 g of ediblee portion) contains water (94.1%), energy (23 calories), calcium (1.0 g), magnesium (7.0 mg), vitamin A (1000 IU), ascorbic acid (22 mg), thiamin (0.09 mg), riboflavin(0.03 mg) and niacin (0.8 mg) (Uddain *et al*, 2009) [23]. In World, the production and productivity of tomato is 160850.683 tonnes/ha. and 33.7 tonnes/hectare Respectively in area of 4778.406 hectare. Leading countries are China, Turkey, Italy, India, USA, Iran, Brazil, Spain etc (India position in world agriculture 2015-16) Seed priming has been used to accelerate the germination, uniform seedling emergence and improve a germination performance under the temperature or drought stresses (Janmohammadi, Dezfuli, & Sharifzadeh, 2008; Jahangir, Amjad, Afzal, Iqbal, & Nawaz, 2009) [12-13]. Priming starts some of the metabolic process to occur in germination without a radicle protrusion. Various seed priming techniques have been developed in different medias: hydropriming (water), osmopriming (low water potential solutions such as polyethylene glycol – PEG), halo-priming (salt solutions) (Hamidi, Pirasteh-Anosheh, & Izadi, 2013; Chen, R. Arora, & U. Arora, 2010) [8]. Seed priming with nitrate solutions resulted in better seed quality and stand establishment in maize field grown (Hanegave, Hunje, Nadaf, Biradarpatil, & Uppar, 2011) [9]. Nitrate solutions helped in shorting a time required for spread of germination in tomato (Farooq, Basra, Saleem, Nafees, & Chisthi, 2005) [6]. These priming treatments which enhance seed germination include hydropriming (Afzal *et al*, 2002) [2] osmopriming.

(Hardegree and Van Vactor, 2000; Rouhi, 2011) [10], solid matrix priming (Ghassemi- Golezani, 2010) [7] halopriming (Afzal *et al*, 2009; Gandonou, 2011) [2].

Priming can also help to increase enzyme activity and neutralize the effects of seed ageing. According to Lee and Kim (2000) [15], *de novo* synthesis of α- amylase is also known during priming. Thus, higher vigour of the primed seeds relates to metabolic activities in seeds due to increased α-amylase activity.

Priming enhances seed performance by increasing germination rate and uniformity which will resulted in faster and better seedling development that was reported in various crop seeds (Pill, 1995; Warren and Bennet, 1997; Taylor *et al*., 1998; Powell *et al*, 2000) [19-20, 22, 25].

Material and Methods

The experiment was conducted in the seed testing laboratory of the department of genetics and plant breeding, SHIATS, Allahabad in Complete Randomized Block Design (CRBD) during Kharif session 2015- 2016.Two variety of tomato (S-22 and Navodya) are treated with hydropriming and halo-priming. At an interval of 12, 24, 36 hours in four replication. After treatment tomato seed are tested for several observation Germination percentage (%), Vigour index length, Vigour index mass, Seed metabolic efficiancey, Electrical conductivity of seed leachates(dsm-1), Through (between paper method and towel paper method)

Results and Discussion

Analysis of variance revealed presence of considerable variability among the variety for all the characters indicating a scope for further improvement and selection.Observation were recorded on ten randomly selected seedling for all the characters except seed test weight for each replication and for each variety. The maximum germination percentage (%) was observed in the variety S-22(91.75%). Whereas the minimum germination percentage (%) was observed in the variety Navodya (90.25%). There are tmore reports about seed priming effect on different plants. It was reported that Soyabean seed priming made better seedling emergence and yield improvement (Arif *et al,* 2007) [3]. The maximum vigour index length was observed in the variety Navodya (1910.59). Whereas the minimum vigour index length was observed in the variety S-22 (1957.52). These positive effects are probably due to the stimulatory effects of priming on the early stages of germination process by mediation of cell division ingerminating seeds (Hassanpouraghdam *et al,* 2009; Sivritepe *et al,* 2003).The maximum vigour index mass was observed in the variety Navodya (8.48). Whereas the minimum vigour index mass was observed in the variety S-22 (9.08).The result are in agreement with the findings of Venkatasubramanian and Umarani (2007) reported that halopriming for eggplant and chilli are established as best methods of priming treatment capable of improving seed vigour mass. As germination and seedling dry weight was positively influenced by the seed treatments, a correlation relationship with vigour index mass is noticed. The maximum Seed metabolice efficiance (SME) was observed in the variety S-22 (0.18). Whereas the minimum Seed metabolice efficiance (SME) was observed in the variety Navodya (0.17). The maximum Electrical conductivity(dsm-1) of seed was observed in the variety S-22 (91.59). Whereas the minimum Electrical conductivity (dsm-1) of seed was observed in the variety Navodya (91.31). Prete *et al.* (1994) [21] detected a highly significant negative correlation between the electrical conductivity evaluation and the field emergence of soybean seedling. Vieira *et al.* (1999) [24] showed that significant correlation were detected between standard germination, electrical conductivity and seedling field emergence. This is of interest to greenhouse growers who use the grafted seedlings and aim mainly at early, timely and more lucrative tomato production. One of the advantages of this is to increase efficacy of machine use and glasshouse space in grafting (Passam *et al,* 2005) [17]. During the process of priming, endosperm loosening, softening the seed coat, hydrolysis of starch that causes of synthesis of proteins and enzymes are known to occur (Taylor *et al*, 1998, Powell *et al*. 2000) [20, 22].

Table 1: Mean performance of various tomato varieties.

Tretment	**Germination Percentage**		**Vigour index length**		**Vigour Index Mass**		**Seed metabolice Efficiency(SME)**		**Electrical conductivity of seed leachates (dsm-1)**	
	(V_1)	(V_2)	(V_1)	(V2)	(V_1)	(V_2)	(V_1)	(V_2)	(V_1)	(V_2)
T_0	77.50	76.50	1178	1107.72	5.794	6.027	0.142	0.157	85.55	84.31
T_1	87.50	78.75	1442.87	1339.14	5.615	5.435	0.14	0.143	87.25	85.26
T_2	88.25	77.25	1473.77	1342.99	6.472	5.712	0.144	0.171	86.48	86.71
T_3	81.25	80.50	1326	1163.63	6.555	5.562	0.177	0.159	86.87	85.55
T_4	80.75	80.75	1352.56	1297.25	6.007	5.897	0.155	0.162	88.57	86.37
T_5	88.50	85.75	1589.46	1451.32	6.242	6.015	0.177	0.172	87.34	86.98
T_6	88.25	87.50	1515.25	1574.56	7.092	6.732	0.157	0.172	89.12	87.35
T_7	86.50	85.75	1793.15	1657.12	8.115	8.022	0.165	0.182	91.39	89.31
T_8	78.25	82.25	1195.66	1350.96	8.087	8.294	0.167	0.171	90.31	90.33
T_9	90.25	91.75	1911.04	1990.52	8.485	9.083	0.185	0.188	91.87	91.59
Mean	84.70	81.66	1477.65	1427.52	6.8464	6.6779	0.1609	0.1677	88.475	87.376
Min	77.50	76.50	1178	1108.97	5.615	5.435	0.14	0.143	85.55	84.31
Max	90.25	91.75	1910.59	1957.52	8.485	9.083	0.185	0.188	90.31	91.59
C.V.	4.01	2.81	9.887	6.082	4.907	4.456	11.433	5.538	0.75	0.881
C.D.(P=0.05)	4.90	3.35	112.09	115.272	0.488	0.423	0.024	0.014	0.965	1.127

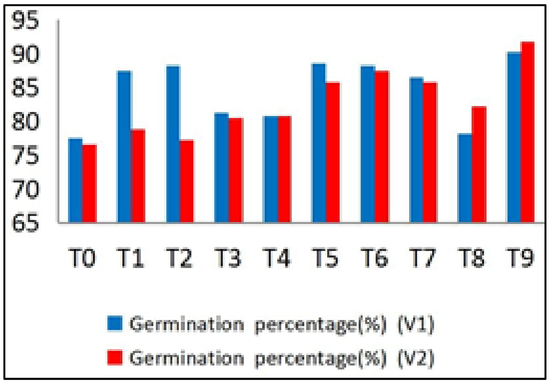

Fig 1: Showing Germination percentage of two variety (Navodya(V_1) and S-22(V_2).

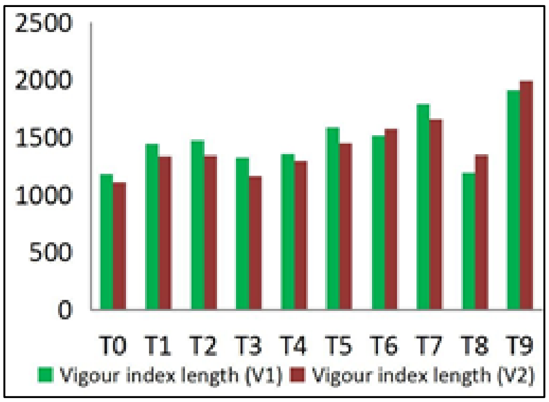

Fig 2: Showing Vigour index length of two Variety (Navodya(V_1) and S-22(V_2).

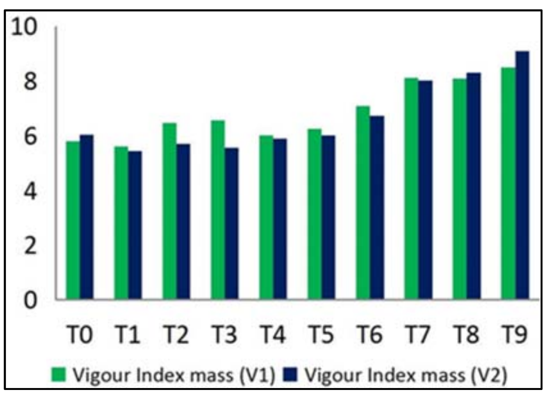

Fig 3: Showing Vigour index mass of two variety (Navodya(V_1) and S-22(V_2)

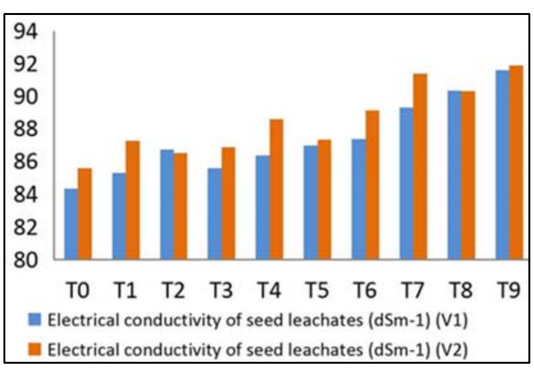

Fig 4: Showing Electrical conductivity of seed leachates $^{(dsm-1)}$of two variety (Navodya(V_1) and S-22(V_2).

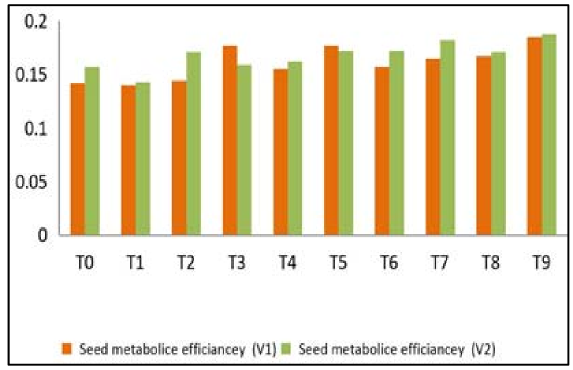

Fig 5: Showing Seed metabolic efficiancey of two variety (Navodya (V_1) and S-22(V_2).

Conclusion

It was concluded that all the priming treatments, seed priming with NaCl (1% solution for 36 hours) was found superior among all the different durations of priming treatments. Moreover, priming treatments have more pronounced effect on variety V2- S - 22 maintained highest seedling parameters followed by NAVODYA of tomato seeds. So, we can integrate these treatments in priming of tomato seeds. The variety S-22 can be beneficial for the farmer as its germination percentage is good it may be grown in farmer field so that they can get more production.

Reference

1. Afzal I, Ashraf S, Qasim M, Basra SMA, Shahid M. Does halopriming improve germination and seedling vigour in marigold (*Tagetes* spp.) Seed Sci. Technol. 2009; 37: 436-445.
2. Afzal I, Basra SMA, Ahmad N, Cheema MA, Warraich EA, Khaliq A Effect of priming and growth regulator treatment on emergence and seedling growth of hybrid maize (*Zea mays*). Int. J. Agric. Biol. 2002; 4: 303- 306.
3. Arif M, Jan MT, Marwat KB, Khan MA. Seed priming improves emergence and yeild of Soybean. *Pak.J.Bot,* 2007; 40(3): 1169-1177.
4. Bovy A, de Vos R, Kemper M, *et al.* High-flavonol tomatoes resulting from the heterologous expression of the maize transcription factor genes LC and C1. *The Plant Cell.* 2002; 14: 2509-2526.
5. Canene-Adams K, Campbell JK, Zaripheh S, Jeffery EH, Erdman Jr JW. The tomato as a functional food. Journal of Nutrition 2005; 135: 1226-1230.
6. Farooq M, Basra SMA, Saleem BA, Nafees M, Chishti S A. Enhancement of tomato seed germination and seedling vigor by osmopriming. Pakistan Journal of Agricultural Sciences, 2005; 42: 36-41.
7. Ghassemi-Golezani K, Afsaneh C, Safar N, Mohammad M. Influence of hydro-priming duration on field erformance of pinto bean (Phaseolus vulgaris L.) cultivars. Afr. J. Agric. Res, 2010; 5(9): 893-897.
8. Hamidi R, Pirasteh-Anosheh H, Izadi M. Effect of seed halo-priming compared with hydro- priming on wheat germination and growth. International Journal of Agronomy and Plant Production, 2013; 4: 1611-1615.
9. Hanegave AS, Hunje R, Nadaf HL, Biradarpatil NK, Uppar DS. Effect of seed priming on seed quality of maize (*Zea mays* L.). Karnataka Journal Agricultural Sciences, 2011; 24: 237-238.
10. Hardegree SP, Van Vactor SS, Germination and

emergence of primed grass seeds under field and simulated-field temperature regimes. Ann. Bot. 2000; 85: 379-390.
11. India position in world agriculture www.almac.com/web page. 2016.
12. Jahangir MM, Amjad M, Afzal I, Iqbal Q, Nawaz A. Lettuce achene invigoration through osmopriming at supraoptimal temperature. Pakistan Journal of Agricultural Sciences, 2009; 46: 1-6.
13. Janmohammadi M, Dezfuli PM, Sharifzadeh F. Seed invigoration techniques to improve germination and early growth of inbred line of maize under salinity and drought stress. General and Applied Plant Physiology, 2008; 4: 215-226.
14. Jianhua Z, Mcdonald. The saturated salt accelerated aging test for small seeded crops. Journal of Seed Science & Technology, 2001; 25: 123-131.
15. Lee SS, Kim JH. Total sugars, α-amylase activity and germination after priming of normal and aged rice seeds. Korean J.Crop Sci, 2000; 45: 108-111.
16. Niggeweg R, Michael AJ, Martin C. Engineering plants with increased levels of the antioxidant chlorogenic acid. *Nature Biotechnology* 2004; 22: 746-754.
17. Passam HC, Stylianou M, Kotsiras A. Performance of eggplant grafted on tomato and eggplant rootstocks. Eur. J. Hortic. Sci. 2005; 70: 130-134.
18. Yetisir H, Sari N. Effect of different rootstock on plant growth, yield and quality of watermelon. Aust. J. Exp. Agric, 2003; 43: 1269-1274.
19. Pill WG. Low Water Potential and Pre-sowing Germination Treatments to Improve Seed Quality. In: Seed Quality, Basra, A.S. (Ed.), Food Products Press, Binghampton, New York, 319-359, 1995.
20. Powell AA, Yule LJ, Jing HC, Groots SPC, Raoul J Bino. *et al*, The influence of aerated hydration seed treatment on seed longevity as assessed by the viability equation. J. Exp. Bot, 2000; 51: 2031-2043.
21. Prete. CEC, Cicero SM, Fplegatti MV. Soybean seedling field emergence and relation of imbibitions and electrical conductivity of seeds. *Semina*, 1994; 15:32-37.
22. Taylor AG, Allen PS, Bennett MA, Bradford KJ, Burris JS, Misra MK. Seed enhancements. Seed Sci. Res, 1998; 83: 245-256.
23. Uddain J, Hossain KMA, Mostafa MG, Rahman MJ. Effect of different plant growth regulators on growth and yield of tomato. International Journal of Sustable Agriculture, 2009; 1(3): 58-63.
24. Vieira RD, Paiva-agueko JA, Perecin D. Bittencowet SRM. correlation of electrical conductivity and other vigour tests with field emergence of soybean seedling. Seed science and Technology. 1999; 27: 67-75.
25. Warren JE, Bennett MA. Seed hydration using the drum priming system. Hort Science, 1997; 32: 1220-1221.