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Short Note

Standardization of Soaking Duration and Volume of Solution for Fortification of Tomato, Brinjal and Chilli Seeds

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An investigation was carried out to standardize the soaking duration and volume of solution for fortification of tomato, brinjal and chilli seeds. The treatments consisted of five soaking durations (3, 6, 12, 24 and 36h) and 3 soaking volumes (two third, equal and double the volume) and control replicated four times in factorial completely randomized block design (FCRD). Results indicated that significant enhancement of germination by all soaking durations and volume of solution. The maximum germination was obtained under 12h soaking duration in double the volume of water for tomato and 12 h soaking duration with equal volume of water for brinjal and chilli.

Key words: Tomato, brinjal, chilli, soaking duration, soaking volume, seed germination.

Tomato, brinjal and chilli are propagated mainly by sowing of seeds in the nursery and transplanting in field. The key to success in seed propagation is proper timing of germination and production of vigours seedlings. Where the period of germination is prolong, the emerging seedling is exposed to risk of attack by soil microbes or lack of sufficient moisture, light or oxygen. The idea of soaking seeds before sowing is aimed at shortening the lag phase in germination and to enhance seedling establishment thereby minimizing the risk in the early vegetative growth. While soaking, water is introduced, enzyme inhibitors are disabled and the seed explodes into life (Frias *et al.,* 2005) Proteins break into amino acids, water soluble vitamins such as B complex and vitamin C are created (Sattar et al., 1995 and Vidal-Valverde *et al.,* 2002). Fats and carbohydrates are converted into simple sugars. Soaking increases the bioavailability of minerals and vitamins (Dhaliwal and Aggarwal, 1999). Therefore, soaking has been identified as an inexpensive and effective technology for improving the quality of seeds, by enhancing their digestibility, increasing the content of amino acids. The object of this study is to identify the most effective soaking period and soaking volume of water for better germination of tomato, brinjal and chilli seeds.

Materials and Methods

Commercially available seeds of tomato cv. PKM 1, brinjal cv. CO 2 and chilli cv. PKM 1 were obtained for this experiment and the moisture content of the seeds were reduced to 8%. Five grams of tomato, brinjal and chilli seeds were weighed and soaked in various duration viz., 0,3h, 6h, 12h, 18h and 24h with equal, two third and double the volume of water to raise the moisture content of seed for endogenous impregnation of inoculants through exogenous application. After the soaking period the surface seed moisture was removed and final weight and moisture content were taken; from this, the moisture content was calculated. Then the seeds were tested for germination to determine ideal soaking duration and volume of water. The germination test was carried out as per the procedure prescribed by ISTA with four replicates of 100 seeds each in roll towel medium. After fourteen days, the normal seedlings produced were counted and expressed as percentage. The data recorded were analyzed statistically as per Panse and Sukhatme (1985)

Results and Discussion

Soaking of seeds promoted germination by high emergence percentage at shorter period in seeds of the tomato, brinjal and chilli in all the treatments. The amount of imbibed water increased steadily with increase in time of soaking and volume of water in all treatments. Soaking treatment enhanced germination in all the three seeds (tomato, brinjal and chilli) tested. Higher germination was recorded in seeds soaked for 12h, which is on par with 18h & 24h. In tomato 12h soaking with double the volume of water recorded 46.8% moisture and maximum germination of 86 % (10% over the control). In brinjal and chilli, seeds soaked in equal volume with 12h soaking recorded higher germination of 82 % and 83% respectively (10 %, 9 % over the control seeds) (Table 1.).The high performance in 12h soaking

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Table 1. Standardization of soaking duration and volume of water in tomato, brinjal and chillies

Volume of water / soaking duration	Tomato		Brinjal		Chillies	
	Moisture content (%)	Germination (%)	Moisture content (%)	Germination (%)	Moisture content (%)	Germination (%)
T_0 - control	8.2	76 (60.66)	7.9	72 (58.05)	7.8	74 (59.34)
T_1 - Two third volume - 3h	24.3	77 (61.34)	18.5	73 (58.69)	18.7	74 (59.34)
T_2 - Two third volume - 6h	38.6	78 (62.02)	36.4	74 (59.34)	36.5	75 (60.00)
T_3 - Two third volume - 12h	43	82 (64.89)	38.2	75 (60.00)	39.6	78 (62.02)
T_4- Two third volume - 18h	43.2	82 (64.89)	39.2	74 (59.34)	40.8	77 (61.34)
T_5- Two third volume - 24h	42.8	81(64.15)	39.6	73 (58.69)	41.2	76 (60.66)
T_6- Equal volume - 3h	26.7	77 (61.34)	21.0	74 (59.34)	20.6	75 (60.00)
T_7- Equal volume - 6h	40.3	79 (62.72)	38.6	76 (60.66)	38.8	77 (61.34)
T_8- Equal volume - 12h	44.3	83 (65.65)	42.3	82 (64.89)	41.6	83 (65.65)
T_9- Equal volume - 18h	45.2	83 (65.65)	43.3	80 (63.43)	43.2	81 (64.15)
T_{10}-Equal volume - 24h	46.5	84 (66.42)	43.8	81 (64.15)	44.5	81 (64.15)
T_{11}-Double the volume - 3h	28	77 (61.34)	22.6	74 (59.34)	21.9	75 (60.00)
T_{12}-Double the volume - 6h	41.5	79 (62.72)	40.2	75 (60.00)	40.6	76 (60.66)
T_{13}-Double the volume - 12h	46.8	86 (68.02)	42.3	80 (63.43)	42.5	80 (63.43)
T_{14}-Double the volume - 18h	48	84 (66.42)	43.4	80 (63.43)	44.6	79 (62.72)
T_{15}-Double the volume - 24h	48.5	85 (67.21)	43.0	79 (62.72)	45.2	80 (63.43)
SEd	0.1333	1.2076	0.1434	1.1667	0.1633	1.2416
CD (P = 0.05)	0.2716**	2.4599**	0.2920**	2.3765**	0.3326	2.5292**

treatment suggest that seed require an optimal level of moisture rather than full saturation to activate the embryo to commence the process of cell division, differentiation and multiplication to grow into a seedling. Optimal level of soaking is thought to have enhanced the effects on germination and growth probably due to the hydrolysis of complex into simple sugars that are readily utilized in the synthesis of auxins and proteins. The auxins so produced help to soften cell walls to facilitate growth and the proteins readily utilized in the production of new tissues. Copeland (1976) observed that most seeds swollen in water and sown in moist environment, germinate faster than untreated seeds. Georghious et.al., 1982, reported that seeds of tomato, brinjal and chillies require adequate moisture for fast germination. The study revealed that 12 h soaking in double the volume of water for tomato and in equal the volume of water for brinjal and chilli significantly resulted in higher germination than untreated seeds and also other treatments of soaking duration and volume of solution.

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