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Effect of Fortified Seed Coating on Seed Germination and Seedling Vigour of Tomato (*Lycopersicon esculentum*), Brinjal (*Solanum melongena*) and Chilli (*Capsicum annuum*)

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Investigation was carried out to evaluate the effect of fortified seed coating on seed germination and seedling vigour of tomato, brinjal and chilli. Seeds of these crops were fortified with water, gelatin (1000 ppm), KNO_3 (2%) and salicylic acid (200 ppm) for 12h and shade dried, followed by seed coating with Bavistin (2g) + Imidacloprid (6g) and Polymer (20g/ Kg of seed) in 40 ml of water along with untreated dry seed as control. The results revealed that tomato, brinjal and chilli seeds fortified with 2% KNO_3 followed by coating performed better in terms of seedling quality parameters *viz*., germination, seedling length, dry matter production and vigour index and it was on par with seed fortified with 1000 ppm Gelatin and 200 ppm Salicylic acid followed by seed coating.

Key Words: Seed fortification, seed coating, seed germination, seedling vigour, tomato, brinjal and Chilli.

Seed enhancement techniques *viz* ., seed fortification and seed coating methods of applied seed biology are some important methods to enhance seed and seedling performance, through addition of chemicals to protect the seed from pathogens and or to improve germination. Seed fortification is a physiological method of seed invigoration that aids in improving the initial stamina of the seed through higher germinability, seedling vigour and initial field stand. Seed coating is a sophisticated process of applying precise amount of active ingredients along with polymer directly to the seed surface without obscuring the shape and size. Tekrony (2006) reported that by polymer coating, improvement in seed weight ranged from 1
- 10 per cent only, since it is of an extremely thin coating and allows multiple layers on the seed. The coat forming formulation consists of a mixture of polymer, plasticizer and colourants. Coated seed has several benefits such as effective delivery system for agrochemicals, providing uniform and precise pesticide placement on the seed which is dust free, reduced dust-off during disinfectant coating, safety, highly visible in the soil, brand identity and ecofriendliness**.** A hydrophobic polymer is generally applied to seeds to regulate and reduce imbibition damage, improve germination and seedling emergence (Schneider and Renault, 1997; Chachalis and Smith, 2001; John, 2003). Hence, it was hypothesized that application of the nutrient in the form of seed fortification as well as application of nutritional elements, plant growth regulators, microbial inoculation, chemical & pesticide etc, in the form of seed coating will enable seed performance and germination of low volume and high value seeds. Hence the present study was formulated to find appropriate seed fortification and coating method for tomato, brinjal and chilli.

Materials and Methods

Seeds of tomato cv. PKM 1, brinjal cv. CO 2 and chilli cv. PKM 1 (aged 3 months ; 8% mc) obtained from Department of Vegetable Science, Horticultural College and Research Institute, Tamil Nadu Agricultural University, Coimbatore was used in study conducted at the Department of Seed Science and Technology, Tamil Nadu Agricultural University, Coimbatore, India during 2010 -2011. Seeds of tomato cv. PKM 1, brinjal cv. CO 2 and chilli cv. PKM 1 previously fortified with water, gelatin 1000 ppm , 2% KNO_3 and salicylic acid 200 ppm for 12 h and shade dried (Ponnuswamy and Vijayalakshmi, 2011a and 2011b) were coated with Bavistin 2g + Imidacloprid 6g + Polymer 20g / Kg of seed in 40ml of water. Untreated dry seeds served as control.

Fortified and coated seeds were subjected to germination test (ISTA, 1999) and evaluated for seed quality parameters such as germination, seedling length, dry matter production and vigour index. Normal seedlings counted at 14th day after sowing were measured from the tip of primary leaf to the end of primary tap root and expressed in centimeter (cm) to assess seedling length. Dry matter production was estimated by drying the normal seedlings shade dried for 12hrs followed by oven drying (80°C) for 4hr and the values were expressed as mg/10 seedlings. Vigour index was calculated by multiplying germination in per cent

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and seedling length in centimeter as suggested by Abdul Baki and Anderson (1973).The experiment was conducted in a completely randomized design and the data recorded were analyzed statistically as per Panse and Sukhatme (1985).

Results and Discussion

In the present study all the seed quality parameters were significantly influenced by fortified seed coating treatments in all the three crops. In

Table 1. Effect of fortified seed coating on seed germination and seedling vigour of tomato cv. PKM 1

Treatment	Germination %	Seedling length (cm)	Dry matter production (mg/ 10 seedlings)	Vigour index
Control	77 (61.34)	16.47	9.40	1268
Water + seed coating	82 (64.89)	16.82	10.06	1379
Gelatin 1000 ppm + seed coating	87 (68.86)	17.46	13.01	1519
2% KNO_3 + seed coating	88 (69.73)	17.56	12.29	1545
SA 200 ppm + seed coating	88 (69.73)	17.42	11.82	1533
Mean	84 (66.43)	17.14	11.31	1440
SEd	2.94	0.20	0.56	61.82
CD(p = 0.05)	6.27**	0.42**	1.21**	131.76**

Figures in parenthesis are arcsine transformed values; **Significant at 1% level

tomato, seeds fortified with 2% KNO_3 followed by coating with Bavistin + Imidacloprid + Polymer recorded the higher germination (88%), seedling length (17.56 cm), dry matter production (12.29 mg / 10 seedlings) and vigour index (1545) and was on par with seed fortification using Gelatin and Salicylic acid followed by coating treatment for all the parameters and significantly higher than water and

Table 2. Effect of fortified seed coating on seed germination and seedling vigour of Brinjal cv. CO.2

Treatment	Germination %	Seedling length (cm)	Dry matter production (mg/ 10 seedlings)	Vigour index
Control	76(60.66)	10.68	8.60	811
Water + seed coating	80(63.43)	11.12	9.20	890
Gelatin 1000 ppm + seed coating	86 (68.02)	11.79	10.00	1014
2% KNO_3 + seed coating	87 (68.86)	11.96	10.01	1041
SA 200 ppm + seed coating	86 (68.02)	11.74	9.78	1010
Mean	83(65.65)	11.45	9.51	953
SEd	3.05	0.30	0.16	54.74
CD(p=0.05)	6.51**	0.62**	0.34**	116.69**

Figures in parenthesis are arcsine values; **Significant at 1% level

control. The control recorded significantly lower germination (77%), seedling length (16.47 cm), dry matter production (9.40 mg / 10 seedlings) and vigour index (1268) (Table.1). Similar trend was observed in brinjal (Table 2) and chilli (Table 3). In general there was 10% increase in germination for tomato and brinjal seeds when compared to control and 5% increase in comparison to water. Not much improvement was seen in seedling length though pronounced effect was noticed for dry matter

Table 3. Effect of fortified seed coating on seed germination and seedling vigour of Chilli cv.PKM.1

Treatment	Germination %	Seedling length (cm)	Dry matter production (mg/ 10 seedlings)	Vigour index
Control	71(57.41)	12.68	10.40	900
Water + seed coating	75(60.00)	13.02	11.30	977
Gelatin 1000 ppm + seed coating	82(64.89)	13.57	13.98	1112
2% KNO_3 + seed coating	81(64.15)	13.69	13.94	1109
SA 200 ppm + seed coating	81(64.15)	13.78	13.21	1116
Mean	78(62.02)	13.34	12.56	1043
SEd	2.58	0.08	0.37	36.53
CD (p=0.05)	5.50**	0.22*	0.77**	77.87**

Figures in parenthesis are arcsine values; **Significant at 1% level

production and vigor index. The rapid, uniform and early germination is a prerequisite for good establishment and survival of the seedlings in the field of any crop species. In the present investigation higher germination and seedling vigour were observed due to seed fortification followed by coating. The probable reason for higher germination could be due to greater hydration of colloids, higher viscosity and elasticity of protoplasm, increased bound water content, lower water deficit, more efficient root system and increased metabolic activity (Joseph and Nair, 1989). The study revealed tomato, brinjal and chilli seeds, that seeds fortified with any one chemical *viz*., Gelatin 1000 ppm or 2% KNO_3 or

Salicylic acid 200 ppm followed by coating with Bavistin 2g + Imidacloprid 6g + Polymer 20 g /Kg of seed in 40 ml of water would improve the germination and seedling vigour than untreated seeds.

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