

## Influence of Seed Pelleting on Field Performance of Tomato (*Lycopersicon esculentum* Mill.) cv. PKM-1

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Tomato (*Lycopersicon esculentum* Mill.) a self pollinated crop is one of the important solanaceous vegetable crops grown widely all over the world because of its special nutritive value and also its wide spread production through out the year. It is the world's largest vegetable crop next to potato and sweet potato, but it tops the list of commercial vegetables. At present in our country, tomato crop is being grown over an area of 0.52 million ha with an annual production of 9.0 million tones [1]. The successful establishment of the crop mainly depends on achievement of optimum plant population, high probability of successful establishment of each seed planted. In order to reach this target, seed pelleting technique has been developed.

Seed pelleting is the process of enclosing a seed and, which is the key basis for successful crop/seed production. The most essential phase of precision planting is the singling of seeds for exact placement at a pre-determined depth and spacing in the soil with a uniform coverage and at reasonable planting speed. Singling is difficult for seeds which are low in density and irregular in shape. To overcome these difficulties seed pelleting is advocated [2]. Seed pelleting in tomato crop is advantageous because it avoids transplanting of seedlings thereby minimizes the labour cost, seed rate per hectare and also for effective control of diseases at seedling stage as

the seeds are pelleted with suitable chemicals and are directly sown in the main field. However, the information on the use of pelleted seeds in improving the productivity of the tomato crop is lacking and sparse.

The present study was therefore aimed to identify the best seed pelleting treatment to improve the tomato fruit and seed yield.

The field experiment was conducted in the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad during the *Kharif* 2007. The tomato seeds were treated with seed pelleting treatments such as T<sub>1</sub> (carbendazim @ 2 g/kg), T<sub>2</sub> (Neem leaf powder @ 10 g/kg), T<sub>3</sub> (CaOCl<sub>2</sub> @ 3 g/kg), T<sub>4</sub> (ZnSO<sub>4</sub> @ 300 mg/kg) and T<sub>5</sub> (*Trichoderma viridae* @ 4 g/kg) and T<sub>6</sub> (unpelleted seeds) as control. The treated seeds were pelleted by using filler material (saw dust @ 10 g/kg) and polyvinyl acetate (60 ml/kg) as binding material. The pelleted seeds were directly sown into the main field with a spacing of 75 x 60 cm. The field experiment was laid out in randomized complete block design (RCBD) with four replications. The gross plot size was 27.50 square metres. The observations recorded on growth and yield parameters such as field emergence (%), plant height (cm) at 90 days after sowing (DAS), number of leaves per plant at 90 DAS, days to first flowering, days to 50 per cent flowering, number of fruits per plant, fruit yield

per plant (g), number of seeds per fruit, seed yield per plant (g), seed yield (kg/ha), and seed quality parameters such as thousand seed weight (g), germination (%), seedling vigour index, dry weight of seedling (mg), electrical conductivity ( $\text{dSm}^{-1}$ )

The present study revealed that there was a significant difference among the seed pelleting treatments on growth, yield and seed quality parameters (after harvest). Among the different seed pelleting treatments  $\text{ZnSO}_4$  (300 mg/kg) ( $T_4$ ) recorded higher field emergence (91%), plant height (84 cm), number of leaves (75), less days to initiation and 50 per cent flowering (58, 64 respectively). While, unpelleted seeds recorded lowest field emergence (81%), plant height (64.25 cm) and number of leaves (50) and more number of days to first and 50 per cent flowering (66, 74 respectively). The increase in field emergence in pelleted seeds might be due to activation of cell which resulted in the mitochondrial activity enhancement leading to the formation of more high energy compounds, an important biomolecule which are made available during the

early phase of germination and also better plant growth due to supply of micronutrients through seed pelleting technique. This increase in physiological process was mainly due to their role in development of cell wall, cell differentiation, root elongation and shoot growth, through active photosynthesis it ultimately helped towards increase in growth of crop. Similar observations were reported by Singh and Verma [3], in tomato, Kavitha [2], in onion and Ramesh [4] in carrot.

Yield Parameters were also significantly influenced by seed pelleting treatments. Seeds pelleted with  $\text{ZnSO}_4$  ( $T_4$ ) recorded significantly higher number of fruits per plant (31), fruit yield per plant (1432), number seeds per fruit (236), seed yield per plant (23.49 g), seed yield per hectare (564 kg) and 1000 seed weight (3.17 g). While control (unpelleted seeds ( $T_6$ )) recorded lower number of fruits per plant (22), fruit yield per plant (1022 g), number seeds per fruit (164), seed yield per plant (7.58 g), seed yield per plot (409 g) and seed yield per hectare (182 kg). Zinc is regarded as component of a variety of enzymes which helps in protein synthesis and in the

Table 1. Effect of seed pelleting on growth parameters in tomato cv. PKM-1

Treatments	Field emergence (%)	Plant height (cm) (90DAS)	No. of leaves/plant (90DAS)	Days to first flowering	Days to 50% flowering
$T_1$	87	69.00	68	61	68
$T_2$	83	64.20	61	64	70
$T_3$	85	67.33	64	62	69
$T_4$	91	84.00	75	58	64
$T_5$	89	72.66	70	60	67
$T_6$	81	63.25	50	66	74
Mean	86.04	70.07	64.50	62	68
S.Em±	2.163	1.850	1.686	1.665	1.732
CD (p=0.05)	6.519	1.055	3.280	5.019	5.221

$T_1$  - Carbendazim @ 2 g/kg;  $T_2$  - Neem leaf powder @ 10 g/kg;  $T_3$  -  $\text{CaOCl}_2$  @ 3 g/kg;  $T_4$  -  $\text{ZnSO}_4$  @ 300 mg/kg;  $T_5$  - *Trichodema viridae* @ 4 g/kg;  $T_6$  - Control (unpelleted seeds)

Table 2. Effect of seed pelleting on yield parameters of tomato cv. PKM-1

Treatments	No. of fruits/plant (g)	Fruit yield (g/plant)	No. of seeds/fruit	Seed yield/plant (g)	Seed yield/ha (kg)
$T_1$	27	1284	202	15.47	371
$T_2$	23	1112	168	08.84	212
$T_3$	26	1228	184	12.43	298
$T_4$	31	1432	236	23.49	564
$T_5$	28	1336	218	18.40	442
$T_6$	22	1022	164	07.58	182
Mean	26.10	1236	195.33	14.37	344.85
S.Em±	0.803	37.26	6.23	0.49	13.54
CD (p=0.05)	2.420	112.32	18.79	1.49	40.83

$T_1$  - Carbendazim @ 2 g/kg;  $T_2$  - Neem leaf powder @ 10 g/kg;  $T_3$  -  $\text{CaOCl}_2$  @ 3 g/kg;  $T_4$  -  $\text{ZnSO}_4$  @ 300 mg/kg;  $T_5$  - *Trichodema viridae* @ 4 g/kg;  $T_6$  - Control (unpelleted seeds)

Table 3. Effect of seed pelleting on seed quality parameters in tomato cv. PKM-1

Treatments	1000 seed weight (g)	Germination (%)	Seedling vigour index	Dry weight of seedling (mg)	Electrical conductivity ( $\text{dsm}^{-1}$ )
T <sub>1</sub>	2.85	91(72.60)	2119	23.00	0.062
T <sub>2</sub>	2.34	89(70.66)	1689	19.00	0.074
T <sub>3</sub>	2.61	90(71.09)	1880	21.00	0.069
T <sub>4</sub>	3.17	94(75.25)	2618	28.00	0.040
T <sub>5</sub>	3.00	93(74.70)	2348	25.25	0.058
T <sub>6</sub>	2.12	87(69.11)	1570	18.00	0.082
Mean	2.67	72.24	2037	22.42	0.064
S.Em±	0.08	0.96	50.25	0.537	0.001
CD (p=0.05)	0.23	2.90	151.46	1.618	0.003

T<sub>1</sub> - Carbendazim @ 2g/kg; T<sub>2</sub> - Neem leaf powder @ 10 g/kg; T<sub>3</sub> - CaOCl<sub>2</sub> @ 3 g/kg; T<sub>4</sub> - ZnSO<sub>4</sub> @ 300 mg/kg; T<sub>5</sub> - *Trichodema viridae* @ 4 g/Kg; T<sub>6</sub> - Control (unpelleted seeds)

utilization of phosphorous and nitrogen and also known to enhance plant growth on account of its major role in increased auxin metabolism which has a pivotal role in metabolic activity of plant as well as seed formation and it is also evident in the present study. These results are also in accordance with the findings of Surayanarayana Reddy [5], Singh and Verma [3], Sharma [6], Balasubramanian *et al.* [7] and Srimathi [8] in tomato.

The seeds harvested from the plots which were sown with the seeds pelleted with ZnSO<sub>4</sub> (300 mg/kg) recorded higher 1000 seed weight (2.12 g), germination (94%), seedling vigour index (2618), dry weight of seedling (28 mg) and lower EC value of seed leachate (0.040 dS m<sup>-1</sup>). While, unpelleted control (T<sub>6</sub>) seeds recorded lower germination (87.00), seedling vigour index (1570), dry weight of seedling (18 mg) and higher EC value of seed leachates (0.082 dS m<sup>-1</sup>), indicating the formation of better quality of seeds due to

direct availability of nutrient in the seeds. Zinc element involved in auxin metabolism play a vital role in seed set, seed size and quality. Higher seed quality parameters noticed in the present study might be due to well developed seeds with higher test weight, lower electrical conductivity and higher dehydrogenase enzyme activity. Hence, additional supply of nutrients and direct availability of micronutrients to the mother plant leads to the production of good quality seed. From the present study it is concluded that tomato seeds are to be pelleted for directly sowing in the main field for better field emergence, successful establishment of the crop and also to get better seed yield and quality.

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