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Manoharapaladagu PV
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P, India

Prashant Kumar Rai
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P, India

DK Srivastava
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P, India

Rupesh Kumar
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P, India

Correspondence
Manoharapaladagu PV
Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, U.P, India

Effects of polymer seed coating, fungicide seed treatment and packaging materials on seed quality of chilli *(Capsicum annuum L.)* during storage

Manoharapaladagu PV, Prashant Kumar Rai, DK Srivastava and Rupesh Kumar

Abstract
The present storage experiment was conducted at Department of Genetic and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Uttar Pradesh during 2016 - 2017 with chilli seeds (Cv. Byadagi Dabbi). The seeds were coated with polymer in combination with fungicide (thiram) and maintained untreated seeds (control) where T_0 is control, T_1 polymer @ 3ml/kg of seeds, T_2 is polymer @ 5ml/kg of seeds, T_3 is polymer @ 7ml/kg of seeds, T_4 is fungicide(thiram) alone 2g/kg of seeds, T_5 is polymer @ 3ml + thiram @2g/kg, T_6 is polymer @ 5ml/kg + thiram @ 2g/kg and T_7 is Polymer @ 7ml + thiram @ 2g/kg of seeds. Treated seeds were packed in polythene bag (700 gauge) and aluminium foil pouch (factor P_1 and P_2) for the assessment of seed germination, seedling length, seedling dry weight, seedling vigour indices, moisture content and seed infection where data was subjected to factorial experiment laid out in completely randomized design. Germination percentage, seedling length, seedling dry weight, seedling vigour indices were high in seed treatment T_7P_2 as compared to all other seed treatments. However, seed infection and moisture content were lowest in T_7P_2.

Keywords: chilli, thiram, polymer, polythene bag, aluminium foil pouch

1. Introduction
Chilli (*Capsicum annuum* L.) is an important spice crop and belongs to the family solanaceae. It is usually a glabrous, woody subshrub. Chilli is widely cultivated throughout warm temperate, tropical and subtropical countries and it is native to tropical South America or Mexico. It was introduced to India during 17th century by Portuguese (Raju and Luckrose, 1991). Chilli or hot pepper is an indispensable spice essentially used in every Indian cuisine due to its pungency, spice taste, appealing odour and flavours. Chilli fruits are rich source of vitamin C, A and E. The polymer coat provides protection from stress imposed by accelerated ageing, which include fungal invasion. The coat is thin (84u), simple to apply, diffuses rapidly and non-toxic to the seed during germination. It improves plant stand and emergence of seeds, accurate application reduces chemical wastage, helps to make room for including all required ingredients protect the nutrients, plant growth promoters, hydrophobic/hydrophilic substances, oxygen suppliers and protect seed from attach of ants. By encasing the seed with thin film of biodegradable polymer, the adherence of seed treatment to the seed is improved, ensures dust free handling, making treated seed both useful and environment friendly. Polymer coating makes sowing operation easier due to the smooth flow of seeds.
Packaging materials play a major role in prolonging the shelf life of a seed during storage as they separate seeds from the surrounding environment. Some packaging materials are moisture pervious and some are impervious. Suitability of various packaging materials for safe storage of seeds for longer periods needs to be studied under various crop seeds.

Materials and Methods
After imposition of seed treatments, the treated seed along with untreated seeds (control) were packed in aluminium foil pouch and polythene bag (700 gauge) and stored under ambient conditions of Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad, Uttar Pradesh for six months. The seed samples drawn at bimonthly intervals were evaluated for various seed quality parameters in order to determine the suitable treatment for better storage.

Results and Discussion
Significant results were obtained due to seed treatment with polymer coating and fungicide for

the seed quality parameters. Among the seed treatments, T_7 followed by T_6 recorded significantly higher germination at the end of 6 months of storage period. Treatment T_7P_2 was effective for maintaining the germination over T_0P_1 (control). The decline in germination is attributed to ageing leading to depletion of food reserves and decline in synthetic activity of embryo apart from the death of seed because of fungal invasion, insect damage and storage conditions. Thiram acted as protective agent against fungal invasion and physiological ageing (Savitri *et al.*, 1994). The film formed around the seed act as a physical barrier, which has been reported to reduce leaching of inhibitors from the seed covering and may restrict oxygen diffusion to the embryo (Duan and Burris, 1997). The higher germination percentage can be seen in polymer coated seeds, it is mainly due to increase in the rate of imbibition where the fine particles in the coating acts as a "wick" or moisture attracting material or perhaps to improve germination.

Germination %, Seedling length and vigour index I and II of chilli were significantly higher in seeds coated with polymer @ 7ml/kg of seed along with thiram @ 2g/kg of seed T_7 followed by T_6 (polymer @ 5ml/kg and thiram @2g/kg of seed) stored in aluminium foil pouch compared to all other treatments and the lowest germination %, Seedling length and vigour index I and II recorded in T_0 (control) at the end of 6 months storage (Table). Similar results were also reported by Geetharani *et al*, 2006 [7], Kamara *et al.* (2014) [3], Almeida (2014).

At the end of six months of storage period, the lowest moisture content and seed infection was recorded in the seeds coated with polymer @ 7ml/kg of seed along with thiram @2g/kg of seeds T_7 followed by T_6 (polymer @ 5ml/kg of seeds and thiram @ 2g/kg of seed) stored in aluminium foil pouch and the highest moisture content and seed infection was recorded in T_0 (control).

Treated seed stored in aluminium foil pouch had lesser fungal infection as compared to untreated seed stored in polythene bag. The incidence of fungi depends on the moisture content of seed, temperature and relative humidity. These results are in conformity with the results of Manoj kumar and Agarwal (1998) in maize. The seeds coated with polymer combined with fungicide had minimal fungal infection (Geetharani *et al.*, 2006) [7] in chilli.

Table 1: Effect of seed treatments and packaging materials of germination%

Treatments	2 Months		4 Months		6 Months	
	P1	**P2**	**P1**	**P2**	**P1**	**P2**
T0	81.00	81.04	78.85	79.05	77.45	79.62
T1	82.27	82.31	82.12	82.33	79.72	81.79
T2	82.90	83.51	80.72	81.43	79.93	81.93
T3	83.73	83.62	81.36	81.58	80.96	82.64
T4	81.73	81.82	79.48	79.70	78.83	79.27
T5	84.05	84.16	81.99	82.20	81.75	83.64
T6	84.57	84.68	82.51	82.70	82.20	83.44
T7	85.09	85.20	83.03	83.22	82.72	83.91
Mean	83.17	83.29	81.26	81.53	80.44	82.03
	T	P	T	P	T	P
SEm±	0.737	0.368	0.604	0.302	0.719	0.360
CD at 5%	2.094	NS	1.717	NS	2.045	1.022

Table 2: Effect of seed treatments and packaging materials of seedling length (cm)

Treatments	2 Months		4 Months		6 Months	
	P1	P2	P1	P2	P1	P2
T0	13.43	13.52	12.97	13.07	11.11	11.40
T1	15.15	15.15	14.70	14.81	12.88	13.35
T2	15.87	15.96	15.42	15.49	13.60	14.21
T3	16.59	16.78	16.24	16.24	14.32	14.86
T4	14.21	14.34	13.76	13.87	11.95	12.61
T5	17.31	17.40	16.86	16.95	15.04	15.70
T6	17.93	18.01	17.48	17.59	15.66	16.46
T7	18.53	18.62	18.08	18.16	16.26	17.02
Mean	16.13	16.22	15.69	15.77	13.85	14.45
	T	P	T	P	T	P
SEm±	0.144	0.072	0.140	0.070	0.125	0.063
CD at 5%	0.409	NS	0.398	NS	0.356	0.18

Table 3: Effect of seed treatments and packaging materials of seedling dry weight

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	**P2**	**P1**	**P2**	**P1**	**P2**
T0	43.05	35.51	35.57	34.83	36.90	33.99	35.47
T1	42.05	37.56	37.51	36.84	36.89	34.82	35.76
T2	43.05	38.56	38.50	37.86	37.91	35.86	36.82
T3	41.95	39.55	39.40	38.86	38.92	36.89	37.84
T4	42.05	36.55	36.59	35.84	35.89	34.75	34.84
T5	42.05	40.52	40.57	39.86	39.91	37.92	38.86
T6	42.05	41.47	41.52	40.87	40.94	38.95	39.89
T7	43.05	42.45	42.51	41.87	41.92	39.96	40.89

Mean	42.41	39.02	39.02	38.35	38.66	36.64	37.55
		T	P	T	P	T	P
SEm±		0.346	0.173	0.317	0.159	0.324	0.162
CD at 5%		0.984	NS	0.903	NS	0.921	0.461

Table 4: Effect of seed treatments and packaging materials on seed vigour index I

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	1091	1088	1096	1023	1033	867	916
T1	1242	1247	1247	1208	1220	1034	1089
T2	1228	1316	1333	1245	1262	1095	1155
T3	1399	1390	1404	1322	1325	1168	1230
T4	1169	1162	1174	1094	1106	949	991
T5	1460	1456	1465	1383	1394	1238	1305
T6	1521	1517	1526	1443	1455	1296	1366
T7	1582	1578	1587	1502	1512	1351	1438
Mean	1337	1344	1354	1277	1288	1125	1186
		T	P	T	P	T	P
SEm±		24.030	12.015	20.939	10.470	15.922	7.961
CD at 5%		68.329	NS	59.540	NS	45.273	22.636

Table 5: Effect of seed treatments and packaging materials on seed vigour index II

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	3670	2878	2884	2747	2918	2634	2826
T1	3595	3091	3089	3026	3038	2777	2927
T2	3691	3198	3216	3057	3088	2868	3018
T3	3598	3313	3296	3163	3176	2988	3128
T4	3616	2989	2996	2849	2861	2741	2763
T5	3637	3407	3416	3269	3282	3101	3252
T6	3648	3509	3518	3373	3387	3203	3330
T7	3746	3614	3624	3478	3490	3298	3433
Mean	3650	3250	3255	3120	3155	2951	3084
		T	P	T	P	T	P
SEm±		57.675	28.837	48.886	24.443	52.852	26.426
CD at 5%		163.997	NS	139.006	NS	150.283	75.14

Table 6: Effect of seed treatments and packaging materials on seed infection (%)

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	6.12	6.52	6.47	6.90	6.93	7.04	6.91
T1	6.11	6.44	6.39	6.96	6.82	6.92	6.76
T2	6.10	6.42	6.37	6.68	6.71	6.82	6.67
T3	6.11	6.36	6.31	6.62	6.65	6.76	6.66
T4	6.12	6.46	6.40	6.84	6.89	6.96	6.90
T5	6.11	6.30	6.31	6.56	6.60	6.70	6.62
T6	6.11	6.19	6.17	6.50	6.53	6.64	6.55
T7	6.11	6.14	6.12	6.44	6.48	6.58	6.50
Mean	6.11	6.35	6.32	6.69	6.70	6.80	6.69
		T	P	T	P	T	P
SEm±		0.056	0.028	0.059	0.030	0.060	0.030
CD at 5%		0.159	NS	0.168	NS	0.170	0.085

Conclusion

It is concluded that chilli seeds treated with the combined treatment of polymer and fungicide T_7 followed by T_6 recorded significantly higher seed quality parameters. These two seed treatments were found effective in improving the shelf life of seed and productivity and it is more beneficial to the farmers. chilli seeds packed in aluminium foil pouch were found very effective for extending the seed longevity and maintaining the storability by safe guarding seed deteriorating from mycoflora.

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Reference

1. Avelar SAG, Souse FVD, Fiss G, Baudet L, Peske ST. The use of film coating on the performance of treated corn seed. Revista Brasileria De Sementes. 2012; 34(2).
2. Jitendra K, Nisar K, Kumar MBA, Walia S, Shakil NA, Prasad R *et al*. Development of polymeric seed coats for seed quality enhancement of Soybean (*Glycine max*).

Indian Journal of Agriculture Sciences. 2007; 77(11):738-43.
3. Kamara EG, Massaquoi FB, James MS, George A. Effects of packing material and treatment on weevil (*Callosobruchus machalatus* (F) Coleoptera: Bruchidae) infestation and quality of cowpea seeds. African Journal of Agricultural Research. 2014; 9(45):3313-3318.
4. Monira US, Amin MHA, Aktar MM, Mamun MAA. Effect of packaging materials on seed quality of storage soybean seed. Bangladesh Research Publications Journal. 2012; 7(4):421-427.
5. Pawar K, Mishra SP, Singh RK. Efficacy of bioagents and fungicides against seed borne fungi of soybean. Annals of Plant and Soil Research. 2015; 17(1):77-81.
6. Chaurasia AK, Singh VJ, Gampala S, Rai PK. Effect of bio-agents and polymer on yield and quality of chickpea seed (*Cicer arietinum* L.). Journal Crop and Weed. 2015; 11(special issue):34-37.
7. Geetharani, Ponnuswamy AS, Srimathi P. Influence of polymer coating on nursery management in chilli. Seed Research. 2006; 34(2):212-214.
8. Pragada Veraja, Prashant Kumar Rai. Effect of Polymer Coating, Chemicals and Biocontrol Agent on Storability of Black Gram (*Vigna mungo L.*). International Journal of Plant & Soil Science. 2015; 8(6):1-8.
9. Sherry Rachel Jacob, Arun Kumar MB, Eldho Varghese, Sinha SN. Hydrophilic polymer film coat as a micro-container of individual seed facilitates safe storage of tomato seeds. *Scientia Horticulturae*. 2016; 204:116-122.
10. Srinivasan J, Vijayakumar A, Srimathi P. Influence of seed treatment, storage containers and storage periods on storability of the female parent of tomato coth 2. I.J.S.N., 2016; 7(3):674-679.