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Effects of polymer seed coating, fungicide seed treatment and storage duration on seedling characteristics of cotton (*Gossypium hirsutum*) seeds

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Abstract
The experiments were conducted to study the effect of polymer coating, fungicide and packaging materials on seedling parameters of cotton hybrid JKCH 8665 BG II during 2016-17 at the Post graduation Laboratory of Department of Genetic and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Sciences, Allahabad Uttar Pradesh. The seeds were coated with polymer in combination with fungicide (thiram) and maintained untreated seeds (control) where T_0 is control, T_1 is fungicide (thiram) alone 3g/kg of seeds, T_2 is polymer @ 3ml/kg of seeds, T_3 is polymer @ 5ml/kg of seeds, T_4 is polymer @ 7ml/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: cotton seed, thiram, citrcoat, polythene bag, aluminium foil pouch

1. Introduction
Cotton is an important fiber crop, known as the 'king' of fiber and in recent time's cotton called as the "White gold". Cotton belongs to Malvaceae family and is the most important commercial crop of India ranks first in both area and production. Cotton seed looses viability and vigour rapidly in storage as being the poor storer. The linted cotton seed hosts many pathogens during storage and reduce the seed quality. To maintain the seed quality, it is advisable to delint the seed and protect from storage pathogens by polymer coating, fungicide treatments. Film coating is a new concept in which the plasticizer polymer forms a flexible film that adheres and protects fungicide. Film coating technology is a sophisticated process of applying precise amount of active ingredients along with a liquid material directly on to the seed surface without obscuring its shape and total seed weight may increase up to 1 to 2 per cent. The film formulations consists of a mixture of polymer, plasticizer and colourants (Robani, 1994) [10] that are commercially available as ready to use liquids or as dry powders (Ni., 1997) [8]. Seed coating provides an opportunity to package effective quantities of material such that they can improve the germination and seedling growth. Cotton is the common cultivated crop of India. Hence, an attempt was made to prolong the shelf life of the seeds through seed management practices for ambient storage conditions. 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. The seeds were coated with polymer in combination with fungicide (thiram) and maintained untreated seeds (control) where T_0 is control, T_1 is fungicide(thiram) alone 3g/kg of seeds, T_2 is polymer @ 3ml/kg of seeds, T_3 is polymer @ 5ml/kg of seeds, T_4 is polymer @ 7ml/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. The experiment was designed as Completely Randomized Block Design with four replicates. Then the seeds were packed in polythene bag and aluminium foil pouch and kept for storage. The bi monthly observations on germination percentage (Anon., 1996), vigour index (Abdul-Baki and Anderson, 1973), dry weight, moisture content and seed infection were recorded. The statistical analysis was done as per the procedure described by Panse and Sukhatme (1985).

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 cotton 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	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	84.3	79.11	80.21	74.26	76.51	68.26	70.61
T1	84.5	80.21	81.11	75.01	77.26	70.31	72.81
T2	84.6	80.71	81.51	76.51	78.21	72.26	74.51
T3	84.75	81.21	81.81	77.76	79.26	74.26	75.81
T4	84.75	81.81	82.51	78.51	79.81	75.81	76.76
T5	84.8	82.31	83.11	79.76	80.41	76.26	77.81
T6	85	83.01	83.81	80.21	81.71	78.01	78.76
T7	85.25	83.21	84.61	80.76	82.01	78.26	79.51
Mean	84.74	81.45	82.34	77.85	79.40	74.18	75.83
		P	T	P	T	P	T
SEm±		0.69	0.34	0.66	0.33	0.63	0.32
CD at 5%		NS	0.98	1.88	0.94	1.79	0.90

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

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	32.05	30.44	30.83	25.35	29.41	21.62	24.14
T1	32.14	30.78	31.29	27.67	29.85	23.92	25.08
T2	32.4	31.14	31.57	28.30	30.17	25.36	25.68
T3	32.56	31.50	31.95	28.73	30.51	25.88	26.44
T4	32.76	31.86	32.33	29.15	30.89	26.21	26.98
T5	32.98	32.24	32.61	29.56	31.29	26.59	27.50
T6	33.2	32.50	32.97	29.76	31.65	26.86	27.96
T7	33.44	32.66	33.15	30.24	32.09	27.11	28.42
Mean	32.69	31.64	32.08	28.59	30.73	25.45	26.53
		P	T	P	T	P	T
SEm±		0.27	0.13	0.25	0.12	0.22	0.11
CD at 5%		0.76	0.38	0.71	0.35	0.62	0.31

Table 3: Effect of seed treatments and packaging materials of vigour index I

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	2702	2408	2472	1883	2250	1482	1704
T1	2716	2466	2536	2075	2305	1665	1826
T2	2741	2512	2573	2164	2358	1830	1913
T3	2759	2556	2612	2234	2417	1921	2004
T4	2776	2605	2665	2287	2464	1986	2071
T5	2796	2652	2709	2356	2514	2027	2140
T6	2822	2696	2762	2385	2585	2096	2202
T7	2850	2716	2804	2441	2630	2121	2260
Mean	2770	2577	2642	2229	2441	1891	2015
		P	T	P	T	P	T
SEm±		21.93	10.96	19.66	9.83	15.86	7.93
CD at 5%		62.35	31.18	55.91	27.95	45.08	22.54

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

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	6029	5128	5297	4824	4800	3720	4554
T1	6065	5320	5529	4926	5125	4370	4621
T2	6088	5475	5675	4988	5308	4528	4757
T3	6120	5568	5760	5085	5445	4689	4872
T4	6144	5647	5843	5176	5505	4840	4957
T5	6173	5750	5939	5288	5561	4884	5076
T6	6202	5865	6078	5340	5682	5061	5187
T7	6240	5908	6160	5404	5717	5136	5267
Mean	6133	5583	5785	5129	5393	4653	4911
		T	P	T	P	T	P
SEm±		48	24	42	21	40	20
CD at 5%		136	68	120	60	115	57

Table 5: Effect of seed treatments and packaging materials on seed moisture content (%)

Treatments	Initial	2 Months		4 Months		6 Months	
		P1	P2	P1	P2	P1	P2
T0	9.98	10.02	9.85	10.16	9.98	10.42	10.16
T1	9.96	10.00	9.84	10.08	9.96	10.41	10.18
T2	9.95	9.99	9.82	10.06	9.95	10.39	10.19
T3	9.93	9.98	9.80	10.03	9.92	10.38	10.20
T4	9.91	9.95	9.78	10.02	9.91	10.36	10.22
T5	9.89	9.94	9.77	10.00	9.89	10.35	10.23
T6	9.86	9.91	9.75	9.99	9.88	10.34	10.25
T7	9.84	9.90	9.74	9.97	9.86	10.32	10.26
Mean	9.92	9.96	9.79	10.04	9.92	10.37	10.21
		P	T	P	T	P	T
SEm±		0.08	0.04	0.08	0.04	0.09	0.04
CD at 5%		0.23	NS	0.24	NS	0.25	NS

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	0.92	2.68	2.60	4.86	4.58	7.49	6.89
T1	0.87	1.70	1.68	2.65	2.60	4.36	4.23
T2	0.91	1.92	1.86	3.28	3.14	4.86	4.54
T3	0.9	1.86	1.81	3.16	2.98	4.68	4.46
T4	0.88	1.81	1.76	2.98	2.82	4.54	4.38
T5	0.85	1.74	1.73	2.84	2.78	4.46	4.32
T6	0.85	1.72	1.69	2.73	2.64	4.40	4.25
T7	0.84	1.68	1.64	2.70	2.58	4.34	4.21
Mean	0.88	1.89	1.85	3.15	3.02	4.89	4.66
		P	T	P	T	P	T
SEm±		0.02	0.01	0.03	0.01	0.05	0.02
CD at 5%		0.05	0.02	0.07	0.04	0.13	0.07

NS: Non significant
T0- Control (uncoated)
T1- Only Fungicide (thiram @ 3g/kg of seed)
T2- Polymer @ 3ml/kg of seed
T3- Polymer @ 3ml/kg of seed
T4- Polymer @ 5ml/kg of seed
T5- Polymer @ 5ml + thiram @ 2g/kg of seed
T6- Polymer @ 7ml + thiram @ 2g/kg of seed
T7- Polymer @ 7ml + thiram @ 2g/kg of seed
P1 – Polythene bag 700 gauge
P2 – Aluminium foil pouch

Conclusion

It is concluded that cotton 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. Cotton 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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References

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. 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 management in chilli. Seed Research. 2006; 34(2):212-214.
8. NI BR. Seed coating, film coating and pelleting. In: Seed Industry and Agricultural Development, Chinese Association of Agricultural sciences, DOA, Ministry of Agriculture, Beijing, China agriculture press. 1997, 737-747.
9. 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.
10. Robani H. Film coating horticultural seed. Horticultural Technology. 1994; 4:104-105.
11. Shakuntala NM, Vyakaranahal BS, Shakargowda I, Deshpande VK, Pujari BT, Nadaf HL. Effect of seed polymer coating on growth and yield of sunflower hybrid RSFH-130. Karnataka J. Agric. Sci. 2010; 23(5):708-711.
12. 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.
13. 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.