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Performance of different genotypes, packaging materials and seed treatments on seedling characters of rice (*Oryza sativa* L) during storage period

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Abstract
Impact of packaging materials and seed treatments on seedling characters during storage, in two different rice varieties was studied during October 2014 to March 2015. Two variety *viz.* Pusa basmati-1(V_1), and Jaya (V_2) were equally divide into 4 lots of 2000 gm each and treated with castor oil @ 5ml/kg seed (T_1), neem cake @ 10 gm/ kg seed (T_2), Thiram @ 2gm/kg (T_3) seed alone with control (untreated T_0) and packed in vaccum polythene bags (P_1), non vaccum polythene bags (P_2), and jute bags (P_3) and maintained for 24 weeks with 12% seed moisture content under ambient conditions. The results clearly revealed that seed stored in non vaccum polythene bags and treated with Thiram, variety Jaya was proved to be superior as it retained good, fresh weight (mean P_2 0.9, T_3 1.0 and V_2 0.8g), dry weight (mean P_2 0.5, T_3 0.6 and V_2 0.4g) and Pusa basmati-1 was proved to be superior germination percent (mean V_1 63.10, P_2 59.40 and T_3 63.80%) and average seedling length (mean V_1 18.60, P_2 18.00 and T_3 18.00cm), which is stored in non vaccum polythene bags and treated with thiram.

Keywords: packaging materials, seedling characters, seed storage and seed treatments

Introduction
Rice (*Oryza sativa* L.) is the most important staple food crop among the cereals consumed by more than half of the world's population. Rice is one of the significant cereal commodities**.** Seeds are required to be kept in safe storage since they are harvested in the preceding season and usually used for sowing in the subsequent season often after a time gap of six months or longer [1]. Thus proper storage is required to keep seeds in good condition. During storage, seed quality remain high at the initial level or decline to a level that may make the seed unacceptable for planting purpose what is related to many determinants: environmental conditions during seed production, pests, seed moisture content, grain characteristics, packing materials, storage periods, fungicidal seed treatments etc. Insect pests are one of the major organisms that are responsible for the decline in quantity, quality and germination potential of rice seeds in storage. According to [2]**;** proper and safe storage conditions are those that maintain seed quality without loss of vigour for three years. Among botanicals and chemical using the castor, neem cake or powder, neem oils, thiram and bavstin are proved to be effective protectants against storage pest; they can reduce infestation and maintain the quality of the seed in terms of viability and vigour for longer period in storage [3]. Keeping these aspects in mind, an investigation was carried out to study the performance of packaging materials and seed treatments on seedling characters, during storage period of rice.

Methods and materials
The experiment was conducted at the Department of Genetics and Plant Breeding, Sam Higginbottom University of Agriculture, Technology and Science, Allahabad, Uttar Pradesh, India during October 2014 to March 2015. Experiment was laid down in a Factorial Complete Randomized Design (FCRD), with four replications. The seed of V_1 (Pusa basmati-1), V_2 (Jaya) were sun dried to a uniform moisture content of 12% before proceeding for storage. Seed to each variety were castor oil (T_1) 5 gm/kg, the other with neem cake (T_2) 10 gm/kg and thiram (T_3) 3gm/kg and the last portion was kept as untreated control (T_0) and stored in three different types of packaging materials *viz*. vaccum polythene bags (P_1), non vaccum polythene bags (P_2) and Jute bags (P_3) and at room temperature in seed store house for different period of time and recorded the following observation:

Germination percentage (%): The germinated seeds were evaluated into normal and abnormal seedlings and hard and dead seeds. Germination percentage was recorded on the basis of normal seedling only. The result were statistically analysed for presentation [4].

Seedling Length (cm): Ten normal seedlings used for root length and shoot length measurement were used for the measurement of seedling length. The seedling length was measured from the tip of the primary root to the base of the primary leaf.

Fresh weight of seedling (g): Ten normal seedlings were used for measuring the seedling length. These seedlings were placed on the electronic weighing balance and the average weights in milligrams of fresh seedling were recorded.

Dry weight of seedling (g): Ten normal seedling used for measuring the seedling length were put in the butter paper bag and dried in hot air oven maintained at 1030C+10C for 12 hours.. These seedlings were placed on the electronic weighing balance and the average weights in milligrams of dry seedling were recorded.

Results and Discussion

Effect of packing materials and seed treatment on germination % difference variety of rice during storage period:

Marked difference was noticed among the treatment with regard to seed germination (%) after 24 week of storage revealed that the (table no 1) variety V_1 (Pusa basmati-1) registered significantly superior values (63.06%) than other variety V_2 (Jaya, 52.57 %).The percentage of seed germination after 24 week of storage as influenced by the fungicidal seed treatments, revealed that treatment T_3 (Thiram, 63.80%) was significantly superior followed by T_2 (neem cake, 59.91%), (castor oil, 50.90%) and control (56.70%). Among the packaging material, P_2 (non vaccum polythene bag, 59.40%), was found to be significantly useful in maintaining germination whereas the effect of (vaccum polythene bag, 58.40%), were found at par (jute bag, 55.70 %) after 24 week of storage. Similar findings were reported by [5]**,** seed treatment with thiram and storage non vaccum polythene bag also increased the germination % of rice. Non vaccum polythene bag deteriorates, although slowly on direct exposure to storage sunlight or ultraviolet radiation similar result were reported by [6] also observed highly effect and difference for treatment, containers and storage period for germination percentage.

Table 1: Effect of different genotypes, seed treatments and packaging materials on germination% of rice seed at different period of storage.

Bioagent/Chemical		Number of weeks						Average
		4	8	12	16	20	24	
T_0	Control	44.17	53.83	62.33	65.33	59.83	54.67	56.70
T_1	Castor oil	37.67	48.50	61.17	56.50	53.17	48.17	50.90
T_2	Neem cake	47.32	54.83	66.33	67.50	63.67	59.83	59.90
T_3	Thiram	52.00	63.83	72.00	71.00	64.33	59.67	63.80
CD at 5%		0.090	0.113	0.114	0.157	0.170	0.135	0.129
Variety								
V_1	Pusa basmati-1	52.12	59.33	73.58	69.17	64.33	59.83	63.06
V_2	Jaya	38.45	51.17	57.33	61.00	56.17	51.33	52.57
CD at 5%		0.078	0.098	0.099	0.136	0.148	0.117	0.112
Packaging Material								
P_1	Polythene bag (vaccum)	45.93	57.25	65.13	64.63	61.25	56.25	58.40
P_2	polythene bag (non vaccum)	46.13	57.50	66.38	66.25	62.25	57.88	59.40
P_3	Jute bag	43.81	51.00	64.88	64.38	57.25	52.63	55.70
CD at 5%		0.090	0.113	0.114	0.157	0.170	0.135	0.129

Effect of packing materials and seed treatment on average seedling length difference variety of rice during storage period:

In table-2 the average seedling length after 24 week of storage showed that the variety Pusa basmati-1 registered significant superior values (18.60 cm) than other variety (Jaya, 15.70 cm). The average seedling length after 24 weeks of storage as affected by the fungicidal seed treatment revealed that all treatments are found statistically at per with each other neem cake (17.40 cm), Thiram (18.01 cm), castor oil (16.30 cm), control (16.80 cm).The packaging material, the treatment P_2 (non vaccum polythene bags, 17.99 cm), were found to be significantly superior to P_1 (vaccum polythene bags 16.88 cm) and P_3 (Jute bags 16.49 cm) after 24 weeks of storage in securing the average seedling length. Similar findings were also reported by [7] in mungbean, [8] in rice and maize. With reference to the packaging materials the shoot and root length found to be significantly superior in plastic bags to cloth bag and jute bag. Similar results reported [9] in maize.

Table 2: Effect of different genotypes, seed treatments and packaging materials on seedling length of rice seed at different period of storage.

Bioagent/Chemical		Number of weeks						Average
		4	8	12	16	20	24	
T_0	Control	22.35	20.52	18.11	16.16	13.40	9.03	16.80
T_1	Castor oil	22.38	19.98	17.90	14.95	13.65	9.13	16.30
T_2	Neem cake	24.33	20.89	18.78	16.22	13.79	10.25	17.40
T_3	Thiram	25.82	21.48	19.32	16.80	14.38	10.27	18.00
CD at 5%		0.13	0.208	0.163	0.193	0.144	0.108	0.157
Variety								
V_1	Pusa basmati-1	25.71	22.28	20.19	17.68	15.13	10.53	18.60
V_2	Jaya	22.22	19.15	16.68	14.41	12.48	8.80	15.70

CD at 5%		0.141	0.180	0.141	0.167	0.125	0.094	0.141
Packaging Material								
P_1	Polythene bag (vaccum)	24.00	20.22	17.87	16.07	13.79	9.33	16.88
P_2	polythene bag (non vaccum)	24.08	21.94	20.13	16.57	14.68	10.55	17.99
P_3	Jute bag	23.83	19.99	17.58	15.50	12.94	9.13	16.49
CD at 5%		0.13	0.208	0.163	0.193	0.144	0.108	0.157

Effect of packing materials and seed treatment on fresh weights difference variety of rice during storage period:
In table-3The fresh weights of the seedling as the effects of variety, seed treatments and packaging materials used, it was found out that V_2 (Jaya, 0.83 g) scored the highest record followed by V_1 (Pusa basmati-1, 0.77 g). As for the effects of seed treatments and packaging materials, the result indicated that Thiram could retain maximum fresh weight values (1.01 g) as the seed treatment and P2 (non vaccum polythene, 0.90 g) revealed highest values amongst all the packing materials used. The interaction effect of variety, fungicides and packaging material on fresh weight at different period of storage showed significant difference. These findings are in agreement with results obtained by [10] in maize and cowpea seeds.

Table 3: Effects of different genotypes, seed treatments and packaging materials on seedling fresh weight of rice seed at different period of storage.

Bioagent/Chemical		Number of weeks						Average
		4	8	12	16	20	24	
T_0	Control	1.05	0.87	0.98	0.96	0.92	0.86	0.94
T_1	Castor oil	0.42	0.37	0.48	0.31	0.27	0.25	0.35
T_2	Neem cake	1.06	1.02	0.99	0.79	0.90	0.88	0.94
T_3	Thiram	1.08	1.06	1.03	1.02	0.97	0.94	1.01
CD at 5%		0.072	0.032	0.016	0.033	0.019	0.018	0.031
Variety								
V_1	Pusa basmati-1	0.89	0.77	0.82	0.72	0.75	0.72	0.77
V_2	Jaya	0.91	0.88	0.91	0.81	0.77	0.74	0.83
CD at 5%		0.062	0.028	0.014	0.029	0.016	0.015	0.027
Packaging Material								
P_1	Polythene bag (vaccum)	0.88	0.79	0.88	0.74	0.75	0.72	0.79
P_2	polythene bag (non vaccum)	1.01	0.95	0.92	0.89	0.83	0.80	0.90
P_3	Jute bag	0.82	0.75	0.80	.069	0.71	0.68	0.63
CD at 5%		0.072	0.032	0.016	0.033	0.019	0.018	0.031

Effect of packing materials and seed treatment on dry weights difference variety of rice during storage period:
Acoording to table -4 the dry weights of the seedling as the effects of variety, seed treatments and packaging materials used, it was found out that V_2 (Jaya, 0.39 g) scored the highest record followed by V_1 (Pusa basmati-1, 0.28 g). As for the effects of seed treatments and packaging materials, the result indicated that Thiram could retain maximum fresh weight values (0.57 g) as the seed treatment and P_2 (non vaccum polythene, 0.45 g) revealed highest values amongst all the packing materials used. The interaction effect of variety, fungicides and packaging material on dry weight at different period of storage showed significant difference. Similar findings were reported by [11 and 12] in sorghum and groundnut. The seeds stored in non vaccum polythene bags (P1) proved better than cloth bags (P2).

Table 4: Effects of different genotypes, seed treatments and packaging materials on seedling dry weight of rice seed at different period of storage.

Bioagent/Chemical		Number of weeks						Average
		4	8	12	16	20	24	
T_0	Control	0.17	0.15	0.12	0.25	0.57	0.45	0.28
T_1	Castor oil	0.16	0.14	0.13	0.23	0.28	0.04	0.16
T_2	Neem cake	0.17	0.15	0.25	0.38	0.60	0.60	0.35
T_3	Thiram	0.35	0.52	0.62	0.59	0.72	0.65	0.57
CD at 5%		0.015	0.013	0.011	0.038	0.035	0.032	0.024
Variety								
V_1	Pusa basmati-1	0.22	0.25	0.27	0.32	0.51	0.16	0.28
V_2	Jaya	0.20	0.23	0.29	0.40	0.58	0.68	0.39
CD at 5%		0.013	0.011	0.010	0.033	0.030	0.027	0.020
Packaging Material								
P_1	Polythene bag (vaccum)	0.15	0.23	0.23	0.32	0.52	0.46	0.31
P_2	polythene bag (non vaccum)	0.34	0.27	0.40	0.52	0.68	0.49	0.45
P_3	Jute bag	0.15	0.21	0.21	0.25	0.43	0.36	0.26
CD at 5%		0.015	0.013	0.011	0.038	0.035	0.032	0.024

Conclusion

Overall results show that seeds of rice were treated with Thiram (3g/kg) and packed in non vaccum polythene bags stored for 24 weeks storage was found best.Seed health was found better in seeds treated with castor oil than other treatments (Thiram, neem cake and control).

Reference

1. Bashir MH, Ashfaq M, Afzal M, Khaliq A. Estimation of germination losses of wheat during storage at farmer's stores due to mite pests in tehsil Toba Tek Singh. Int. J Agric. and Appl. Sci. 2009; 1:39-42.
2. Joao Abba and Lovato**.** Effect of seed storage temperature and relative humidity on maize (*Zea mays* L.) seed viability and vigour. Seed Sci. and Tech. 1999; 27:101-114.
3. Kulkarni SG, Harode S, Borikar PS, Puri SN, Deshpande SD. Effect of containers and seed treatment on the storage of legumes. Seed Research. 2012; 16(1):121-122.
4. International Seed Testing Association (ISTA)**.** International rules for seed testing. Seed Science and Technology. 1985; 13:299-355.
5. Choudhury MM, Rajanna CM, Jaime A, Silva TA, Balakrishna. Influence of Packaging Materials and Seed Treatments on Physiological Attributes during Storage in Rice (*Oryza sativa* L.). Seed Science and Biotechnology. 2011; 5(1):15-20.
6. Singh SN, Srivastava SK, Agrawal SC. Viability and germination of soybean seeds in relation to pre-treatment with fungicides, period of storage and type of storage conditions. Tro
7. pical Agriculture, United Kingdom. 2007; 65(2):106-108.
8. Paul SR, Sharma NN, Sarma D, Borah RK, Nath PD. Maintenance of viability and vigour of stored mungbean seeds under the ambient conditions in the hills zone of Assam. Annals of Agricultural Research. 1996; 17(2):196-198.
9. Daniels MJ, Marks BP, Siebenmorgen TJ, Mcnew RW, Meullenet JF. Effects of long-grain rough rice storage history on end-use quality. Journal of Food Science. 1998; 63:832-835.
10. Kumar G, Rai PK. Combined and individual action of insecticide and ageing treatments on chromosome biology of maize (Zea mays L.) inbred. Nat. Acad. Sci. Letters. 2007; 30(11-12):359-364.
11. Duruigbo CI. Assessing the viability of maize and cowpea seeds stored using local plant biocides. New York Science Journal. 2012; 3:55-60
12. Saxena OP. Physiological and biochemical changes in relation to storage in some crop seeds. Seed Tech News. 1994.
13. Raikar SD, Janagoudar BS. Effect of seed source, containers and seed treatment with chemical and biopesticide on storability of scented rice cv. Mugad sugandha. Karnataka Journal of Agricultural Sciences. 2008; 24(4):448-454.