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Effect of comprehensive seed treatments on storability of coriander (*Coriandrum sativum* L.) cv.CO 4

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***Abstract**: The study was carried out to find out the effect of comprehensive seed treatments on storability of coriander cv.CO4 seeds. The seeds fortified with KH_2PO_4 @ 1% for 16h and treated with Azospirillum sp. @100g/kg were found to be good in storage which maintained quality characteristics such as germination (87 %), vigour index (2229), dry matter production (32.33 mg 10 seedlings^{-1}), α-amylase activity (4.60 mg maltose g^{-1} min^{-1}) and protein content (12.77 %) for six months of storage. The comprehensive seed treatments are worthy to be applied for many species of seeds with consequent improvement on the seed quality and maintenance of properties after storage.*

***Keywords:** comprehensive, coriander, seed treatment, storability*

I. Introduction

The seed spices constitute an important group of agricultural commodities. Among the seed spices, coriander is the most important economic spice crop with multipurpose utility. Coriander (*Coriandrum sativum* L.) is an annual herb in the family apiaceae (umbelliferae). Coriander is liable to infestation by common storage pests. Though loss of viability is inevitable, irreversible and inexorable during storage, its rate and extent could be slowed down to some extent by prestorage seed management techniques. Prolonging the shelf life of stored seed is always a profitable proposition and can be adopted if the procedure is cheap and easy to follow. Seed treatment is also essential for extended life of seed in case of unforeseen situation that hinder with the usage of seed for in time i.e., for next season sowing. In many species such as *Allium cepa*, *Capsicum annuum*, *Pisum sativum* and *Daucus carota*, an improvement in storability after osmotic treatments has been found (1). Comprehensive seed treatment involves the addition of nutrients, plant protectants and bioinoculants in order to extend the storage life of the seed. Onion seeds coated with polymer + thiram recorded better seed quality during storage (2). Tomato seeds coated in sequence with white red polykote + carbendazim + dimethoate maintained better seed quality in terms of higher germination, drymatter and vigour index upto 12 months of storage under ambient conditions (3). From the lights of above facts study was conducted to find out the storage potential of coriander seeds with comprehensive seed treatments.

II. Materials And Methods

Pure seeds of coriander (*Coriandrum sativum* L.) cv. CO 4 which formed the base material for the study were obtained from the Department of Spices and Plantations Crops, TNAU, Coimbatore. Seeds were subjected to leaching in water for 16 h in order to remove the dormancy. Then seeds were dried back to original moisture content (8 %) and were imposed with the following seed treatments in three replications. The seeds were stored in brown paper bags for six months.

Treatments

T1 -Control (dormancy broken seeds through leaching)
T2 -Polymer coating @ 3ml/kg+ *Trichoderma viridae* @4g/kg
T3 -Polymer coating @ 3ml/kg+ *Azospirillum sp*. @100g/kg
T4 -Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg + *Trichoderma viridae* @ 4g/kg + *Azospirillum sp*.@100g/kg
T5 -Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg + imidachloprid @ 2ml/kg + *Azospirillum sp*.@100g/kg
T6 - Fortification (KH_2PO_4 @ 1% for 16h) + *Azospirillum sp*. @100g/kg
T7 -Fortification (KH_2PO_4 @ 1% for 16h) + imidachloprid @ 2ml/kg + *Trichoderma viridae* @4g/kg+ *Azospirillum sp*. @100g/kg
T8 -Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg+ imidachloprid @ 2ml/kg + *Trichoderma viridae* @4g/kg + *Azospirillum sp*. @100g/kg

Observations on germination (4), vigour index (5), dry matter production (6), α-Amylase activity (7) and protein content (8) were taken at three months interval.

III. Result And Discussion

The storage potential of the seed was extended with the comprehensive seed treatments. Germination potential of seeds decreased with increase in period of storage. The decline in germination over the period of storage might be due to depletion of food reserves and decline in synthetic activity (9). Higher germination was observed for the seeds fortified with KH_2PO_4 (88, 87 and 87 % respectively in T7, T6 and T4). KH_2PO_4 increased the activity of nucleic acids. The better performance of the seeds fortified with KH_2PO_4 is due to the maintenance of higher water balance in the tissue(10) The hike in germination of seeds pelleted with biofertilizer (*Azospirillum*) might be due to the increased cytokinin production which actively involved in cell division and production of growth regulating endogenous substances like auxin and GA_3. The vigour index (2229) and drymatter production (32.33 mg 10 seedlings^{-1}) recorded higher for the treatment KH_2PO_4 @ 1% for 16h + *Azospirillum sp*. @100g/kg than the other treatments and showed gradual reduction during the storage period due to seed deterioration. The reduction in vigour attributing characters maintained at minimum level for the seeds treated with KH_2PO_4 @ 1% for 16h + *Azospirillum sp*. @100g/kg (Table 1).

The decrease in α-amylase enzyme activity was observed due to storage. It might be due to acceleration of senescence (11). Amylase activity decreased with ageing due to the reduced supply of readily available sugars that accounts for poor seedling growth of stored seeds. However, the fortified and polymer coated seeds were able to maintain the α-amylase enzyme at higher level (4.63 and 4.60 mg maltose min^{-1} respectively in T5 and T6). Protein content of the stored seeds decreased with the advancement in storage period due to the degradation of protein in to amino acids by protease enzyme. Failure of synthesis of protein apparatus and reduction in mobilisation efficiency in the stored seeds also should have resulted in reduced protein content (12). It accelerates the seed deterioration. Seeds treated with KH_2PO_4 @ 1% for 16h + *Azospirillum sp*. @100g/kg recorded higher protein content. It might be due to controlled biochemical changes in the treated seeds (13) (Table 2).

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Table 1. Effect of comprehensive seed treatments on seed quality during storage in coriander cv. CO 4

Treatments (T) / Period of storage in months (P)	Germination (%)				Vigour index				Dry matter production (mg 10 seedlings^{-1})			
	Initial month	3rd month	6th month	Mean	Initial month	3rd month	6th month	Mean	Initial month	3rd month	6th month	Mean
T1	84 (66.42)	82 (64.90)	80 (63.44)	82 (64.90)	1957	1705	1464	1708	30	25	23	26.00
T2	87 (68.87)	85 (67.22)	82 (64.90)	84 (66.42)	2366	2031	1689	2028	35	29	24	29.33
T3	88 (69.73)	85 (67.22)	84 (66.42)	85 (67.22)	2481	2167	1798	2148	37	31	27	31.67
T4	89 (70.63)	88 (69.73)	85 (67.22)	87 (68.87)	2465	2094	1777	2112	34	32	25	30.33
T5	87 (68.87)	87 (68.87)	84 (66.42)	86 (68.03)	2340	2149	1797	2095	33	27	25	28.33
T6	90 (71.57)	88 (69.73)	85 (67.22)	87 (68.87)	2556	2305	1828	2229	39	31	27	32.33
T7	91 (72.54)	87 (68.87)	86 (68.03)	88 (69.73)	2457	2219	1763	2146	35	34	26	31.67
T8	88 (69.73)	85 (67.22)	84 (66.42)	85 (67.22)	2455	2134	1722	2103	34	30	25	29.67
Mean	88 (69.73)	85 (67.22)	83 (65.65)	85 (67.22)	2384	2100	1729	2067	34.63	29.88	25.25	29.92
	T	P	TxP		T	P	TxP		T	P	TxP	
SEd	1.08	0.66	1.87		31.95	19.56	55.33		0.46	0.28	0.80	
CD (P=0.05)	2.17	1.33	NS		64.24	39.34	111.26		0.93	0.57	1.60	

(Figures in parentheses indicate arc sine transformed values)

[Where, T1-control ; T2-Polymer coating @ 3ml/kg+ *Trichoderma viridae* @4g/kg; T3-Polymer coating @ 3ml/kg+ *Azospirillum sp*. @100g/kg; T4-Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg + *Trichoderma viridae* @ 4g/kg + *Azospirillum sp.*@100g/kg; T5-Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg + imidachloprid @ 2ml/kg + *Azospirillum sp.*@100g/kg ; T6 - Fortification (KH_2PO_4 @ 1% for 16h) + *Azospirillum sp.* @100g/kg; T7- Fortification (KH_2PO_4 @ 1% for 16h) + imidachloprid @ 2ml/kg + *Trichoderma viridae* @4g/kg+ *Azospirillum sp.* @100g/kg; T8-Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg+ imidachloprid @ 2ml/kg + *Trichoderma viridae* @4g/kg + *Azospirillum sp*. @100g/kg]

Table 2. Effect of comprehensive seed treatments on seed quality during storage in coriander cv. CO 4

Treatments(T) / Period of storage in months (P)	α amylase activity (mg maltose min^{-1})				Protein content (%)			
	Initial month	3rd month	6th month	Mean	Initial month	3rd month	6th month	Mean
T1-Control (dormancy broken seeds through leaching)	4.9	3.2	3.0	3.70	12.5	11.3	10.5	11.43
T2-Polymer coating @ 3ml/kg+ *Trichoderma viridae* @4g/kg	4.9	3.9	3.5	4.10	13.9	12.5	10.8	12.40
T3-Polymer coating @ 3ml/kg+ *Azospirillum sp*. @100g/kg	5.0	4.2	3.9	4.37	13.0	12.0	10.7	11.90
T4-Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg+ *Trichoderma viridae*@4g/kg+ *Azospirillum sp.*@100g/kg	5.1	4.4	3.6	4.37	12.7	11.8	11.0	11.83
T5-Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg+ imidachloprid @2ml/kg+ *Azospirillum sp.*@100g/kg	5.3	4.9	3.7	4.63	12.6	11.9	11.3	11.93
T6 -Fortification (KH_2PO_4 @ 1% for 16h) + *Azospirillum sp*. @100g/kg	5.2	4.8	3.8	4.60	13.8	12.7	11.8	12.77
T7-Fortification (KH_2PO_4 @ 1% for 16h) + imidachloprid @ 2ml/kg+ *Trichoderma viridae* @4g/kg+ *Azospirillum sp*. @100g/kg	5.3	4.7	3.7	4.57	14.1	12.5	10.7	12.43
T8- Fortification (KH_2PO_4 @ 1% for 16h) + polymer coating @ 3ml/kg+ imidachloprid@2ml/kg+ *Trichoderma viridae* @4g/kg + *Azospirillum sp*. @100g/kg	5.0	4.7	3.5	4.40	13.4	12.3	11.1	12.27
Mean	5.09	4.35	3.59	4.34	13.25	12.12	10.98	12.12
	T	P	TxP		T	P	TxP	
SEd	0.07	0.04	0.12		0.18	0.11	0.32	
CD (P=0.05)	0.13	0.08	0.23		0.37	0.23	0.64	