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SEED STORAGE STUDIES IN *Gymnema sylvistre*

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ABSTRACT

Studies were conducted with freshly harvested *Gymnema* seeds to assess the influence of seed treatment and containers on storability of seeds. The seeds treated with thiram at 2 g kg^{-1}, stored both in cloth bag and 700 gauge polythene lined cloth bag at 8 per cent moisture content recorded 48 per cent germination after 6 months of storage. The untreated seeds recorded lower germination and vigour than the treated seeds. But vigour index values were significantly higher in 700 gauge polythene bag than in cloth bag stored seeds. The electrical conductivity of seed leachate was also lower order in treated seeds stored in moisture vapour proof containers. The protein and oil content of stored seeds showed significant differences.

KEY WORDS: Seed treatment, Quality parameters, Storage, *Gymnema*

Seed storage is an important aspect of post harvest production technology which focuses its value in meeting the demand forecast and supply of seeds in needy time with high quality. This aspect fetches more weightage in high cost low volume seeds like seeds of medicinal plants. *Gymnema* is one of the important medicinal plants and its seed has a market value. Studies on seed production and preservation were very meagre in this crop, hence at attempt was made to evaluate the storage potential of seed with fungicide treatment and storage containers.

MATERIALS AND METHODS

The freshly harvested seeds were collected from *Gymnema sylvistre* plants maintained at coconut nursery area of Tamil Nadu Agricultural University, Coimbatore and dried to uniform moisture content of 8 per cent. The seeds were graded using air blower with 0.5 water pressure. The seeds were treated with thiram at 2 g kg^{-1} and packed in cloth bag and 700 gauge polythene bags along with untreatedseeds and stored under ambient conditions (25 ± 2°C and 90 ± 2% RH) for 6 months. The seed samples were evaluated initially and subsequently at monthly interval using the following parameters.

The germination test was conducted with 4 x 100 seeds using and sand media in a germination room maintained at 25 ± 3°C and 95 ± 3 per cent RH. At the end of 12 days the number of normal seedlings were counted and germination percentage calculated to the total number of seeds tested. The vigour index was computed from germination (%) and seedling length (cm) (Abdul-Baki and Anderson, 1973). Electrical conductivity test was conducted as per the procedure of Presley (1958) using 20 seeds in 40 ml of deionised water and soaked for 6h at room temperature. The seed leachate was collected by decanting and EC was measured and expressed as dSm^{-1}.

Oil content of seed was estimated as per the procedure described by A.O.S.A. (1945) and

Table 1. Effect of periods, treatments and containers on germination (%).

Periods (Months)	Containers								Period Mean
	CB			PB			Mean		
	T0	T1	Mean	T0	T1	Mean	T0	T1	
0	75	75	75	75	75	75	75	75	75
	(60.00)	(60.00)	(60.00)	(60.00)	(60.00)	(60.00)	(60.00)	(60.00)	(60.00)
1	68	70	69	69	72	71	68	71	70
	(55.25)	(56.95)	(56.09)	(56.17)	(57.89)	(57.03)	(55.70)	(57.42)	(56.56)
2	61	65	63	64	66	65	62	65	64
	(51.36)	(53.72)	(52.54)	(52.83)	(54.04)	(53.48)	(52.09)	(53.88)	(52.99)
3	52	62	57	56	64	60	53	63	59
	(45.86)	(52.09)	(48.97)	(48.30)	(53.28)	(50.79)	(47.08)	(52.68)	(49.88)
4	52	58	55	52	58	55	52	58	55
	(45.86)	(49.46)	(47.65)	(45.86)	(49.45)	(47.65)	(45.85)	(49.45)	(47.65)
5	48	55	52	48	55	52	48	55	52
	(43.99)	(47.58)	(45.78)	(43.99)	(47.58)	(45.86)	(43.99)	(47.65)	(45.82)
6	43	48	45	44	48	46	43	48	45
	(40.69)	(43.56)	(42.12)	(41.26)	(43.71)	(42.48)	(40.97)	(43.63)	(42.30)
Mean	57	62	59	58	62	60	57	62	
	(49.00)	(51.91)	(50.45)	(49.77)	(52.32)	(51.05)	(49.38)	(52.10)	

(Figures in parenthesis are arcsin values)

	C	T	P	CxT	CxP	TxP	PCT
SEd	0.14	0.14	0.27	-	0.38	0.38	-
CD (P=0.05)	0.28	0.28	0.54	NS	0.76	0.76	NS

expressed in per cent. The protein content of seed was estimated by weighing 1 g of seed and crushed with 2 ml of Tris HC buffer (50 mm) in a pestle and mortar. The content was centrifuged and the supernatant was collected. The protein content in the supernatant was collected. The protein content in the supernatant was estimated following the procedure developed by Lawry *et al.* (1951). The data obtained were statistically analysed as per Gomez and Gomez (1984).

RESULTS AND DISCUSSION

Germination potential of seeds differed due to periods of storage, seed treatment and containers. The germination per cent decreased with increased period of storage. The germination decrease was steady from P_0 to P_6. Polythene bag (PB) maintained higher germination (60 per cent) compared to cloth bag (CB) (59 per cent) irrespective of periods and treatments. The treated seeds (T_1) recorded higher germination (62 per cent) than untreated (T_0) seeds (57 per cent) irrespective of period and containers (Table 1). The rate of decrease was slow in PB and treated seeds compared to cloth bag and untreated seeds.

Significant difference were observed due to storage periods, containers and treatments (Table 2). The vigour index decreased with increase in the period of storage from 669 (P_0 to 349 (P_6) irrespective of treatments and containers. Seeds stored in polythene bag recorded increased vigour

Table 2. Effect of periods, treatments and containers on - vigour index

Periods (Months)	Containers								Period Mean
	CB			PB			Mean		
	T0	T1	Mean	T0	T1	Mean	T0	T1	
0	663	671	667	666	674	670	665	673	669
1	567	596	581	584	610	597	576	603	589
2	510	545	528	532	565	48	521	555	538
3	424	519	472	465	536	501	445	527	486
4	414	466	440	424	478	451	419	472	446
5	375	431	403	384	448	416	379	440	410
6	319	361	340	335	381	358	327	371	349
Mean	468	513	490	484	527	505	475	520	

	C	T	P	CxT	CxP	TxP	PCT
SEd	2.02	2.02	3.78	-	-	5.34	-
CD (P=0.05)	4.02	4.02	7.52	NS	NS	10.6	NS

(505) compared to that of cloth bag (490). The treated seeds (T_1) recorded higher vigour (520) than untreated (T_0 seeds (475).

The differences in electrical conductivity (EC) of seeds leachate were significant due to treatments, containers and periods of storage (Table 3). The EC increased gradually with increase in the storage

Table 3. Effect of periods, treatments and containers on - electrical conductivity (dSm^{-1})

Periods (Months)	Containers								Period Mean
	CB			PB			Mean		
	T0	T1	Mean	T0	T1	Mean	T0	T1	
0	0.159	0.155	0.157	0.159	0.155	0.157	0.159	0.155	0.157
1	0.177	0.167	0.172	0.172	0.162	0.167	0.174	0.164	0.169
2	0.217	0.196	0.207	0.206	0.187	0.196	0.211	0.192	0.201
3	0.277	0.257	0.267	0.266	0.247	0.256	0.271	0.252	0.262
4	0.306	0.284	0.295	0.293	0.273	0.283	0.299	0.279	0.289
5	0.369	0.345	0.357	0.353	0.333	0.343	0.361	0.339	0.349
6	0.415	0.392	0.404	0.395	0.377	0.386	0.405	0.384	0.394
Mean	0.274	0.257	0.265	0.263	0.248	0.255	0.268	0.252	

	C	T	P	CxT	CxP	TxP	PCT
SEd	0.001	0.001	0.001	-	0.001	0.001	-
CD (P=0.05)	0.001	0.001	0.002	NS	0.002	0.002	NS

Table 4. Effect of periods, treatments and containers on - protein (%)

Periods (Months)	Containers								Period Mean
	CB			PB			Mean		
	T0	T1	Mean	T0	T1	Mean	T0	T1	
0	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9	15.9
1	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7	15.7
2	13.2	13.2	13.2	13.4	13.5	13.4	13.3	13.3	13.3
3	12.4	12.4	12.4	12.7	12.7	12.7	12.5	12.5	12.5
4	11.5	11.5	11.5	11.7	11.7	11.7	11.6	11.6	11.6
5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5	9.5
6	7.0	7.1	7.1	7.3	7.3	7.3	7.2	7.2	7.2
Mean	12.2	12.2	12.2	12.2	12.3	12.3	12.3	12.3	

	C	T	P	CxT	CxP	TxP	PCT
SEd	0.004	-	0.007	0.006	0.011	0.011	-
CD (P=0.05)	0.008	NS	0.015	0.011	0.021	0.021	NS

period form 0.157 (P_0) to 0.394 dsm^{-1} (P_0). The container PB recorded lower EC (0.255 dSm^{-1}) than CB (0.265 dSm^{-1}). Between the treatment T_1 recorded lower EC (0.252 dSm^{-1}) than T_0 (0.268 dSm^{-1}).

The protein content of seeds showed significant differences due to containers, periods of storage and their interactions (Table 4). The initial protein content of 15.9 per cent decreased to 7.2 per cent within a period of six months, irrespective of containers and treatments. Between the container PB maintained higher protein (12.3%) than CB (12.2%) over periods of storage.

The oil content of stored seeds varied significantly due to treatments and periods of storage (Table 5). The initial oil content of 17.6 per cent got reduced to 16.8 per cent over a period of six months. Between the treatments, T_1 (17.2 per cent) maintained higher oil content compared to T_0 (17.1 per cent) over a period of 6 months.

In the present study, with the increase in the storage period, the germination of the seeds decreased. The same trend was observed in vigour index also. Bewley and Black (1982) in *D. composita* and Kalavathi (1996) in *Cassia* and *Hibicus subdarifa* reported similar reduction in germination and vigour of the seeds over periods of storage. The loss of membrane integrity and degradation of food materials in the seed is the possible reason for decreased germination and vigour.

Between the treated and untreated seeds, the treated seeds maintained higher germination and vigour over periods of storage and containers. This is in conformity with the findings of Suneeta *et al.* (1988) in legumes.

The prevention of entry of moisture is the reason for maintaining higher viability and vigour of the seeds storaged in 700 guage polythene bag as reported by Justice and Bass (1979). Agong (1993) in *Solanum nigrum* reported similar superiority of moisture vapour proof container. In the present study also the seeds stored in 700 gauge polythene bag maintained higher viability over periods of storage.

The electrical conductivity increased with increase in the periods of storage irrespective of treatments and containers. The increase was less in treated seeds than untreated seeds. The oil and protein content decreased with increase in the

Table 5. Effect of periods, treatments and containers on - oil content (%)

Periods (Months)	Containers								Period Mean
	CB			PB			Mean		
	T0	T1	Mean	T0	T1	Mean	T0	T1	
0	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6	17.6
1	17.3	17.4	17.4	17.3	17.4	17.4	17.3	17.4	17.4
2	17.3	17.4	17.4	17.3	17.4	17.4	17.3	17.4	17.4
3	17.1	17.1	17.1	17.1	17.2	17.1	17.1	17.1	17.1
4	16.9	17.1	17.0	16.9	17.1	17.0	16.9	17.1	17.0
5	16.9	17.0	17.0	16.9	17.0	17.0	16.9	17.0	17.0
6	16.7	16.8	16.8	16.8	16.9	16.9	16.8	16.8	16.8
Mean	17.1	17.2	17.2	17.1	17.2	17.2	17.1	17.2	

	C	T	P	CxT	CxP	TxP	PCT
SEd	-	0.018	0.034	-	-	-	-
CD (P=0.05)	NS	0.036	0.067	NS	NS	NS	NS

storage period irrespective of treatment and containers. Degradation of food materials and membrane integrity was the cause for the increased EC and decreased protein and contents.

The study revealed that the storability of *Gymnema sylvistre* seeds can be improved by treating with thiram at 2g kg^{-1} of seeds and storing them in 700 guage polythene bag.

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