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Influence of Pre-storage Treatments on Storability of Hedge Lucerne (*Desmanthus virgatus*) cv. TNDV 1 Seeds

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Seed samples of hedge lucerne scarified with commercial sulphuric acid @ 200 ml kg^{-1} of seed for 15 min and dried to seven per cent moisture content.Treated with (i) halogen mixture @ 3 g kg^{-1} of seed, (ii) bavistin @ 2.5 g kg^{-1} of seed, (iii) carbaryl @ 2 g kg^{-1} of seed (iv) neem oil @ 1: 100 (w/v) and (v) diflubenzuron @ 2 ppm and were packed in cloth bag along with untreated seed samples under ambient conditions for a period of 12 months. The seed samples were tested at trimonthly intervals for moisture content, germination, seedling vigour, electrical conductivity and dehydrogenase enzyme activity. The results revealed that treating the seeds with diflubenzuron maintained the maximum germination of 74 per cent after 12 months of storage followed by halogen (70 %) and bavistin (70 %). Neem oil was found to affect the seed viability.

Key words: Hedge Lucerne, seed storage, seed viability, seed germination, seedling vigour.

One of the major constraints encountered in seed production is the lack of technology to carry over the seeds until the next planting season. Of the several factors which affect the seed quality in storage is the environment favourable for insect multiplication and other seed deterioration changes. Therefore to find out an effective method which can control the seed deterioration changes and insect activity besides providing an environment for maintaining the viability and vigour of seeds, the studies were under taken.

Materials and Methods

From a seed crop of hedge lucerne cv TNDV 1, fully mature pods were collected, dried and threshed. The bulk seed was pre-cleaned and those retained in BSS 14 X 14 sieve were dried to 7 per cent moisture content. To the seed samples the following treatments were given *viz.,* (i) halogen mixture @ 3 g kg^{-1} of seed (T_1), (ii) bavistin @ 2.5 g kg^{-1} of seed (T_2),(iii) carbaryl @ 2 g kg^{-1} of seed (T_3), (iv) neem oil 1: 100 (w/v) (T_4) and dilubenzuron @ 2 ppm (8 mg WP kg^{-1} of seed) (T_5).The treated samples were kept in storage under ambient conditions (RH: maximum 85.93 %, minimum 54.66 % ; temperature : maximum 31.78°C minimum 20.68°C) for 12 months along with untreated seed (T_6) after packing in cloth bag. At each trimonthly intervals (P_0, P_3, P_6, P_9 and P_{12}), samples were tested for (i) moisture content (ISTA, 1999), (ii) germination (ISTA, 1999) and drymatter production of seedlings. The vigour index of seedlings (Abdul-Baki and Anderson, 1973) was also evaluated. The seed samples were also tested for the electrical conductivity and dehydrogenase activity. The percentage values were transformed into arcsine values for conducting the statistical analysis adopting Factorial Completely Randomized Design as per Panse and Sukahtme (1957).

Results and Discussion

The longevity of seed is altered primarily by temperature moisture content and oxygen pressure (Justice and Bass, 1961). Of these, seed moisture is the most important factor that decides the shelf life of the seed (Roberts, 1972). Agrawal (1995) reported that moisture content of

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Table 1. Effect of seed treatments and period of storage on moisture content (%) and germination (%) of *Desmanthus virgatus*

Seed Treatments (T)	Period of storage (P)											
	Moisture content (%)						Germination (%)					
	P_0	P_3	P_6	P_9	P_{12}	Mean	P_0	P_3	P_6	P_9	P_{12}	Mean
T_1	7.4 (15.79)	8.1 (16.54)	8.5 (16.95)	8.9 (17.32)	9.3 (17.76)	8.4 (16.86)	94 (76.62)	88 (69.73)	82 (64.93)	76 (60.67)	70 (56.80)	82 (64.93)
T_2	7.4 (15.79)	8.2 (16.64)	8.6 (17.00)	8.9 (17.32)	9.3 (17.76)	8.5 (16.95)	94 (76.62)	88 (69.73)	80 (63.44)	74 (59.36)	70 (56.80)	81 (64.98)
T_3	7.4 (15.79)	8.2 (16.64)	8.7 (17.10)	9.2 (17.64)	9.5 (17.81)	8.6 (17.00)	94 (76.62)	86 (68.08)	78 (62.05)	70 (56.80)	66 (54.34)	79 (63.46)
T_4	7.4 (15.79)	8.1 (16.54)	8.3 (15.74)	8.8 (17.26)	9.1 (17.46)	8.3 (16.74)	94 (76.62)	88 (69.73)	82 (64.93)	74 (59.36)	68 (55.55)	81 (64.98)
T_5	7.4 (15.79)	8.0 (16.43)	8.3 (16.74)	8.7 (17.10)	9.0 (17.46)	8.3 (16.74)	94 (76.62)	88 (69.73)	84 (68.08)	78 (64.93)	74 (59.36)	84 (68.08)
T_6	7.4 (15.79)	8.1 (16.54)	8.5 (16.95)	9.0 (17.46)	9.3 (17.76)	8.5 (16.95)	94 (76.62)	86 (68.08)	78 (62.05)	70 (56.80)	66 (54.34)	81 (64.98)
Mean	7.4 (15.79)	8.1 (16.54)	8.4 (16.86)	8.9 (17.32)	9.2 (17.64)		94 (76.62)	87 (69.78)	81 (64.98)	74 (59.36)	69 (57.49)	
	T	P	TXP				T	P	TXP			
CD(P=0.05)	0.066	0.060	0.147				1.786	1.956	NS			

seed reached equilibrium with relative humidity of the atmosphere stored in cloth bag at a faster rate. The increase in moisture content of seed was from 7.4 to 9.2 per cent. The slight increase in the moisture content may be due to the accumulation of metabolic moisture within the seed (Justice and Bass, 1978). The seeds treated with neem oil gave 9.1 per cent of seed moisture while untreated control gave 9.3 per cent at the end of the storage period may be

Table 2. Effect of seed treatments and period of storage on root length (cm) and shoot length (cm) of *Desmanthus virgatus*

Seed Treatments (T)	Period of storage (P)											
	Root length (cm)						Shoot length (cm)					
	P_0	P_3	P_6	P_9	P_{12}	Mean	P_0	P_3	P_6	P_9	P_{12}	Mean
T_1	3.7	3.4	3.0	2.8	2.7	3.1	3.5	3.2	2.9	2.6	2.5	2.9
T_2	3.7	3.4	2.9	2.8	2.7	3.0	3.5	3.2	2.9	2.5	2.4	2.9
T_3	3.7	3.3	2.7	2.6	2.5	3.2	3.5	3.1	2.8	2.4	2.3	2.8
T_4	3.7	3.4	3.2	3.0	2.8	3.3	3.5	3.2	2.9	2.7	2.4	2.9
T_5	3.7	3.5	3.3	3.1	3.0	3.2	3.5	3.4	3.2	3.0	2.9	3.2
T_6	3.7	3.5	3.2	3.0	2.8	3.1	3.5	3.3	3.1	2.8	2.7	3.1
Mean	3.7	3.4	3.0	2.9	2.7		3.5	3.2	2.9	2.6	2.5	
	T	P	TXP				T	P	TXP			
CD(P=0.05)	0.069	0.063	0.154				0.055	0.050	0.124			

due to the oil acting as a barrier for transmission of moisture. Similar results were reported by Parameswari (1999) in tamarind.

Abdalla and Roberts (1969) reported that the percentage of seed viability is an excellent indicator of growth potential of the surviving seed irrespective of the factors responsible for the viability of seeds. The decline in germination from 94 to 69 per cent with increase in storage period was evident in the present study (Table.1) which may be either due to the negative relationship between the moisture content and germinability due to the biochemical reactions (Abdalla and Roberts, 1969) .Among the treatments, seeds treated with diflubenzuron @ 2 ppm recorded 74 per cent germination which was followed by halogen mixture (70 %) and bavistin (70 %) treated seeds at the end of the storage period, while the untreated seeds registered only 66 per cent. The lower germination (68 %) of seeds treated with neem oil (Mital, 1971) may be due to the low thermal conductivity property of the dissipation into the surrounding atmosphere and considerable heat evolved within the seed due to its respiratory activity with microorganisms (Harrington, 1972).

However, Raja (2000) observed no impairment in germination when leguminous seed treated with oil. Seeds treated with diflubenzuron recorded higher germination than other treatments. Similarly insecticide treatment would maintain the germinability result was reported by Parameswari (1999) and Natarajan (2000) recommended carbaryl treatment for preventing the insect infestation.

The drymatter production by the germinating seedlings is the manifestation of the physiological efficiency dependent on vigour (Heydecker, 1972). In the present study, vigour as measured through seedling length (Table 2) drymatter production and vigour index (Table 3) decreased with increasing the storage which was in uniformity with the findings of Vanangamudi and Palanisamy (1989). Seeds treated with diflubenzuron recorded the highest seedling length, drymatter production and vigour index which was followed by halogen treated seeds.

The electrical conductivity of seeds increases with storage period and exerts a negative association with seed quality characters. Diflubenzuron recorded less electrical conductivity

Table 3. Effect of seed treatments and period of storage on drymatter production (mg seedlings ^{10})and vigour index of *Desmanthus virgatus*

Seed Treatments (T)	Period of storage (P)											
	Drymatter production (mg seedlings^{-10})						Vigour index					
	P_0	P_3	P_6	P_9	P_{12}	Mean	P_0	P_3	P_6	P_9	P_{12}	Mean
T_1	26.5	23.0	21.0	20.5	19.0	22.0	672	577	480	410	361	500
T_2	26.5	22.5	20.5	20.0	18.5	21.6	673	577	456	385	354	489
T_3	26.5	22.0	19.5	19.0	18.0	21.0	682	551	421	333	314	460
T_4	26.5	23.5	22.0	20.0	19.5	22.4	658	577	496	418	350	500
T_5	26.5	24.0	23.0	21.5	20.5	23.1	672	612	555	500	453	558
T_6	26.5	23.0	20.0	18.0	17.0	20.6	673	594	521	453	404	529
Mean	26.5	23.0	21.0	19.9	18.8		658	577	488	416	372	
	T	P	TXP				T	P	TXP			
CD(P=0.05)	0.069	0.063	0.154				16.993	15.513	37.998			

Table 4. Effect of seed treatments and period of storage on electrical conductivity (dSm^{-1}) and dehydrogenase activity of *Desmanthus virgatus*

Seed Treatments (T)	Period of storage (P)											
	Electrical conductivity (dSm^{-1})						Dehydrogenase activity					
	P_0	P_3	P_6	P_9	P_{12}	Mean	P_0	P_3	P_6	P_9	P_{12}	Mean
T_1	0.063	0.079	0.090	0.101	0.106	0.088	0.098	0.085	0.071	0.055	0.040	0.070
T_2	0.063	0.080	0.091	0.103	0.107	0.089	0.098	0.084	0.071	0.056	0.041	0.070
T_3	0.063	0-084	0.102	0.111	0.121	0.096	0.098	0.083	0.063	0.045	0.030	0.064
T_4	0.063	0-076	0.087	0.094	0.099	0.084	0.098	0.087	0.075	0.060	0.046	0.073
T_5	0.063	0.067	0.077	0-.084	0.092	0.077	0.098	0.090	0.079	0.065	0.050	0.076
T_6	0.063	0-098	0.110	0.123	0.131	0.105	0.098	0.083	0.066	0.050	0.035	0.066
Mean	0.063	0.081	0.093	0.102	0.109		0.098	0.085	0.071	0.055	0.045	
	T	P	TXP				T	P	TXP			
CD(P=0.05)	0.002	0.002	0.004				0.001	0.001	0.002			

at 12 months of storage (Table 4) due to their action on preservation of membrane integrity even at advanced storage period. Similar results were recorded by Parameswari (1999) and Natarajan (2000). The dehydrogenase enzyme is the one of the biochemical measure of seed quality and it indicated the positive influence with diflurobenzurher values for enzyme activity on due to its high value after 12 months of seed preservation.

This study concluded that *Desmanthus virgatus* scarified seeds treated with diflurobenzuron @ 2 ppm (8 mg WP kg^{-1} of seed) exhibited better seed quality.

Reference

Abdalla, F.H. and Roberts, E.H. 1969. The effect of temperature and moisture on the induction of genetic changes in seeds of barley, broad bean and peas during storage. *Ann. Bot.,* **10:** 31-34.

Abdul-Baki, A.A. and Anderson, J.D. 1973. Vigour determination in soybean seed by multiple criteria. *Crop Sci.,* **13:** 630-633.

Agrawal, R.L. 1995. Seed Technology. *Oxford and IBH Publishing Co. Pvt. Ltd.,* New Delhi.

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Harrington, J.F. 1972. Seed storage and longevity. In: Seed Biology III (ed.) T.T.Kozlowski, Academic press, New york and London, P. 145-245.

Heydecker, W. 1972. Vigour. In: Viability of seeds (ed. E.H. Roberts), Chapman and Hall, London, P. 209-252.

ISTA, 1999. International Rules for Seed Testing. *Seed Sci. Technol.*, **27:** 30-35.

Justice, O.L. and Bass, L.N. 1978. Principles and Practices of Seed Storage. Agricultural Hand Book No. 506. SEA Publication, USDA, Washington, D.C, P. 289.

Natarajan, K. 2000. Seed technological studies in marigold (*Tagetus erecta* L) cv African Giant. M.Sc. (Ag) Thesis, Tamil Nadu Agricultural University, Coimbatore.

Panse, V.S. and Sukhatme, P.V. 1995. Statistical Methods for Agricultural Research Workers. ICAR, New Delhi.

Parameswari, K. 1999. Seed technological studies in tamarind (*Tamarindus indica* Linn). M.Sc (Ag) Thesis, Tamil Nadu Agricultural University, Coimbatore.

Raja, K. 2000. Storage studies for bruchid management and characteristics in greengram cv CO 6 (*Vigna radiata* L). M. Sc (Ag) Thesis, Tamil Nadu Agricultural University, Coimbatore.

Roberts, E.H. 1972. Loss of viability and crop yields. In: Viability of seeds (ed.) E.H. Roberts, Chapman and Hall Ltd., London, P. 313.

Vanangamudi, K. and Palanisamy, V. 1989. Viability of illupai (*Maduha longifolia*) seeds. *Seed Res.,* **17:** 186-187.