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EVALUATING THE STORABILITY OF CARYOPSES OF *CENCHRUS GLAUCUS* CV. CO1

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ABSTRACT

Germination of caryopses of *Cenchrus glaucus* was assessed under storage and germination improvement was noticed up to two months of storage due to the dormant nature of the species, which decreased gradually in the later periods. In storage, the caryopses stored in cloth bag absorbed more moisture which was parallel to the moisture fluctuations of the surrounding storage environment which also affects the storage behaviour of seeds. Halogen mixture treated seeds stored better in polythene bags preserved germination and vigour of seeds.

Key words: Caryopses, *Cenchrus*, Storage.

INTRODUCTION

Seed dormancy is the natural phenomenon for the survival of grasses in their undisturbed ecosystem. The seed dormancy in forage grasses prevents successful establishment of a new pastures. *Cenchrus* is an apomicitic grass species, established from both seed and rooted slips.

In *Cenchrus glaucus* also seed germination itself is a problem and the fresh fluffs hinder the germination if sown as such. Lahiri and Kharabanda (1963) reported that fresh fluffs of both *Cenchrus* and *Lasirus* possessed inhibitors in the husk which prevents germination of fresh fluffs. More over handling with the fluffs during sowing or transport poses problem due its bulkiness and empty glumes. Deglumed seeds recorded ready germination than spikelets as such in *Cenchrus* sp. ((Parihar *et al*., 1984b; Vijendradas, 1990; Venter and Rethman, 1992). But storability of the deglumed/ caryopses is not well documented. Hence an attempt was made to assess the storability of caryopses given with halogen treatment stored under ambient conditions.

MATERIALS AND METHODS

One month old fluffs of *Cenchrus glaucus* (Blou buffel) cv. CO1 were treated with sulphuric acid (purity 95%) @ 500 ml kg^{-1} of seeds for 15min. and the caryopses were extracted after thorough washings for 4-5times. Then caryopses were dried back to 10 per cent moisture and cleaned by blowing the seeds in the air blower at 0.55 mg pressure for 15 min and used for the study. Seeds were graded also with BSS 24 x 24 wire mesh sieve. Both treated and untreated seeds were packed in cloth or 700 gauge polythene bag (heat sealed) and stored under ambient conditions.

Treatments

T_1 - Seeds without any treatment
T_2 - Seeds treated with halogen mixture
C_1 - Stored in cloth bag
C_2 - Stored in polythene bag

The experiment was conducted with a CRD design in factorial concept with three factors *viz*., period of storage, containers and seed treatment with four replications. The seeds were tested initially and subsequently at bimonthly intervals designated as P_0, P_2, P_4, P_6, P_8-, P_{10} and P_{12} to assess the extent of loss in vigour and viability of seeds. The seeds were evaluated for moisture content (%), germination (%), root and shoot length (cm), vigour index values (Abdul-Baki and Anderson, 1973) and electrical conductivity of seed leachate (Presley, 1958). Moisture estimation was done by hot air oven method at 105 ± 2°C for 16h. Germination test was conducted on top of the paper media at 25°C and 90 ± 5% RH with the germination period of 14 days (Anonymous, 1990). Data were analysed following Snedecor and Cochran (1967).

RESULTS AND DISCUSSION

Germination and vigour of caryopses increased initially due to the dormancy nature of the species but it decreased gradually in further storage where the effect of treatments and containers has its own effect (Fig. 1 & 2).

Seed moisture has greater influence on germination of caryopses under storage. The moisture content of caryopses stored in cloth bag showed gradual increase during monsoon months (August-December), which again reduced during summer. Changes in seed moisture during storage were parallel to the changes in relative humidity of air in the ambient condition. The relative humidity during monsoon months was high compared to summer months. The effect was low in poly bags. Moisture content increased from 10.05 per cent (P_0) to 10.8 per cent at P_6 and P_8 which decreased to 10.24 per cent at P_{12}. (Fig.1.)

Germination of caryopses was increased by 25 per cent reaching 79 per cent during first two months of storage and then decreased gradually in the later periods to the minimum of ten per cent at the end of the storage period (Table 1). The initial increase in the germination per cent during first two months of storage was due to the release of dormancy which lies in the caryopses rather than the spiklet structures. Butler (1985) also opined that dormancy mechanisms of *C. ciliaris* lies within the caryopses rather than in the associated structures of fluff. Pandeya and Pathak (1978) recorded the presence of phenolics particularly anthocyanins in fresh glumes and other phenolics in fresh seeds of *Cenchrus ciliaris*. Das (1990) also recorded 23.7, 61.2 and 69.0 percentages of germination with deglumed seeds of *C. glaucus* after 1,2 and 10months of storage respectively.

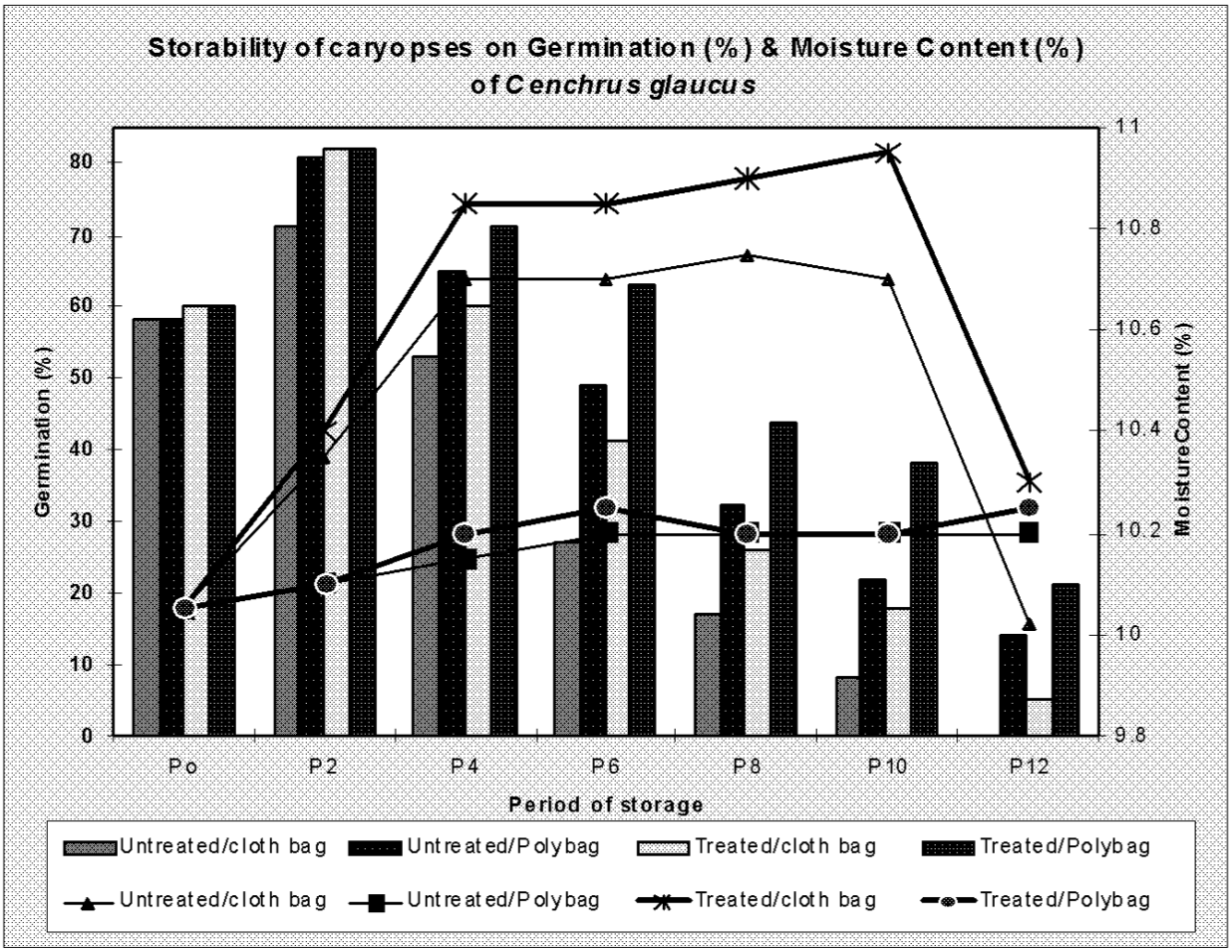

FIG.1 Effect of storage treatments on Germination and moisture content of caryopses of *Cenchrus glaucus*.

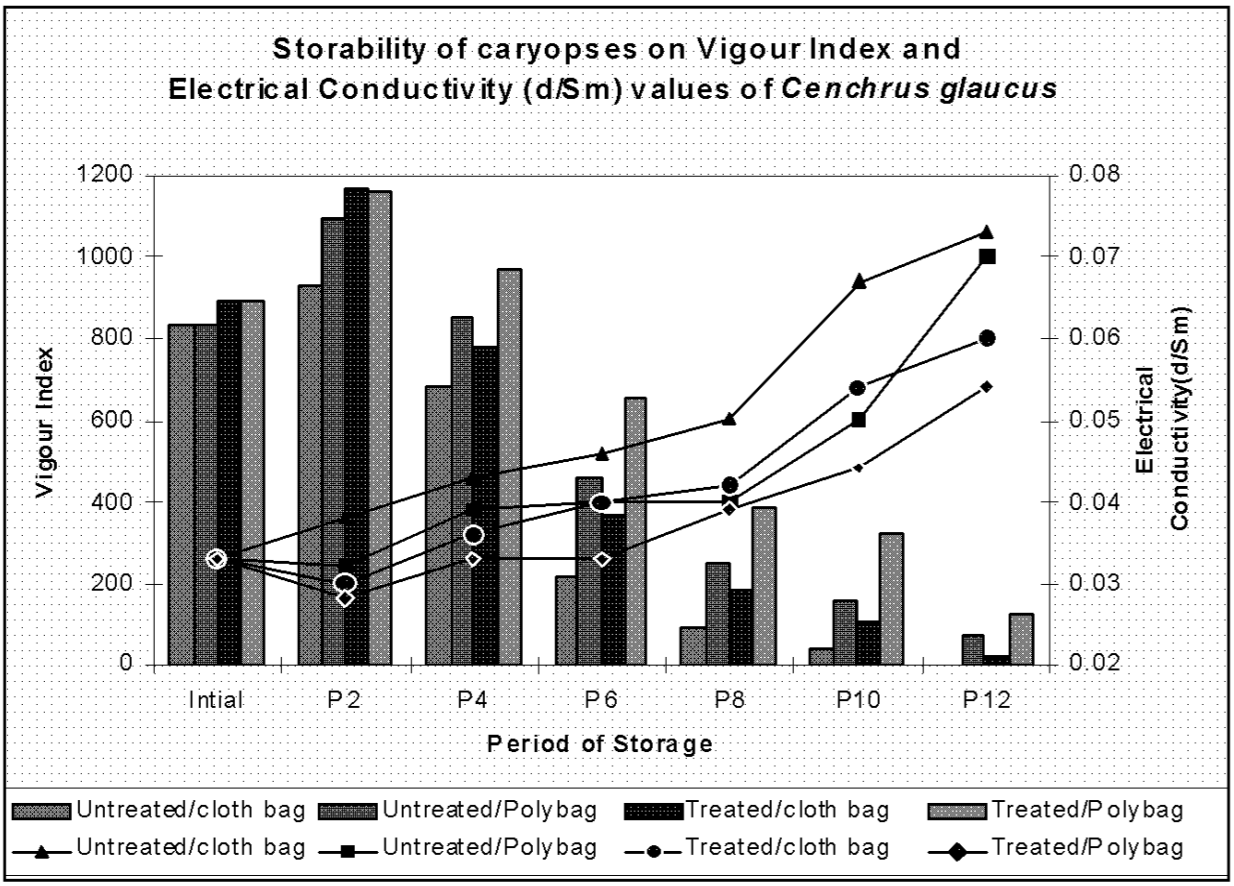

FIG 2. Effect of storage treatments on vigour status of seeds of *Cenchrus*.

The loss in germination was 87.3 per cent compared to the initial values. The tiny nature of true seeds associated with little protection and possibly because of the invisible injury caused during acid defluffing would have made them vulnerable for faster deterioration in storage. Similar results with the loss of viability of true seeds were noticed by several authors in grass seeds (Parihar *et al.* 1984a; Narayanasamy, 1994; White *et al.* 1999). The loss of viability was more (100 per cent) with untreated seeds stored in cloth bags than halogen treated seeds in polythene bag containers. (Fig.1) The possible effect of treatment was consistently associated with reduced production of volatile aldehydes, which are presumably the product of lipid peroxidation (Wilson and McDonald, 1986). The halogens act at the molecular level and stabilizes the C=C double bond in the unsaturated fatty acids of the lipo protein moiety and making less susceptible to lipid peroxidation and free radical reaction (Basu, 1994). Seedling length both root and shoot length and vigour index of the stored seeds showed steady decline in vigour from the beginning of storage indicating the vigour loss of the true seeds which precedes the viability loss. The decrease was more in cloth bags compared to poly bags and likewise with untreated seeds.

The seeds stored in 700 gauge polythene bags sustained minimum deterioration in seedling length, vigour and membrane integrity as reflected through electrical conductivity (Fig.2) when compared to the seeds stored in the cloth bag. The 700 gauge polythene bag formed an effective barrier to moisture, vapour and gas and it would have also create oxygen tension and increase CO_2 accumulation inside the bag which would slowed down the respiration rate (Justice and Bass, 1978). Peel and Prondroff (1970) recommended sealed storage for *Panicum maximum* than open storage to maintain vigour and viability of seeds.

TABLE 1. Effect of treatments, containers and periods of storage on true seed germination (%) in *C. glaucus* cv. CO 1

Period of storage / treatments	T1			T2					Grand Mean
	C_1	C_2	M	C_1	C_2	M	C_1	C_2	
P_0	58 (49.61)	58 (49.61)	58 (49.61)	60 (50.77)	60 (50.77)	60 (50.77)	59 (50.19)	59 (50.18)	59 (50.19)
P_2	71 (57.45)	81 (64.18)	76 (60.80)	82 (64.93)	82 (64.93)	82 (64.93)	77 (61.18)	82 (64.55)	79 (62.87)
P_4	53 (46.72)	65 (53.73)	59 (50.23)	60 (50.77)	71 (57.42)	66 (54.98v	57 (48.75)	68 (55.58)	62 (52.16)
P_6	27 (31.30)	49 (44.43)	38 (37.87)	41 (39.82)	63 (52.54)	52 (46.18)	34 (35.56)	56 (48.48)	45 (42.02)
P_8	17 (24.27)	32 (34.44)	25 (29.36)	26 (3.64)	44 (41.56)	35 (36.10)	22 (27.46)	38 (38.00)	30 (32.73)
P_{10}	8 (16.43)	22 (27.95)	15 (22.19)	18 (25.07)	38 (38.05)	28 (31.56)	13 (20.75)	30 (33.00)	22 (26.88)
P_{12}	0 (0.383)	14 (21.92)	7 (11.15)	5 (12.86)	21 (27.27)	13 (20.66)	3 (6.62)	18 (24.60)	10 (15.61)
M	33 (32.31)	46 (42.32)	40 (37.32)	42 (39.27)	54 (47.51)	48 (43.39)	38 (35.79)	50 (44.91)	

	P	T	C	PT	TC	PC	PTC
SE d	0.781	0.418	0.418	1.105	0.591	1.051	1.563
CD ($P \leq 0.05$)	1.601	0.856	0.856	2.264	1.210	2.264	3.201

Figures in parentheses are arc sine values. Analysis was done with the transformed values.

TABLE 2. Effect of treatments, containers and periods of storage on root & shoot length (cm) of seedlings of caryopses in *C. glaucus* cv. CO1

Period of storage / treatments	T1			T2			C_1	C_2	Grand Mean
	C_1	C_2	M	C_1	C_2	M			
				Root Length (Cm)					
P_0	8.11	8.11	8.11	8.27	8.27	8.27	8.19	8.19	8.19
P_2	7.62	7.68	7.65	8.18	8.07	8.13	7.90	7.88	7.89
P_4	7.43	7.58	7.51	7.64	7.93	7.78	7.54	7.75	7.64
P_6	3.45	4.65	4.05	4.26	5.22	4.74	3.86	4.94	4.40
P_8	2.21	3.34	2.78	3.10	4.05	3.58	2.66	3.70	3.18
P_{10}	1.93	3.16	2.54	2.88	3.83	3.36	2.40	3.50	2.95
P_{12}	0.00	2.68	1.34	1.22	2.95	2.08	0.61	2.81	1.71
M	4.39	5.31	4.85	5.08	5.76	5.42	4.75	5.54	
	P	T	C	PT	TC	PC	PTC		
SE d	0.163	0.087	0.087	0.231	0.123	0.023	0.326		
CD ($P \leq 0.05$)	0.334	0.179	0.179	NS	NS	0.472	NS		
				Shoot Length (Cm)					
P_0	6.26	6.26	6.26	6.53	6.53	6.53	6.40	6.40	6.40
P_2	5.50	5.80	5.65	6.08	6.11	6.09	5.79	5.96	5.87
P_4	5.39	5.57	5.48	5.33	5.76	5.54	5.36	5.66	5.51
P_6	4.49	4.73	4.61	4.72	5.20	4.96	4.60	4.97	4.78
P_8	3.18	4.44	3.81	3.80	4.78	4.29	3.49	4.61	4.05
P_{10}	2.45	3.95	3.20	3.06	4.61	3.83	2.76	4.28	3.52
P_{12}	0.00	2.65	1.32	2.34	3.05	2.70	1.17	2.85	2.01
M	3.89	4.77	4.33	4.55	5.15	4.85	4.22	4.96	
	P	T	C	PT	TC	PC	PTC		
SE d	0.154	0.082	0.082	0.217	0.217	0.116	0.307		
CD ($P \leq 0.05$)	0.315	0.168	0.168	0.445	0.445	NS	NS		

Thus it was evident from the study that the caryopses of *Cenchrus glaucus* could be stored in polybags after treatment with halogen mixture @3g kg^{-1} of seed for better storage.

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