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Genotypic variation in seed germination in *Stylosanthes seabrana*

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Abstract

Genotypic variability was recorded with respect to the germination and vigour index among the genotypes of *S. seabrana*, maximum germination was recorded in the seeds scarified through coarse sand paper followed by concentrate H_2SO_4 (for 5 minutes) treatment. No germination was recorded in the seeds up to two months of storage but it improved to 22% after eight months of storage. Comparing the genotypic difference maximum germination was recorded in IG 370 (95%) followed by IG 352 (94%), CPI 408403 and minimum in CPI 408405 (75%) after eight months of seed storage. In some genotypes the germination significantly improved by scarification seed treatments even after two months of seed storage indicating that the hard seed coat is the major cause to induce the dormancy in stylo seeds. Vigour index was also improved by these dormancy breaking treatments and more significantly enhanced by the scarification treatments. It is recommended that the seed scarification through coarse sand paper is the most easiest and economic dormancy breaking method for better germination in *S. seabrana*.

Keywords : Dormancy, Genotypes, Germination, *Stylosanthes seabrana*, Vigour index

Introduction

The genus *Stylosanthes* is the most important source of pasture legumes for tropical and subtropical environments in India. Introduced in late sixties in India it have gained a prominent status in rangeland development programme; it is also extensively utilized in pastoral, agro-pastoral and silivipastural systems for animal production due to its ability to restore soil fertility improve soil physical properties and provide permanent cover, it is playing a vital role in the development of wasteland in the country. For Indian conditions five species *viz., S. guianensis, S. hamata, S. humilis, S. scabra* and *S. viscosa* have been found suitable (Ramesh *et al.* 1997). Out of these *S. hamata* has been found most desirable and adoptive to wide ecological amplitude. The Introduction of new species *S. seabrana* in India from Australia and Ethiopia in 1999 which shown great promise in terms of both establishment and ability to perform better over other species in semi-arid tropical environmental conditions. The genotype of S. seabrana produces high proportion of hard seeds. Germination of untreated seeds is therefore, generally very low. Seed treatment viz. mechanical scarification and sulfuric acid may improve seed germination. Therefore, the twenty promising genotypes of *Stylosanthes seabrana* have been studied for their seed germination and vigour index after two and eight months of storage at room temperature.

Materials and Methods

The mature seeds of different genotypes of *Stylosanthes seabrana* (viz., IG 325,IG 339, IG 346, IG 352, IG 355, IG 369, IG 370, IG 384, IG 387, IG 391, IG 393, CPI 2523, CPI 2534, CPI 2539, CPI 408403, CPI 408404, CPI 408405, CPI 104710, CPI 105546B, CPI 110372) were harvested during November-December, 2005 and stored in polythene bags (700 gauge) at room temperature at Indian Grassland and Fodder Research Institute, Jhansi, India (25.27° N, 75.35° E and at altitude of 275 msl). The germination study of seeds was carried out after two and eight months of storage. The dormancy breaking seed treatments of concentrated H_2SO_4 for 4-5 minutes a[illegible]en washing in tap water for 15 min. and scarification of seed through coarse sand paper were imposed. For germination 25 uniform sized and healthy seeds of different genotypes were placed in sterilized petridishes lined with double layer Whatman filter paper moistened with distilled water (control). Three replications for each treatment were taken. The experiment was conducted in the seed germinator at 30°C and 75% relative humidity. The emergence of radical was considered as the criteria for seed germination. Observations on seed germination were recorded on alternate days upto completion of

Table 1 : Germination (%) and Vigour Index (VI) of different genotypes of *S. seabrana* under various treatments and storage period

Genotypes	Germination (%)						Vigour Index (VI)					
	After two months of storage			After eight months of storage			After two months of storage			After eight months of storage		
	Control	H_2SO_4	Scarification	Control	H_2SO_4	Scarification	Control	H_2SO_4	Scarification	Control	H_2SO_4	Scarification
IG 325	0	67	77	30	75	90	0	339.0	359	90	503	720
IG 339	0	43	70	20	55	86	0	261.0	418	64	297	499
IG 346	0	43	45	18	55	85	0	232	196	45	308	561
IG 352	0	67	77	28	70	94	0	333	403	67	420	677
IG 355	0	30	63	18	60	84	0	159	291	58	396	672
IG 369	0.33	30	57	30	55	92	0	156	281	108	363	718
IG 370	0	73	93	30	80	95	0	354	491	81	448	646
IG 384	0	27	73	10	40	80	0	148	417	31	228	560
IG 387	0	30	70	20	50	86	0	165	348	48	300	585
IG 391	0	50	60	25	70	92	0	228	181	58	364	552
IG 393	0	47	47	25	56	82	0	283	272	88	308	508
CPI 2523	0	33	63	16	66	90	0	202	381	62	370	693
CPI 2534	0	77	93	22	50	93	0	330	474	84	300	642
CPI 2539	0.33	50	80	20	55	88	0	311	438	144	319	625
CPI 408403	0	60	86	28	78	94	0	287	410	65	406	583
CPI 408404	0	46	83	22	55	92	0	272	424	73	341	754
CPI 408405	0	33	56	12	45	75	0	165	288	30	238	458
CPI 104710	0	40	90	20	62	92	0	192	491	84	378	754
CPI 105546B	0	40	73	25	75	88	0	214	410	127	487	634
CPI 110372	0	40	53	16	70	80	0	268	310	43	350	424
Average	0.33	46	70	22	61	88	0	245	364	72	356	613

germination. The growth of three uniform seedlings from each treatment was recorded at the end of experiment by measuring the seedling length. The vigour index was calculated by multiplying germination with seedling elongation.

Results and Discussion

In control no germination was recorded after two months of seed storage whereas it improved to 22% after eight months of storage (Table 1). The germination percentage ranged from 12-30% in different genotypes. In contrast, average 70% and 88% germination were achieved by seed scarification treatments after two and eight months of storage respectively. Maximum germination was recorded in IG 370 (95%) followed by IG 352 (94%), CPI 408403 and minimum in CPI 408405 (75%) after eight months of seed storage through seed scarification. Germination significantly improved up to 93% (IG 370) by scarification seed treatment even after two months of seed storage indicating that the hard seed coat is the major cause to induce the dormancy. Seed treatment with concentrate H_2SO_4 (5 minutes) and then washing with tap water for 15 minutes has also significantly improved the seed germination to about 46% and 61% after two and eight months of seed storage. Nan *et al.* (1998) reported that sulfuric acid for 6 minutes is the most effective treatment for reducing fungal infection without reducing seed viability in *Stylosanthes hamata* and *S. scabra*. Sulphuric acid has also been found for breaking hard coat seed dormancy in other plant species (Airi *et al.*, 1998 and Li *et al.*,1999). However, in some of the genotypes 70 to 80% germination was achieved. The results revealed that germination of stylo seeds can be improved by the treatment of concentrated H_2SO_4 but it is difficult to be used in practice by the common farmers.

The vigour index was recorded by multiplying germination percentage with seedling length. As there was no germination in control after two months of storage therefore, no vigour index was calculated whereas it improved to 73 after eight months of storage (Table1). Highest value of vigour index was calculated in the scarification treatment as compared to H_2SO_4 seed treatment. The vigour index was recorded to be 364 in scarification and 245 in H_2SO_4 seed treatment after two months of storage which further improved to 356 (H_2SO_4 seed treatment) and 611 (scarification) after eight months of seed storage. The significant improvement in the vigour index after eight months of storage indicates that stylo seed may also require after ripening period. The scarification seed treatment has improved the vigour index over the concentrated H_2SO_4 seed treatment. The

germination percentage is linearly and significantly correlated the vigour index (r = .8983). The genotypic variability exists with respect to the seed germination and vigour index in different genotypes of *S. seabrana*. It is recommended that the seed scarification through coarse sand paper is the most easiest, feasible and economical dormancy breaking method for better germination in *S. seabrana*.

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