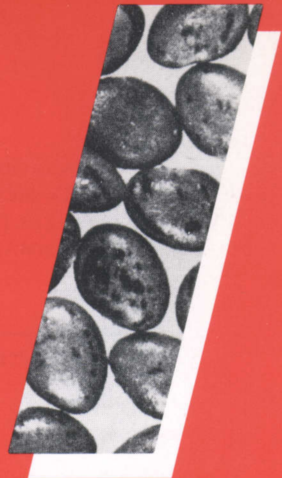
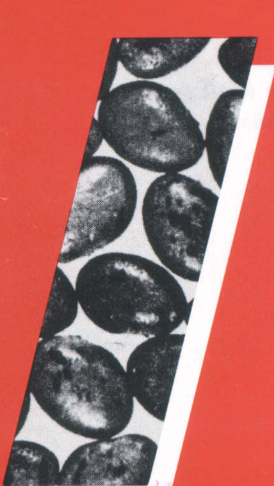


Factors Affecting Germination of Sericea Lespedeza Seed After Prolonged Storage



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FACTORS AFFECTING GERMINATION OF SERICEA LESPEDEZA SEED AFTER PROLONGED STORAGE

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INTRODUCTION

SERICEA lespedeza, a non-bloating legume, is one of the few perennial legumes well adapted to a large portion of marginal land in the Southeastern United States.[2] It is widely used as a forage crop and in soil conservation, and has much potential for future usage.

The market for sericea lespedeza seed often varies considerably from year to year (F. Campbell, 1989, personal communication). Hence, in some years, seed processed for sale must remain in storage. Reports on germinability of sericea lespedeza seed stored under ambient conditions are contradictory. Hanson and Moore[3] reported that sericea lespedeza seed retained 46 percent of its initial germination after 4 years of storage under ambient conditions. Bass[4] reported that seed stored under ambient conditions for 18 years still had 4 percent germination. He also found that 74 percent of sericea lespedeza seed in controlled climate storage (41°F and 35 to 40 percent relative humidity) germinated after 15 years. Seed stored under subfreezing temperatures were found to retain acceptable germinability even after 18 years.[4] However, no information was provided with regard to seed moisture content or whether the seed had been hulled prior to storage.[4]

Seed industry workers suspect that hull removal of sericea

[1] Associate Professor of Agronomy and Soils.

[2] CHAMBLEE, D.S. and SPOONER, A.E. 1985. Hay and Pasture Seedings for the Humid South. pp. 359-370. *In* M.E Heath, R.F. Barnes, and D.S. Metcalfe (eds.) Forages. Iowa State University Press, Ames, Iowa.

[3] HANSON, C.H. and MOORE, R.P. 1959. Viability of Seeds of Eight Forage Crop Plants Stored Under Subfreezing Conditions. Agronomy Journal, 51:627.

[4] BASS, L.N. 1981. Storage Conditions for Maintaining Seed Quality. pp. 239-321. *In* E.E. Finney, Jr., (ed.) Handbook of Transportation and Marketing in Agriculture. Vol. 2. Field Crops CRC Press, Boca Raton, Fla.

lespedeza seed hastens loss of germinability under the environmental conditions found in the Southeast, but this has not been documented. If true, seed companies without controlled climate storage facilities may find the quality of stored seed substantially reduced after storage for 1 year or longer. Furthermore, there is no information available on whether seed germination after prolonged storage varies among sericea lespedeza genotypes.

The objectives of this investigation were to determine the germinability of sericea lespedeza seed after prolonged storage as affected by seed conditioning (hulled versus unhulled), storage conditions, and genotype.

MATERIALS AND METHODS

Seed of the sericea lespedeza cultivars Serala and AU Donnelly and the experimental lines 80-91-15 and 79-19-11, which had been harvested in 1985, were subjected to all combinations of two seed treatments and two storage conditions. Seed treatments were (1) unhulled (left in the hulls) and (2) hulled (hulled and mechanically scarified). The hulled treatment was accomplished with a Forsberg[5] sample seed electric huller/scarifier. Seeds were put in the huller/scarifier for 7 seconds, cleaned, and again placed in the huller/scarifier for 2 additional seconds. About 200 grams of seed from each seed treatment and each genotype were packed in paper bags and stored at 60°F and 55 percent relative humidity. Equal amounts of seed were stored in a warehouse in Tallassee, Alabama, and, thus, exposed to ambient conditions.

Seed germination was determined by a standard germination test of four replicates of 100 seeds each[6] Prior to the germination test, seed of the unhulled treatments were hulled and mechanically scarified in the same manner seed of the hulled treatments had been treated prior to storage. Seed of the hulled treatments were germinated without further manipulation. Analyses of variance on actual and transformed (arcsin) data were carried out. Since both analyses gave the same results, only the analysis on the actual data will be reported.

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[5] Names of products are included for the benefit of the reader and do not imply endorsement or preferential treatment by the Alabama Agricultural Experiment Station, Auburn University.

[6] ASSOCIATION OF OFFICIAL SEED ANALYSTS. 1970. Rules for Testing Seeds. Proceedings of the Assoc. of Official Seed Analysts, 60:1-116.

Germination was monitored at the initiation of the experiment and 1, 2, 3, and 4 years thereafter.

RESULTS AND DISCUSSION

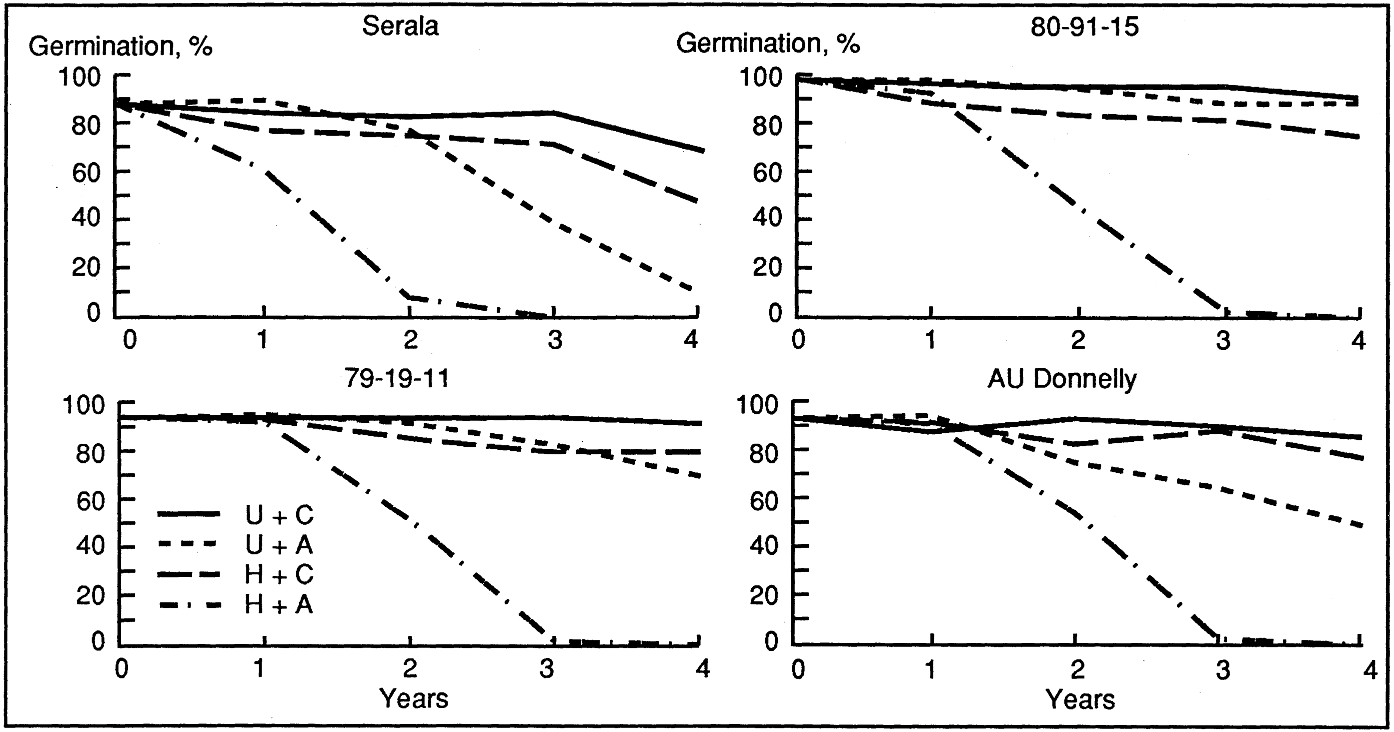
Analysis of variance indicated that initial germination of the genotypes was different, as seen in the table. Serala had the lowest germination, 86 percent. After one year in storage, differences among genotypes, genotype-seed treatment (G x T) interaction, and genotype-seed treatment-storage condition (G x T x S) interaction were significant, see the table. Germination was not significantly affected by seed treatment or storage condition at 1 year. However, germination of hulled seed of Serala stored under warehouse conditions was reduced 30 percent from their initial level. Germination of hulled seed of other genotypes stored under warehouse conditions fell 3 to 5 percent after 1 year, as seen in the figure.

STATISTICAL SUMMARY OF THE ANALYSES OF VARIANCE OF PERCENTAGE OF SEED GERMINATION OF FOUR GENOTYPES OF SERICEA LESPEDEZA SUBJECTED TO TWO SEED TREATMENTS AND TWO STORAGE CONDITIONS

Source of variation	Result by length of storage				
	Initial	1 year	2 years	3 years	4 years
Genotype	**	**	**	**	**
Seed treatment (T)	—	NS	*	**	*
Storage condition (S)	—	NS	*	**	**
G x T	—	**	**	**	**
G x S	—	NS	**	**	**
T x S	—	NS	*	*	NS
G x T x S	—	*	**	**	**
C.V., percent	3.4	5.7	6.3	7.4	10.1

*, ** Significant at a probability level of 0.05 and 0.01, respectively.

After 2 years in storage, significant differences in seed germination due to genotype, seed treatment, storage conditions, and the interactions among these factors were detected, see table. Unhulled seed retained a significantly higher percentage of germination than hulled seed. The same advantage was seen for seed stored at 60°F compared to seed stored under warehouse conditions. Hulled seed stored under warehouse conditions had the lowest germination, particularly those of Serala, which experienced a 90 percent reduction in germination, see figure. Unhulled seed of AU Donnelly and Serala stored under warehouse conditions had a reduction in germination of 13 and 19 percent, respectively, whereas unhulled



Germination of sericea lespedeza unhulled seed (U) and hulled seed (H) of four genotypes (AU Donnelly, Serala, 79-19-11, and 80-91-15) after storage for 4 years at 60° F or under warehouse conditions (A).

seed of the experimental lines 80-91-15 and 79-19-11 did not decline under warehouse conditions, as seen in the figure.

As in the second year, most of the variability in germination of the seed stored for 3 or 4 years was accounted for by the effects of seed treatment, storage condition, and interaction of those two main effects.

Unhulled seed stored for 3 years at 60°F maintained their initial germinability, see figure. Germination of unhulled seed stored under warehouse conditions depended on the genotype. Serala and AU Donnelly experienced the largest reduction in germination (56 and 30 percent, respectively), while seed of 80-91-15 and 79-19-11 experienced a smaller reduction, 7 and 12 percent, respectively. Storing hulled seed at 60°F resulted in a 4-17 percent reduction in germination. Seed germination of AU Donnelly remained about constant when stored at 60°F, see figure. Germinability of hulled seed stored under warehouse conditions was negligible after 3 years in storage.

After 4 years in storage, unhulled seed of most genotypes stored at 60°F retained their initial germinability. The exception was Serala, which had an 18 percent reduction in germination. Germination of unhulled seed stored under warehouse conditions was reduced 26 to 86 percent in all genotypes except 80-91-15, which had a reduction of only 5 percent. Hulled seed of AU Donnelly, 80-91-15, and 79-19-11 stored at 60°F lost between 15 and 20 percent germination. Serala seed lost 44 percent germination under the same conditions. Hulled seed stored under warehouse conditions lost their germinability regardless of the genotype.

In conclusion, hulled sericea lespedeza seed that remained in storage for a year in a nonrefrigerated warehouse experienced a reduction in germinability that was partially dependent on the genotype. Seed of the genotype 80-91-15 maintained germinability better than the other genotypes, regardless of hull removal or storage conditions. Serala seed quickly lost germinability when not stored in a 60°F environment. The results reported here indicate that it would not be advisable to store hulled sericea lespedeza seed under the usual warehouse conditions found in the Southeastern United States.

SUMMARY

Market demand for sericea lespedeza [*Lespedeza cuneata* (Dumont de Courset) G. Don.] seed is quite variable from year to year. Thus, in some years, seed processed for sale must remain in storage. In October, 1985, seed of four genotypes of sericea lespedeza were stored in either unhulled or hulled and mechanically scarified conditions. Storage treatments for each type of seed of each genotype were either ambient conditions or 60°F and 55 percent relative humidity. Depending on the genotype, hulled sericea lespedeza seed that remained in storage for 1 year in a warehouse could experience a reduction in germinability. Seed of the genotype 80-91-15 retained germinability better than the other genotypes regardless of seed conditioning or storage conditions. Serala seed quickly lost germinability when not stored in the 60°F environment. These results indicate that it would not be advisable to store hulled sericea lespedeza seed under the environmental conditions found in the Southeastern United States. Unhulled seed of most genotypes (except Serala) stored at 60°F maintained their initial germinability after 4 years in storage.