Viability of Grass Seed After Long Periods of Uncontrolled Storage[1]

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Highlight

In 1961, germination tests were made on seeds of 12 southwestern grass species collected between 1933 and 1939. Some seeds of vine-mesquite, silver beardgrass, curlymesquite, and Arizona cottontop remained viable, even though stored with no control of humidity or temperature.

In 1960, several small cardboard boxes filled with grass seeds were found in a storage locker at the Sierra Ancha Experimental Forest, elevation 5,100 ft, near Globe, Arizona. These seeds, collected on or near the Experimental Forest by various people between 1933 and 1939, presented an opportunity to study long-term viability of native grass seed.

Several studies (Soil Conservation Service, 1951; Wheeler and Hill, 1957; Little, 1937; Hafenrichter et al., 1965) have shown that grass seed may remain viable for several years if stored in a cool, dry place. The locker at Sierra Ancha provided no special protection from humidity or temperature, nor did the unsealed, though relatively tight, cardboard boxes. Temperatures at the Experimental Forest vary from 100 F. during the summer to almost 0 F. during some winters. Humidity rarely exceeds 50% for more than 1 or 2 days at a time in this semi-arid locality, which receives about 21 inches of rainfall each year.

In July of 1961, the seeds were subjected to standard germination tests by the Colorado State Seed Laboratory at Fort Collins, Colorado. Results are based on the number of pure seeds that developed into normal seedlings after 24 to 36 days in a petri dish with blotter substrate.

Table 1. Percent germination of 12 species of native southwestern grass seed after 20 years' storage without control of humidity or temperature.

Species and collection date	Percent germination Initial	July 1961
Vine mesquite (*Panicum obtusum* H.B.K.)		
1933	?	22
1934	?	27
1934	?	34
1936	?	8
1936	98	11
1936	98	3
1938	?	9
Silver beardgrass (*Andropogon saccharoides* Swartz)		
1933	?	17
1934	?	0
Curlymesquite (*Hilaria belangeri* (Steud.) Nash)		
1936	?	6
Arizona cottontop (*Trichacne californica* (Beuth.) Chase)		
1936	?	25
Green sprangletop (*Leptochloa dubia* (H.B.K.) Nees.)		
1939	26	0
Side-oats grama (*Bouteloua curtipendula* (Michx.) Torr.)		
1933	91	0
1939	?	0
Hairy grama (*B. hirsuta* Lag.)		
1934	?	0
Bullgrass (*Muhlenbergia emersleyi* Vasey)		
1933	?	0
1934	?	0
1937	?	0
Purple three-awn (*Aristida purpurea* Nutt.)		
1933	?	0
Fringed brome (*Bromus ciliatus* L.)		
1936	?	0
Plains lovegrass (*Eragrostis intermedia* Hitchc.)		
1936	?	0
Texas timothy (*Lycurus phleoides* H.B.K.)		
1936	?	0

Results and Discussion

Of the 12 species tested, 8 showed no sign of viability (Table 1). Initial germination of most species was not checked, but of those which showed no viability in 1961, green sprangletop and the 1933 collection of side-oats grama germinated 26 and 91% respectively, at time of collection.

[1] *Assistance of the Colorado State Seed Laboratory, Colorado State University, Fort Collins, and the Arizona Agricultural Experiment Station, University of Arizona, Tucson, is gratefully acknowledged.*

[2] *Forest Service, U.S. Department of Agriculture, with headquarters at Fort Collins, in cooperation with Colorado State University. Mr. Pond is located at the Station's project headquarters at Flagstaff, in cooperation with Northern Arizona University.*

Four species—vine-mesquite, silver beardgrass, curlymesquite, and Arizona cottontop did germinate in 1961. These results (Table 1) indicate that seed of some species can maintain viability under uncontrolled conditions of storage for long periods of time.

Long-term viability differences between species were probably due to physiological as well as morphological differences in the seeds (Asgrow Seed Co., 1954; Quick, 1961). Although data are insufficient to allow comment on physiological differences, some morphological differences between the seeds are obvious. Arizona cottontop and silver beardgrass, for example, both have hairs on the outside of the seed that may provide insulation from heat and excessive humidity when the seeds are closely packed. In addition, both have fairly hard seed coats, particularly Arizona cottontop. Vine-mesquite has a hard coat and a large amount of endosperm, which may account for its longevity. Curlymesquite grass, on the other hand, has a small seed with a thin seed coat, and its continued viability is apparently due to factors other than morphological characteristics.

The initial germination of two vine-mesquite samples collected in 1936 was high, 98%, but the viability of these two samples in 1961 was considerably lower than the samples collected in 1933 and 1934. The initial germination of the earlier collections could have been little better than that of the 1936 samples; yet the viability of the earlier samples held up better during storage. Several factors could have been responsible, but the most logical are impermeable seed coat and moisture content at time of collection. The effect of these factors is also shown by the continued viability of the 1933 sample of silver beardgrass, while the 1934 collection failed to survive.

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DU WAYNE GOODWIN, of the Pakistan Forest Institute at Peshawar reports that a Pakistan Society of Range Management is being organized there.

DIRECTOR PECHANEC RECEIVES SUPERIOR SERVICE AWARD

Joseph F. Pechanec, director of Intermountain Forest and Range Experiment Station, has received a Superior Service Award from the Secretary of the U.S. Department of Agriculture according to announcement today by Edward P. Cliff, chief of the Forest Service. Mr. Pechanec has worked with the Forest Service since 1933 in a variety of research and administrative posts.

The citation accompanying Mr. Pechanec's award read: "For outstanding contributions to wildland conservation through distinguished administration of a comprehensive forestry and wildland research program, eminent personal research, and inspiring professional leadership."

Mr. Pechanec has been director of the Intermountain Station, with headquarters in Ogden, Utah, since June 1962. From 1953 to 1956 he was director of the Division of Range Management Research of the Forest Service in Washington, D.C. For part of this time he was staff assistant to the deputy chief in charge of Forest Service research.

Mr. Pechanec was one of the founders of the American Society of Range Management when it was organized in Salt Lake City in 1948. He was the society's first president and was editor of its Journal of Range Management for one year in 1953. In 1951 he was a member of a United Nations team, with headquarters in Rome, assigned to evaluate range resources in several underdeveloped nations. In 1954 he received a second assignment for foreign service as advisor in range resources for the Foreign Operations Administration.

Virgle L. Cunningham Jr. former Area Conservationist, Soil Conservation Service, Amarillo, Texas was recently named Assistant Chief Management Records Branch, Budget & Finance Division of the Soil Conservation Service and transferred to the Washington, D.C. office.