

Longevity of Velvet Mesquite Seed in the Soil¹

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Highlight

One velvet mesquite seed out of 450 that were buried in 1948 on the Santa Rita Experimental Range was sound and germinated after it was dug up 20 years later. The percentage of apparently sound seeds declined fairly rapidly as seeds germinated or decayed (only 10% were sound after 10 years), but viability of the apparently sound seed remained high to the end of the study. Thus, even if no new seed is produced or introduced, some mesquite seedlings may emerge 20 years or more after clearing.

Velvet mesquite (*Prosopis juliflora* var. *velutina* (Woot.) Sarg.) greatly reduces forage production on southwestern grass-shrub ranges. It reproduces only from seed. Mesquite seeds get covered with soil mainly as the result of erosion or activities of rodents, such as the Merriam kangaroo rat, which buries seeds in shallow caches (Reynolds and Glendening, 1949). The longevity of the seeds in the soil affects not only the spread of the species but also reinvasion after control. Longevity, as used in this paper, refers to the length of time seeds remain viable in the soil.

Mesquite seeds in dry storage remain viable indefinitely. Martin (1948) reported 60% germination of 44-year-old mesquite seeds that had been stored in a Tucson herbarium. Six years later, Glendening and Paulsen (1955) obtained 60% germination from another sample of the same lot of seeds. Germination tests have not been made on older seeds, but there is no reason to expect a rapid decline of viability when seeds are stored in a dry atmosphere and at a moderate temperature.

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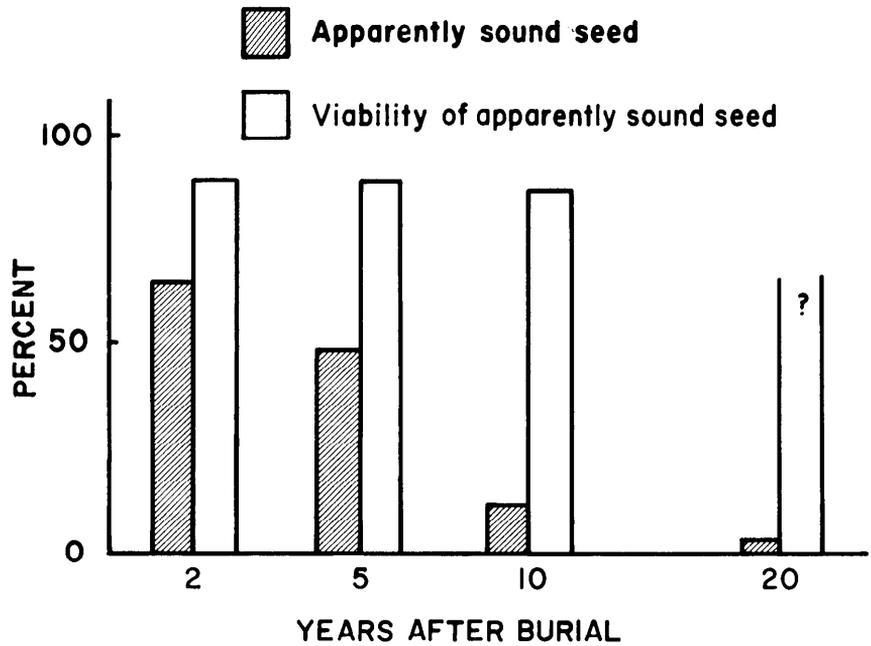


FIG. 1. Percentage of mesquite seeds still apparently sound 2, 5, 10, and 20 years after burial, and viability of apparently sound seed. (Viability after 20 years was uncertain, but the single apparently sound seed germinated.)

This paper reports results of observations on mesquite seeds that had been buried in the soil, and subjected to normal wetting and drying, for 20 years. In an earlier report on the same experiment, Tschirley and Martin (1960) found that 8.6% of the original number of mesquite seeds were still viable after 10 years in the soil. The discovery of one live, recently sprouted seedling at that time showed that germination could occur naturally after 10 years in the soil.

Materials and Methods

Mesquite seeds were buried in 1-pint³ fruit jars at three elevations on the Santa Rita Experimental Range, near Tucson, Arizona, in August 1948. Fifty hulled seeds, together with a small amount of soil, were put into each of 12 jars at each elevation. The jar covers were punctured, and a piece of blotting paper was placed inside the jar lid. The jars were buried under 6 inches of soil with their long axes parallel to the surface to prevent direct entrance of water. The 12 jars at each location were divided into 4 sets of 3 jars each. Three jars at each site were scheduled for excavation 2, 5, 10, and 20 years after burial.

³ Tschirley and Martin (1960) erroneously listed jar size as ½-pint.

After excavation, the contents of each jar were carefully separated and examined. Germination was tested by putting the seeds on moist filter paper in petri dishes and storing them in a dark chamber. Seeds that failed to germinate in 3 weeks were nicked with a file to break the seed coat and again placed in the dark. The seeds were considered nonviable if they had not germinated 2 weeks after being nicked.

Results

This is the final report of the buried-seed study. The last nine jars of seeds were dug up in the summer of 1968. After 20 years, only one seed was sound out of 450 originally buried. However, seed remnants consisting of soft, fragile seed coat shells were identifiable, so that all but three of the original 450 seeds were accounted for. The presence of many roots and root fragments, none of them recent, showed that many seeds had germinated during the 20-year period.

The one apparently sound seed was placed on blotting paper in dark storage for 3 weeks without response. When the seed coat was nicked with a file, however, it germinated normally.

Although mesquite seeds can remain viable in the soil for 20 years, 90% had sprouted or decayed in 10

years (Fig. 1). Thus, the percentage of apparently sound seeds declined fairly rapidly as seeds germinated or decayed, but viability of the apparently sound seed remained high to the end of the study.

These results show that some followup will usually be necessary to keep cleared range mesquite-free, even if no new mesquite seeds are produced or imported.

Literature Cited

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Australian Arid Zone Research Conference 1970

The third 5-year arid zone research conference will be held at Broken Hill, New South Wales, Australia, from Saturday, May 2, to Thursday, May 7, 1970. A pre-conference tour from Adelaide to Broken Hill will leave Adelaide, Thursday, April 30, 1970. There will also be one-day tours to Fowlers Gap Arid Zone Research Station and to a sheep station.

The conference theme will be "The Management of Arid Zone Resources." The aim is to discuss the management of Australia's arid land resources by considering the climate/land/vegetation/animal ecosystem, the factors and processes within it, and their interactions with each other, with social and economic influences, and within the system as a whole.

The conference discussions will be arranged in three sections.

Section I. Invited Reviews.

Water Resources.

1. Rainfall/Runoff Relationships.
2. Surface Water and Groundwater.

Soil and Landscape Resources.

3. Chemical and Physical Characteristics of Soils.
4. Landscape Characteristics, Influence of Past and Present Land-Use Techniques on Present Condition and Trends.

Vegetation Resources.

5. Influence of Vegetation on Landscape and Soil Stability.

6. Utilization and Influence of Vegetation on Animal Production.

Animal Resources.

7. Domestic Animals.
8. The Ecology of Non-domesticated Animals.

Human Resources.

9. Human Populations and Their Facilities.
10. Land Tenure and Administration.

Financial Resources.

11. Public Investment.
12. Private Investment.

Section II. Contributed Papers.

Contributed papers on the same 12 topics as the reviews will be discussed for the following regions:

- Summer rainfall arid.
- Winter rainfall arid.
- Summer rainfall semi-arid.
- Winter rainfall semi-arid.

Section III. The Structure and Function of the Ecosystem.

A half-day discussion led by a four- or five-man panel.

Inquiries about the conference should be addressed to Mr. A. C. Doery, Secretary, Australian Arid Zone Research Conference, PO Box 89, East Melbourne, Victoria 3002.