Time of collection and Storage in Relation to Germination of Desert Saltbush Seed[1]

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Highlight

Seeds of desert saltbush (*Atriplex polycarpa*) were collected at two locations early and later during the season of seed maturity. The percentage of filled seed was highest in the early collection. Seed that matured early and was collected early germinated more rapidly and to a higher percentage than seed collected when not fully mature. Seeds left to ripen on the plants often germinate while still on the plants.

Desert saltbush (*Atriplex polycarpa* (Torr.) S. Wats.) is a native shrub of the southwest deserts, principally those of California, southern Nevada and Arizona and has a distribution in those states very similar to that of creosotebush (*Larrea divaricata*) (Benson and Darrow, 1954). Many native stands of desert saltbush which characterized much of the land now under irrigation in the Southwest (Shantz and Zon, 1924) were destroyed with the spread of intensified agricultural practices. Many of the remaining native stands have been depleted by overgrazing (Sampson and Jesperson, 1963). Desert saltbush has a great potential for use as a forage plant in arid range lands of the Southwest because its nutritious, succulent foliage is readily grazed by livestock and big game and also because of its ability to withstand extreme drought. The time of year that mature seed may be harvested as well as its keeping qualities are important considerations of any species being considered for introduction. Like most wild species genotypic variation among desert saltbush plants results in a wide range of time over which seeds reach maturity. Generally some seed matures during October but on the later plants it may not fully mature until December. The present study was conducted to determine the effect of stage of seed maturity on subsequent germination.

[1] Part of a study undertaken by the senior author for partial fulfillment of the requirements of the Ph.D. degree, University of California, Riverside.

Materials and Methods

Seeds were collected on November 2 and December 3, 1966 from two sites in southern California (McKittrick, Site 1; and Lancaster, Site 2) at two stages of seed maturity (G, seeds not fully mature as evidenced by their green color and high water content; and D, fully matured seed). The 2-D seed, however, was somewhat drier than the 1-D seed on the first date of collection. The first and second collections were made from the same plants. On the December date all seeds were dry but the previously green seeds were labeled G to distinguish between the two lots from McKittrick. All seeds were kept in cloth sacks and stored temporarily in a wooden cabinet in the laboratory where temperatures range from 16°C to 29°C.

Germination trials were begun shortly after collection and at weekly intervals thereafter for 7 weeks with the November seed and for 3 weeks with the December seed. After approximately one year another set of replications of each seed lot was germinated. At the end of each set of trials (approximately 30 days duration) the utricles were opened and the number of unfilled seeds determined. This information made it possible to express the results as percent germination of filled seeds. Two replications of 50 seeds from each lot were placed in petri dishes (9 cm × 9 cm × 1.5 cm deep) with blotter pads and germinated in an environmental chamber maintained at a 12 hour 24°C light period and a 16°C dark period. Blotter pads were kept moist with tap water.

Results

In each instance the percentage of filled seed was highest on the early date of collection and it decreased most rapidly in the seeds most mature on the first date of collection (Fig. 1).

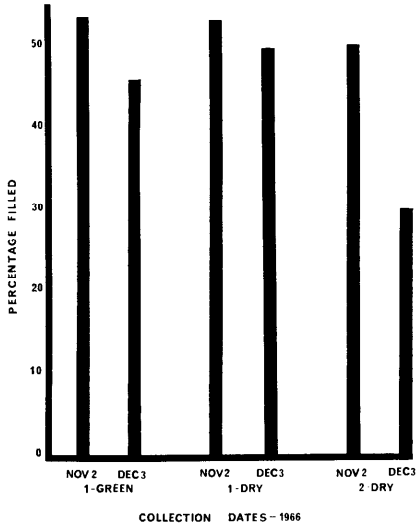

FIG. 1. Percent filled seeds collected from three sites on two dates. Each percentage is based on 800 seeds.

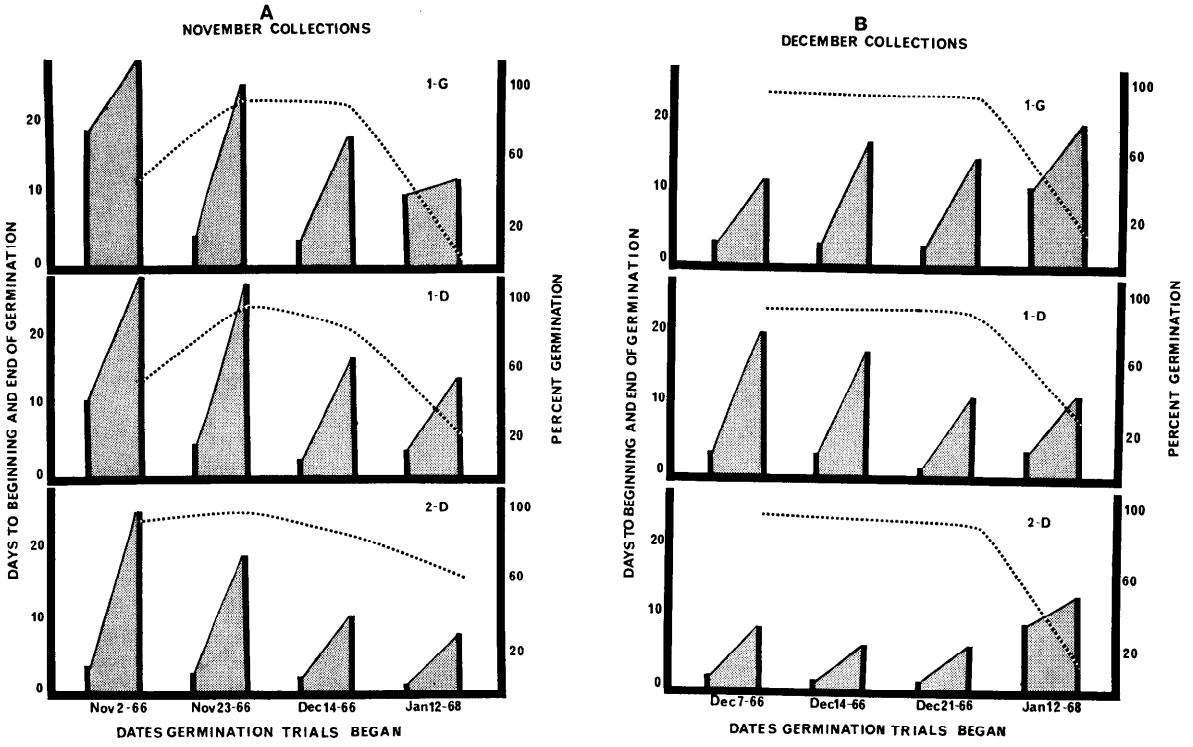

FIG. 2 Effects of time of seed collection and subsequent storage on germination of three seed lots collected on November 2 (A) and December 3, 1966 (B) and planted on four dates thereafter. The broken line represents percent germination. The first bar of each pair shows days to onset of germination (10% of final) and the second indicates days to end of germination (90% of final).

Germination of the 2-D seed lot collected in November was almost twice the percentage of the 1-G and 1-D lots in the trials began the day of collection (Fig. 2). Not only was the percent germination of the 2-D seed much greater but the time to onset of germination was much less. After the first week of storage the germination percentages of filled seeds from the various November seed lots were comparable (all were above 90%); however, the time to onset of germination was much reduced for the 1-G and 1-D lots. After 6 weeks storage the time to end of germination had begun to decrease as had the percent germination.

After 14 months in storage the percent germination of filled seeds collected in November had dropped to a low of 2% for the 1-G seed and to 21% and 65%, respectively, for the 1-D and 2-D lots. Time to onset of germination remained at a low of one day for the 2-D seed but had increased by one day and 6.5 days for 1-D and 1-G, respectively. Days to final germination decreased in all cases.

All seed lots collected in December gave comparable germination percentages during the first weeks after collection. However, that seed which had matured earliest still germinated much faster than the later developed seed. After 14 months the percent germination was greatest and germination time least for the earliest maturing seed from McKittrick.

Discussion and Conclusion

The reduction in percent filled seed from November to December in each seed lot can be accounted for in two ways: 1) destruction of seeds by insects; 2) some germination occurs during minor storms while the seed is still on the plant; death surely follows for want of sustained moisture. Such losses would be expected to increase with time after maturity and such expectations are born out in the results.

The keeping quality of seed was found to vary between lots collected on the same date from different sites. Seed that matured early and was collected early germinated more rapidly and to a higher percentage than seed collected when not yet fully matured. Seeds having green utricles at the time of collection required a curing period before either the percent germination or the time required for germination was comparable to that of seed fully matured when collected. Although there was a period about 3 weeks after collection when all November seed lots had similar viability and time requirements for germination, the keeping quality of the seeds that were most mature when collected was superior.

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