Journal of Tropical Forest Science 12(1):191–193 (2000)

THE INFLUENCE OF HIGH STORAGE AND GERMINATION TEMPERATURES ON THE GERMINATION OF *PROSOPIS CINERARIA* SEEDS FROM NORTHERN OMAN

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Prosopis is a highly adapted plant species of extremely harsh desert habitat conditions in various parts of the world. Compared to that on other eco-physiological aspects of this species, little information is available on the germination response of *Prosopis* seeds to extremely high storage and germination temperatures (Lopez & Aviles 1988, Medina & Cardemil 1993, Villagra 1995, Cony & Trione 1996, Sacheti 1996, Teketay 1996). *Prosopis cineraria* (L.) Druce, the only naturally occurring species and an important multipurpose leguminous species in the Sultanate of Oman (Leaky & Last 1980), has been recommended by Brown (1991) for the reforestation of the fast declining *Prosopis* woodlands in this country. However, the germination of *Prosopis cineraria* seeds in the field has been observed to be scarce, although an enormous number of seeds are produced in the summer months of May–June. Prior to their germination in winter, subject to adequate rainfall, the seeds of this species are exposed to very high temperatures (>50 °C) for several months while lying on or buried under the soil. The aim of this laboratory study was thus to investigate two important aspects of the germination process, namely the effects of extremely high storage and high germination temperatures on the viability of *Prosopis cineraria* seeds.

Seeds of *P. cineraria* were collected from four diferent areas (Adam, Bani-Bu-Hasan, Sur and Suwayq) in Northern Oman. After drying and cleaning, the seeds were kept at room temperature (21 °C) in the laboratory. In the first set of experiments, seeds were stored at 50, 70, 80 and 90 °C for one week. In the second set of experiments, seeds kept at room temperature were germinated at temperatures of 30, 40, 45 and 50 °C in dark incubators. In both sets of experiments, one lot of seeds was manually scarified by coarse sand paper while in the other lot seeds were kept intact (unscarified). All seeds were sterilised by 0.5% solution of mercuric chloride and then rinsed with distilled water. Seeds were germinated in plastic Petri dishes lined with Whatman's filter paper No. 1. Germination was recorded every day until no further germination occurred for seven days. All germination data were analysed by transforming germination percentages to the arcsine square root of percentages to stabilise the variance. Duncan's multiple range test was used to compare between means (Gomez & Gomez 1976).

Figures 1a and 1b show that with increase in storage temperature there is a general reduction in germination percentage for both scarified and unscarified seeds. At storage temperature of 50 °C, the scarified seeds from the Adam area showed relatively high germination (68%) compared to those from the three other sites (Figure 1a). Interestingly, even after storing at an extremely high temperature of 80 °C for one week, some germination (~ 10%) was recorded. In contrast, the unscarified seeds showed a very low germination response (< 5%) at storage temperatures of 50 °C or more. Storage at 90 °C completely prevented any germination in both scarified and unscarified seeds.

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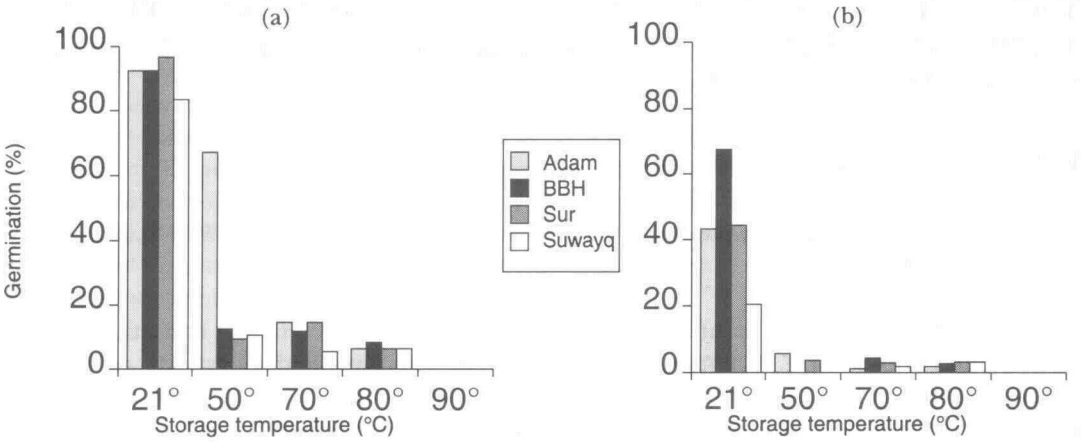

Figure 1. Influence of storage temperature on the germination of (a) scarified and (b) unscarified *Prosopis cineraria* seeds

The germination response of unscarified seeds (Figure 2b) was significantly different ($p < 0.01$) and lower from that of scarified seeds (Figure 2a) at all tested germination temperatures, 30 °C being the optimal temperature. Surprisingly, even at a high germination temperature of 40 °C, the scarified seeds from Adam and BBH showed ~80% germination. However, at 45 °C the germination was severely reduced. In the case of unscarified seeds, a sharp decrease was observed in seeds from all the four sites at germination temperatures of 30 °C and beyond. At a germination temperature of 50 °C, no germination was recorded for both scarified and unscarified seeds.

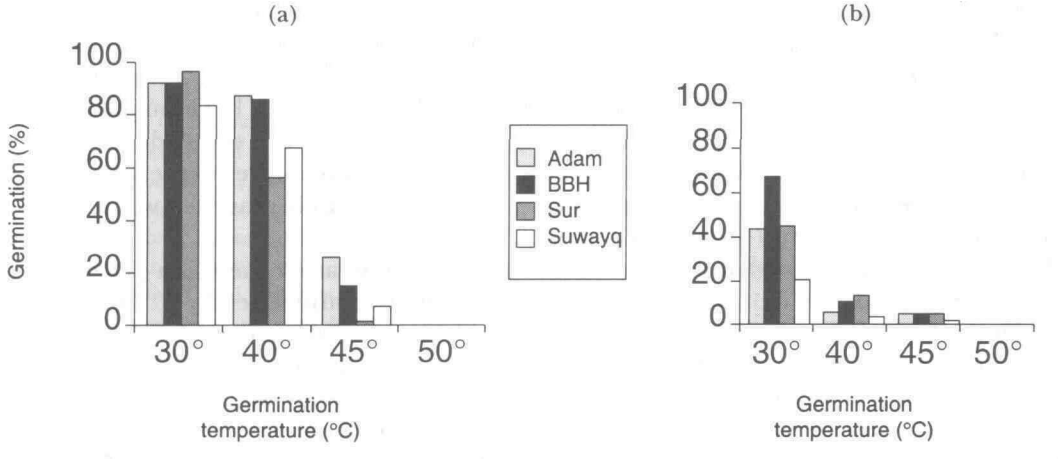

Figure 2. Influence of germination temperature on the germination of (a) scarified and (b) unscarified *Prosopis cineraria* seeds

Prosopis cineraria seeds remained viable even after being stored at temperatures beyond 50 °C. These results compare favourably with earlier findings (Sacheti 1996) in a related study on some leguminous species of Northern Oman. However, in most other leguminous plants from desert areas an exposure to extremely high temperatures (>50 °C), varying from a few minutes to 24 hours, is rather lethal (Chatterji & Mohnot 1964, Lopez & Aviles 1988, Sanchez & King 1994, Villagra 1995, Teketay 1996). The germination of seeds from all four areas was severely affected with increasing germination temperature although the response of scarified and unscarified seeds was variable. Similar results have been reported by other workers (Medina & Cardemil 1993, Villagra 1995, Cony & Trione 1996). Although a germination temperature of 45 °C has been considered to be lethal for most plant species (Bewley & Black 1994), the *Prosopis* seeds from Adam area in this study showed as much as 26% germination, thus suggesting a remarkable tolerance of this species to high temperatures.

The results of this preliminary study suggest that exposure of seeds to very high temperatures during summer months, coupled with dormancy caused by hard seed coats of *Prosopis cineraria* may limit the establishment of this species in Oman. However, long term investigations are required to fully understand this aspect.

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