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The Effect of Environmental Conditions on Seed Germination of Some Saudi Arabian Rangeland Species

Naser Almarri, Alistair Murdoch, Simon Mortimer

University of Reading, Dept. of Agriculture, Seed Science Laboratory, United Kingdom

Abstract

Saudi Arabia experiences unpredictable and low rainfall and high temperatures. Growth of plants occurs mainly in winter. Rangelands occupy about 70 % of the land area. Factors which may relieve seed dormancy include: afterripening; chemical treatments such as potassium nitrite and nitrate; temperature and light.

Experiments were carried out to investigate the effects of light, different alternating and constant temperature regimes and several chemical treatments on seed germination and dormancy of six Saudi Arabian rangeland species. The ultimate aim is to anticipate potential impacts of global climate change.

Seeds of *Atriplex leucoclada*, *A. halimus*, *Calligonum comosum*, *Salsola villosa*, *Teucrium polium* and *Nitraria retusa* were collected in Saudi Arabia in 2007 and 2008. Seeds of *S. villosa* were tested with and without covering structures (wings). Germination of seeds collected in 2007 was tested at two alternating temperatures (15°/25°C, 10°/30°C, 12h/12h), three constant temperatures (10°, 20° and 30°C), two light treatments (light and darkness) and moistened with either water or 0.01 M potassium nitrite. Seeds collected in 2008 were germinated in a range of concentrations of (KNO_2) and (KNO_3) in alternating temperatures (15/25°C, 12h/12h) and light.

Optimum constant temperature for germination of *S. villosa* with and without wings and *T. polium* was 20°C with no promotion of germination at alternating temperatures implying that seeds were non-dormant. In *A. leucoclada*, (KNO_2) promoted germination in the light but not in darkness at all temperatures. In *A. halimus* there was no effect of light and slight promotion by alternating temperatures and potassium nitrite. In *C. comosum* potassium nitrite promoted germination in light but not in darkness at 20°C, 15/25°C and light generally promoted germination. In *S. villosa* with and without wings and *T. polium*, (KNO_2) generally inhibited germination. In *T. polium* light promoted germination in water at 10°, 30° and 10/30°C (data not shown) but not at 20°C , 15/25°C. The germination of *C. comosum* was promoted by exposure to low concentrations of (KNO_2) (10^{-3} M) and (KNO_2) (10^{-4} M).

Results are discussed with reference to the impact of the characteristics of seed dormancy and germination on the resilience of their regeneration in rangelands.

Keywords: Climate change, dormancy, germination, rangeland species

Contact Address: Alistair Murdoch, University of Reading, Dept. of Agriculture, Seed Science Laboratory, RG6 6AR UK Reading, United Kingdom, e-mail: a.j.murdoch@reading.ac.uk