Effect of Temperature Changes on Germination of Three Range Grass Species and Implication for Their Conservation

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The XXI International Grassland Congress / VIII International Rangeland Congress took place in Hohhot, China from June 29 through July 5, 2008.

Proceedings edited by Organizing Committee of 2008 IGC/IRC Conference

Published by Guangdong People's Publishing House

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Key words: Seed dormancy, grass, temperature, germination percent and germination rate

Introduction Seed dormancy is wide spread in warm season grasses and can contribute to establishment and stand persistence when a reserve of dormant seeds preserves the opportunity for plant establishment over time (Voigt and Tischler, 1997). Grass reseeding at smallholder livestock production level is a relatively new phenomenon. However, the success of artificial seeding of semi arid rangelands is often affected by limited understanding of the type of dormancy affecting the seeds being used. It is also affected by a dearth in dormancy breaking techniques required for improved germination and eventually well-established forage stands. We needed therefore to establish farmer friendly possible dormancy breaking methods for the seeds of three semi arid rangeland grasses, which are being used in reseeding trials aimed at improving forage production in the southern rangelands of Kenya. Seeds of Masai lovegrass (*Eragrostis superba* Peyr.), African foxtail (*Cenchrus ciliaris* L.) and horsetail grass (*Chloris roxburghiana* Schult.) were subjected to different temperature treatments. Two factors were recorded; germination capacity (GC) and germination rate (coefficient of Velocity, CV) using Kotowski's velocity coefficient (Voigt and Tischler, 1997).

Materials and methods Seeds of *C. ciliaris*, *E. superba* and *C. roxburghiana* harvested by hand at KARI-Kiboko forage plots during the late February to mid March 2003 were subjected to sun drying and oven temperatures (33℃, 40℃, 50℃ and 70℃) for 5 consecutive days in October 2003. Similarly one-month-old seeds of the 3 grass species harvested in March 2004 were subjected to the same treatments except oven drying at 33℃.

Results VC of 8 month old seeds of *C. ciliaris* significantly increased with oven drying at 33℃, 40℃ and 50℃ with peak VC at 40℃ and with sun drying showing positive relation to exposure period. Significant increase in GC of 8 months old seeds of *C. roxburghiana* was achieved at 33℃ and sun drying. Contrary, 8 months old seeds of *E. superba* responded well to higher oven temperature (70℃) with an increase in both the GC and VC. Heat treatments adversely affected VC for one-month old seeds of *C. roxburghiana*, but *C. ciliaris* responded well to higher temperatures with peak GC and VC at 50℃.

Table 1: *Coefficient of Velocity (VC, %) of one month old grass seeds.*

Treatment	C. ciliaris	C. roxburghiana	E. superba
	VC	VC	VC
Control	24.23a	35.88a	23.33a
Sun drying	27.49ab	25.5b	19.48a
Oven 40℃	28.30ab	27.44b	19.38a
Oven 50℃	30.93b	22.3b	18.84a
Oven 70℃	27.71ab	23.94b	19.77a

* Figures proceeded with same letter not significantly different

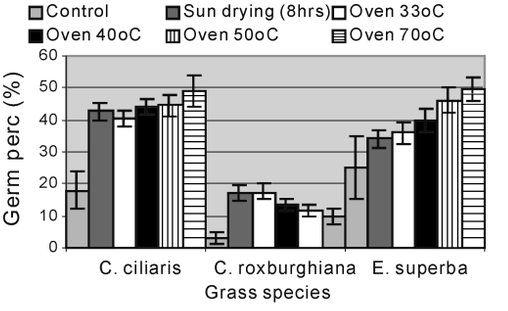

Figure 1 *Germination capacity of 8 months old grass seeds under various drying treatments.*

Conclusion Temperatures below 50℃ or sun drying seeds of *C. ciliaris* harvested during the short rain season significantly improves VC especially if the seeds are to be planted during the next short rain season. However, exposing seeds of *C. roxburghiana* to temperatures above 40° and especially for longer periods significantly reduces both GC and VC. The noted climate change with expected increase in temperatures (IPCC, 2007) could therefore have negative implication on the species conservation, thus calls for development of strategies addressing its sustainability.

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