

The effects of gut passage and dung fertilization on seedling establishment of *Dichrostachys cinerea* and *Acacia nilotica*

Julius Tjelele^{ab*}, David Ward^b and Luthando Dziba^c

^aAgricultural Research Council, Animal Production Institute,

^bUniversity of KwaZulu-Natal, School of Life Sciences,

^cCSIR: Natural Resources and the Environment



Introduction

- Pods of many woody plant species have higher nutritive value than grasses, especially during the dry season.
- Seeds of various plant species ingested by animals pass through the digestive tract via the faeces (nutrient input).

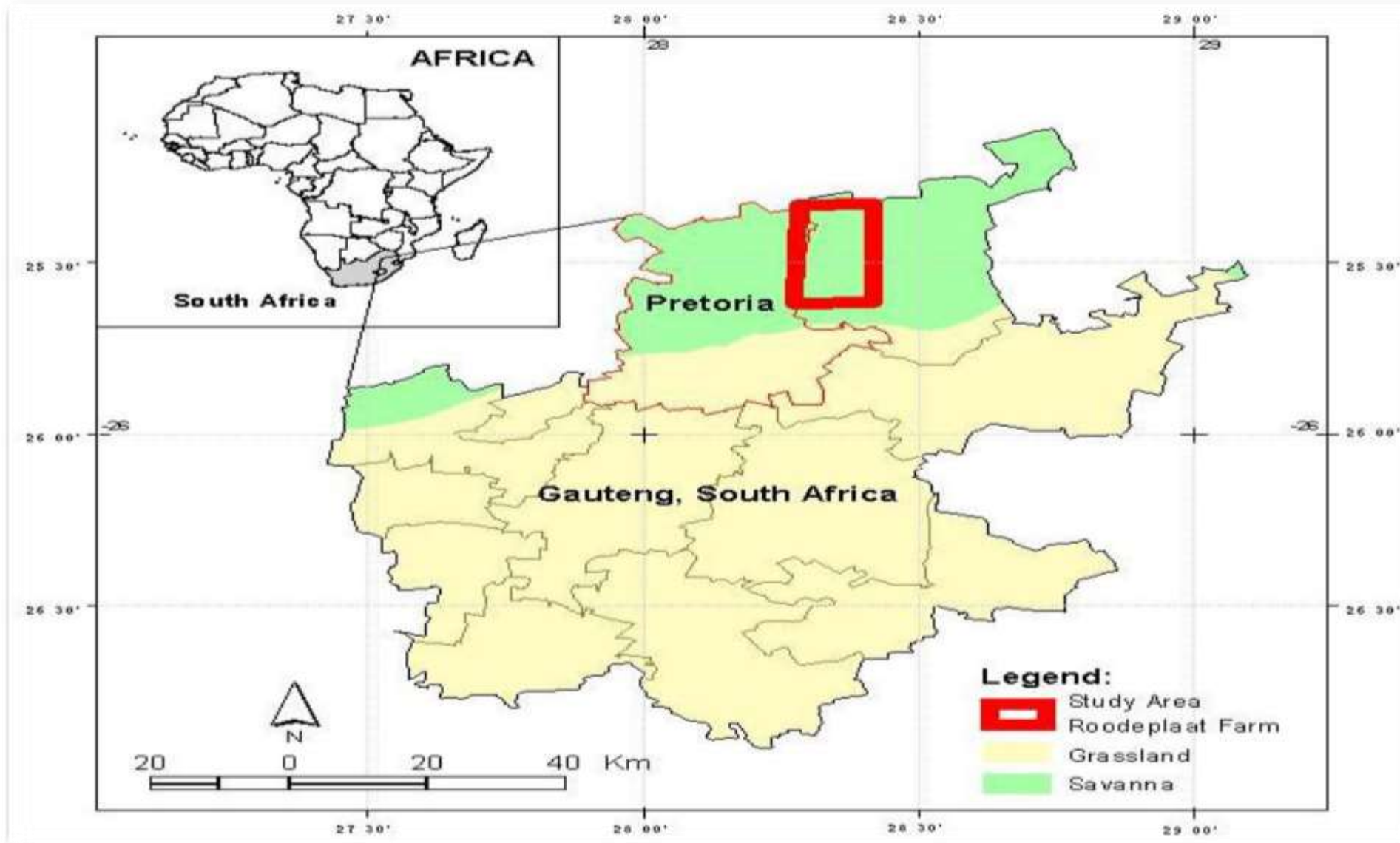
Introduction

- Seeds that retain viability after passage through the gut could be dispersed,
- ✓ subsequently establish, facilitating rapid woody plant encroachment



- Overall, there is unlikely to be a single cause of seedling recruitment, but rather a combination of interacting factors
- Seedling emergence, establishment and recruitment of *D. cinerea* and *A. nilotica* will be favoured by **gut passage** of goats and cattle, and through the addition of goat and cattle **dung (nutrient input)**.

Study area



Experimental animals and seed recovery

- Two Bonsmara heifers and two Indigenous goats were gavaged (force-feeding)
- Seven paddocks (0.5 ha), each paddock had 2 cows and 2 goats
- Seeds were recovered according to Tjelele et al. (2012)

Monitoring of seedling emergence

- Data collection lasted for nine months from May 2011 to July 2012 (dry and wet seasons)
- Seeds were monitored monthly to record germinated seeds and seedling survival
- Seedling recruitment = seeds emerged - seedlings that died

Results

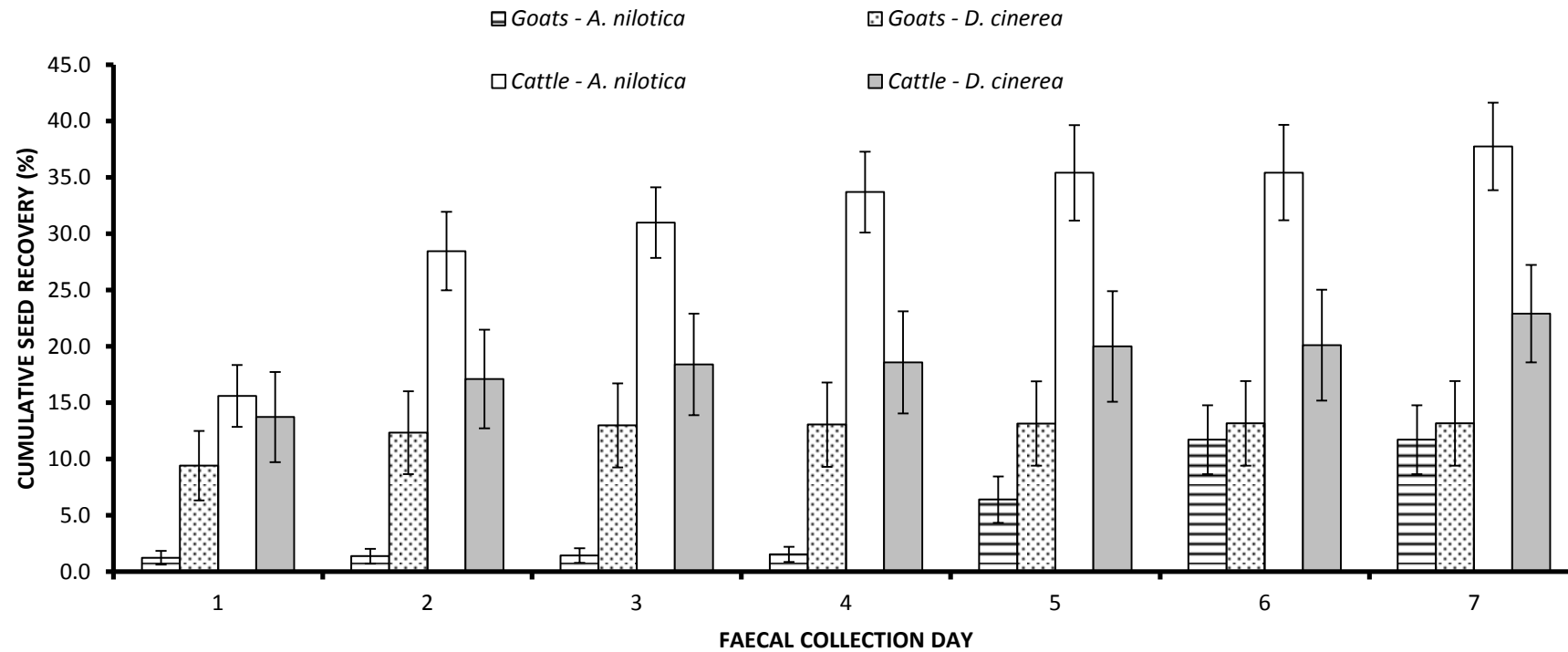


Figure 1: Cumulative seed recovery of the total number of *D. cinerea* and *A. nilotica* seeds fed to the animals (cattle and goats) expressed as a percentage of the number of seeds originally fed. Error bars represent standard errors (SE). Fisher's *post hoc* test was used.

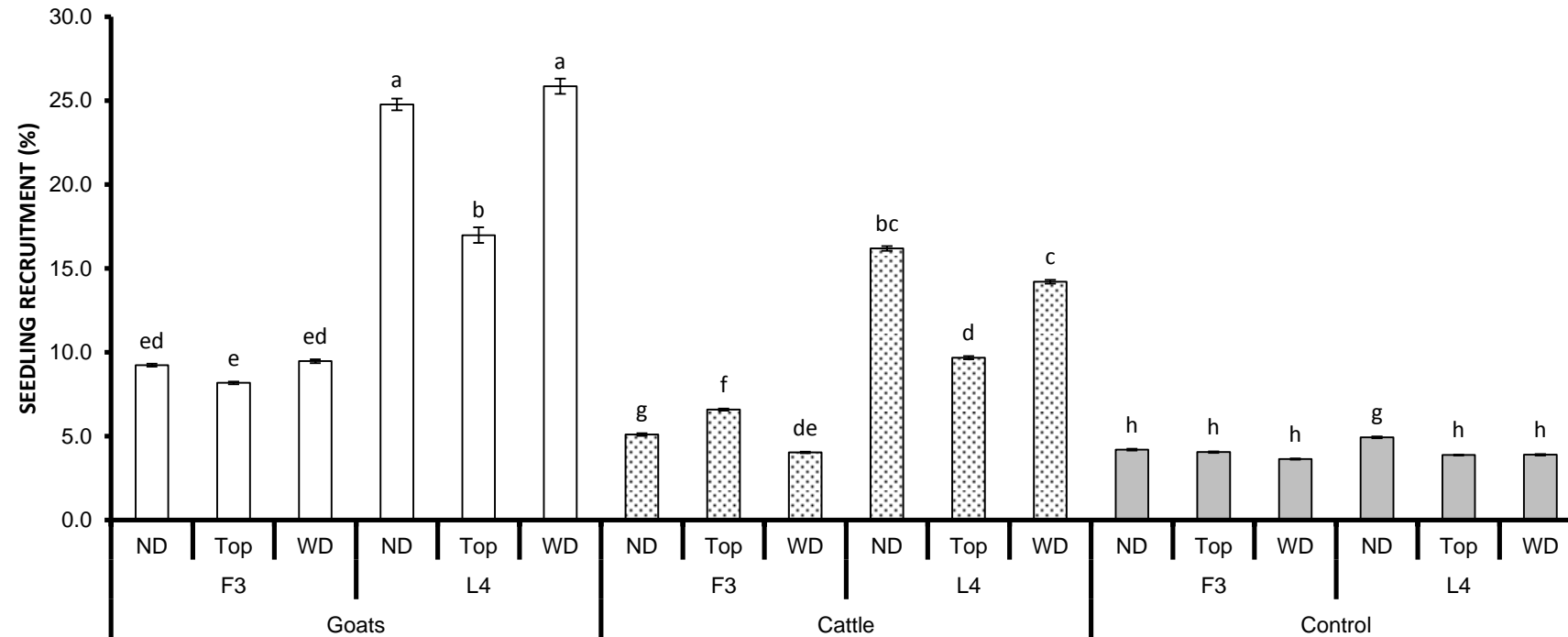


Figure 2: The interaction effect of animal species (goats, cattle) and unpassed/untreated seeds (i.e. not ingested - control), seed recovery day (first three days (F3)), last four days (L4)) and planting methods (seeds placed on top of the soil with no dung (Top), seeds buried 2 cm in the soil with no dung (ND), seeds buried 2 cm in the soil with dung (WD) on seedling recruitment. Bars represent standard errors (S.E). Fisher's *post hoc* test was used.

- High % seed recovery may be attributed to body size and ingestive chewing.
- Acid scarification in the digestive tract of goats and cattle improved seedling emergence and recruitment (Grellier et al. 2012, Tjelele et al. 2012).
- Hardening of the seeds that had been softened (scarified) by gut passage due to exposure to the sun and dry air .

Acknowledgements

- National Research Foundation (NRF) and
- International Foundation for Science (IFS).
- Students: Marvin Mavhunga, Malose Matlou and Olga Mabelebele