The influence of tree thinning and tree species on the dry matter yield of grasses of a bush encroached semi-arid savanna in South Africa

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Introduction The *Acacia erubescens-Combetum apiculatum* dominated savanna of South Africa is water-limited and an increase in woody plant abundance suppresses the grasses. This is the major reason why thinning or total clearing of all woody plants is often considered by landowners. The objectives of this study were to investigate the influence of intensity of tree thinning and tree species on grass yields in a semi-arid South African savanna.

Materials and methods The study was conducted in the Limpopo Province of South Africa on sandy soil. The mean long-term seasonal rainfall is 416 mm. The treatments consisted of five, 1 ha plots (200 m x 50 m) of which the control plot was left undisturbed (100 % plot) and the others thinned to the equivalents of 70 %, 50 %, 30 % and 10 % of the tree density of the 100 % plot (3 679 tree equivalents (TE)/ha, 1 TE = a tree of 1.5 m). The mean height of the trees was 2.57 m (SE ± 0.067), with a mean canopy diameter of 2.05 m (SE ± 0.074). The dry matter (DM) yield of grasses within the five tree-density plots was determined during five seasons following tree thinning. Grasses were harvested in 60 quadrats (0.5 m^2) per treatment, randomly placed under leguminous and non-leguminous trees, respectively. The leguminous tree group comprised of *A. erubescens, A. tortilis, A. nilotica, Dichrostachys cinerea* and *Peltophorum africanum*. The non-leguminous tree group comprised of *C. apiculatum, Euclea undulata, Terminalia sericea* and *Grewia* species.

Results and discussion The total seasonal rainfall for the five seasons following tree thinning were 481, 277, 335, 495 and 335 mm, respectively. The annual grass DM yields (Figures 1 and 2) followed the rainfall pattern, but within any season yields were generally higher in the thinned plots compared to the control plot, confirming the suppressive effect of the woody plants on the grass layer. However, the highest yields were not always recorded in plots with the highest intensity of tree thinning. Grass yields were generally higher under leguminous trees compared to non-leguminous trees. This can mainly be ascribed to one grass species, *Panicum maximum*. A higher soil nutrient status under leguminous trees is considered the main reason for these differences.

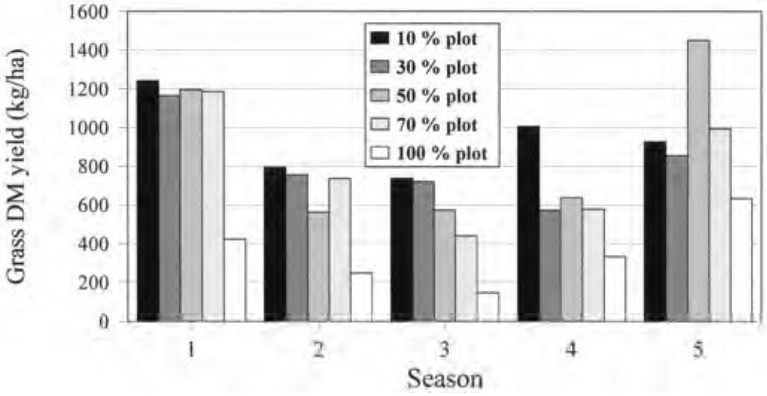

Figure 1 Grass DM yields under the canopies of leguminous tree species

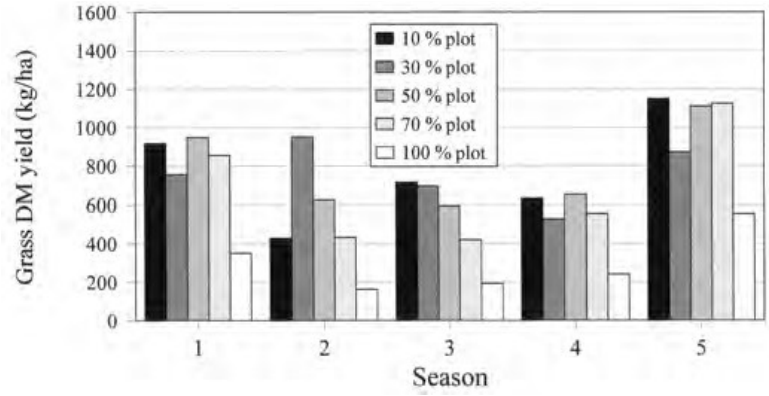

Figure 2 Grass DM yields under the canopies of non-leguminous tree species

Conclusions Considerable benefits in terms of grass DM yield, can be derived from tree thinning, but some trees need to be retained. In this regard the leguminous trees proved more advantageous to grass yields and these trees should preferably be retained.