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A comparison of *Cassia sturtii*, *Tripteris sinuatum* and *Sutherlandia microphylla*: three fodder shrubs applicable to revegetation of degraded rangeland in the Northern Cape Province

T.E. Wilcock[1], W.A. van Niekerk[2#], N.F.G. Rethman[1] and R.J. Coertze[2]
[1]Department of Plant Production & Soil Science, University of Pretoria, Pretoria, 0002, South Africa
[2]Department of Animal & Wildlife Sciences, University of Pretoria, Pretoria, 0002, South Africa

Abstract

Many arid and semi-arid areas have been degraded to bare patches and interventions are necessary to restore a productive state. Fodder shrubs, both exotic and indigenous, have been used for revegetation and reclamation. Ideally the species to be used should be adapted to arid conditions. This trial included one exotic (*Cassia sturtii*) and two indigenous (*Sutherlandia microphylla* and *Tripteris sinuatum*) species. The objective was to make a comparison of production and nutritional qualities over the growing season. *Sutherlandia* and *Tripteris* compared well in terms of both production and quality, with *Cassia.*

Keywords: *Cassia sturtii*, *Sutherlandia microphylla*, *Tripteris sinuatum*, production, crude protein, *in vitro* DOM and ash
[#]Corresponding author. E-mail: willem.vanniekerk@up.ac.za

Introduction

In South Africa many arid and semi-arid areas have been degraded and in severe cases large bare patches developed (Van der Merwe & Kellner, 1999), which then eroded, exposing the lowest horizons of the soil profile and preventing the germination of seeds (Van der Merwe & Kellner, 1999). The vegetation will not recover with rest alone (Hoffman & Aswell, 2001) and the establishment of palatable fodder shrubs supplies a fodder source during dry months (Kibon & Ørskov, 1993). This trial involves drought tolerant fodder species, *Cassia sturtii* (an exotic) and two indigenous species, *Tripteris sinuatum* and *Sutherlandia microphylla.* These shrubs are generally palatable and meet the nutritional needs of grazing animals (Le Roux *et al*., 1994).

The objective of this trial was to compare the three species, over time, in terms of production, leafiness and certain qualitative characteristics.

Materials and Methods

Twenty replicates per species were randomly allocated to plots. Five seedlings of a species were planted per plot. Four replicates per species were harvested (20 cm above ground level) randomly at each harvest date (7th July, 18th August, 29th September, 10th November and 22nd December 2003). The plant material was separated into leaf and stem material and then dried in a forced draught oven at 60 °C for 24 hours. Plant production was based on dry matter (DM) yields. The percentage leaf material was also determined. Representative samples of the final harvest were analysed for *in vitro* digestible organic matter (IVDOM %) (Tilley & Terry, 1963), as modified by Engels & Van der Merwe (1967), crude protein (CP) (AOAC, 2000) and ash (AOAC, 2000).

An analysis of variance with the GLM model (SAS, 1994) was used to determine the significance of differences between species, leaves and stems and harvest dates. Means and standard deviations (s.d.) were calculated. Significance of difference ($P < 0.05$) between means was determined by the Bonferroni test (Samuels, 1989).

Results and Discussion

Sutherlandia had the highest DM yield (Figure 1). After the third harvest *Sutherlandia* exhibited a drastic increase in yield in comparison with the other species. Severe frost (experienced at the end of August

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2003) affected both *Tripteris* and *Cassia*. *Cassia*, although affected by the frost, recovered quickly and an increase in yield was noted after 29th September. Although *Tripteris* produced more material in the initial harvests, the frost took its toll and recovery was slower than that of C*assia*. *Cassia* had a slow start and the lowest DM yield over time. By the 22nd of December production levels of *Cassia* were equivalent to those of *Tripteris.* There was also an increase in the amount of weeds in the camp and they too, seemed to impact the growth of *Tripteris*.

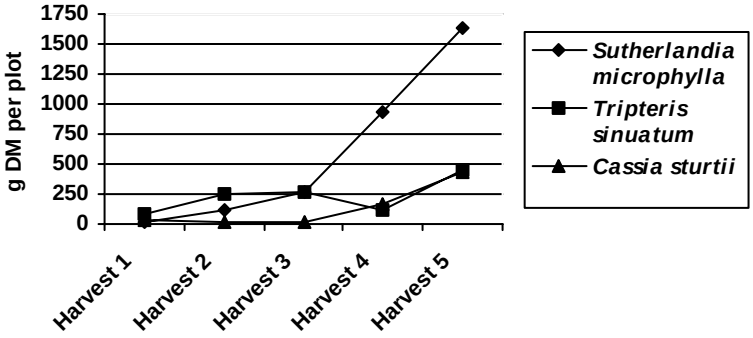

Figure 1 The dry matter (DM) production (g per plot) of different fodder shrub species at different harvest times

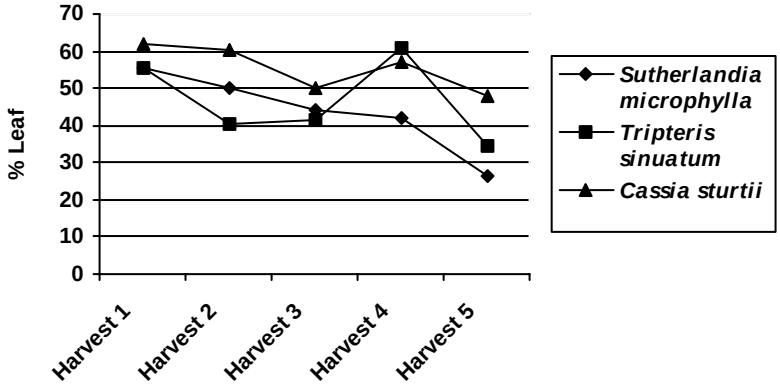

Figure 2 The percentage leaf in different species at different harvest dates

As the plants increased in size, a decrease in the percentage leaf material was observed (Figure 2). Of the three species the largest decrease was observed in *Sutherlandia*. *Cassia* had the highest percentage leaf. The drastic decrease in percentage leaf between the November and December harvests in *Tripteris* may have been due to a heavy weed infestation at that stage.

Harvested material was analysed for *in vitro* digestible organic matter (IVDOM), ash and CP concentrations (Table 1). The leaves of *Tripteris* and *Sutherlandia* had the highest CP concentrations and IVDOM ($P < 0.05$). *Cassia* stems had higher IVDOM values than those of both *Tripteris* and *Sutherlandia* ($P < 0.05$), but no differences were observed in the CP concentration between the different species ($P > 0.05$). Research conducted by Sparks (2003) indicated that *Cassia* was nutritionally inferior to *Atriplex nummularia*. The leaves of *Tripteris* had a higher percentage ash than leaves of both *Sutherlandia* and *Cassia* ($P < 0.05$). In all species higher IVDOM and CP concentrations were observed in the leaves than in the stems ($P < 0.05$).

The NRC (1981) suggested that the protein requirement for maintenance of a 50 kg doe is 75 g/kg feed. All three species met this requirement.

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Table 1 Comparison of the *in vitro* digestible organic matter (IVDOM) and the ash and crude protein (CP) concentrations of the leaves and stems of different fodder shrub species (± s.d.)

	Stems ≤ 3 mm	Leaves
Sutherlandia microphylla		
IVDOM, %	$38.9^{ab}{}_1$ (± 2.7)	$66.0^{b}{}_2$ (± 3.7)
Ash, g/kg DM	$25^{a}{}_1$ (± 3.0)	$64^{a}{}_2$ (± 2.0)
CP, g/kg DM	$88^{a}{}_1$ (± 9.0)	$225^{b}{}_2$ (± 19)
Tripteris sinuatum		
IVDOM, %	$33.0^{a}{}_1$ (± 4.9)	$66.8^{b}{}_2$ (± 1.2)
Ash, g/kg DM	$105^{c}{}_1$ (± 14)	$184^{b}{}_2$ (± 17)
CP, g/kg DM	$98^{a}{}_1$ (± 8)	$216^{b}{}_2$ (± 47)
Cassia sturtii		
IVDOM, %	$41.8^{b}{}_1$ (± 2.4)	$55.4^{a}{}_2$ (± 2.3)
Ash, g/kg DM	$53^{b}{}_1$ (± 2)	$73^{a}{}_2$ (± 10)
CP, g/kg DM	$76^{a}{}_1$ (± 10)	$147^{a}{}_2$ (± 11)

^{ab}Column means within parameter with common superscripts do not differ ($P > 0.05$)
$_{1,2}$Rows means with common subscripts do not differ ($P > 0.05$)

Conclusion

Both indigenous species have potential as fodder shrubs for revegetation projects. Although the establishment of such fodder shrubs is often not financially feasible for small scale farmers (Le Houérou, 2000), it is important that farming systems be used which are based on sustainable practices in order to restore degraded areas and maintain them at a satisfactory production level.

Acknowledgments

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