

## The chemical composition of leaves from indigenous fodder trees in South Africa

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### Introduction

Leaves from indigenous trees are an important source of nutrients for herbivores in Southern Africa. Not only are many game species dependent on this food source, but commercial and small holder farmers make extensive use of edible trees as a livestock feed. According to McDonald & Ternouth (1979) the leaves from these trees are usually rich in protein and their chemical composition tends to vary little within a season. Leaves on trees also tend to stay green longer into the dry season than grasses. Due to their deep roots it is usually assumed that trees and shrubs can extract minerals from deep soil layers which are inaccessible to shallow rooted plants such as grasses and are therefore a good source of minerals to herbivores. However, the utilization of nutrients from many tree species is limited by anti-nutritional factors such as tannins. This study was aimed at measuring the nutrient composition of leaves from tree species found in the northern bushveld regions of South Africa.

### Materials and Methods

The species sampled were *Combretum zeyheri* (Raasblaar, 546), *Combretum apiculatum* (Red Bushwillow, 532), *Combretum molle* (Velvet Bushwillow, 537), *Peltophorum africanum* (Weeping Wattle, 215) and *Colophosphermum mopane* (Mopane, 198). Leaves were picked randomly from trees within a species at different sites between Pretoria and Warmbaths and in the vicinity of Phalaborwa. Collections were made during summer, spring and autumn. A total of 47 samples were analyzed. The green leaves were rinsed in distilled water to remove dust and stored in a refrigerator to be freeze dried as soon as possible after collection. Twigs and branches were removed before a sample was ground and stored pending chemical analyses. The standard Proximate analysis was performed on the samples, except for crude fibre where the Van Soest analyses of neutral detergent fibre (NDF), acid detergent fibre (ADF), acid detergent insoluble nitrogen (ADIN) and acid detergent lignin (ADL) were done instead. Atomic absorption (AA) spectrophotometry was used to measure the concentration of the calcium (Ca), potassium (K), magnesium (Mg), sodium (Na), manganese (Mn), cobalt (Co) and copper (Cu) in the leaves and the hydride generator attachment to the AA for the selenium (Se) assay.

### Results and Discussion

The results are presented in Tables 1 and 2. The concentrations of the macronutrients were similar to values for Mopane and Red Bushwillow published by Groenewald *et al.* (1967). The crude protein concentration of the leaves varied between 80 and 200 g/kg DM. The concentrations of macrominerals compared well with those from other studies (Serra *et al.*, 1997). The sodium concentration in the leaves was much lower than the requirements of livestock (McDowell, 1997). The average Se concentration in all the tree species was lower than requirements of livestock (minimum Se requirement: 0.1 mg/kg DM; McDowell, 1997).

**Table 1** Average concentration of nutrients in tree leaves.

Species	CP	Ash	NDF	ADF	ADFN	ADL	EE
	g/kg DM						
<i>P. africanum</i>	124	58.3	384	228	-	-	-
<i>C. mopane</i>	141	58.1	380	307	10.2	145.7	42.3
<i>C. apiculatum</i>	122	62.0	323	247	6.4	52.3	44.0
<i>C. molle</i>	92	78.9	392	355	5.7	74.8	32.8
<i>C. zeyheri</i>	114	50.2	350	302	5.5	62.5	29.7

**Table 2** Average concentration of minerals in leaves.

Species	P	Ca	K	Na	Mg	Se	Mn	Cu	Co
	g/kg DM				mg/kg DM				
<i>C. mopane</i>	1.56	9.9	7.86	0.049	2.05	0.088	55.9	8.1	3.1
<i>C. apiculatum</i>	1.05	9.4	6.62	0.037	3.15	0.073	46.7	8.3	13.6
<i>C. molle</i>	1.20	12.1	6.66	0.040	2.71	0.034	50.6	4.2	3.1
<i>C. zeyheri</i>	1.11	10.5	6.78	0.039	2.18	0.012	27.6	6.3	8.7

## References

- Groenewald, J.W. et al., 1967. Proc. S.Afr. Soc. Anim Prod. 6, 117.  
McDonald, W.J.F. & Ternouth, J.H., 1979. Aust. J. Exp. Agric. Husb. 18, 344.  
McDowell, L.R., 1997. Minerals for grazing ruminants in tropical regions. Bull. 3, University of Florida Coop. Extension Services.  
Serra, A.B. et al., 1997. Asian-Austr. J. Anim. Sci. 10, 28.