

Influence of Species and Harvesting Height on Chemical Composition, Buffer Nitrogen Solubility and in vitro Ruminal Fermentation of Browse Tree Leaves

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Abstract : In some tree species, sustained herbivory can induce changes in biosynthetic pathways resulting in overproduction of anti-nutritional secondary plant compounds. This inductive mechanism, which has not been demonstrated in semi-arid rangelands of South Africa, may result in browse leaves of lower nutritive value. In this study we investigate the interactive effect of browsing pressure and tree species on chemical composition, buffer nitrogen solubility index (NSI), in vitro ruminal dry matter degradability (IVDMD) and in vitro ruminal N degradability (IVND) of leaves. Leaves from *Maytenus capitata*, *Olea africana*, *Cordia alliodora*, *Carissa macrocarpa*, *Rhus refracta*, *Ziziphus mucronata*, *Boscia olivoides*, *Grewia robusta*, *Phyllanthus vespucosus* and *Ehretia rigida* trees growing in a communal grazing area were harvested at two heights: browsable (< 1.5 m) and non-browsable (> 1.5 m), representing high and low browsing pressure, respectively. The type of animals utilizing the communal rangeland includes cattle at 1 livestock unit (450kg)/12 to 15 hectares and goats at 1 livestock unit/4 ha. Harvested leaves were dried, milled and analysed for proximate components, soluble phenolics, condensed tannins, minerals and in vitro ruminal fermentation. A significant plant species and harvesting height interaction effect ($P < 0.05$) was observed for total nitrogen (N) and soluble phenolics concentration. Tree species and harvesting height affected ($P < 0.05$) condensed tannin (CTs) content where samples harvested from the non-browsable height had higher (0.61 AU550 nm/200 mg) levels than those harvested at browsable height (0.55 AU550 nm/200 mg) while their interaction had no effects. Macro and micro-minerals were only influenced ($P < 0.05$) by browse species but not harvesting height. Species and harvesting height interacted ($P < 0.05$) to influence IVDMD and IVND of leaves at 12, 24 and 36 hours of incubation. The different browse leaves contained moderate to high protein, moderate level of phenolics and minerals, suggesting that they have the potential to provide supplementary nutrients for ruminants during the dry seasons.

Keywords : browse plants, chemical composition, harvesting heights, phenolics

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