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Evaluating the Temporal, Seasonal and Spatial Variation in Nutritive Value of Cactus Pear (*Opuntia ficus-indica*) Using *in vitro* Gas Production and Chemical Analysis Methods

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Abstract

Cactus pear (*Opuntia ficus-indica*) is a multipurpose plant of increasing importance in dry areas. A series of three investigations done in northern Ethiopia showed that: (1) farmers use cactus as forage, (2) it can substitute hay up to 60 % and is a vital water source, (3) it is complimentary with urea-treated straw and could partly substitute wheat bran provided straw is urea-treated. Since the feeding trials were done during a dry season at one location this study investigated the seasonal and spatiotemporal variation in chemical composition and *in vitro* gas production. Three cladodes/pads of three age groups (<1, 1, and >1 years old) from five plants per location (three agro-ecologies) were collected during dry and rainy seasons. *In vitro* gas production test was done according to Menke and Steingäß (1988). Data were subjected to ANOVA using the General Linear Model of SPSS 13.0. Age affected crude protein and crude fibre ($p < 0.001$) but not dry matter (DM) and ash contents ($p > 0.05$). Season affected ($p < 0.001$) all chemical composition parameters except ash content. Location affected ($p < 0.05$) all components except DM content. None of the *in vitro* degradation parameters were affected by age and season except b and a, respectively ($p > 0.05$). In contrast, location had effects on a and b ($p < 0.001$). None of the factors affected c ($p > 0.05$). Gas production was unaffected ($p > 0.05$) by age and season while location appeared to affect ($p < 0.05$) it at 4 and 48 incubation hours. In conclusion, from the nutritionally important components only crude protein content is affected by age, season and location. Cactus pear could be fed in all cactus-growing zones of the study area year-round but with a strategy that younger cladodes are fed during the dry season.

Keywords: Age, cactus pear, chemical composition, Ethiopia, *in vitro* gas production, location, season