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## Variety, Harvest Date after Planting, and Fraction of Napier Grass Influence *in vitro* Gas Production

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### Abstract

An experiment was conducted to assess the effect of variety (V), harvest date (HD) and plant fraction (PF) on *in vitro* gas production (IVGP) of Napier grass cultivated and harvested in the humid zone of Ghana. The varieties were Local, 16798, 16786 and 16840. Except for the Local variety, all were improved varieties from ILCA (now ILRI). The HD was at 60, 90 and 120 days after planting and leaf and stem fractions were tested separately. A randomised 4\*3\*2 factorial design was used to evaluate the amount and rate of IVGP using the automated AnkomRF system.

The results from IVGP showed multi-phasic curves indicating differential microbial degradation rates. Therefore the results were separated into three phases (0–7, 7.5–24.5 and 25–48 hours) based on the mean rate of gas production. Effects of V, HD and PF and interactions on amount and rate of IVGP were tested with linear models (significance:  $p < 0.05$ ). There was significant difference in the rate of IVGP in phase III among varieties with V16798 showing highest values. Rate of V and HD significantly interacted in phases II and III. V and PF interaction was significant in phase III for rate. There was a significant difference in absolute IVGP after 48 hours, with V16798 highest. There was significant difference in the rate for HD in all 3 phases. The rate was highest for HD120 in phase I and HD60 higher in phase II and III. Interaction between HD and PF was significant in phase I and II for rate of IVGP. Total amount decreased with increase in HD (60>90>120). The difference in absolute IVGP was significant for HD after 48 hours. There was a significant difference in the rate of IVGP for PF in all 3 phases. The rate of IVGP was higher for stem in phase I and II, with the leaf taking over in phase III. The overall IVGP for the PF was higher for the leaf but the difference was not significant.

The study revealed that improved and local varieties degraded differentially with large differences in PF and HD and could potentially provide complementary fermentation substrate throughout 48 hours.

**Keywords:** AnkomRF gas production system, mean rate of gas production, napier grass variety