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Crude Nutrient and Mineral Composition of *Asystasia Gangetica (L)* Derived from Different Growing Areas

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Abstract

Asystasia gangetica as a predominant plant species for feeding goat grows widely in various lands in Payakumbuh region. The present study was aimed to determine crude nutrient and mineral composition of the wild plant derived from five different growing areas, i.e. banana and cacao plantations, road sides, idle lands and river banks. The sampling sites were distributed in 3 different subdistricts. Fresh samples which were collected by using a plate meter of 0.5 x 0.5 m^2 were weiighed, chopped, dried and then ground in meal form prior to analysis for dry matter (DM), crude ash, crude protein (CP), crude fiber (CF), acid detergent fiber (ADF), cellulose, and minerals of Ca, P, Mg, Cu, Zn, Mn. Data were subjected to analysis of variance (ANOVA) in completely randomixed design of 5x3 consisting of 5 growing areas and 3 subdistricts as replications. Results showed that *A. gangetica* contained relatively low DM of 9.3-11.9%. Crude ash ranged 16.8-20.9%, CP: 15.5-25.0%, CF: 23.2-28.6 %, ADF: 42.5-46.4%, and cellulose :26.5-29.7%. Macro mineral Ca ranged 18.8-20.5 g, P:11.2-17.4, Mg: 7.5-8.5 g/kg DM. Trace element of Cu ranged 22.0-29.4 mg, Zn:17.4-22.6 mg, Mn: 36.2-41.4 mg/kg DM. *A. gangetica* grown in the banana plantation areas showed the highest crude protein content, while the highest fiber content was found by *A. gangetica* collected from the cocoa plantation. *A. gangetica* grown in river banks tended to have the higher mineral content of Ca, P, Mg, and Cu.

*Keywords***:** *Asystasia gangetica* L, predominant species, crude nutrient, mineral composition

Introduction

A. gangetica (Linn) T. Anderson belongs to the family of Acanthaceae and is commonly known as the Chinese violet. It has green and oval-shaped leaves with rounded base occurring in opposite pairs. This herb grows well and spreads widely in crop plantations, such as rubber, coffee, and palm oil plantations in particular (Ong *et al*., 2008). Although this plant is considered a serious environmental and agricultural weed (Asbur *et al*., 2015), *A. gangetica* is known have high nutritional value for feed, because this plant was not only rich in protein and soft fiber, but also contained favorable amount of minerals (Khalil, 2016; Sobayo *et al*., 2012; Adigun *et al*., 2014).

Goat farming in Payakumbuh region which cover Payakumbuh city and 50 Kota district is distributed mainly in the six sub-districts of Lareh Sago Halaban, Harau, Mungka, Luhak, Payakumbuh Timur and Payakumbuh Barat (Kurnia *et al*., 2015). These regions are dominated by annually small-scale crop estates as potential sources of fodder feed. *A. gangetica* is widely grown in various areas, like plantation areas, river banks, rice fields, idle lands, forest edges, and roadsides. This wild forage which called "akar jalar" or "aka jala" by locals was found to be very palatable and as a predominant species used for feeding goat in Payakumbuh (Khalil, 2016). The present research was aimed to identify the dominance and to determine crude nutrient and mineral composition of *A. gangetica* derived from five different growing areas, i.e. banana and cacao plantations, road sides, idle lands and rive banks.

Materials and Methods

Fresh samples of *A. gangetica* were collected at 5 growing areas, i.e. banana and cacao plantations, road sides, idle lands and river banks. The sampling areas were distributed in 3 different subdistricts of South Payakumbuh, Payakumbuh and Luhak. Samples were collected at 5 sampling points each area by using quadrants plate mater of 0.5 x 0.5 m^2 in size. Plant materials in plate meter were cut about 10 cm above ground level and placed in individual plastic bag. The fresh samples were weighed, separated into species and then weighed for determination of botanical composition.

Samples of *A. gangetica* at each sampling area were chopped and mixed. Representative samples of about 100-150 g were dried in a forced draught oven at 60ºC for 24 hours, weighed again and ground in meal form prior to analysis for dry matter (DM), crude ash, crude protein (CP), crude fiber (CF), acid detergent fiber (ADF), cellulose and minerals (Ca, P, Mg, Zn, Cu, Mn). Data were subjected to analysis of variance using a completely randomized design of 5x3 consisting of of 5 growing areas and 3 subdistricts as replications. Duncan's Multiple Range Test was applied to compare means. Differences were considered significant at P < 0.05 (Steel *et al*., 1997).

Results and Discussion

There were in total about 12-16 wild plant species growing together with *A. gangetica*. As shown in Table 1, *A. gangetica* dominated plant colonies which composed of about 90% in banana and cacao plantations, road sites, and idle lands and 76% in river bank. This plant is known as a rapidly growing struggling herb, spreads very quickly as weed which infests crops, such as rubber, coffee, and particularly palm oil plantations (Ong *et al*., 2008). It adapts well to low fertility soils and shaded areas (Ong *et al*., 2008; Samedani *et al*., 2013). *A. gangetica* contained relatively low DM of 9.3-11.6%. The DM content of *A. gangetica* of the present study was comparable with the result of Bindelle *et al*. (2007) who reported that *A. gangetica* contained DM of about 10.5%, but lower than the DM content of 14.6% and 15.0% of those reported by Khalil (2016) and Odhav *et al*. (2007), respectively. This plant is presumably favored by goats because of its soft leaf texture and high-water content.

The nutrient content ranged from 15.4 to 25.0% CP, 23.2 to 28.6% CF, 16.8 to 20.9% crude ash, 42.5 to 46.3% ADF, and 26.5 to 29.7% cellulose in DM. *A.*

gangetica grown in banana plantation showed significantly higher crude protein concentration of about 25.0%, while four other sources showed relatively low variation of about 15-19% CP. Crude fibers were varied among the feed. *A. gangetica* from cacao plantation contained the highest crude fiber of about 28.6% followed by road sides and idle lands of 25.8 and banana plantation of 24.4%, while the lowest fiber was found by *A. gangetica* from river banks of about 23.2% (P<0.05). There was no statistically different in crude ash, ADF and cellulose content (P>0.05).

There were no significant differences in macro mineral content. Calcium varied from 18.3-20.5 g/kg, followed by P (11.2-17.3 g/kg), and Mg (6.8-8.5 g/kg DM). In term of mean values, *A. gangetica* grown at river banks tend to have the highest macro mineral content presumably due to high mineral sedimentation carried by river water flow. In compare to other dominant forages fed to goat in Payakumbuh region, *A.gangetica* was found as reliable sources of Ca and P with relatively narrow Ca/P ratio. It contained significantly higher Ca of 8.2 g/kg DM than that of grasses (2.1 and 2.2 g/kg DM) and *C. pubescens* (3.5 g/kg DM) (Khalil, 2016). The P mineral content of 11.2-17.3 g/kg DM of *A. gangetica* was found comparable to P content of *C. pusbescens* (12.6 g/kg DM) and cassava leaf (11.4 g/kg DM) (Khalil, 2016).

Table 1. Plant dominance, dry matter and crude nutrient content and mineral composition of *A. gangetica* grown in different areas

Parameter	Growing areas				
	Banana plantations	Cacao plantations	Road sides	Idle lands	River banks
Plant dominance (%)	94.3±5.0	90.2±3.0	89.1±11.3	95.0±3.9	76.2±8.1
DM content (%)	9.3±0.7	10.6±1.2	11.9±0.5	10.1±1.3	11.6±2.7
Crude nutrient (% DM)					
- Crude protein	25.0±3.7[a]	15.4±3.6[b]	18.7±4.2[b]	18.5±3.8[b]	18.7±1.0[b]
- Crude ash	20.9±2.4	18.5±2.1	17.0±2.2	17.4±1.4	16.8±4.4
- Crude fiber	24.4±2.8[b]	28.6±0.8[a]	25.7±2.2[ab]	25.8±2.0[ab]	23.2±2.1[b]
- ADF	42.5±2.5	46.4±3.7	45.0±3.9	45.2±3.0	45.2±4.7
- Sellulosa	27.4±1.5	29.7±2.7	26.5±3.7	29.0±1.5	29.0±1.6
Macro minerals (g/kg DM):					
- Ca	18.3±0.9	19.0±1.7	18.5±4.7	20.5±3.5	20.3±1.3
- P	14.4±2.8	11.2±3.6	15.6±7.0	12.6±1.2	17.3±3.8
- Mg	7.4±1.6	8.3±0.6	8.5±0.6	6.8±0.4	7.7±1.3
Micro minerals (mg/kg DM)					
- Zn	17.4±2.3[d]	22.5±3.8[a]	18.5±2.5[cd]	22.1±1.5[a]	19.9±1.8[bc]
- Cu	29.4±1.6[a]	27.2±2.4[a]	22.0±0.7[b]	24.8±3.3[ab]	29.1±3.1[a]
- Mn	40.2±4.1	41.3±3.5	38.1±5.0	37.8±3.1	36.2±1.6

Different superscript in the same line means significantly different (P < 0.05)

A. gangetica was found a relatively rich on trace mineral Zn, Cu, and Mn. *A. gangetica* derived from cacao plantation and idle land contained the highest Zn, while the highest Cu concentration of 29 mg/kg DM was found by *A. gangetica* derived

from banana plantation and river banks. There was no significant difference in Mn concentration. Concentration of Zn (17.7-22.5 mg), Cu (22.0- 29.1 mg), and Mn (36.2-41.3 mg/kg DM) were comparable to the previous results reported by Khalil (2016).

Conclusions

A. gangetica was favored by goats presumably because of its availability, palatability and high nutritional values. This plant grown in the banana plantation areas showed the highest CP, while the highest fiber was found by *A. gangetica* collected from the cocoa plantation. *A. gangetica* grown in the river banks tended to have the higher mineral content of Ca, P, Mg, and Cu.

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