



## Evaluation of the chemical constituents of savannah tea (*Lippia multiflora*) leaves

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### ABSTRACT

**Objectives:** this study is to determine macromolecules and ash contents in the buds of young and mature leaves of *Lippia multiflora*.

**Methodology and results:** The Samples of buds, young and mature leaves of *Lippia multiflora* were harvested from non cultivated areas at Yamoussoukro, town localised in the Center of Côte d'Ivoire. The dry matter, lipids and ash contents were assessed according to AOAC methods. Soluble sugars and proteins contents were measured by Agbo and Kjeldahl methods respectively. The dry matter contents were  $19.86 \pm 0.13\%$  in buds,  $20.36 \pm 0.31\%$  in young leaves and  $36.82 \pm 1.50\%$  in mature leaves. The ash contents were respectively  $10.26 \pm 0.048$ ,  $10.95 \pm 0.15$  and  $17.94 \pm 0.43\%$ . The protein levels were  $12.95 \pm 0.073\%$ ,  $11.21 \pm 0.14\%$  and  $9.63 \pm 0.57\%$  respectively. The lipids contents were less than 1% and the soluble sugars, less than 3%.

**Conclusion and Application:** the dry matter, ash and proteins contents depend on the age of *Lippia multiflora* leaves. Their lipids and soluble sugars levels are low but they can provide a good source of minerals. The nutritional value of the young leaves and buds could encourage the population to consume more *Lippia multiflora*. This study also gives precious information about the choice of better time for harvest. These results could also bring the food industries to popularize *Lippia multiflora* (an underexploited wild plant) through the transformation of its leaves (buds and young leaves) as tea. This could constitute a new agricultural product for the country and can serve as a source of income for the agricultural population.

**Keywords:** savannah tea, *Lippia multiflora*, chemical constituent, tea leaves

### INTRODUCTION:

The Verbenaceae is a large family of perennial herbaceous plants and is composed of 41 genera with about 200 species (Owolabi and al., 2009). *Lippia multiflora* Moldenke, issued from this plant

family, is an herbaceous plant, perennial, and very fragrant, which grows spontaneously in the areas of savannah. It is found almost everywhere in the Sudan savannah of West and Central Africa (Jim

and *al.*, 2001) It is commonly called savannah tea or Gambia tea. The infusion of the leaves is traditionally used to treat fevers, coughs, influenza (Irvine, 1961). Some rural dwellers cook the herbs and use it to relieve stress and enhance sleep (Kanko and *al.*, 1999). In modern medicine, *Lippia multiflora* Moldenke is used against gastrointestinal disorders, anti diarrheal and Malaria (Oussou and *al.*, 2008; Benoit and *al.*, 1976) and possesses hypertensive, fatigue-relieving and diuretic properties (Benoit, et *al.*, 1976). This plant also

possesses pesticide properties (Silou and Ouamba, 1993). Despite these multiple uses, studies on the physicochemical characteristics of *Lippia multiflora* Moldenke were limited to physicochemical properties of its essential oil (Kanko and *al.*, 1999) and the biochemical study concerning the domestic plant (Yao-Kouamé and Kane, 2008). The objective of this work is to determine macromolecules and ash contents of the buds of the young and mature leaves of *Lippia multiflora* Moldenke wild.

## MATERIAL AND METHODS

**Material:** Samples of buds, young and old leaves of *Lippia multiflora* were harvested from the non -

cultivated areas from July to August in 2009 at Yamoussoukro in the Centre of Côte d'Ivoire.



Buds



young leaves



mature leaves

**Figure 1:** Different stages of maturity of Savannah tea leaves

**Methods:** The samples were dried inside with air in the laboratory at temperature of 25° C during two weeks and preserved separately at ambient temperature in closed plastic containers. The leaf proteins contents were measured using the Kjeldahl Method, by the mineralization of 1g of every sample and, titration of the total nitrogen after distillation. The dry matter, lipids and ash contents were assessed according to AOAC methods (AOAC, 1984; AOAC, 1976). Soluble sugars

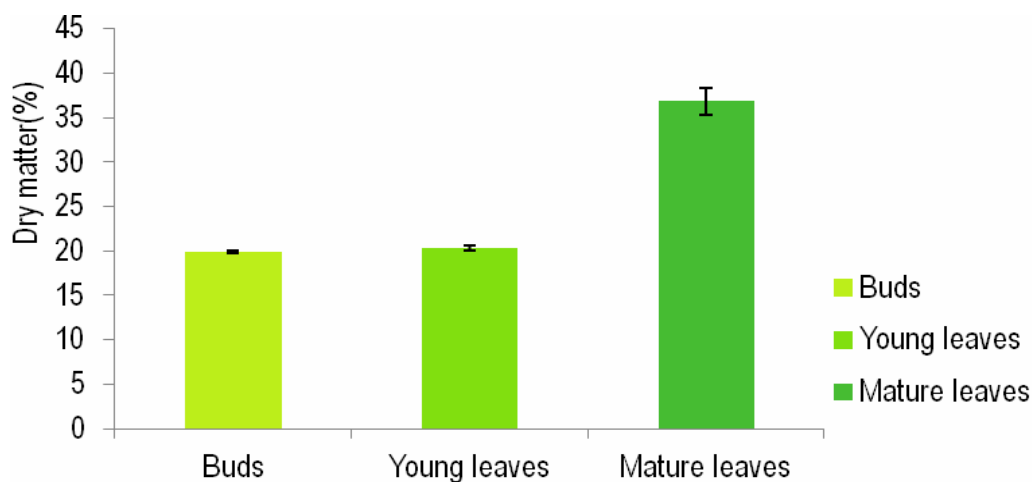
contents were measured according the method which is elaborated by (Agbo and *al.*, 1985). All determinations were expressed on a dry matter basis.

**Statistical analyse:** Data obtained from the chemical constituents analysis of savannah tea leaves simple were subject to analysis of variance (ANOVA) using STATISTICAL (six sigma) software package. Where significant difference existed Tukey's test was used in separating the means.

## RESULTS

Figure 2: show that the dry matter contents were 19.86 ± 0.13% in buds, 20.36 ± 0.31% in young leaves and 36.82 ± 1.50% in mature leaves. There is a significant

difference at ( $p < 0.01$ ) among the differents stages of tea leaves on dry matter. Tukey's test showed a difference among the three stages of tea leaves.

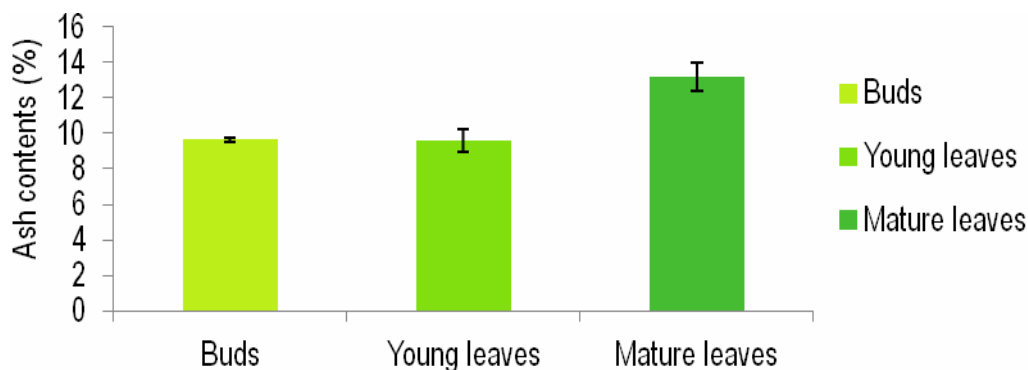


Maturity stage of leaves

**Figure 2:** dry matter contents in maturity stage of savannah tea leaves

The ash contents were respectively  $10.26 \pm 0.048$ ,  $10.95 \pm 0.15$  and  $17.94 \pm 0.43\%$ . According to the ANOVA, there is a significant difference in ash for the

three stages of leaves. The Tukey test showed a significant difference among the samples (buds, young leaves and matures leaves)

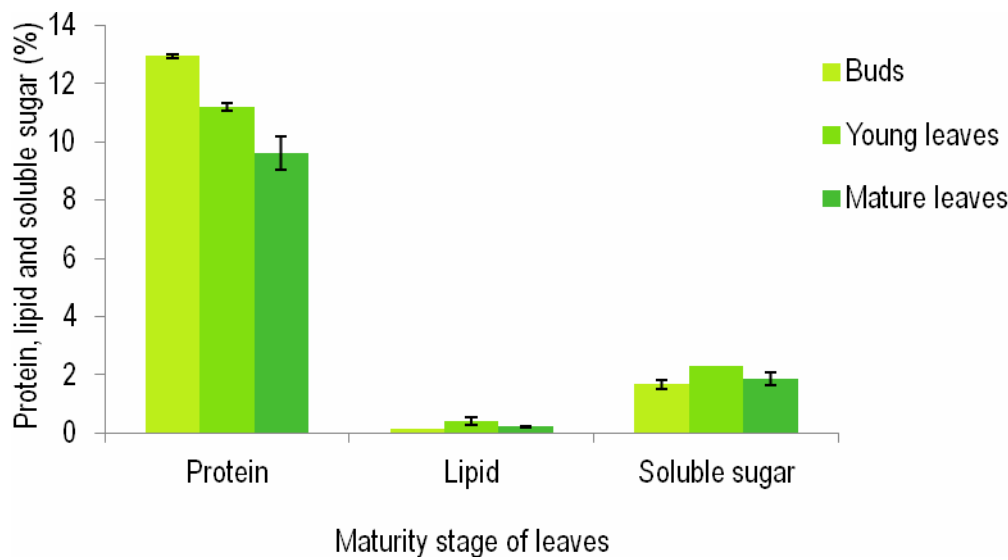


Maturity stage of leaves

**Figure 3:** Ash contents in maturity stage of savannah tea leaves

Protein levels was  $12.95 \pm 0.073\%$ ,  $11.21 \pm 0.14\%$  and  $9.63 \pm 0.57\%$ , respectively in buds, young leaves and matures leaves of *Lippia multiflora*. The lipids contents were less than 1% and the soluble sugars less than 3%. The protein, lipid and soluble sugar contents in samples were analyzed by the ANOVA and Tukey test.

The analysis showed a significant difference in protein between the different stages of savannah tea leaves (buds, maturity and young leaves). However the Tukey test showed no significant difference among samples in soluble sugar and lipid.



**Figure 4:** Macronutrients contents in Savannah tea leaves

## DISCUSSION

The dry matter content of leaves of *Lippia multiflora* at different ages is consistent with that obtained by (Denis, 1988) on *Camellia sinensis (tea)* (insert common name) which is between 20 and 30%. The low dry matter content of young leaves and buds, showed their high water content. In all, the ash content of *Lippia multiflora* was higher than those previously given as 4.5 to 5 %.( Denis, 1988). This reflects the richness of these leaves minerals content. The protein content was high in buds and in young leaves but low in old leaves. Protein levels were close to those given by (Yao-Kouame and Kané, 2008), which is 12% in the leaves of *Lippia multiflora*. This high content of protein in the

buds and young leaves may be the basis of their strong flavor, as shown in other studies (Guignard and *al.*, 1985). The buds and young leaves taste better than mature leaves, which could be recommended for making tea. The lipid contents are generally very low less than 1%. This result is similar to that found by (Luczaj and Skrzydlewska, 2005), around 2%, grade obtained in the fresh leaves of *Camellia sinensis (tea)* (common name). The very low content of sugars in the leaves could be due to their fast transfer and their storage in fruits, grains and roots by the sap (Zuffery, 2000).

## CONCLUSION

The dry matter, ash and proteins contents depend on the development stage of *Lippia multiflora* leaves. Their lipids and soluble sugars levels are low but they can provide a good source of minerals. The period of harvest and maturity of leaves are important for the quality of the tea process. The nutritional value of the young leaves and buds could encourage the population to consume more *Lippia multiflora*. This study also

gives precious information about the choice of better time for harvest. These results could also bring the food industries to popularize *Lippia multiflora* (an underexploited wild plant) through the transformation of its leaves (buds and young leaves) as tea. This could constitute a new agricultural product for the country and can serve as a source of income for the agricultural population.

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