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Comparism of the Proximate Composition of Shea (*Vitellaria paradoxa*) and Rubber Latex (*Hevea Brasilienesis)*

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Abstract: *The shea latex sample was tapped from different shea trees and the rubber latex sample was obtained from Kade in Ghana. The latex samples were spread on tarpaulin and subjected to air drying for three days. The samples were then poured into a transparent container and sent to the laboratory for the proximate analysis. Results from the study indicated that latex proximate composition varied considerably and is dependent on a number of factors including climatic conditions, season of the year and time of tapping. The study also revealed higher percentages of moisture, crude protein and carbohydrate in rubber latex than in shea latex. There was higher percentage of ash and crude fat in shea latex than in rubber latex. The shea latex yield was higher when tapping was done at 45˚C however, continuous tapping of the same tree eventually reduced yield. The study revealed that shea latex can be exploited and used to manufacture products such as balloons, gloves and condoms because of its low protein content compared to rubber latex.*

Key words: *Shea tree, (Vitellaria paradoxa) rubber tree,(Hevea brasilienesis), latex.*

1. Introduction

The shea tree (*Vitellaria paradoxa)* is a member of the Sapotaceae family which is divided into two subspecies: *nilotica* and *paradoxa.* The ranges of the two subspecies are mutually exclusive, although they have been found within 175km of one another (Hall *et al.,* 1996). *Hevea brasilienesis*, the Pará rubber tree, simply called rubber tree, and the most economically important member of the genus Hevea and belongs to the kingdom: Plantae, the Order: Malpighiales, Family: Euphorbiaceae, Subfamily: Crotonoideae, Tribe: Micrandreae, Sub tribe: Heveinae, Species: Brasilienesis.

In the bark of the rubber tree is a complex network of laticifers, or latex vessels, each vessel merely one-third the thickness of a human hair is exuded when the bark is cut (Omo-Ikerodah *et al.,* 2009). In the chemical industry's nomenclature, the term latex applies to any emulsion of polymers, including synthetic rubbers and plastics (Cyr, 1982).

Natural rubber latex (NRL) is obtainable from different species of plants/trees (Yip and Cacioli, 2002). Apart from being a carrier medium of various nutrients, the latex is thought to act as the protective fluid against insect predators for the tree (Dean, 1987).

2. Methodology

To harvest latex, the tree is tapped by excising a shaving of bark to sever the latex vessels (laticifers) from which latex then exudes (Gomez, 1983). Several factors contribute to the selecting of the right tapping method, including the cultivar grown, the age of the trees, the rainfall regime, the availability of skilled tappers and local wage agreements. Tapping usually takes place during the night when the initial flow rate of the latex is highest due to increased turgor pressure in the latex vessels (Paardekooper, 1989).

The shea latex (SHL) sample was tapped from a number of shea trees in the Northern Region of Ghana and the rubber latex (RL) sample was also obtained from Kade in the Eastern Region of Ghana. The SHL was tapped at angles 45˚ and 135˚ respectively at three days interval for one month.

Proximate analysis was conducted on both latex samples for moisture content, ash content, crude protein, crude fat and carbohydrate. Various known methods such as the Kjeldahl method (digestion, distillation and titration) were used for the determination of the crude protein and the soxhlet method for the determination of crude fat percentage. The moisture analyzer was used to determine moisture content. It was set at a temperature of 405°C for one hour after which the moisture content in the sample evaporated gradually and the final moisture recorded.

3. Results and Discussion

Table 1. *Proximate composition of shea and rubber latex*

	Shea latex (SHL)	**Rubber Latex (RL)**		
Parameter (%)	**Mean±S.D**	**Mean±S.D**	**P.Value**	**L.S.D**
Crude Protein	1.961±0.124	2.075±0.013	0.326	0.381
Ash	5.835±0.783	3.721±0.873	0.126	3.569
Moisture content	0.965±0.162	4.395±0.148	0.002	0.670
Crude fat	57.208±10.252	1.154±0.264	0.016	31.200
Carbohydrate	33.494±10.068	90.610±2.130	0.016	31.310

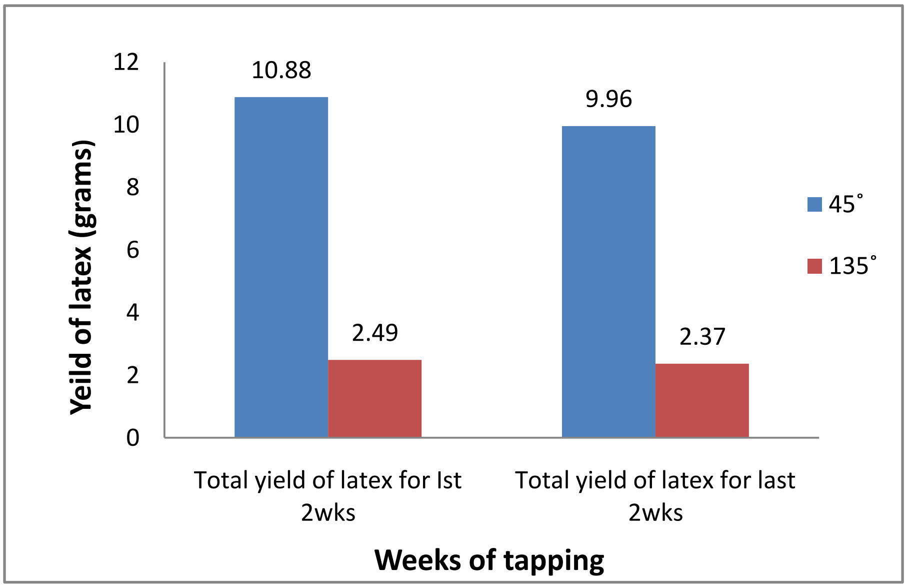

Figure 1. *Yield of shea latex from angles 45˚ and 135˚*

The results revealed significant difference ($p<0.05$) between the SHL and the RL in terms of their percentage moisture content. The percentage of moisture content was found to be less in the SHL than in the RL. Also, there was no significant difference between the SHL and the RL in terms of their percentage ash content ($p<0.05$). The percentage of ash was higher in the SHL than in the RL. There was also no significant difference between the SHL and the RL in terms of their percentage crude protein content ($p<0.05$). The percentage crude protein was higher in the RL than in the SHL.

Furthermore there was significant difference between the SHL and the RL in terms of their percentage crude fat content ($p<0.05$). The percentage of crude fat was found to be more in the SHL than in the RL.

4. Conclusion

The study reveals that shea latex can be exploited and used to manufacture products like balloons, gloves and condoms owing to its low protein content compared to rubber latex. Further research needs to be carried out on the biochemistry and identify the potential uses of the shea latex.

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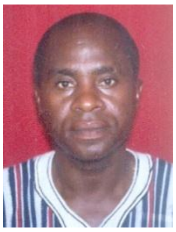
Authors' Biography

Ruth Fosu was a former student of the University for Development Studies Ghana who graduated from the Department of Biotechnology with a degree in Agriculture Technology in 2013. She is a Senior Technical Assistant at the Crop Research Institute Ghana and involved in tissue culture. She goal is to further her education in the area of plant sciences and agriculture.



Dr Albert K, Quainoo is a Senior Lecturer, the head of Department of Biotechnology and the Vice Dean of the Faculty of Agriculture University for development Studies Ghana. He has intensive research background in plant production, tissue culture, molecular biology and agriculture by-product utilization. He has passion for shea tree research demonstrated by his publications and look forward to research collaboration.