

## Evaluate the Different Gum Extracting Tapping System of Cashew Tree (*Anacardium occidentale* L.)

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### Introduction

Cashew (*Anacardium occidentale* L.) is native of North East Brazil. Its area of origin seems to have been the state of Ceara, where the tree is found to be this day in large natural forest (Jayasekara and Jayasekara, 2003). Collectively, cashew is usually considered the third or fourth the greatest nut of commerce (by mass) worldwide. Cashew is a perennial crop, which gives its harvest once in the year and harvesting period is about three to four months and in rest of the period in the year it is not making much attention to crop by most of farmers since they are not having economical benefits. Hence, this situation will affect to next year nut yield as well. Economic life span of cashew tree is about 30 years. Thus, utilization of unproductive and old plants is important to obtain continuous economic benefits to farmers. Cashew-gum extraction represents one more source of revenue for the producer, in addition to the cashew nut yield and the peduncle, as well as an alternative for the utilization of non productive cashew trees in a phase of decline or senescence (Lima, 2002). The resin is synthesized in the epithelial cells lining pockets or canals and then secreted into internal cavities (Lima, 2002). There are many application potentials can be identified in food industry, pharmaceutical industry and stationary industry (Gyedu et al., 2008 and Kumar et al., 2009). Therefore, there will be huge undiscovered potential to cashew gum in future if we could produce them in substantial amounts. Findings of this study will be important to the cashew cultivators, researchers, gum produces and gum base industries. Objectives of this study were to investigate potential of harvesting cashew gum and to identify the proper gum exudates method to tap the cashew trees.

### Methodology

This study was conducted at Cashew Research Center, Sri Lanka Cashew Corporation, Kamandaluwa Plantation, Puttalam district. The experiment plot was laid down in two factor factorial design with main two factors with four replicates. The main two factors were shape of cut (Horizontal cut, Vertical cut, "V" Shaped cut and 45° angle cut) and tapping depth (100% bark depth, 75% bark depth, 50% bark depth and 25% bark depth). Sampling plot consisted with 64 randomly selected fourteen years old budded cashew plants, which were propagated using single mother tree. Bark depth of cashew trees were measured using a bark gauge and tapping was practiced using conventional rubber tapping knife. One fourth of tree girth was taken as tapping length for all experimental trees. Maximum height for each cut was 60 cm from the ground level. A plastic cup was hanged to stem to collect cashew gum. Tapping direction was decided according to the cutting method. For "V" shape cut, tapping panel was marked by using a stencil and half of tapping length (one eighth of girth) was taken to one side of tapping line. For the 45° angle shape cut also, tapping panel was drawn by using a stencil. Growth parameters (girth, height and canopy size) were recorded from all experimental trees. Yield parameters namely availability of gum within unit time periods (three, six, and twenty four hours interval), gum yield within 24 hours interval and state of gum (liquid or solid) with three to six hours were

recorded. Data was subjected to Pearson correlation analysis and Tukey Mean Separation using Minitab Analytical software package (version 15.00) and SAS analytical software package (Version 9).

### Results and Discussion

Tree growth parameters such as stem girth, tree height and tree canopy did not significantly affect on the exuded gum yield. Scatter plots diagrams (Figure 1) of growth parameters and gum yield did not shown correlations and nether p values, which were obtained from Pearson correlation analysis was not less than 0.05. There was no significant ( $p < 0.05$ ) effect of physical growth parameters to gum exudation whiles there was a correlation among growth parameter and positive correlation.

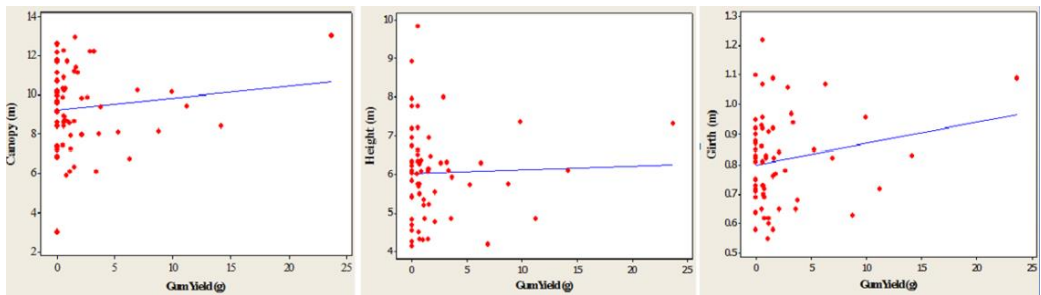


Figure 1. Scatter plot diagram of gum yield (g) vs. canopy (m), height (m) and girth (m).

Gum was collected after the gum reached to solid state. More tapping systems exuded gum within 96hrs. Gum exuded in liquid state and after certain time, gum state was change up to solid state. According to the data, time taken for changing state was 48 hrs. Gum which was reached to solid state was collected.

Solid state gum exuded was collected and weighted. 100% bark depth exuded the high gum amount than other depth. Best and second best tapping system was horizontal shape of cut and 100% bark depth. More than 65% of tapping systems tested trees were exuded the gum and therefore there is a good potential to extracting gum by using a tapping system. Sixteen treatment combinations were evaluated.

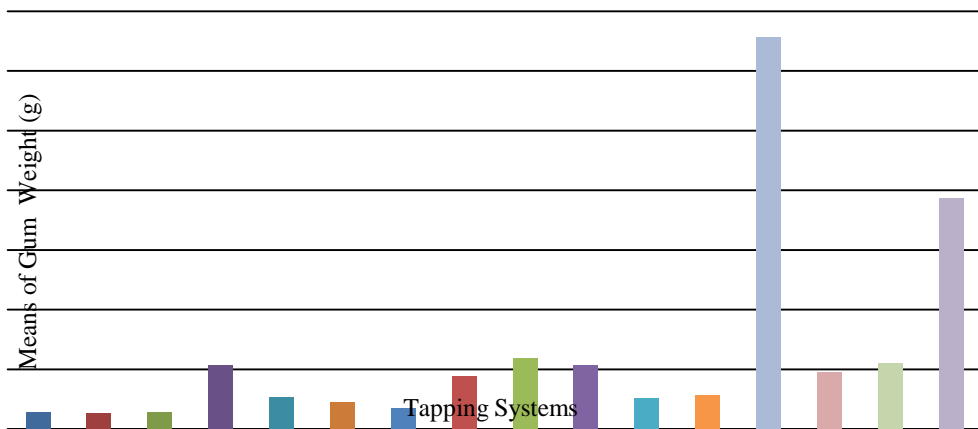


Figure 2. Exuded gum yield of tapping system.

According to the general linear model analysis,  $p$  value of shape of cut and tapping bark depth were 0.03 and 0.00 respectively. Therefore there was a significant effect between shape of cut and tapping depth to gum yield. There was an interaction between tapping cut method and tapped bark depth to gum yield ( $p=0.000$ ). Then, Tukey mean separation was carried out and according to the Tukey mean separation procedure, the best shape of cut was the horizontal cut (T<sub>1</sub>) and second best method was selected as 45° angle cut (T<sub>4</sub>). The best tapping depth was 100% bark depth (d) and second best was 75% bark depth (c). Horizontal shape cut with 100% bark depth (T<sub>1d</sub>) was best tapping system for extracting gum and it was significantly differ ( $p<0.05$ ) from the 45° angle shape cut with 100% bark depth (T<sub>4d</sub>). T<sub>4d</sub> significantly differ ( $p<0.05$ ) from the horizontal shape cut and 75% bark depth (T<sub>1c</sub>), “V” shaped cut with 100% bark depth (T<sub>3d</sub>) and vertical shape cut with 100% bark depth (T<sub>2d</sub>).

Pine and cashew trees synthesize gum in quiet similar way and both trees synthesized gum from epithelium cells (Your Article Library, 2013). In cashew tree gum is synthesized in the epithelial cells lining pockets or canals and then secreted into these internal cavities. If a large number of internal cavities are exposed a high amount of gum is exuded therefore applying of horizontal tapping method with 100% bark depth exposes large number of internal cavities. More secretion was shown because of the rain. Secretion of gum exudates may be varied due to the different climatic conditions (Lima, 2009 and Glicksman, 1969).

## Conclusion

According to this study there was no significant relationship between physical growth parameters and gum yield. Further it showed that, there is a good potential to gum extracts by using a tapping method. Out of four tapping systems, horizontal cut and 100% depth (T<sub>1d</sub>) is the suitable tapping system to extracting cashew gum.

## References

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