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Short Communication

Use of Seasoning Mixtures for Enhancing Flow of Sap of Kitul (*Caryota urens L.*) in Sri Lanka

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ABSTRACT. *Kitul sap is obtained by seasoning the inflorescence before it is open. Objectives of seasoning are to tenderize the flower for easy slicing, delay in maturity and promote sap flow. Using tempering mixtures is a widespread method of seasoning of the flower. The objective of the study was to identify seasoning mixtures currently in use in major Kitul growing areas. A questionnaire survey was conducted in 12 Kitul growing districts. A multi-stage stratified sampling scheme was adopted for data collection. Three hundred and four tapper were included in the sample. Eight seasoning mixtures were identified based on the main ingredients used. They were pepper-based mixture (28.0%), non-specified mixture-without identifiable main ingredients (21.7%), ash-based mixture (21.1%), slaked lime-based mixture (20.7%), spice-based mixture (11.8%), medicinal leaves mixture (dalupas wargaya) (11.5%), artificial mixture (8.9%) and citrus mixture (paspangiri) (6.3%). Seasoning mixtures could be categorized as natural and artificial. There were significant relationships among the type of mixture and independent variables; level of engagement in the tapping profession, means of acquiring tapping skills, type of family and region. A high proportion of full-time tappers preferred artificial mixtures. Majority of tappers using artificial mixtures were families engaged in tapping over generations. Natural seasoning mixtures with more ingredients could be suggested as the most suitable in tempering Kitul inflorescence.*

INTRODUCTION

Sap of Kitul palm is obtained by tapping the inflorescence (flower) to make a variety of products including treacle, jaggery and toddy (Dissanayake, 1977). Kitul industry of the island was well established in the 18th century and approximately 200 metric tons of jaggery products had been exported to Europe during a five-year period from 1893 to 1897 (Kehelpannela, 1898), whereas present exports are limited to approximately one metric ton. Major reasons for declining of the Kitul industry has been attributed to incorrect seasoning methods and excessive damage to flowers in attempting to extract Kitul sap (Premakumara, 2000). Present average sap yield is four to five liters whereas a few decades ago it was over 15 liters (Premakumara, 2000). Every flower produced in a Kitul tree cannot be tapped due to adverse weather conditions such as drought, excessive rains and winds. On the other hand, a flower giving a good sap yield can also suddenly discontinue its flow.

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Kitul sap is obtained by seasoning the inflorescence before it is open. Seasoning of flowers has three objectives *viz.* tenderization of flower for easy slicing, delaying maturity to extend longevity of sap flow and to keep the flower bent downwards to facilitate collection of sap. It is important to tap a tree using correct seasoning method, to receive a fair volume of sap without damaging the tree and maintaining its production capacity. Methods employed in seasoning a flower include placing a seasoning mixture usually in an incision made on the flower stalk, burning the base of the inflorescence with a light flame, inserting wooden pecks or fish bones to the base of inflorescence and pomelling the stem of inflorescence with a wooden mallet (Premakumara, 2000).

Historical evidence shows that the most common method employed in seasoning a flower was placing a herbal mixture, which did not affect adversely the health of consumers of Kitul products (Kehelpannala, 1898). However, inclusion of destructive substances in seasoning mixtures has posed consumers a danger due to toxic ingredients (Premakumara, 2000). Ranasinghe *et al.*, (2004) found that tree characteristics including height, girth, number of leaves and volume of inflorescence have no significant relationship with sap yield and tapping duration. They suggest that treatment methods and tapping techniques might be major factors that contribute to a variation of sap yield and tapping duration. Therefore, this study was conducted to identify the seasoning mixtures currently in use in major Kitul growing areas.

MATERIALS AND METHODS

Selection of villages

Verifiable data on the distribution of Kitul in the country is scanty. Therefore, in the first phase of the study a preliminary survey was conducted in 12 major Kitul growing districts to identify the villages where Kitul tapping is undertaken at commercial scale. Approximately 700 Kitul growing villages have been identified from the study. It has been observed that practices used in obtaining sap flow such as tapping methods vary from region to region. In addition, the number of Kitul growing villages also varies from region to region (Gunaratne *et al.*, 1996). These variabilities were taken into account in sampling. Districts and villages within districts were selected in a multi-stage stratified sampling scheme which was adopted for data collection.

Data collection

In the second stage an open-ended questionnaire was administered for data collection. Variables including age of tappers, their education level, tapping experience, level of engagement in tapping profession, means of acquiring tapping skills, type of family (traditional or non-traditional), location and types of seasoning mixtures used were considered on data collection. In addition to the questionnaire survey, in-depth discussions and field observations were also performed during visits. Data collection was done between January to September 2004. All Kitul growing districts were considered as the first stratum. The second stratum was villages and the number of villages from each district was selected randomly proportionate to the total number of Kitul growing villages in each district (Table 1). Using the lists prepared during the first phase of the study, three tappers were selected randomly from each selected village. Accordingly, 304 tappers were included in the sample. The collected data were coded and the distributions and relationship were analyzed using the SPSS statistical package.

Table 1. Distribution of Kitul growing villages and selected respondents in different districts

District	Number of Kitul growing villages	Number of villages selected	Number of tappers selected
Kandy	106	15	43
Matale	101	14	42
Badulle	98	14	40
Matara	75	11	33
Nuwara Eliya	62	9	27
Kurunegala	53	8	24
Ratnapura	49	7	21
Galle	40	6	18
Kegalle	38	5	15
Moneragala	37	5	15
Hambantota	24	4	12
Kalutara	16	3	10
Total	699	101	304

RESULTS AND DISCUSSION

Of the population examined only 6.6% of the respondents were full-time tappers while the majority were part-time tappers. Of the part-time tappers about 9% carry out Kitul tapping as a hobby. Age of the tappers varied between 21-84 years. Seventy five per cent of the tappers were between 21-55 years of age. Old tappers (above 60 years) were 17%. Approximately 73% of the respondents were descended from traditional Kitul tapping families. Nearly 54% of the respondents had acquired tapping skills from their father whereas 40% from friends, relatives and neighbors. Thirteen per cent of the respondents had developed tapping skills through their own experiences.

Approximately one-third of the tappers combined two methods for seasoning their flowers while 23% combined three methods. Nearly 13 % of the tappers combined four methods in seasoning their kitul flowers. Details of different methods and their usage are given in Table 2.

Type of seasoning mixtures

Six tappers (2%) refused to disclose details of seasoning mixtures as they keep them as a secret. Revealing the same was said to cause subsequent failures in seasoning. It was revealed that the seasoning mixtures were numerous and contained single components to many. Proportion of ingredients also varied in different mixtures. Eight seasoning mixtures were identified according to the main ingredients contained in the mixture. The mixtures containing different ingredients without having a prominent base were named as non-specified mixtures. The seasoning mixtures used by the respondents are given in Figure 1.

Table 2. Distribution of respondents according to different seasoning methods adopted (n=304)

Methods of seasoning	Percentage
Seasoning mixtures only	30.6
Seasoning mixtures and piercing	24.7
Seasoning mixtures, piercing and burning	12.9
Seasoning mixtures, piercing, burning and pomelling	12.9
Seasoning mixtures, piercing and pomelling	6.9
Seasoning mixtures and burning	5.3
Seasoning mixtures, burning and pomelling	3.9
Seasoning mixtures and pomelling	3.6

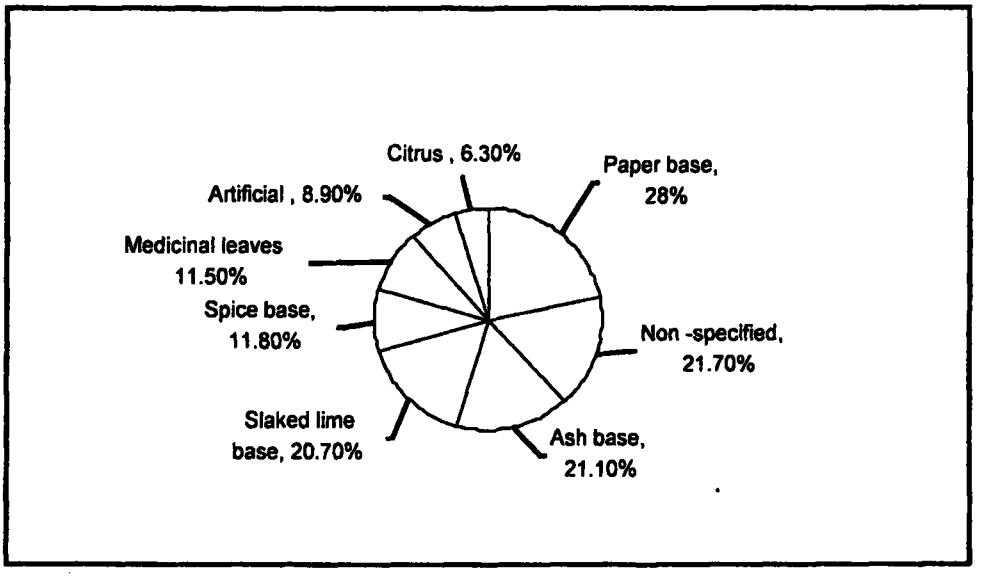

Fig. 1. Types of seasoning mixtures

These mixtures were categorized as natural (70%), artificial (2%) and both (28%). Artificial mixtures included harmful ingredients like urea and battery acids. The main constituent of the pepper-based mixture was black pepper. The mixture was used with other spices or with different ingredients. Ash-based mixture was obtained from kitchen ash, different parts from coconut tree and burning fuel wood from citrus plants. Slaked lime-based mixture was prepared by using freely available lime packets used in betel chewing either as it is or sprinkled with turmeric powder.

Table 3 shows that two-mixture combinations are widely used and this could be due to the cumulative effect of seasoning of flower when more ingredients are used. The second most frequently used mixture was non-specified mixture, which also possessed a number of ingredients and might give the same results. The total number of combinations was 36. It was found that both full-time and part-time tappers preferred to use artificial

mixtures. A significantly higher proportion of full-time tappers (89.5%) had used artificial seasoning mixtures whereas only 10.5% had used natural mixtures (Table 4).

Table 3. Usage of seasoning mixtures (n=304)

Mixture	Percentage
Non-specified mixture	17.8
Pepper- based mixture	14.1
Slaked lime-based mixture	9.9
Spice-based mixture	8.9
Medicinal leaves mixture	7.2
Ash-based mixture	6.9
Citrus mixture	2.6
Artificial mixture	1.6
Two- mixture combination	23.0
Three-mixture combination	5.3
Four-mixture combination	0.6

Table 4. Association between type of seasoning mixture and level of engagement in the tapping profession

	Level of engagement in tapping		
Type of mixture	Full-time	Part-time	Total
Natural	2 (10.5)	132 (47.7)	134
Artificial	17 (89.5)	145 (52.4)	162
Total	19	277	296

Chi-square value = 9.892 p value = 0.002. Values within parentheses indicate column percentages

Nearly 84% of the natural mixtures users had acquired tapping skills significantly from their father whereas only 15.7% had learnt from other sources like relatives, friends and neighbors. There was a significant relationship between the means of acquiring tapping skills and the type of mixtures used (Table 5).

Table 5. Association between type of seasoning mixture and means of acquiring tapping skills

	Means of acquiring tapping skills		
Type of mixture	Father	Other sources	Total
Natural	113 (84.3)	21 (15.7)	134
Artificial	149 (92.0)	13 (8.0)	162
Total	262	34	296

Chi-square value = 4.218 p value = 0.040. Values within parentheses indicate row percentages

The traditional as well as non-traditional families practiced Kitul tapping. The association between seasoning mixture and the type of family was examined and results are presented in table 6. Of the artificial mixtures users, 78.4% were descended from traditional Kitul families whereas 21.6 from non-traditional families.

Type of seasoning mixtures and their use in different locations

Kitul growing districts were divided into two categories based on the similarities of the methods of seasoning of flowers. Tappers living in districts around Sinharaja forest periphery adopt similar seasoning practices. Hence, tappers in Galle, Matara, Hambantota, Ratnapura and Kalutara were included for the category named Southern region and the rest of the districts (Kandy, Matale, Nuwara Eliya, Moneragala, Badulla, Kegalle and Kurunegala) were included in Mid-country category where tapping methods are more or less similar. There was a significant relationship between the type of seasoning mixture and region (Table 7).

Table 6. Association between type of seasoning mixture and type of family

	Type of family		
Type of mixture	Traditional	Non-traditional	Total
Natural	88 (65.7)	46 (34.3)	134
Artificial	127 (78.4)	35 (21.6)	162
Total	215	81	296

Chi-square value = 5.973 p value = 0.015. Values within parentheses indicate row percentages.

In-depth discussions with tappers about the reasons for moving away from the natural seasoning mixtures to artificial mixtures revealed that artificial mixtures were easily accessible and easy to use required in low quantities and their effect was easily observable. These ingredients were effective during detrimental weather conditions.

Table 7. Association between type of seasoning mixture and region

	Region		
Type of mixture	Southern region	Mid-country	Total
Natural	32 (23.9)	102 (76.1)	134
Artificial	65 (40.1)	97 (59.9)	162
Total	97	199	296

Chi-square value = 8.782 p value = 0.003. Values within parentheses indicate row percentages

Premakumara (2000) argued that tapping from first inflorescence onwards of a high-yielding tree would result in no seeds for future propagation. In many villages high yielding trees have been continuously tapped leaving no room to produce seeds for the next generation of plants. Only the low yielding trees remained untouched and produced seeds. As a result, evolving of low yielding Kitul trees was inevitable. Therefore, present tappers were increasingly being forced to exploit trees and harvest sap by using strong harmful artificial seasoning mixtures. Declining use of natural mixtures can be attributed to deficiencies of transferring knowledge on traditional seasoning mixtures; difficulties in finding the herbal ingredients that are required to make seasoning mixtures; requiring extra effort to prepare natural mixtures by pounding and heating and difficulty in observing results.

CONCLUSIONS

There are over 44 mixtures used for seasoning flowers The mixtures comprising of natural ingredients such as spice-based mixture, medicinal leaves mixture and citrus mixture are more suitable since they contain non-toxic substances and have more ingredients in minor quantities. There may be synergistic or cumulative effect from the constituents on plant tissues and it is worthwhile to investigate further. It can be suggested that seasoning mixtures with more natural ingredients are better than mixtures containing less number of components and toxic substances so that effects of the latter cannot be easily manipulated.

It is important that detrimental artificial seasoning mixtures have to be discontinued. Educating farmers on the consequences of these mixtures would help to overcome this problem. Damaging flowers by making large wounds is also not advisable since mechanical damages are probable. Adequate information on the chemistry of ingredients and their effect on flower tissues are not available. Hence, it is difficult to recommend the most suitable seasoning mixtures and their doses. Therefore, further research into the chemistry of ingredients of seasoning mixtures is needed.

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