

# ORGANOLEPTIC CHARACTERISTICS OF SAPAL: A TRADITIONAL FERMENTED TARO (*COLOCASIA ESCULENTA*)' CORM AND COCONUT CREAM MIXTURE FROM PAPUA NEW GUINEA.

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## ABSTRACT

Sapal is a traditional food prepared from cooked and grated taro with coconut milk and allowed to ferment at ambient temperature. Sensory evaluation of this product showed that the coconut milk to taro ratio affected the acceptability of the final product. Four different coconut milk to taro ratios (1:1, 1:2, 1:3 and 1:4) were used to determine the most suitable in terms of texture, colour, odour and acceptability. Ratio 1:3 was significantly different ( $P < 0.05$ ) from 1:1 and 1:4 in colour and acceptability, and was also significantly different ( $P < 0.05$ ) from all the ratios in texture. There was no significant difference ( $P < 0.5$ ) in odour for all the different ratios used. A ratio of 1:3 (coconut milk to taro) produced sapal of the required quality in terms of texture, colour and acceptability.

**Key words:** Sapal, fermentation, taro, sensory evaluation.

## INTRODUCTION

Sapal is a traditional food produced by mixing cooked and grated taro (*Colocasia esculenta* (L) Schott) corm with coconut cream and allowed to ferment at ambient temperature. It is a creamy greyish coloured food consumed anytime during fermentation. The fermentation period can be as long as one month, depending on when the product is completely consumed.

Sapal is a ceremonial food produced only on very important occasions, for exchange as gift with neighbouring clans or villages or to show appreciation for a good harvest. It is produced only on the North Coast of Madang and the neighbouring islands such as Karkar Island. A similar type of product, *poi* is processed and consumed on a large scale in Hawaii (Allen and Allen 1933, Moy and Nip 1983, Frazier and Weshoff 1988). *Poi* is prepared by mixing water with cooked taro (Moy and Nip 1983) whilst coconut milk or cream is used instead of water for preparation of sapal prior to fermentation. The traditional method used for the production of sapal has been studied (Gubag *et al.* 1996). However, the traditional method does not define the proportion of taro to coconut cream, and

consequently the quality of the final product is often inconsistent. Therefore, this study was done to determine a suitable coconut milk to taro ratio which will be used consistently to produce sapal of an acceptable quality.

## METHODS

### Preparation of sapal

The method used for the preparation of sapal was as described by Gubag *et al.* (1996) with few modifications. Taro corms were bought from Lae market. Two litre plastic containers were used for storing sapal instead of the usual traditional wooden bowls of about 50 litre volume, and muslin cloth was used for extraction of coconut milk.

### Determination of coconut milk/taro (cooked) ratio

The following coconut milk to taro ratios were used during mixing: 1:1, 1:2, 1:3, and 1:4. Each treatment was placed in a 2 L plastic container with lid and allowed to ferment at ambient temperature for 7 days.

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All treatments were evaluated for texture, colour, odour and acceptability by a trained panelists of 10 people. A score range of 0 to 5 (0 having the lowest and 5 having the highest) was used. Analysis of variance was done for data collected from the organoleptic examination. The analysis was performed to determine whether there were any significant differences in texture, colour and acceptability between *sapal* produced with different ratios of coconut milk and taro as judged by the 10 panelists. The data obtained was calculated to determine the F values (Larmond 1977, O'Mahoney 1986) between different treatments. The F values were then used to ascertain if there were any significant differences. Least significant difference values were also calculated to compare the means of different ratios.

## RESULTS AND DISCUSSION

Physical observations based on colour and texture are presented in Table 1. The table shows that

the colour immediately after mixing was creamy white for all the different ratios. Change in colour to yellowish grey and yellowish brown was observed for ratios 1:1 and 1:4 respectively on day 7. Ratios 1:2 and 1:3 however, retained most of the original colour except for a few patches to grey on the surface. Ratio 1:2 also turned slightly yellow during fermentation. The change of colour to yellowish brown observed for ratio 1:4 is due mainly to surface drying. The yellowish colour observed for all the ratios except for ratio 1:3 was most probably due to the growth of yeast on the surface of *sapal*. Studies on the microbial ecology of *sapal* showed yeast species to be predominantly of the genus *Candida* (Gubag *et al.* 1996).

The analysis of variance test (O'Mahoney 1986) on the organoleptic evaluation of *sapal* after 7 days of fermentation showed no significant differences in colour (Table 2) between ratios 1:2 and 1:3. However, they were significantly different ( $P < 0.05$ ) from 1:4. The texture likewise was affected by different coconut milk to taro ratios. Table 1

**Table 1.** The effect of coconut milk/taro ratios on texture and colour of *sapal* during fermentation

Ratio	Texture and colour on day 0	Texture on day 7	Colour on day 7
1:1	Very watery Creamy white	Watery and mushy	Yellowish grey
1:2	Watery Creamy white	Slightly watery	Creamy white with few patches of yellow and grey colour
1:3	Dry but slightly moist	Slightly moist	Creamy white with few patches of grey colour
1:4	Dry Creamy white	Very dry, particularly at the surface	Yellowish brown

**Table 2.** Means of sensory evaluation of sapal after 7 days of fermentation produced using different coconut milk/taro ratios.

Ratios	Texture	Colour	Odour	Acceptability
1:1	4.8bd	1.2b	1.2a	1.9c
1:2	3.7b	4.4a	4.4a	3.4ab
1:3	7.4a	3.8a	3.8a	4.3a
1:4	1.7c	2.7c	2.7a	2.8ba

Mean values within a column bearing the same subscript are not significantly different at 0.05 (5%) level of significance.

shows 1:1 ratio having watery texture throughout the fermentation period. Ratio of 1:3 likewise was moist but firmer than 1:1 and 1:2 and ratio 1:4 was drier than all the other treatments. Analysis of variance (Table 2) showed 1:3 to be significantly different ( $P<0.05$ ) in texture from other treatments. Ratios 1:1 and 1:2 were similar in texture but were significantly different ( $P<0.05$ ) from 1:4.

The texture of good quality *sapal* is moist, but firm. These observations show that *sapal* produced using 1:3 coconut milk to taro ratio had the required texture.

Unlike colour and texture, the statistical analysis on odour did not show significant differences ( $P<0.05$ ) among the different treatments. *Sapal* has a milk or cream, acid-like odour. Odour therefore, was not affected by different coconut milk to taro ratios used during the production of *sapal*.

General acceptability by panelists based on these variables (odour, colour, texture) showed a mean score of 4.3 (scale 1-5, 5 having most liked) for ratio 1:3, followed by 1:2, 1:4 and 1:1. Ratio 1:3 was also significantly different ( $P<0.05$ ) from 1:1 and 1:4 in acceptability but not different from 1:2 (Table 2). These findings on sensory evaluation of *sapal* during fermentation shows that the ratio of coconut milk to taro affects colour and texture but not odour. The acceptability of the product therefore, depends mainly on these variables. Ratio of 1:3 was more acceptable than the other three ratios. Furthermore, this treatment (1:3) was significantly different ( $P<0.05$ ) from ratios 1:1 and 1:4 in colour.

## CONCLUSION

Traditionally, texture is a common parameter used by *sapal* producers to determine the volume of coconut milk to be added during mixing with cooked taro. The traditional *sapal* producers use texture as the major quality determinant. Firm moist *sapal* with creamy greyish colour is of good or acceptable quality. From the above results, production of *sapal* with coconut milk/taro ratio of 1:3 is recommended.

## REFERENCES

- ALLEN, O.N. and ALLEN E.K. (1933). The manufacture of *poi* from Hawaii Agricultural Experimental Station Bull. No. 70.
- FRAZIER, W.C. and WESHOF, D.C. (1988). Food fermentations. In: *Food microbiology*. McGraw-Hill Book Company, Singapore, pp. 369 - 375.
- GUBAG, R., OMOLOSO, D.A. and OWENS, J.D. (1996). *Sapal* a traditional fermented taro [*Colocasia esculenta* (L) Schott] and coconut cream from Papua New Guinea. *International Journal of Food Microbiology* 28: pp. 361-367.
- LARMOND, E. (1977). Laboratory methods for sensory evaluation of food, statistical methods and procedures. Canadian Government Publishing Centre, Ottawa, Canada.
- MOY, J.H. and NIP, W.K. (1983). Processed food. In *Taro, A Review of Colocasia esculenta and its Potential*. Wang J.K. (ed.) University of Hawaii Press, pp. 263-268.
- O'MAHONEY, M. (1986). *Sensory evaluation of food, statistical methods and procedures*. Marcel Dekker Inc., New York.