CONSUMER PREFERENCE OF SOME RICE VARIETIES GROWN LOCALLY IN PAPUA NEW GUINEA.

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ABSTRACT

Consumer preference tests were conducted on three varieties of rice grown in Papua New Guinea and their blends with Trukai rice, an imported variety. Significant differences were observed in consumer preference for the different rice varieties. Trukai was most preferred followed by Taichung Sen 10. The pure varieties of Niupela and Wantok were found unacceptable by the consumers. However, blending them with Trukai at 25% level of substitution greatly increased their acceptability.

Keywords: *Papua New Guinea rice, Trukai, Wantok, Niupela, Taichung Sen 10, consumer preference.*

INTRODUCTION

Rice (*Oryza sativa* L.) is a very important staple in Papua New Guinea (PNG). It contributes 16-20% of total energy and 14% of total protein in the diet of Papua New Guineans (Juliano 1993). It is the cheapest source of energy in the urban centers. Although small amounts of rice have been growing in P.N.G. for over 100 years, the country depends almost entirely on imported rice, on an average 120-130,000 tons/year to meet consumers' demands (Sloan Cook & King 1993; PPBD 1994). Research for varieties which can grow in P.N.G. in commercial quantities has been going on for many years (Wohuinangu and Kap 1982) and varieties: Wantok, Niupela, E1, Senis, Tambu, and Taichung Sen 10 (TCS 10) were released for cultivation (unpublished P.N.G. rice reports of Wohuinangu 1992/93 and Lin 1993). While these breeding efforts have been successful in producing a number of high yielding varieties, systematic tests of the promising varieties for consumer preference and acceptance have been neglected, and some of these varieties are still being vigorously promoted without consideration for preference (Sajjad 1994).

Varieties need evaluation for their suitability for the end uses and consumer preferences. Rice varieties have specific milling, cooking, eating and processing characteristicts and an agronomically superior cultivar may be unacceptable for traditional cooking and processing (Del Mundo 1979; Siaka and Bains 1993). The importance of combining sensory quality with physico-chemical quality in any rice breeding programme has been stressed (Juliano and Pascual 1980).

This paper examines consumer preference of the three varieties currently cultivated on commercial basis in P.N.G.: Varieties Wantok in Bereina area (Central Province), Niupela in Maprick and Nuku (West and East Sepik Provinces) and TCS10 (Morobe Province). It also evaluates their blends with Trukai, the rice preferred by the majority of Papua New Guineans.

METHODOLOGY

Milled samples of Niupela and Wantok (Bereina rice) varieties were obtained from the Department of Agriculture and Livestock Research Station, ERAP. Milled TCS 10 was supplied by the Taiwanese Research Station at Bubia in Lae. These three rice varieties were subsequently referred to as "local rice". Trukai rice was bought from a supermarket in Lae. Cooking in excess water was done following essentially the method by Myklestad *et al.* (1968). 0.1% brine solution was used.

Cooking times were established in preliminary experiments according to the excess water method of Perez

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Table 1. **Mean consumer preference scores of rice varieties and blends.**

% Trukai in Blend	Niupela	Wantok	TCS 10
100%	2.14 a	2.37 a	2.19 a
95%	2.35 a	2.67 a	2.32 ab
90%	2.17 a	2.57 a	2.29 ab
85%	2.35 a	2.23 a	2.29 ab
75%	2.41 a	2.67 a	2.69 ab
50%	2.93 b	2.80 ab	2.71 ab
25%	3.17 b	3.33 bc	2.81 b
0%	3.17 b	3.47 c	2.77 ab

Note: 1. Based on a scale of 1 - 5, where 1=like extremely (best score) and 5=dislike extremely (worst score).
2. In a column, treatments with the same letter are not significantly different from each other at $p < 0.05$ based on DMRT.

et al. (1993). After cooking for the set time, the rice was drained in sieves and allowed to stand for 2 mins. The rice was kept warm in covered containers until it was ready to be served. Consumer preference was determined by indication of degree of likeness (1-5 scale; 1-best score, 5-worst score) as per Lamond (1977). Two separate evaluations were conducted. In the first experiment, coded samples comprising 100% Trukai, 100% local samples as well as blends of Trukai and the local samples at various levels of substitution (100%, 95%, 85%, 75%, 50%, 25%, 0% Trukai) were served warm to 30 random untrained panelists. One variety and all its various blends were served at the same sitting.

Based on the results obtained from the first evaluation,

Figure 1. **Some sensory quality parameters of rice in Papua New Guinea**

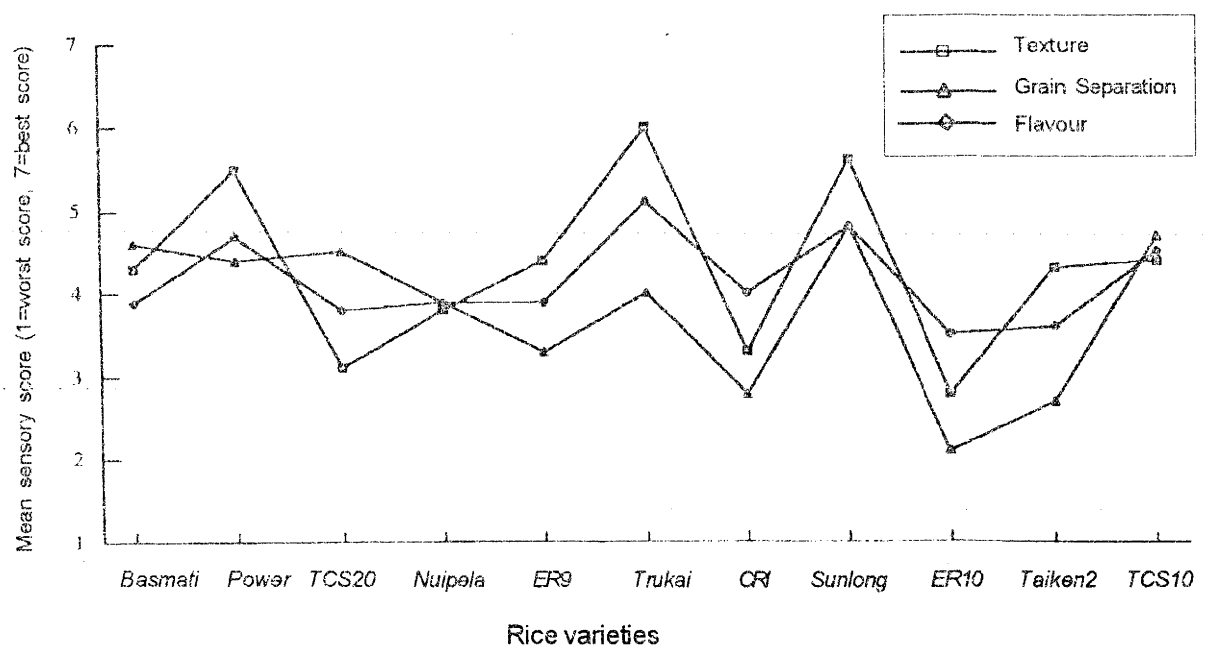

Table 2. **Rice consumer preference evaluation, mean scores of adult and youth groups 1.**

Treatment	Youth Group	Adult Group	Weighted mean [Rank]	
Trukai 100% (control)	2.65 a	2.27 ab	2.51 a	2nd
Trukai 75%/TCS 10, 25%	3.14 bc	2.21 a	2.80 b	4th
Wantok 100%	3.34 cd	3.13 d	3.26 c	7th
Trukai 75%/Niupela 25%	2.47 a	2.37 abc	2.43 a	1st
TCS 10, 100%	3.01 a	2.57 bc	2.84 b	5th
Trukai 75%/Wantok 25%	2.50 a	2.54 abc	2.51 a	2nd
Niupela 100%	3.45 d	2.64 a	3.17c	6th

Note: 1. Based on a sclae of 1-5, where 1=like extremely and 5=dislike extremely
2. In a column, means followed by a common letter are not significantly different from each other at $p < 0.01$ by DMRT.

Table 3. **Summary of rice consumer preference evaluation indicators, based on all samples.**

Variety/Blend	Mean Score [Rank]	% Based on Best Score(1)[Rank]	% Based on Like Score(2)[Rank]	Mean Ranks (3)
Trukai 100%	2.51 [2nd]	21.8 [2nd]	56.5 [2nd]	2.00 ab
Trukai 75%/TCS 10, 25%	2.80 [4th]	17.0 [4th]	45.4 [4th]	3.66 bcd
Wantok 100%	3.26 [7th]	12.9 [6th]	28.8 [7th]	6.00 c
Trukai 75%/Niupela 25%	2.43 [1st]	25.5 [1st]	55.7 [3rd]	1.66 a
TCS 10, 100%	2.94 [5th]	18.1 [3rd]	43.9 [5th]	4.00 cd
Trukai 75%/Wantok 25%	2.51 [2nd]	17.0 [4th]	59.8 [1st]	2.33 abc
Niupela 100%	3.17 [6th]	12.9 [6th]	34.6 [6th]	5.33 dc

(1) - Based on the % of people giving the best score of 1=like extremely.
(2) - Based on the total % of people giving scores 1=like extremely and 2=like very much.
(3) - Mean ranks followed by the same letter are not significantly different from each other at $p < 0.05$ by DMRT.

the 75% Trukai/25% local variety blends were selected for further consumer testing. Two tests were conducted using a total of 271 consumers representing a cross-section of Papua New Guineans in the various age and ethnic groups residing in Lae city. The first test involved 172 consumers from a predominantly youth group between 15-20 years of age, while the second test involved 99 predominantly adult group between 25-50 years. The results were analysed by analysis of variance and Duncan's Multiple Range Test (DMRT) using IRRISTAT 93 soft ware.

RESULTS

The results of the first evaluation indicated, that there were significant differences in consumers' preference of some of the pure varieties and their blends (Table 1). Based on the mean scores, Trukai 100% and TCS10, 100% were equally liked. Niupela 100% and Wantok 100% were not so well liked. Their scores bordered on dislike, with Wantok 100% receiving the worst scores. There were no significant differences in the preference of the consumers for blends of Trukai 50-90%/corresponding proportions of TCS and Wantok. In the case of Niupela, blend levels of only 75-95% Trukai could be made without affecting consumer preference.

The second evaluation of rice consumer preference on a relatively large scale using blends of Trukai 75% and Local rice 25% confirmed the poor performance of Niupela 100% and Wantok 100% (Table 2). The larger

consumer groups were however more discriminating in their preference for all the pure varieties except Trukai. There were no significant differences in the preference of both the youth and older consumer groups for Trukai 100%, Trukai 75%/Niupela 25% and Trukai 75%/ Wantok 25% blends. The marked difference in the preference for Trukai 75%/TCS10 25% blend by the two consumer age groups could be due to the different taste preference of youth as compared to adults.

An analysis of the the results based on the percentage of people that gave each sample a particular score, the mean ranks (Table 3) resulted in the following decreasing order of preference: The most preferred were, Trukai 75%/Niupela 25%>Trukai 100%>Trukai 75%/ Wantok 25%. Of intermediate preference were Trukai 75%/TCS10 25%>TCS10 100%. Wantok 100% and Niupela 100% again were the least preferred.

DISCUSSION

People from different regions have different tastes and preferences. What consumers consider good rice depends partly on historical and sociocultural factors (Kaosa-ard and Juliano 1990). Rice quality characteristics, to a large extent, determine market price and consumer acceptance. Next to yield, grain quality is the most important factor considered by plant breeders. If consumers do not care for the taste, texture, aroma, or appearance (sensory characteristics) of a newly developed rice variety, any other outstanding characteristic may be worthless.

There are two dominant varieties of rice on the market, all of which are imported. There is the long grain with 90% head rice (rice has 10% broken), which sells at a higher price and is marketed as Sunlong and the medium grain with 80% head rice (rice has 20% broken), japonica type, which sells at a lower price and is marketed as Trukai. Partly because of the price difference, the majority of Papua New Guineans especially those in the rural areas have opted for and identify with Trukai rice. The results of the consumer preference tests (Table 1-3) and those of a laboratory taste panel tests reported elsewhere (Fig. 1) confirm this pattern. Trukai was consistently preferred over the other varieties in the consumer tests. In the laboratory taste panel tests, the texture and flavour of cooked Trukai were scored higher than those for all the other varieties tested including Sunlong. Consumers will choose a new variety over the preferred and accepted variety only if it has superior quality characteristics and sells at an affordable price (Bhattacharya 1979). Trade stores in Bereina Region in the Central Province sell a ton of Wantok rice in three weeks as against one week for a ton of Trukai, even though Wantok sells at a lower price (Rice Industries-personal communication). A similar trend is seen in Maprik.

The results indicated, that the quality characteristics of Wantok and Niupela varieties will have to be improved if they are to succeed on their own on the domestic market. The preference for TCS 10 is intermediate (between that of Trukai and Wantok/ Niupela). It is therefore imperative that rice breeders in the country identify with the help of sensory and chemical tests, those quality characteristics which consumers find most pleasing and breed them into new varieties. It may mean crossing these three higher yielding local varieties with others having known desirable quality characteristics. This is a generally acceptable practice by breeders emphasising the significance given to grain quality in modern rice improvement programmes. Scientists have been successful in producing high-yielding rices with good grain quality and high acceptability (Bhattacharya 1979). It is by no means an easy matter and it has to be looked at as a long term strategy in Papua New Guinea's rice breeding programme with breeders, biochemists, chemists, food scientists, agronomists, engineers and entomologists working together to produce acceptable varieties. Quality cannot be ignored since the ultimate test of the success of the programme is high consumer preference and acceptance.

In the interim it may be possible to market blends of above local varieties with Trukai as the results indicate. The Trukai 75%/Niupela 25% was preferred as equally as Trukai 100%. The practice of blending rice varieties is not new. Traders in Hong Kong and Philippines blend rice from different origins to achieve the desired cooking and sensory quality (Kaosa-ard and Juliano 1990; Samiano, ERAP, personal communication). The fact that the blends performed as well as Trukai 100%, seems to indicate that blending will increase the consumer preference and market acceptability of the local varieties. Even though the high yielding varieties tested here may not be accepted as the principal cereal on their own, they may probably have other characteristics that would make them ideal for processing into some types of rice products (Del Mundo 1979), and these should be investigated.

CONCLUSION

Among the pure varieties tested, Trukai was the most preferred followed by TCS10. Wantok and Niupela

were the least preferred. However blends of these local rices with Trukai (75% Trukai) greatly improved their consumer preference. These results underscore the importance of incorporating sensory quality tests into rice breeding programmes to help identify the varieties which will not only satisfy farmers in terms of yield but also possess sensory qualities acceptable to consumers.

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