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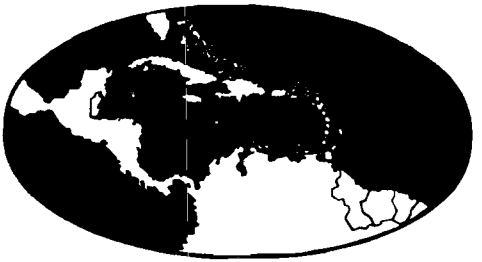

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AN ASSESSMENT OF FRUIT COLOUR FOR TOMATO PROCESSING IN TRINIDAD

W.G.M. OTTARO and W.B. CHARLES
Caribbean Agricultural Research and Development Institute,
University Campus, St. Augustine, Trinidad.

INTRODUCTION

The tomato is one of the most popular vegetables grown in Trinidad. It is eaten fresh and also in processed forms such as paste, ketchup and juice. The colour of the fruits is perhaps the most important criterion in determining the quality of the processed products; the deeper and more uniform the colour, the better the quality. The depth of redness is dependent upon the ratio of lycopene (red pigment) to beta-carotene (orange pigment) present in the ripe fruit.

The current trend in the cultivation of tomato in Trinidad is to produce the crop for the fresh market. Meanwhile over 1.3 - 1.6 million pounds of tomato paste and other processed preparations are imported annually into the country (Anon, 1974). In view of the present situation there is need to develop varieties that can meet the requirements of a local processing industry. Such a development will both save on foreign exchange and open avenues for the exportation of processed tomato products.

The problem which has hitherto hindered the use of locally grown tomatoes for processing is probably the lack of a good red colour in the varieties currently grown. The poor colour development may be ascribed to: (1) inhibition of lycopene development caused by the high temperatures in which the commercial varieties are grown in Trinidad and (2) lack of selection for cultivars having the ability to develop high lycopene content under local climatic conditions. Work conducted in temperate countries has shown that temperatures above 30°C inhibits lycopene development. Fruits exposed to such temperatures ripened yellow or orange and contained mainly the beta-carotene pigment (Vogele, 1937; Denisen, 1948). High humidity can aggravate the effects of temperature on fruit ripening in tomatoes. Fruits developed under high humidity have been reported to ripen unevenly and to be generally of a poor colour (Lipton, 1970).

Work conducted in the tomato breeding programme at the Regional Research Centre (University of the West Indies, Trinidad) now CARDI, has isolated several lines which have the ability to develop high

lycopene content when grown under the local climatic conditions. This paper deals with the assessment of fruit colour of some locally marketed tomatoes against that of Regional Research Centre (now CARDI) selection and seeks to obtain a comparative evaluation of their ripening characteristics for the processing industry.

MATERIALS AND METHODS

The tomato samples used for colour assessment were fully ripened tomatoes obtained from the following sources:

(1) An open air market (market 1).

(2) An open air market (market 2).

(3) A supermarket.

(4) CARDI tomato breeding programme (line IE174) (formely RRC/UWI).

The sample size used comprised lots of 3 lbs each. Three lots were obtained from each source judged visually to represent (1) the least red, (2) medium red and (3) the most red tomatoes available, except for the supermarket where only one sample visually judged to represent the most red tomatoes was obtained. Sampling was done on two different occasions.

On each sampling day, all samples were brought to the laboratory and judged visually under the same conditions of lighting for intensity of red colour. An index system of numbering from 1 - 10 with 1 representing least red and 10 representing most red was used. The objective measurement of colour was made on benzene extracts using modified methods of Kramer, Guyer and Smith (1948) and McCollum (1953). Five fruits of each sample were used for pigment extraction. Percent transmittance of the extracts was measured and standardized against pure benzene at 100% transmittance on a Pye Unicam Sp 600 Series 2 spectrophotometer at 485 nm.

In order to assess how the colour of these tomatoes compared with marketed tomato preparations, colour of two brands of tomato ketchup was assessed using the same technique.

RESULTS AND DISCUSSION

The visual colour score of each sample is shown in Table 1 for the 2 days of sampling. The least red tomatoes from both markets 1 and 2 were characteristically light yellow externally with whitish yellow flesh occasionally with blush of pink. The locular jelly was generally greenish yellow or light yellow. The medium types were mainly yellow orange externally but the flesh was orange yellow with light pink mainly in the septae. The central portion was generally white and locular jelly mainly orange or yellow. The fruits judged as most red were actually orange to dark orange. The flesh in this group was orange especially the pericarp but the septae had more pink and the locular jelly had more orange. The supermarket sample was similar to the most red samples from the open markets but appeared to have more pink in the septae. The RRC/ UWI selection IE174 samples were generally redder than all the market samples. The least red samples was comparable to the most red one from the markets. The medium red was generally red externally with red flesh and orange red locular jelly, while the most red sample had a deep red colour externally and a uniform deep red flesh with a deep pink locular jelly.

TABLE 1. Visual score for colour on two days of sampling tomatoes

Source	Sample	Colour score Day 1	Day 2	Mean
Market 1	Least red	2.0	2.5	2.25
	Medium red	3.5	3.5	3.50
	Most red	6.0	5.0	5.50
Market 2	Least red	2.5	2.0	2.25
	Medium red	4.0	5.0	4.50
	Most red	5.5	6.0	5.75
Supermarket	Most red	6.5	7.5	7.00
UWI IE174	Least red	7.0	8.0	7.50
	Medium red	8.5	9.0	8.75
	Most red	9.5	10.0	9.75

The mean transmittance values of tomato pigment extracts measured at 485 nm is shown in Table 2. In terms of transmittance, the higher the value the poorer the colour. It is clear that the most highly coloured sample was that from the most red UWI IE174 selection. This sample also showed better colour compared with the marketed ketchups A & B measured. It should be noted here that there is a certain amount of colour loss during tomato processing and therefore these results should not be interpreted to necessarily mean that IE174 will give better ketchup than those marketed until actual processing trials are done. Also during the extraction it was noted that the ketchups A & B did not blend easily in the benzene as did the fresh tomato preparations. How far this contributed to the observed colour value cannot be said. It is, however, reasonable to state that only this selection reached the colour standard of the marketed ketchup and that all the samples of the locally grown types failed to reach these standards.

TABLE 2. Mean transmittance values of tomato pigment extracts measured at 485 nm.

Source	Sample	Transmittance value		
		Day 1	Day 2	Mean
Market 1	Least red	90.0	88.9	89.5
	Medium red	84.1	86.0	85.1
	Most red	74.7	79.3	77.0
Market 2	Least red	89.2	90.4	89.8
	Medium red	83.8	78.8	81.3
	Most red	78.3	74.2	76.3
Supermarket	Most red	70.6	69.5	70.1
UWI IE174	Least red	56.1	57.6	56.9
	Medium red	51.6	49.2	50.4
	Most red	45.3	43.8	44.6
	*Ketchup A	-	64.2	64.2
	Ketchup B	-	50.1	50.1

*Ketchup A was poorer coloured on visual judgement and was lower priced than Ketchup B.

CONCLUSION

This survey showed, both visually and objectively, that the marketed tomato samples were inferior to the RRC/UWI breeding line IE174 in colour and their ripening characteristics were unsatisfactory for processing. It was also shown by the objective method that the RRC/UWI breeding line IE174 had colour intensity comparable with that of the marketed tomato ketchup.

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