Relationships of flavour and quality of the Keitt mango

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Introduction

The cultivated area dedicated to pineapple is decreasing due to the wider availability of canned products (Figure 1), whereas the area dedicated to mango is increasing.

Most mangoes grown are currently of the Irwin kind, although the Keitt mango is becoming increasingly popular. The main drawback of the Keitt mango, is that it remains green when ripe, which means that consumers are unsure when it is good to eat. This paper describes a consumer-based taste test and examines the relationship between human taste perceptions and NIR measurements.

Method

The sweetness of the sample was analysed before the taste test, using standard equipment. The results of the sweetness analysis are shown in Figure 2.

JA Okinawa, which is the Japanese Agricultural co-operative, recommends a 14% sugar content, although 31.4% of the samples tested here had a higher sugar content. The taste test was conducted over two days (October 4th and 5th, 2008). Each mango was chopped into mouth-sized pieces, and each respondent was asked to evaluate their piece on the basis of five attributes.

The taste tests were “hardness”, “sweetness”, “acidity”, “taste”, and “ripeness of fruit”.

Table 1, which lists the demographic characteristics of the respondents, shows that most were below 30 years of age and that a large number (21 people) were single.

Results and discussion

The brand of mangoes of highest quality from JA Okinawa used in this study has a sugar content of more than 14%. Table 2 shows the average taste perception for each class of respondent.

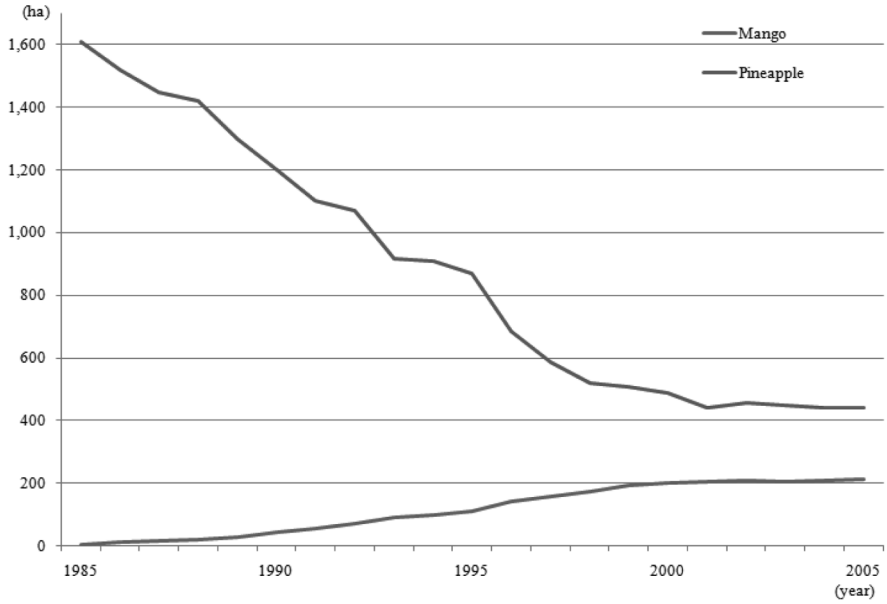
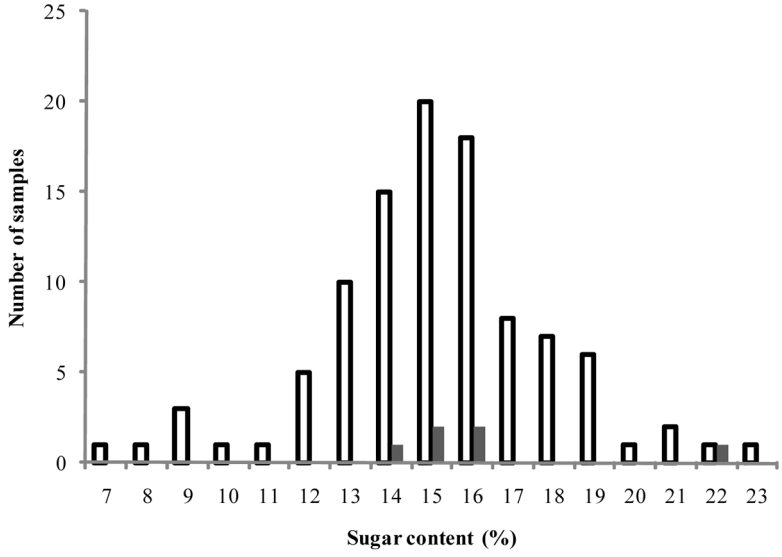


Figure 1. Cultivated area dedicated to pineapple and mango. Source: Okinawa General Bureau Agriculture, Forestry and Fisheries statistics annual report.



n	Total	Average	Min	Max	Var	SD
101	1,582.2	15.665	7.7	23.4	7.629	2.762

Figure 2. Mango sugar content determined by NIR. Source: From this investigation.

Table 1. Respondent characteristics.

		Number	Percentage
Age	Younger than 30	36	52.2
	30 or older	30	43.5
	Unknown	3	4.3
Number of people in household	Single	21	30.4
	More than two people	45	65.2
	Unknown	3	4.3
Occupation	Employed	15	21.7
	Student	31	44.9
	Housewife	18	26.1
	Unknown	5	7.2

The age group to which the respondent belongs had no effect on their assessment of the mango's sugar content. The respondents under 30 years of age did not evaluate the first B mango by the evaluation of the appropriate degree of ripeness. Evaluation was low in this B mango, with 2.3 grades of sweetness. The sugar content was 15.5%, and the evaluation of the respondents was not good. The reason why the evaluation of the respondents was low for the B mango is the hardness of the flesh of fruit. Even if the sugar content was high, the evaluation of this aspect of quality by the respondent was low. Evaluation for the degree of ripeness because the taste was good was high in the second (C) mango. Even if the taste was good, and it was a ripe mango the respondent, evaluated the sweetness as low.

Regardless of the number of people in the household, the respondents did not consider a mango with hard flesh to be ripe enough, and did not report it as being sweet.

The evaluation of the appropriate degree of ripeness of the B mango (test of Oct. 4) was low, as evaluated by the single respondents. The sweetness of the B mangoes was evaluated as low by these respondents, and the hardness of the flesh of the fruit was evaluated as firm by these respondents. In households of more than two people, the B mangoes (test of Oct. 4) were judged to be not ripe enough (unripe), and the respondents evaluated the flesh of the fruit to be firm. This affects the reaction of the respondent to the sweetness. With regard to the occupation of the respondents, even if the sugar content is high the respondents' opinions of the sweetness differed according to the taste and hardness of the flesh.

Employed respondents estimated a C mango (test of Oct. 4) as the appropriate degree of ripeness accurately. For this mango, the respondents evaluated the sweetness as high, and also the hardness of the flesh of fruit as high. The taste influenced the respondents in evaluating sweetness.

Housewives evaluated the B mangoes as having a low taste (2.3 grades). This associates evaluation with sweetness and acidity. These respondents is evaluated the hardness of the flesh of the fruit into two grades.

Table 2. Sweetness determined by NIR and average consumer taste perceptions.

			Sugar content by NIR (%)	Hardness	Sweetness	Acidity	Taste	Ripeness of fruit
Younger than 30	Oct. 4	A	14.8	3.6	3.2	3.2	3.6	4.0
		B	15.5	2.3	2.3	3.9	2.6	2.6
		C	15.8	3.7	3.7	3.1	3.9	4.7
	Oct. 5	A	16.4	3.5	3.4	2.5	3.5	4.0
		B	16.0	3.4	3.4	2.8	3.6	3.9
		C	20.2	3.6	3.7	2.6	4.3	4.5
30 or older	Oct. 4	A	14.8	3.8	3.5	3.3	3.6	4.0
		B	15.5	3.2	2.9	2.8	2.9	3.4
		C	15.8	4.5	3.9	3.6	4.0	4.8
	Oct. 5	A	16.4	3.0	3.2	3.2	3.4	4.3
		B	16.0	3.0	3.5	3.1	3.4	4.5
		C	20.2	2.7	3.5	2.8	3.2	3.9
Single	Oct. 4	A	14.8	3.5	2.9	3.4	3.4	4.2
		B	15.5	2.4	2.3	3.5	2.3	2.8
		C	15.8	3.8	4.0	3.1	4.1	4.8
	Oct. 5	A	16.4	3.3	3.6	2.7	3.6	4.1
		B	16.0	3.2	3.4	3.2	3.3	3.6
		C	20.2	3.6	4.6	2.8	4.2	4.3
More than two people	Oct. 4	A	14.8	3.7	3.5	3.2	3.6	4.0
		B	15.5	2.7	2.6	3.6	2.9	2.9
		C	15.8	4.1	3.7	3.3	3.8	4.7
	Oct. 5	A	16.4	3.0	3.2	3.0	3.4	4.3
		B	16.0	3.1	3.5	3.0	3.6	4.6
		C	20.2	2.8	3.2	2.7	3.3	4.0
Student	Oct. 4	A	14.8	3.6	3.3	3.3	3.8	4.1
		B	15.5	2.4	2.4	4.0	2.8	2.7
		C	15.8	3.7	3.7	3.0	3.9	4.8
	Oct. 5	A	16.4	3.5	3.5	2.2	3.4	3.9
		B	16.0	3.4	3.2	2.8	3.5	3.9
		C	20.2	3.7	3.9	2.6	4.2	4.5
Employed	Oct. 4	A	14.8	3.7	3.6	3.3	3.6	4.1
		B	15.5	2.9	2.7	3.3	3.1	3.1
		C	15.8	4.4	4.3	3.4	4.0	4.6
	Oct. 5	A	16.4	3.0	3.4	3.1	3.8	3.8
		B	16.0	2.9	3.6	3.1	3.9	4.8
		C	20.2	2.4	3.5	2.9	3.0	3.6

Table 2. Sweetness determined by NIR and average consumer taste perceptions. (*Continued*)

			Sugar content by NIR (%)	Hardness	Sweetness	Acidity	Taste	Ripeness of fruit
Housewife	Oct. 4	A	14.8	3.8	3.0	3.1	3.3	4.0
		B	15.5	2.9	2.6	2.6	2.3	3.1
		C	15.8	4.3	3.8	3.6	4.0	4.9
	Oct. 5	A	16.4	2.9	3.4	3.3	3.3	4.6
		B	16.0	3.5	3.8	3.3	3.2	4.2
		C	20.2	3.2	3.2	2.6	3.4	4.2

Source: From the investigation.
Note: The standard deviation was never more than 1.6.

The results of this organoleptic analysis showed that respondents do not evaluate sweetness consistently, even if the sugar content in a mango is high. Indeed, a respondent may evaluate a mango to be sweet even if its sugar content is low. Mangos with a high sugar content are therefore not necessarily of high quality, as in these experiments respondents did not mention sugar content as being a factor that indicates whether a mango is of high quality.

The quality of mangos does not therefore depend on their sugar content, which means that a new quality-assessment method needs to be developed.