Stonefruit consumer evaluation: melting versus nonmelting flesh in peaches and nectarines

Reid, C.E.[1]; Smyth, H.E. [1]*; Bignell, G.[2]; Promchot, S.[2]; Gore, C.[1]; Abberton, K.[1]; Jarrett, W.D.[1]; and Topp, B.L.[2]

[1] Emerging Technologies, Department of Primary Industries and Fisheries, Hamilton 4007, Australia
[2] Horticulture & Forestry Science, Department of Primary Industries and Fisheries, Nambour 4560, Australia
* Corresponding author: heather.smyth@dpi.qld.gov.au

Introduction

Nonmelting flesh in peach and nectarine offers potential benefits for both growers and consumers. Growers would benefit because nonmelting (firmer flesh) stonefruit typically damage less easily during harvest, transport and storage which results in a reduction of product loss compared to melting (softer flesh) stonefruit. Consumers would benefit if the increased flesh firmness allows the fruit to be delivered to markets when it is physiologically closer to tree-ripe. The Department of Primary Industries and Fisheries lowchill summerfruit breeding project is developing both melting and nonmelting flesh types of peach and nectarine. Currently, there are very few nonmelting stonefruit varieties for the fresh market and consumer acceptance of nonmelting stonefruit is not well understood. The objective of this preliminary study was to investigate consumer acceptability for melting and nonmelting stonefruit flesh types in peaches and nectarines.

Methodology

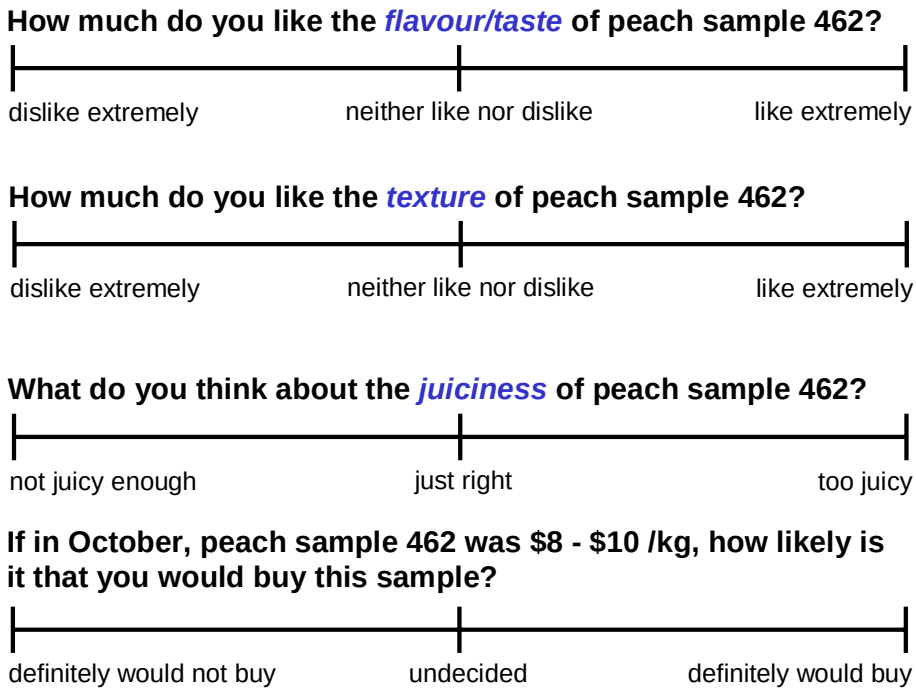
Four fruit varieties, consisting of a melting and nonmelting peach and a melting and nonmelting nectarine, were selected for the consumer evaluation. These varieties were sourced commercially and from Maroochy Research Station, Nambour. Ideally, varieties should be selected that produce fruit similar in all traits except flesh type thus allowing any differences in consumer acceptance to be attributed to flesh type. In reality, it was a challenge to find melting and nonmelting flesh varieties that fit this description.

Photo 1. The board room format used for stonefruit consumer tastings

The consumer study was conducted in Brisbane City Centre during December 2005 and involved 65 consumers consisting of 53 females and 12 males with an even distribution of age between 20 and 60 years. The four varieties were presented as whole fruit in coded cups according to a balanced presentation design. A six-page questionnaire was completed by each consumer after tasting the fruit. The questionnaire included hedonic scales for flavour/taste, texture and juiciness, a 'just right' scale for juiciness, and a purchase intent scale as shown in Figure 1. A number of demographic and purchase habit questions were also included in the questionnaire. Scores were converted linearly from the scale to 0 - 100 for statistical analysis.

Physical and chemical measurements were also made of each variety including fruit size, colour, penetrometer measurements, titratable acidity and percent soluble solids. These measurements were compared with consumer scores, and were used to objectively demonstrate that the nonmelting flesh fruit were significantly firmer than the melting flesh fruit. The acid and sugar measurements indicated how similar or different the varieties should have tasted from one another in terms of tartness and sweetness.

Figure 1. Scales used in consumer questionnaire



Results and Discussion

The results from the physical and chemical measurements are shown in Table 1. The nectarines selected were close to ideal with the melting and nonmelting varieties being very similar in all aspects other than flesh type. The nonmelting nectarines were significantly larger, on average, than the melting nectarines. In terms of acidity (% titratable acidity) and sweetness (°Brix), there was no significant difference between the nectarine varieties. The average penetrometer measurements (compressive load at 8 mm) clearly showed that the nonmelting flesh nectarine was much firmer than the melting flesh nectarine, requiring a much larger force for the 11 mm probe to penetrate to 8 mm into the flesh.

The melting peach variety was significantly larger, higher in acidity and higher in sugars than the nonmelting peach. Unfortunately, this was a less than ideal selection of fruit and it was extremely difficult at the time of the study to source two peach varieties that were very similar in all aspects other than flesh type. Penetrometer measurements showed, as expected, that the nonmelting peach was significantly firmer than the melting peach.

Table 1. Summary of stonefruit physical and chemical measurements

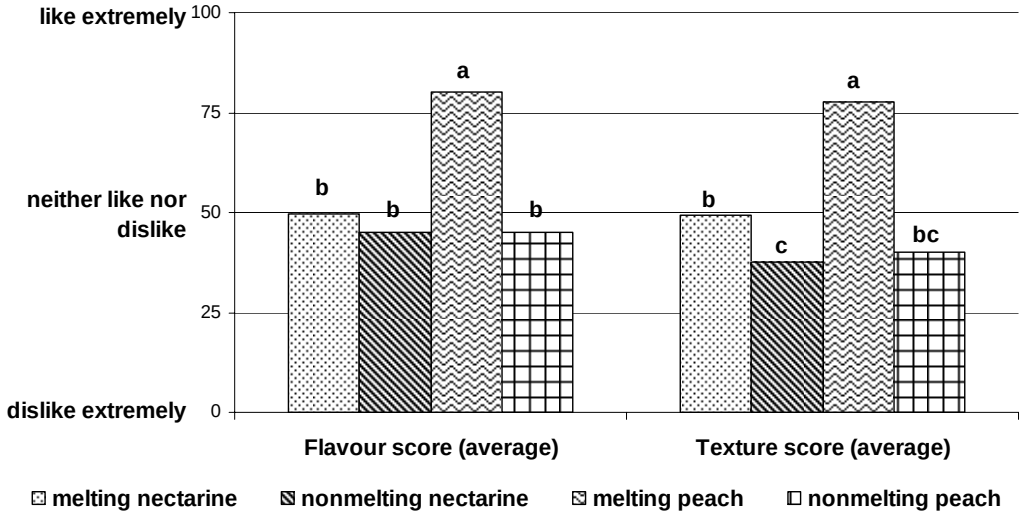
	mass (g)	diameter (mm)	% titratable acidity (as malic acid)	% soluble solids (°Brix)	compressive load at 8mm (N)
nectarines					
melting	100[c]	58[c]	1.02[a]	13[a]	15[c]
nonmelting	125[b]	63[b]	0.93[a]	12[a]	45[a]
peaches					
melting	193[a]	73[a]	0.83[b]	11[b]	10[c]
nonmelting	94[c]	58[c]	0.56[c]	10[c]	35[b]

Different letters within a column indicate a statistically significant difference between samples by ANOVA, where $p < 0.05$.

The results of the consumer analysis of the fruit are given in Figure 2, 3 and 4.

Figure 2 shows a graph of the average hedonic (likeability) scores for flavour/taste and texture. Consumers scored the melting peach very high for both flavour/taste and texture. It is likely that these scores are influenced by the size, visual appearance and different flavour of the melting peach and are not a true reflection or comparison of flesh type. There was no significant difference between the nectarines in terms of consumer rating for flavour but the flesh texture of the melting nectarine was significantly preferred.

Figure 2. Average consumer acceptability scores for flavour and texture

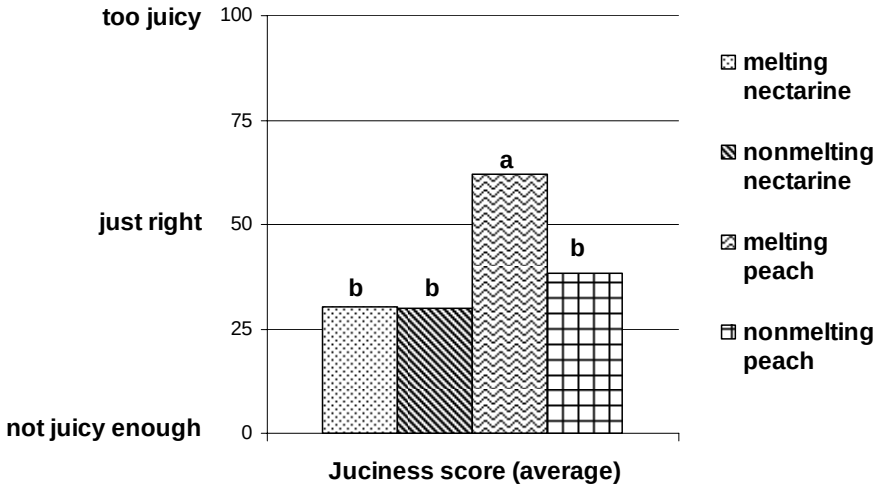


Different letters above each bar within a consumer variable, indicate a statistically significant difference between samples by ANOVA, where $p < 0.05$.

Figure 3 shows a graph of the average consumer scores for juiciness as rated on a 'just right' scale. The melting peach scored much higher than the other fruit toward the 'too juicy' part of the scale. The nonmelting peach was scored significantly lower toward the 'not juicy enough' part of the scale.

The melting and nonmelting nectarines did not differ significantly in terms of juiciness scores and were both rated toward being 'not juicy enough'.

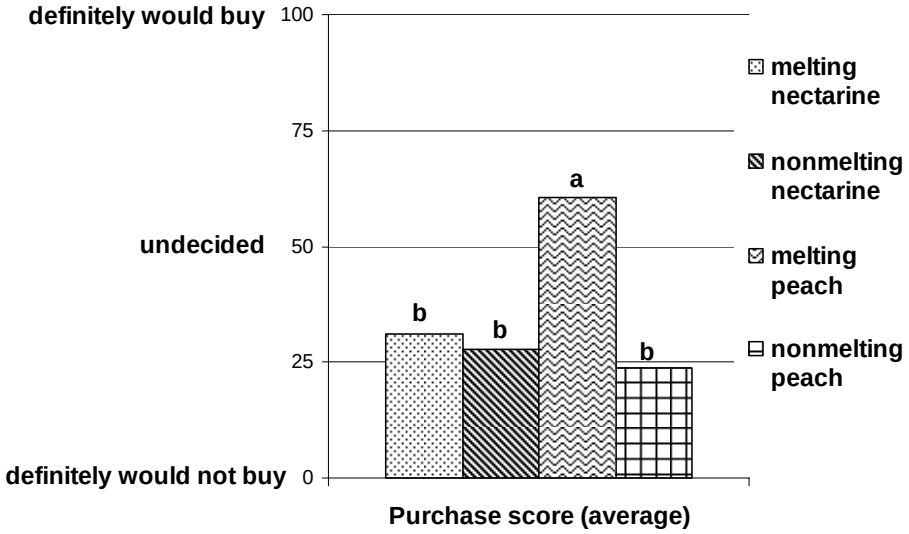
Figure 3. Consumer acceptability scores for juiciness



Different letters above each bar indicate a statistically significant difference between samples by ANOVA, where $p < 0.05$.

Figure 4 shows a graph of the purchase intent scores if the fruit were priced at 8-10 $/kg. There was no significant difference between any of the varieties for purchase intent other than the melting peach, which scored toward the 'definitely would buy' part of the scale.

Figure 4. Average consumer scores for purchase intent of stonefruit priced at $8-10/kg



Different letters above each bar indicate a statistically significant difference between samples by ANOVA, where $p < 0.05$.

The nectarines were both rated toward the 'would not buy' part of the scale, and there was no significant difference in consumer purchase intent between the different flesh types.

Conclusions

The physiochemical results show that the melting and nonmelting peaches were not suitable to compare for flesh type due to the differences in appearance, acidity and sugars. Further work must be done to determine consumer acceptance of different flesh types in peach using a careful selection of peach varieties that are very similar in all aspects other than flesh type.

The melting and nonmelting nectarine varieties in this experiment were almost identical in physical and chemical measurements of appearance and taste and differed only in flesh type. Consequently, the results from the comparison between consumer acceptance of these two varieties, was much more meaningful. Although consumers preferred the texture of the melting nectarine, there was no difference between the melting and nonmelting fruit for consumer ratings of flavour, juiciness and purchase intent. These results might indicate that although consumers may prefer melting texture in nectarines, this will not influence whether or not they would buy the nectarine. Further work needs to be done to fully understand the importance of texture in consumer preference. In particular, a wider range of nonmelting varieties need to be evaluated and the consumer testing should be expanded to provide information on export as well as domestic market requirements.

Overall, this was a successful preliminary study with some interesting findings. This study demonstrates the need to further investigate and understand the complexity of consumer preferences in stonefruit to support breeding programs in developing new varieties that meet the requirements of both the grower and the consumer.

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