Consumer appreciation of New Zealand-grown and imported tomatoes

Introduction

Tomatoes (Lycopersicon esculentum) in New Zealand are generally available for extra all year-round but they are imported to times of scarcity. Most tomatoes are grown under hydroponic conditions, except for ecological (organic) tomatoes, which are grown in soil. Many different cultivars of tomato are available in New Zealand retail outlets. Studies have shown that the colour of the tomato is one of the principal quality attributes which determines the purchasing decision and consumer acceptance of tomatoes, while flavour and texture are also important sensory attributes for acceptance. 1, 2

We used a consumer-type panel to evaluate six tomato cultivars for preference to purchase, the colour of the skin and the flesh, flavour (sweetness and bitterness) texture (firmness and juiciness) and overall acceptance. Skin colour was measured, using a colorimeter (CELLAB system) in order to compare the magnitude of the red colour with the rankings from the sensory evaluation questionnaire about preference for purchase.

Materials and Methods

Sample Collection

Five different locally grown cultivars (Aranca, Excell, Flavourine, Mondeo (grown organically) and Solario) and one imported tomato cultivar (Australian – cultivar not known) were evaluated by a consumer-type panel.

All tomatoes (except for Mondeo) had been grown using a hydroponic fertigation system in greenhouses before being harvested at the light-red stage and kept at room temperature until evaluated three days later at the red-ripe stage (maturity stage 6; California Tomato Commission, 2003)

Sensory Evaluation

Panelists (51) were drawn from staff and students at Lincoln University and the sensory evaluation was carried out using standard procedures.

Questions about preference for purchase, acceptance of flesh and skin colour, flavour (sweetness and bitterness), texture (firmness and juiciness) and overall acceptance were asked. A hedonic (five-point scale) was used. These data, therefore, do not have a normal distribution and so the proportional-odds model developed by McCullagh3 was used to give a ranking of “liking” for each attribute.

Colour Measurements

The colour of the tomato skin of each cultivar was measured (CELLAB system) using a Minolta chroma meter CR-210 with a 50 mm measuring head. Three replicate measurements were taken for each sample. Colour measurements were recorded as **L** = lightness (100 = white, 0 = black); **a** = redness (a**+** = redness, a**−** = greenness) and **b** = yellowness (0 = blue).

Results

Table 1: Sensory Evaluation results showing rankings generated for each question. (1 = lowest ranking; 6 = highest ranking).

<table>
<thead>
<tr>
<th>Rank</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appearance</td>
<td>Pre</td>
<td>Excell</td>
<td>Flavourine</td>
<td>Solario</td>
<td>Aranca</td>
<td>Mondeo *</td>
</tr>
<tr>
<td>Colour</td>
<td>Skin</td>
<td>Excell</td>
<td>Mondeo</td>
<td>Imported</td>
<td>Aranca</td>
<td>Solario</td>
</tr>
<tr>
<td>Texture</td>
<td>Firmness</td>
<td>Aranca</td>
<td>Mondeo</td>
<td>Flavourine</td>
<td>Solario</td>
<td>Excell</td>
</tr>
<tr>
<td>Flavour</td>
<td>Sweetness</td>
<td>Aranca</td>
<td>Flavourine</td>
<td>Solario</td>
<td>Excell</td>
<td>Imported</td>
</tr>
<tr>
<td>Intensity</td>
<td>Aranca</td>
<td>Flavourine</td>
<td>Solario</td>
<td>Excell</td>
<td>Imported</td>
<td></td>
</tr>
<tr>
<td>Overall</td>
<td>acceptance</td>
<td>Aranca</td>
<td>Flavourine</td>
<td>Solario</td>
<td>Excell</td>
<td>Imported</td>
</tr>
</tbody>
</table>

*Mondeo cultivar: Because of technical difficulties these tomatoes were not picked in optimal condition and so these results are not to be taken as representing organic tomatoes overall.

The results show that Excell was the cultivar that ranked highest for preference for purchase, and skin and flesh colour. However, based on overall acceptance, Aranca was the most preferred cultivar. The second most preferred cultivar (other than for skin colour) was Flavourine followed by Solario.

Discussion

The most preferred cultivar for purchase, based on appearance, was Excell, a large bright red tomato. However, this cultivar was not ranked as highly for texture and flavour attributes analysed, i.e. it looked good to eat, but this promise was not borne out when it was eaten. Aranca and Flavourine were ranked as first and second in liking for all characteristics, except for Firmness and skin colour (Flavourine only). Aranca was most preferred overall, and this appears to be due to its preferred flavour characteristics.

Lack of characteristic tomato flavour is a common complaint with supermarket tomatoes,” so, it is interesting to note that Flavourine (a highly ranked cultivar) was specifically developed for its intensity of tomato flavour (pers. comm. Steve McArthur. South Pacific Seeds). For skin colour, one of the cultivars with the two highest a**+** (red) scores was also chosen as the most preferred cultivar (these (Excell) while the other was not (Imported). However, neither of these cultivars was ranked highly for the other sensory attributes of flavour, texture and overall acceptance. It appears that panelists may have been using tomato colour as the main criteria in their decision to purchase, but that colour does not appear to be a reliable indicator of the subsequently preferred tomato flavour and texture. This was demonstrated by the low ranking (4th) for Excell in overall acceptability.

Conclusions

Tomato quality is a complex issue and involves breeders in balancing trade-offs between characteristics such as size, colour, flavour and texture. This study will benefit growers, wholesalers and retail outlets who, increasingly, need to ensure that the tomatoes they produce meet the quality parameters favoured by their consumers.

References