Boysenberry - a Character Description for Commerce

Introduction
Boysenberry (Boysen) has a very distinctive flavour, colour and volatile aroma that differentiates it from other Rubus berries. A description of Boysen would assist with:

- Verification and detection of adulterations in Boysen products;
- The establishment of boundaries to define new Boysen cultivars within breeding programmes.

Three different methods were investigated to distinguish Boysen from other Rubus fruit.

Materials and methods
The following methods to test differentiation amongst Rubus berry types:

1. Anthocyanin Pigment Analysis
Juice from Boysen and other Rubus fruits was analysed for anthocyanins using HPLC.

2. Test Panel “Sniff Test”
Defrosted berry samples were placed in coded, sealed jars and "sniffed" by a panel of growers and researchers who recorded similarity to Boysen.

3. Volatile Analysis
Headspace analysis was used to analyse the juice samples. Volatiles and standards of known compounds were separated and identified by GCMS.

Results

1. Anthocyanin Pigment Analysis
- The cyanidin 3-sophoroside (cy-sop) to cyanidin 3-glucoside (cy-glu) ratio appeared to distinguish Boysen in most cases (Fig. 1).
- Pigments detected from Boysen/Young samples were cy-sop, cyanidin 3-rutinoside-5-glucoside (cy-glurut), cy-glu and cyanidin 3-rutinoside (cy-rut) (Fig. 2).

2. Test Panel “Sniff Test”
- Over 70% of the panel identified Boysen/Young and selections similar to Boysen (Table 1).

3. Volatile Analysis
- High levels of linalool were associated with Young, Logan and Boysen but ethyl 2-butenoate with Boysen and other selections (Fig. 3).
- No volatiles unique to Boysen were identified (Fig. 3).

Conclusions
The following criteria could provide a workable definition of Boysen:

- Contains levels of cy-sop over 550mg/mL; cy-glurut over 100mg /mL; cy-glu over 350mg /mL and cy-rut over 0mg /mL;
- A cy-sop / cy-glu ratio of between 0.9 and 2.0;
- 70% of a panel identifies the aroma as "Boysen";
- A similar volatiles profile to Boysen.

As yet the total characterisation of Boysen is incomplete. Further studies that could be of value.

Table 1: Proportion of Panellists who Identified a Selection/ Cultivar as having a "Boysen" Aroma

<table>
<thead>
<tr>
<th>Cultivar/Selection and Relatedness to Boysen</th>
<th>Percentage identified as &quot;Boysen&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>“Early”, Young</td>
<td>72</td>
</tr>
<tr>
<td>“Late”, Boysen</td>
<td>86</td>
</tr>
<tr>
<td>Selection 1: Unlike Boysen background</td>
<td>14</td>
</tr>
<tr>
<td>Selection 2: Like Boysen background</td>
<td>86</td>
</tr>
<tr>
<td>Selection 3: Unlike Boysen background</td>
<td>14</td>
</tr>
<tr>
<td>Selection 4: No Boysen background</td>
<td>0</td>
</tr>
<tr>
<td>Selection 5: Unlike Boysen background</td>
<td>43</td>
</tr>
</tbody>
</table>

Figure 2
Levels of cy-sop, cy-glurut, cy-glu and cy-rut in Boysen, Young and selections from HortResearch

Figure 3a,b
Levels of volatiles from headspace analysis of Boysen, Young and selections from HortResearch.