Evaluation of promising new mango cultivars and selections in different climatic areas (2012/2013)

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ABSTRACT
Although the mango breeding program of the ARC-ITSC hasn’t been funded by the industry for many years, it still continued successfully and several promising selections have been identified. Currently, two strategies are followed by the ARC-ITSC to obtain new and improved cultivars. Imported cultivars from other mango producing countries are evaluated in order to determine their potential under South African conditions. Trees of these selections were established only in one climatic region namely Malalane, where cultivar performance is evaluated. Secondly, a breeding program is used to obtain new cultivars by using open pollinated seed and irradiation of mango plant material. The progeny are evaluated in different orchards to determine their commercial potential.

The Phase I program consists of 2 696 open pollinated seedlings spread over six hectares at the Malalane Research Farm. In previous years the focus of the mango breeding program was to select promising cultivars for the export market mainly to Europe. Due to decline of the export market the industry focus shifted to other niche markets. This resulted that promising selections from the ARC-ITSC breeding program not suitable for the export market are becoming more suitable to other markets. During the past season the Phase I orchards at Malalane were evaluated with representatives of SAMGA and 29 selections were identified for further evaluation. Once identified, selections with the potential to perform in these different markets will also be evaluated on producer farms in different climatic regions.

A Phase II statistical trial has been established at Malalane in 2010 where 11 promising selections are compared with four commercial cultivars. These trees bore fruit for the first time during the past season and yield and fruit size data were taken.

INTRODUCTION
The replacement of current commercial cultivars with new ones has been investigated in the past (Human and Rheeder, 2002; Le Lagadec, et al., 2002, Le Lagadec, 2003). This breeding objective was initially not regarded as a high priority by the industry because the export of mangoes was the main aim of many producers and cultivars were available to comply with their needs. However, the situation changed during the last few years with the decline of the export market, forcing the mango producers to look at other markets as well as certain niche markets. The mango breeding program of the Agricultural Research Council’s Institute for Tropical and Subtropical Crops (ARC-ITSC) hasn’t been funded by the industry for many years. Despite this situation and even though it had to be scaled down, it still continued successfully and several promising selections have been identified, mainly aimed at the export market to Europe, that could benefit the local producers. Currently the challenge is to find mango fruit with characteristics suitable for all the different markets.

MATERIALS AND METHODS
The ARC-ITSC mango breeding program mainly follows two strategies to obtain new, improved cultivars. Firstly, imported cultivars from other countries are evaluated to determine their potential under South African conditions. Secondly, an active breeding process is utilised where open pollinated seeds are used as well as irradiated plant material. Material emanating from these processes are established at only one location, Malalane, where cultivar performance is evaluated in Phase I and Phase II orchards. The Phase I program consists of 2 696 open pollinated seedlings spread over six hectares, whilst 11 promising selections are currently compared with four commercial cultivars in the Phase II program. The evaluation of
the Phase I orchards is done twice during the season together with members of the South African Mango Growers’ Association (SAMGA). Selections identified as promising during these visits will be further evaluated on the farms of participating and contracted producers in different climatic regions. The localities for the establishment of these trials still have to be determined.

RESULTS AND DISCUSSION
Phase I (Block B2)
This block was planted in 2001 and has been evaluated since 2008. Results from promising selections in this block are summarised below.

Phase I (Block C5)
This block was planted between 2008 and 2010 and was evaluated for the first time at the end of January 2013. During this evaluation 29 selections were identified as promising by the evaluation team and will be looked at again during the next season. Some of these selections are described below.
The rest of the identified selections are listed in Table 1.

**Phase II**

The Phase II statistical trial was established in 2010 at Malalane Research Farm and bore fruit for the first time during the past season. The yield was, however, too small to do any statistical analysis. In this orchard 11 selections with potential are compared with four commercial cultivars, ‘Tommy Atkins’, ‘Heidi’, ‘Joao’ and ‘Crimson Pride’. The selections included in this trial are listed below.

### Table 1. Promising Phase I selections from Block C5, Malalane – 2012/2013.

<table>
<thead>
<tr>
<th>Selection</th>
<th>Harvest date</th>
<th>Yield (kg/tree)</th>
<th>Fruit size (g)</th>
<th>Taste</th>
<th>Fibre</th>
<th>Remarks</th>
</tr>
</thead>
<tbody>
<tr>
<td>C5-E2</td>
<td>End February</td>
<td>5.4</td>
<td>450</td>
<td>6</td>
<td>6</td>
<td>Harvested too early</td>
</tr>
<tr>
<td>C5-E8</td>
<td>Mid-February</td>
<td>2.5</td>
<td>343</td>
<td>6</td>
<td>4</td>
<td>Good external appearance, fibre</td>
</tr>
<tr>
<td>C5-E10</td>
<td>End February</td>
<td>2.7</td>
<td>540</td>
<td>6</td>
<td>7</td>
<td>Very sweet</td>
</tr>
<tr>
<td>C5-H27</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-H36</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-J31</td>
<td></td>
<td>0.4</td>
<td>400</td>
<td>6</td>
<td>7</td>
<td>Slightly sour, not fully ripe</td>
</tr>
<tr>
<td>C5-K17</td>
<td>Mid-February</td>
<td>8.4</td>
<td>323</td>
<td>7</td>
<td>6</td>
<td></td>
</tr>
<tr>
<td>C5-K38</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-L31</td>
<td>End January</td>
<td>0.8</td>
<td>800</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>C5-L44</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-M11</td>
<td>Mid-February</td>
<td>18.7</td>
<td>374</td>
<td>-</td>
<td>-</td>
<td>Late</td>
</tr>
<tr>
<td>C5-M27</td>
<td></td>
<td>1.4</td>
<td>233</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
<tr>
<td>C5-M35</td>
<td>Mid-February</td>
<td>10.0</td>
<td>417</td>
<td>8</td>
<td>7</td>
<td>Good taste</td>
</tr>
<tr>
<td>C5-M38</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-N4</td>
<td>Early February</td>
<td>0.8</td>
<td>200</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-O12</td>
<td>End February</td>
<td>20.5</td>
<td>513</td>
<td>6</td>
<td>7</td>
<td>Too big?</td>
</tr>
<tr>
<td>C5-O23</td>
<td>Mid-February</td>
<td>5.3</td>
<td>353</td>
<td>7</td>
<td>6</td>
<td>Taste strange, but nice</td>
</tr>
<tr>
<td>C5-T5</td>
<td></td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>Look again 2014</td>
</tr>
<tr>
<td>C5-T34</td>
<td>Late February</td>
<td>2.1</td>
<td>350</td>
<td>7</td>
<td>6</td>
<td>Harvest too early but still good taste, look again 2014</td>
</tr>
<tr>
<td>C5-U15</td>
<td>End February</td>
<td>1.1</td>
<td>275</td>
<td>-</td>
<td>-</td>
<td></td>
</tr>
</tbody>
</table>

Harvesting date: Mid February
- Yield: (Kg/tree) (Planted – 2010)
  2012 – 5.5
- Fruit Size (g/fruit): 301
- Taste: 7
- Fibre: 6

Harvesting date (Average): Mid Feb.
- Yield: (Kg/tree) (Planted – 1999)
- Fruit Size (g/fruit): 387
- Taste: 6
- Fibre: 6

Harvesting date (Average): Mid Feb.
- Yield: (Kg/tree) (Planted – 1996)
- Fruit Size (g/fruit): 494
- Taste: 6
- Fibre: 6

Harvesting date (Average): Mid Feb.
- Yield: (Kg/tree) (Planted – 1997)
  2004 – 95.3, 2005 – 60.8, 2006 – 149.0
- Fruit Size (g/fruit): 613
- Taste: 6
- Fibre: 7
- Remarks: Attractive fruit, juicy, soft.
CONCLUSION

Although mango breeding is a time consuming and expensive program it still managed to produce several promising selections for different markets and consumer preferences. The strategies for this program are flexible and with the help of producers in different areas the need for new cultivars should be addressed. The evaluation program only started this year and the producers that will form part of this program as well as the localities where the program will be carried out are not yet decided on.

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REFERENCES