

Evaluation of promising new mango cultivars and selections in different climatic areas (2013/14)

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Abstract

The evaluation of promising hybrids from the Agricultural Research Council - Institute for Tropical and Subtropical Crops' (ARC-ITSC) breeding programme before commercialisation in different climatic regions, is necessary to identify the best performers in the different mango areas. It also serves as a source for the descriptions of new cultivars before releasing to the industry where it can be compared to commercial cultivars in the same orchard.

Currently, two strategies are followed by the ARC-ITSC to obtain new and improved cultivars. The first is to import new cultivars and the second is to use available plant material to breed new cultivars. Most of the currently available material are established at the Malelane Research Station. However, due to the closure of this facility in 2015, the ARC-ITSC is forced to relocate the plant material. This process is ongoing and involves the re-establishment of Phase I and Phase II material.

Two Phase I orchards at Malelane produced fruit for the first time this season and were evaluated during January 2014 by the two responsible researchers, assisted by members of SAMGA and Subtrop. These two orchards consist of 330 open pollinated seedlings of which a large portion did not produce fruit yet. The evaluators identified 62 selections with potential that had to be looked at again. With the 29 promising selections identified during the previous season, it means that a total of 91 selections are in the second phase of evaluation. This is a high percentage of promising selections and can be attributed to the collection of seed from the Phase II orchard.

A Phase II statistical trial has been established at Malelane in 2010 where 11 promising selections are compared with four commercial cultivars. The second crop already showed the good performance of cultivars from the breeding programme where the best producers are from the breeding programme. This trial will be subject to a final evaluation at the next harvest season.

Introduction

Promising selections from the breeding programme are identified by the mango breeding team as well as members of SAMGA and Subtrop. The most promising selections are grafted on Sabre rootstocks for the Phase II statistical evaluations where they will be compared with commercial cultivars. Promising selections are also topworked at mango producers in different climatic regions. The most important characteristics that have to be met during the Phase II evaluation, are yield, disease resistance, fruit shape and colour and internal quality.

The current challenge is to find selections with characteristics suitable for all the different markets that are now being explored, due to the rapid decline of the export market.

Materials and methods

The breeding programme follows two strategies to obtain new, improved cultivars. Cultivars identified as promising are imported and evaluated to determine their potential under South African conditions, and secondly, to use available plant material to breed new cultivars. Most of the currently available material are established at the Malelane Research Station. However, due to the closure of this facility in 2015, the ARC-ITSC is forced to relocate the plant material. This process is ongoing and involves the re-establishment of Phase I and Phase II material.

The evaluation of the Phase I orchards is done during the season together with members of the South African Mango Growers' Association (SAMGA) and Subtrop. Selections identified as promising du-



Figure 1. C3-M13



Figure 2. C3-M16



Figure 3. C5-O3

ring these visits are evaluated on the farms of producers in different climatic regions. Promising selections have already been established at Mohlatsi Farm (Hoedspruit) and will be established at Bavaria (Hoedspruit) and in the Clanwilliam area as soon as material becomes available.

Results and discussion

Phase I (Block C5)

This block was planted between 2008 and 2010 and was evaluated for the second time in 2014. No new selections were identified and some of the selections that are still performing well are listed in Figures 1 to 4. The rest of the identified selections are listed in Table 1.

Phase I (Block A4)

This block was planted in May 2010 and produced fruit for the first time. From the 130 trees in this orchard, 103 did not bear fruit. A total of 18 promising selections

were identified and nine selections eliminated due to poor characteristics. Some of the best performers can be seen in Figures 5 to 8. The rest of the identified selections are listed in Table 2.

Phase I (Block B3)

This block, planted in 2010, also produced fruit for the first time. This block consists of two hundred trees of which 125 did not produce fruit. Promising selections identified were 44 whilst 31 were eliminated. A few of the best performers can be seen in Figures 9 to 13. The rest of the identified selections are listed in Table 3.

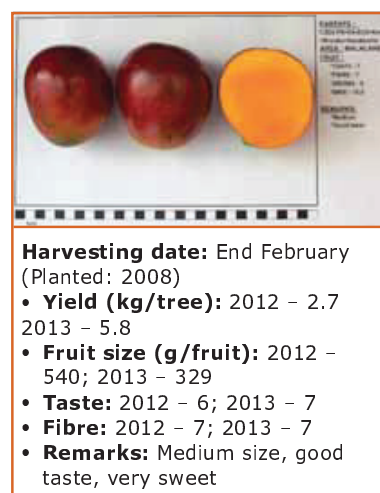


Figure 4. C5-E10

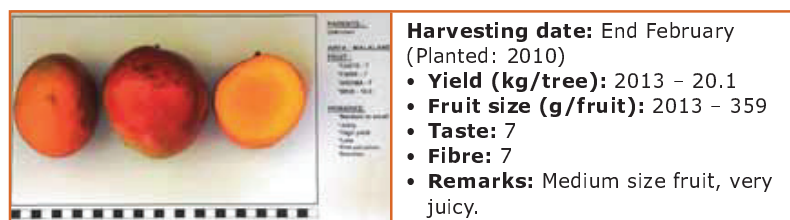


Figure 5. A4-M8

Table 1. Promising Phase I selections from Block C5, Malelane – 2013/14.

Selection	Harvest date	Yield (kg/tree)	Fruit size (g)	Taste	Fibre	Aroma	Brix	Remarks
C5-E2	Mid-February	3.8	633	7	5	7	19.8	Large fruit, good taste, stringy fibre
C5-E11	Mid-February	15.6	678	6	6	6	9.6	Large fruit
C5-M38	Mid-February	8.5	404	5	8	6	15.7	Small fruit, late, soft, harvested too early
C5-O12	End February	18.0	563	6	7	6	11.1	Medium-large fruit, harvested too early
C5-O45	Mid-February	23.2	215	6	4	6	11.9	Small, fibre, looks like large Nelpetite, pineapple taste

A total of 91 selections are currently in the second phase of evaluation. This is a high percentage of promising selections and can be attributed to the collection of seed from the Phase II orchard.

Phase II

The second yield of the Phase II statistical trial was

harvested this year. In this orchard, 11 selections with potential are compared with four commercial cultivars, 'Tommy Atkins', 'Heidi', 'Joa' and 'Crimson Pride'. The second crop already showed the good performance of cultivars from the breeding programme where the best producers are from the breeding programme. This trial will be subject to a final evaluation



Harvesting date: Mid-February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 5.9
 • **Fruit size (g/fruit):** 2013 - 369
 • **Taste:** 7
 • **Fibre:** 7
 • **Remarks:** Medium size, sweet taste, peach after taste.

Figure 6. A4-O9



Harvesting date: End February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 9.4
 • **Fruit size (g/fruit):** 2013 - 313
 • **Taste:** 7
 • **Fibre:** 6
 • **Remarks:** Small - medium size fruit, sour taste

Figure 7. A4-Q4



Harvesting date: Mid-February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 9.4
 • **Fruit size (g/fruit):** 2013 - 495
 • **Taste:** 6
 • **Fibre:** 6
 • **Remarks:** Medium size, good external appearance

Figure 8. A4-M5



Harvesting date: End February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 37.3
 • **Fruit size (g/fruit):** 2013 - 397
 • **Taste:** 7
 • **Fibre:** 6
 • **Remarks:** Medium size fruit, good taste, good external appearance.

Figure 9. B3-H3



Harvesting date: Early February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 8.5
 • **Fruit size (g/fruit):** 2013 - 315
 • **Taste:** 7
 • **Fibre:** 6
 • **Remarks:** Small - medium size, good taste, sweet.

Figure 10. B3-L17



Harvesting date: Early February
(Planted - 2010)
 • **Yield (kg/tree):** 2013 - 11.3
 • **Fruit size (g/fruit):** 2013 - 251
 • **Taste:** 7
 • **Fibre:** 6
 • **Remarks:** Small fruit, pink/red external colour, stringy

Figure 11. B3-N6

Table 2. Promising Phase I selections from Block A4, Malelane - 2013/14.

Selection	Harvest date	Yield (kg/tree)	Fruit size (g)	Taste	Fibre	Aroma	Brix	Remarks
A4-M2	Mid-February	13.6	340	6	6	5	17.0	Medium size fruit, sour
A4-M12	Early February	20.2	331	7	7	6	12.5	Medium-small fruit, sour taste, juice?
A4-N1	Mid-January	3.4	486	6	6	5	15.9	1 fruit, late, medium size, juicy
A4-N8	Early February	3.8	380	6	6	6	14.0	Medium size fruit, sour taste
A4-O1	Early February	16.0	348	6	7	6	11.2	Lenticells, watery taste
A4-O8	Mid-February	23.2	483	6	7	6	11.2	Medium size, watery taste
A4-O11	Early February	13.3	429	5	5	5	9.8	Medium size, fibre, watery taste, out?
A4-P12	End January	5.6	509	6	7	6	11.3	Large fruit
A4-P17	End January	11.1	347	6	7	5	13.2	Medium size
A4-Q8	End January	5.5	290	6	7	6	10.1	Small fruit
A4-R3	Early February	11.3	3.5	6	5	6	14.3	Small fruit, fibre, sour taste
A4-R4	Mid-January	13.5	386	6	6	6	12.8	Medium size, sour taste
A4-R6	Mid-February	7.6	475	7	6	6	14.8	Large fruit, good taste
A4-R7	Early February	7.6	292	-	-	-	-	Small fruit

at the next harvest season.

The overall yield of this block increased substantially from last year. None of the selections produced more than 9 kg/tree. In Table 4 it can be seen that only one selection produced less fruit than the best producer of the previous year. 'Joa', the best producer this season, had a yield of 35.8 kg/tree, compared to the 6.4 kg/tree from last year. 'Crimson Pride' and 'Heidi' also produced well. 'Crimson Pride' had the biggest fruit of 580 g/fruit with the smallest fruit coming from selection A2-I23.

Conclusion

The long term objective of this project is the evaluation of promising hybrids from the ARC-ITSC's breeding programme before commercialisation in different climatic regions. A total of 330 trees were evaluated for the first time in 2014 and 62 selections with potential were identified. Due to the closure of the Malelane Research Farm at the end of March 2015, it was necessary to relocate all the younger Phase I trees that didn't bore fruit yet, all the promising Phase I extension selections, as well as the selections already in

Table 3. Promising Phase I selections from Block B3, Malelane – 2013/14.

Selection	Harvest date	Yield (kg/tree)	Fruit size (g)	Taste	Fibre	Aroma	Brix	Remarks
B3-H7	Early February	4.3	269	6	5	6	19.8	Small fruit, fibre
B3-H11	End January	3.2	246	6	6	7	11.5	Small fruit, sweet taste
B3-H14	Early February	3.0	333	7	5	6	14.5	Medium size, sweet taste, fibre
B3-H16	Early February	11.6	504	6	6	7	12.0	Medium/large fruit
B3-H19	Early February	12.7	249	6	6	6	13.0	Small fruit
B3-H22	End January	7.1	444	7	6	8	11.6	Medium size
B3-H23	End January	4.9	408	6	6	5	14.8	Medium size, fruit not good looking, sour taste
B3-I2	Early February	18.4	613	6	6	7	15.6	Large fruit, soft fruit flesh
B3-I5	Mid-February	7.3	456	6	7	6	11.9	Medium size, sour taste
B3-I7	Mid-February	32.0	160	6	7	6	14.1	Small fruit, no mango taste, lenticels
B3-I11	Mid-February	10.8	491	6	6	6	15.3	Medium size, stringy, sweet/sour taste
B3-I14	End January	7.1	473	6	6	6	15.4	Medium size, fruit not good looking. Sour taste
B3-I17	End January	13.5	321	6	6	5	10.3	Medium/small size, pumpkin like taste
B3-I21	End January	7.1	374	6	5	6	20.8	Medium size, very sweet taste, fibre
B3-J4	Mid-February	14.5	309	7	6	6	17.2	Small/medium size, slightly sour, nice taste
B3-J5	End February	22.5	300	6	6	7	10.6	Small/medium size, juicy, bit watery
B3-J9	End February	19.9	398	6	7	6	17.0	Medium size, Stringy fibre, sour, harvest too early.
B3-J22	Mid-January	2.5	417	7	6	7	17.5	(1 fruit) Medium size
B3-K24	Early February	4.5	450	6	6	6	11.8	Medium size
B3-M1	End January	11.5	885	6	7	6	13.2	Large fruit, lenticels, bland taste
B3-M2	Mid-February	11.7	468	5	8	5	11.2	Medium size, soft fruit flesh, sweet, pumpkin taste
B3-M3	Mid-February	7.4	569	6	6	5	10.2	Large fruit, good internal colour
B3-M12	End February	27.2	486	6	7	5	11.8	Medium size, juicy, harvest too early
B3-N5	Mid-January	2.5	417	6	7	6	15.0	Medium size, soft fruit flesh, very sweet
B3-N10	Mid-February	38.8	511	6	6	6	10.9	Large fruit, soft fruit flesh
B3-N15	Mid-February	10.6	408	5	6	5	12.7	Medium size, bad taste
B3-N16	End January	11.8	381	-	-	-	-	Medium size
B3-N17	End January	4.4	440	7	6	6	14.9	Medium size, stringy
B3-N22	End January	11.1	463	6	6	6	11.5	Medium size
B3-O13	End February	25.3	253	7	7	6	11.8	Small fruit



Harvesting date: Early February
(Planted - 2010)

- **Yield (kg/tree):** 2013 - 13.6
- **Fruit size (g/fruit):** 2013 - 378
- **Taste:** 7
- **Fibre:** 6
- **Remarks:** Medium size, pink external colour, good appearance



Harvesting date: End January
(Planted - 2010)

- **Yield (kg/tree):** 2013 - 9.0
- **Fruit size (g/fruit):** 2013 - 375
- **Taste:** 7
- **Fibre:** 6
- **Remarks:** Medium size, pink blush, good taste, smooth skin

Figure 12. B3-H8

Figure 13. B3-N8

Table 4. Average fruit production and fruit size of Phase II Trial (Malelane, 2013+2014).

Cultivar/selection	Fruit bearing trees	Ave yield (kg/tree)	Ave fruit size (g/fruit)
'Joa'	16	35.8	315.0
'Crimson Pride'	16	23.9	580.0
'Heidi'	16	21.4	377.8
C2D2-U1	14	17.7	444.7
A2-I23	16	17.2	276.1
K3-Q43	13	16.0	351.3
A2-CD5	12	14.9	500.2
B2-J17	14	14.8	463.3
K3-S25	11	14.2	473.0
K3-K43	9	14.0	410.4
C2D2-D23	14	10.8	435.0
'Tommy Atkins'	16	10.5	374.9
C2D2-Y3	14	9.4	347.3
E10-5/10	14	6.2	304.6
E10-5/18	9	4.3	344.6

Phase II. A total of 1522 trees were topworked at Mohlatsi Farm near Hoedpruit.

The Phase II statistical trial that was established in block A4 at Malelane, produced fruit for the second time this year. The overall yield of this block increased substantially from last year. 'Joa' was the best producer this season with 'Crimson Pride' and 'Heidi' also producing well. 'Crimson Pride' had the biggest fruit.

Acknowledgements

- South African Mango Growers' Association for co-funding of the evaluation project.
- ARC-ITSC for the funding of the breeding and the evaluation projects.
- Co-workers for their input and use of their farms to establish evaluation blocks.