

SAMGA FINAL RESEARCH REPORT

Salomie Willemse

September 2025

PROJECT TITLE

Evaluation of promising mango cultivars and selections in different climatic regions.

RESPONSIBLE RESEARCHER

Salomie Willemse (Project leader)

Phumelele Ngwenya (Co-worker)

Dr E. Hajari (Co-worker)

RESPONSIBLE ORGANISATION

ARC - Tropical and Subtropical Crops

APPROVED FUNDING

R204 000.00

OVERALL PROJECT OBJECTIVES

1. Evaluation of promising hybrids from the ARC-TSC's mango breeding program before commercialisation.
2. Establish promising mango selections at four mango co-workers in different climatic areas for Phase I extension and Phase II evaluation (Hoedspruit, Tzaneen, Malalane and Clanwilliam).
3. Release new cultivars for the S.A. mango industry.

SPECIFIC OBJECTIVES DURING REPORTING PERIOD

1. Establish seedling hybrids for evaluation continuity.
2. Evaluate Phase I seedling hybrids at ARC-TSC and Hoedspruit.
3. Summary of dates regarding topworking at the four sites, evaluations and cultivar days.
4. Evaluate Phase I extension and Phase II bearing trees established at the sites of the four co-workers.

5. Identify promising selections to be included in Phase I extension and Phase II evaluation blocks in the different areas.
6. Identify the best performers, with the cooperation of the evaluation groups in each area, to be commercialised in future.

PROGRESS ACHIEVED

1. Seed collection to establish seedling hybrids for evaluation continuity

Seeds from promising mono-embryonic mango selections are collected annually from trials for the establishment of hybrid seedling trees. This action ensures continuity in evaluation to identify the most promising selections. After germination, seedling trees are established in the Breeding Nursery at the ARC-TSC for Phase I evaluation. The number of seeds planted and the germination rate are shown in Table 1. Currently, 261 seeds have been planted, with 80 having germinated (Fig. 1a and b).



Fig.1a and b: Seed of promising seedlings were planted for Phase I evaluation.

Table 1: Mono-embryonic seeds planted for Phase I evaluation

<u>SELECTION/CULTIVAR</u>	<u>AMOUNT PLANTED</u>	<u>AMOUNT GERMINATED</u>
CH16-C11	8	8
B3-K24	7	7
CH16-C29	8	8
CH16-B8	6	6
CH16-D23	7	5
CH31-O34+35	7	6
CH31-P39+40	7	2
CH31-L7	7	1
CH32-I31+32 (CH30-F30+31)	2	2
CH31-Q12 (Tzaneen)	12	5
CH32-G18	7	5
A4-M5 (CH30-C16+17)	9	6
CH16-D43	8	4
CH31-O4	8	1
B3-L17	7	1
L3-A3	6	1
K3-S25	5	2
CH31-L16	9	3
C5-O3	6	1
CH32-H12	1	-
CH16-L16	1	-
CH31-K18 (CH30-H28+29)	1	-
CH32-I6	3	-
CH16-C22	6	-
CH16-C44	2	-
CH31-N7+8	1	-
B3-M2 (CH30-B51+52)	1	-
B2-C38	10	-
B3-H3	7	-
A4-O8	10	-
B3-J10 (CH30-B32+33)	8	-
C5-O3 (Tzaneen)	7	-
CH16-E35	3	-
L3-O1	2	-
A4-N1 (CH30-C22+23)	6	-
L3-S7	6	-
CH32-I36+37	7	-
CH31-Q12	6	-
A4-M8 (Tzaneen)	7	-
CH16-F56 (CH30-H7+8)	8	-
CH31-L21 (CH30-G1+2)	1	-
CH31-N9	2	-
A4-O9 (CH30-C42+43)	1	-
CH31-Q6 (Tzaneen)	6	-
CH32-F10+11 (CH30-F37+38)	6	-
CH32-H25+26	2	-
CH16-E20	2	-
<u>TOTAL</u>	<u>261</u>	<u>80</u>

2. Phase I evaluation of seedlings at ARC-TSC and Hoedspruit

A. ARC-TSC Breeding nursery

Annually, mono-embryonic seeds are established and after germination, the seedlings are moved to a breeding nursery at ARC-TSC for Phase I evaluation. The total number of trees maintained in UV-resistant bags and air pots is 1 078. The seedlings are evaluated to identify promising selections that are topworked for further evaluation in four different climatic areas. Fruit and tree losses occurred again this year because the top-heavy trees in bags were blown over by strong winds. It was decided to discontinue the use of UV-resistant bags and current seedlings will be transplanted in stages into air pruning pots. The advantage of using air pruning pots is that the roots reach the open slots on the outside, where they are pruned by air and light. This causes the tree to produce more roots and shoots, resulting in a larger tree in a shorter period compared with traditional pots. Approximately 200 seedlings were planted in October 2024, followed by the re-potting of an additional 200 seedlings from grow bags into air pots (Fig. 2a and b). The irrigation system installed (drippers) was inadequate and is in the process of being replaced by micro-irrigation after planting in the air pots.



Fig. 2a: Some of the seedlings should still be re-established in air pots and will be done in batches.



Fig. 2b: Some of the seedlings were re-established in air pots and the irrigation also changed from drippers to micros.

B. Hoedspruit

The mango-breeding program is primarily established at the Hoedspruit site, as this is the main mango production area. Therefore, Phase I seedlings, as well as all promising selections (Phase I extension and Phase II), are based at Mohlatsi Farm. During the 2024/2025 mango season, 383 Phase I seedlings were evaluated on 7 January, 9 January and 4 February. Due to extreme heat waves the fruit ripened much quicker and harvesting of all the mango fruit including late commercial varieties such as 'Keitt' concluded by end of February. Samples were taken on every occasion of Phase I selections that were impressive during the orchard evaluation and were evaluated in the lab for taste, aroma, fibre content, internal and external colour, fruit shape, fruit size and brix (Table 2). Fruit shape is scored based on the 'Fruit Shape Chart' (Fig. 3), while external fruit colour is evaluated according to the percentage of each specific colour present on the fruit. For example, a score of Red7;YellowOrange3 indicates that 70% of the fruit is red and 30% is yellow/orange. Of the 383 Phase I seedlings that were evaluated, 68 were discarded due to poor fruit attributes, and nine selections were identified in total - four for Phase II, displayed in Fig. 4a to d, and five for Phase I extension (Fig. 5a - c).

Table 2: Fruit attribute data for seedlings sampled in the Phase I orchards

DATE	SELECTION	SITE POSITION	FRUIT SHAPE	FRUIT SIZE	EXTERNAL COLOUR	INT. COLOUR	FIBRE	TASTE	AROMA	BRIX	REMARKS
15/01/2025	CH16-B8	HOEDSPRUIT	6	M-L	RedPink7; OrangeYellow3	7	7	7	7	17.4	Aroma – normal mango, soft texture, sweet but not too sweet, good internal quality. Phase I extension.
	CH16-C11	HOEDSPRUIT	8	S-M	OrangeYellow8; Red2	6	7	8	7	21.8	Aroma – normal mango, very nice taste, exotic flavour, good internal quality. Phase I extension.
	CH16-D23	HOEDSPRUIT	9	M-L	OrangeYellow6; OrangePink4	8	8	6	6	19.1	Aroma – not a strong aroma, not a nice texture, a bit too soft, unpleasant aftertaste, mango taste. Discard.
	CH31-O34+35	HOEDSPRUIT	3	M	OrangeYellow6; Green1; DarkRed3	8	4	7	7	19.4	Aroma – smells like Peach? Check mother tree in CH31 and take a sample.
	CH16-C29	HOEDSPRUIT	9	S	Red6; OrangeYellow3; Green1	6	8	7	6	17.6	Aroma – not a strong aroma, good internal quality, tropical taste, not too sweet and not a strong mango taste. Phase I extension.
17/01/2025	CH16-C22	HOEDSPRUIT	4	M-L	RedPurple8; Green1; OrangeYellow1	7	7	6	7	15.6	Aroma – bit of turpentine smell, good internal quality, faint turpentine taste, somewhat bland, no sweetness. Discard.
	CH31-L16	HOEDSPRUIT	4	S	RedPurple7; OrangeYellow2; Green1	7	7	7	7	17.1	Aroma – normal mango, firm fruit although ripe , good internal quality, sweet/sour taste, nice mango taste, maybe a good shelf life because fruit is hard but ripe. Move to Phase II.
	CH31-O4	HOEDSPRUIT	9	M-L	Yellow7; PinkOrange3	7	7	7	6	15.8	Aroma – no mango smell, firm fruit although ripe, very good internal quality, sweet/sour taste, mango/pineapple taste. Already in Phase II.
	L3-A3	NELSPRUIT	3	M	RedPurple6; OrangeYellow4	7	8	8	7	17.2	Aroma – very nice tropical aroma, good internal quality, some lenticels, excellent taste and texture, sweet, nice tropical taste. Phase I extension to Hoedspruit.
	CH31-K4+5	HOEDSPRUIT	7	S	DarkRed4; YellowOrangeRed6	8	7	6	6	17.4	Aroma – no mango smell, good internal quality, normal sweet, mango taste. Already identified for Phase I ext.
20/01/2025	CH31-L7	HOEDSPRUIT	6	M-L	Red6; YellowOrange4	6	7	7	7	16.9	Aroma – very nice tropical aroma, skin feels a bit thick, good internal quality, exotic/tropical taste but not very juicy, “dry” texture, not too sweet. Phase I extension – Harvest sample for cultivar day
13/02/2025	CH31-L11	HOEDSPRUIT	8	M	Red3; YellowGreen7	6	8	6	7	17.2	External colour not very good, turpentine aroma and slight taste, soft flesh, check again next year, maybe harvested too early.
	CH32-H12	HOEDSPRUIT	2	M	DarkRed7; YellowOrange3	7	7	8	8	17.2	Good external colour, nice fruity aroma (pineapple), good internal quality, move to Phase II.
	CH16-E20	HOEDSPRUIT	3	S-M	RedPurple7; YellowOrange2; Green1	7	6	7	6	21.2	Good internal quality, excellent fruity taste, maybe Phase II but check again next year for

											taste, had an overripe taste.
	CH32-I6	HOEDSPRUIT	7	M-L	Purple8; OrangeBrownGreen2	7	7	8	7	18.5	Fruit shape not very good, bumps on fruit, very juicy, nice faint aroma, very nice mango taste, soft flesh, nice balance, Phase II.
	CH31-N9	HOEDSPRUIT	9	M	DarkRed6; YellowOrange4	8	6	6	6	14.8	Very attractive fruit and colour, internal quality is good, bland taste, check again
	CH16-E35	HOEDSPRUIT	11	S-M	PinkRed5; OrangeYellow5	-	5	-	-	-	Too much fibre, discard.
	CH16-D37	HOEDSPRUIT	10	M	Red5; OrangeYellow3; Green2	7	8	8	7	20.0	Very nice colour, mango aroma, juicy very sweet but balanced, soft flesh, move to Phase II.
	CH16-C44	HOEDSPRUIT	9	M-L	DarkRed8; YellowOrange2	7	7	6	6	15.3	Very attractive fruit and colour, internal quality is okay, bland taste
	CH16-H17	HOEDSPRUIT	4	S-M	Red6; YellowOrange1; Green3	6	6	6	6	14.8	Good internal quality, bland taste but just sweet. Discard
17/02/2025	CH16-D43	HOEDSPRUIT	2	M	DarkRed5; YellowOrange4; Green1	7	8	6	6	18.2	Aroma – faint overripe smell, very soft flesh but firm, sweet but not a strong mango taste, a bit of paw-paw taste. Check again next year.
	CH32-G18	HOEDSPRUIT	9	M-L	RedOrange2; OrangeYellowGreen8	8	8	8	8	15.4	Aroma – very nice fruity aroma, very good internal quality, smells exotic, very fruity, exotic taste and sweet but not too sweet, melt in your mouth texture and juicy. Move to Phase II.

***1 = Poor and 10 = Excellent for columns 7 – 10 only**

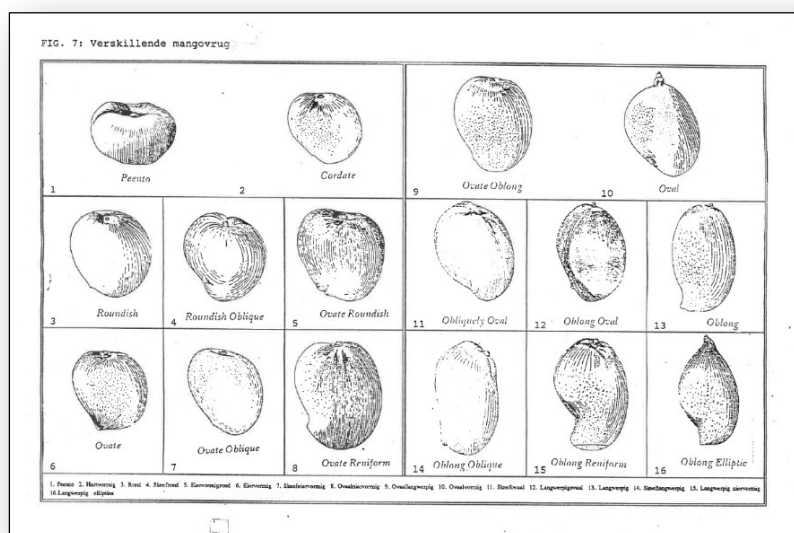


Fig. 3: The fruit shape of the seedlings during fruit evaluation are compared to the shapes on the 'fruit shape chart'

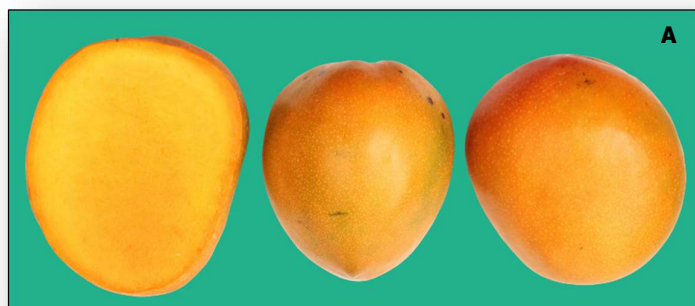


Fig. 4a: Selection CH32-G18 had excellent fruit attributes and was identified for Phase II.

Evaluation date: 17 February

- Medium to large fruit size
- Taste: 8
- Fiber: 8
- Int. color: 8
- Aroma: 8
- Brix: 15.4
- Remarks: Aroma – very nice fruity aroma, very good internal quality, smells exotic, very fruity, exotic taste and sweet but not too sweet, melt in your mouth texture and juicy.

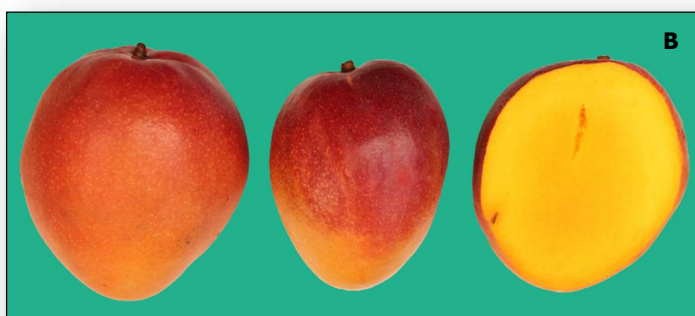


Fig. 4b: Selection CH31-H12 had excellent external colour and was identified for Phase II.

Evaluation date: 13 February

- Medium fruit size
- Taste: 8
- Fiber: 7
- Int. color: 7
- Aroma: 8
- Brix: 17.2
- Remarks: Excellent external colour, nice fruity aroma (pineapple), good internal quality.

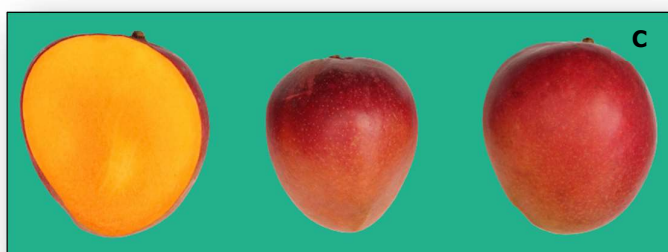


Fig. 4c: Selection CH31-L16 had a very firm texture although ripe and was identified for Phase II.

Evaluation date: 17 January

- Small fruit size
- Taste: 7
- Fibre: 7
- Int. color: 7
- Aroma: 7
- Brix: 17.1
- Remarks: Good internal quality, firm fruit although ripe - maybe a good shelf life because of firmness, sweet/sour mango taste, very sweet with a tropical taste, very nice taste.

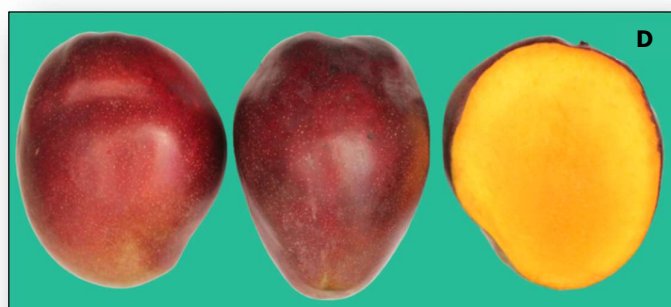


Fig. 4d: Selection CH32-I6 had an excellent taste and was identified for Phase II.

Evaluation date: 13 February

- Medium to large fruit size
- Taste: 8
- Fibre: 7
- Int. color: 7
- Aroma: 7
- Brix: 18.5
- Remarks: Nice faint aroma, very nice mango taste, soft flesh, nice balance.



Fig. 5a: Selection CH31-L7 was identified for Phase I extension.

Evaluation date: 20 January

- **Medium to large fruit size**
- **Taste: 7**
- **Fiber: 7**
- **Int. color: 6**
- **Aroma: 7**
- **Brix: 16.9**
- **Remarks: Aroma – very nice tropical aroma, skin feels a bit thick, good internal quality, exotic/tropical taste but not very juicy, “dry” texture.**



Fig. 5b: Selection CH16-B8 was identified for Phase I extension.

Evaluation date: 15 January

- **Medium to large fruit size**
- **Taste: 7**
- **Fibre: 7**
- **Int. color: 7**
- **Aroma: 7**
- **Brix: 17.4**
- **Remarks: Normal mango aroma, soft texture, sweet but not too sweet, good internal quality.**



Fig. 5c: Selection L3-A3 was identified for Phase I extension.

Evaluation date: 17 January

- **Medium fruit size**
- **Taste: 8**
- **Fibre: 8**
- **Int. color: 7**
- **Aroma: 7**
- **Brix: 17.2**
- **Remarks: Aroma – very nice tropical aroma, good internal quality, some lenticels, excellent taste and texture, sweet, nice tropical taste. Phase I extension to Hoedspruit.**

3. Summary of dates - Topworking activities, evaluations and cultivar days

At Mohlatsi Farm, five Phase II selections were successfully topworked. Additionally, several promising selections from the Phase I and Phase I extension orchards in Hoedspruit were topworked at two co-operative farms: Malalane and Clanwilliam. In Tzaneen, trees were prepared for topworking; however, the development of new shoots progressed slowly and therefore no

topworking was performed in 2024 at this site. A further challenge was the limited availability of budwood material, as it is sourced from a single mother tree.

The dates of the topworking activities, trial evaluations and cultivar days during the reporting period are summarised in Table 3.

Table 3: Topworking activities, evaluations and cultivar days during the 2024/2025 season

LOCATION	DATE - SELECTIONS TOPWORKED	DATE - EVALUATIONS	DATE - CULTIVAR DAYS
Hoedspruit	13 November 2024	7 January 2025 9 January 2025 4 February 2025 5 February 2025	6 February 2025
Malalane	14 November 2024	14 November 2025	31 January 2025
Tzaneen	None	3 February 2025	No cultivar day, only fruit evaluation
Clanwilliam	12 February 2025	25 March 2025	26 March 2025

4. Evaluations (Phase I extension and Phase II) and cultivar days

A. Hoedspruit – Mohlatsi Farm

Phase I extension

Nine of the current Phase I extension selections have been identified for advancement to Phase II based on their yield and fruit quality performance, as shown in Table 4. The following selections are set to be moved to Phase II once sufficient budwood material becomes available in November and are displayed in figure 6a - d: CH31-P39+40 (tree position number in Phase I extension block - CH30-F49+50), CH31-K18 (tree position number in Phase I extension block - CH30-H28+29), CH32-I31+32 (tree position number in Phase I extension block - CH30-F30+31) and B3-K24 (tree position number in Phase I extension block - CH30-E21+22). The Phase I extension orchard evaluation data indicate that some selections were discarded, while others should be re-evaluated next season. Six selections from the Phase I trials were identified for Phase I extension and evaluation data for two of these selections can be seen in Fig. 7a and b.

One of the Phase I extension selections, A4-N1 (tree position in Phase I extension trial – CH30-C22+23) is very late and shows ripening time of almost a month later than the late commercial cultivar 'Keitt'. According to the harvesting color chart, the ripeness value was 0.25 – 0.30 on April 9 in Tzaneen, indicating that it is not yet ready for harvesting for the local market, where fruit is usually harvested at a 0.30 – 0.40 value. The cultivar 'Keitt' is typically harvested in Tzaneen from mid-February to April 1st, depending on seasonal variation. This year, however, the harvest concluded earlier, on March 3rd, suggesting that A4-N1 matures significantly later than 'Keitt'. Fruit quality data for A4-N1 harvested in Clanwilliam is compared with the cultivars 'Keitt', 'Autumn Gold', and 'Blyde Late', is presented in table 4. This selection produces a good yield in Clanwilliam and had good fruit quality in Tzaneen (Fig. 8a and b). It will also be topworked in Phase II for further evaluation.

Table 4: Fruit attribute data of promising Phase I extension selections at Hoedspruit identified for Phase II

DATE	SELECTION	FRUIT SHAPE	FRUIT SIZE	EXTERNAL COLOUR	INTERNAL COLOUR	FIBRE	TASTE	AROMA	BRIX	REMARKS
15/01/2025	B3-K24 (CH30-E21+22)	3	S-M	RedPurple8; OrangeYellow2	7	7	7	7	15.3	Aroma – normal mango, good internal quality, good texture, nice mango taste, some lenticels. Phase II.
17/01/2025	B3-J10 (CH30-B32+33)	9	L	Red6; YellowOrange3; Green1	6	6	-	7	-	Aroma – normal mango aroma, good external colour. Sample fruit again for tasting.
	B3-L17 (CH30-C49+51)	2	S	Purple7; OrangeYellow3	8	7	7	8	18.3	Aroma – very nice, strong aroma, very good internal quality, somewhat of a firm texture, nice tropical taste, not too sweet, good taste balance. Already identified in 2024 for Phase II.
20/01/2025	B3-J10 (CH30-B32+33)	9	L	Red6; YellowOrange3; Green1	7	6	6	7	14.2	Aroma – normal mango aroma, good external colour, juicy, bland taste, texture is good. Discard.
	CH31-P39+40 (CH30-F49+50)	3	S	Red3; OrangeYellowGreen7	7	7	7	7	16.9	Aroma – normal mango aroma, some lenticels, external colour not very good, good internal quality, soft texture, sweet and nice mango taste but not too sweet, juicy. Phase II
13/02/2025	B3-M2 (CH30-B51+52)	3	S-M	Red6; Green1; OrangeYellow3	8	7	7	6	17.9	Excellent internal quality, normal mango taste, firm flesh, maybe Phase II, check again next year.
	CH31-L21 (CH30-G1+2)	2	S	OrangeYellowGreen9; Orange1	8	6	8	7	17.7	Excellent internal quality, slight tropical aroma and flavour, Phase II.
	CH31-K18 (CH30-H28+29)	9	M	PurpleRed6; OrangeYellow4	7	7	7	8	17.7	Excellent internal quality, tropical taste but somewhat bland, not very sweet, Phase II.
	A4-M8 (CH30-D44+45)	3	S-M	PinkRed3; OrangeYellowGreen7	7	7	7	5	14.0	A bit of an overripe aroma, maybe harvested too late. Check again next year.
	A4-O9 (CH30-C42+43)		M	OrangeYellow7; Orange2; Green1	7	8	8	7	19.8	Good internal quality, slight turpentine aroma and taste, very nice tropical taste, firm flesh, move to Phase II.
	CH32-F10+11 (CH30-F37+38)	10	M	Red2; YellowOrange8	7	6	7	7	18.2	A faint fruity aroma, sweet mango taste with a fruity taste as well, move to Phase II.
	CH16-F56 (CH30-H7+8)	10	S	Red4; YellowOrange6; Green1	7	8	6	6	16.0	Not a strong aroma, very good internal quality, normal mango taste, firm flesh, discard.
	CH32-I31+32 (CH30-F30+31)	10	M	DarkRed5; YellowOrange4; Green1	7	7	7	6	15.9	Bumpy shape, good internal quality, juicy, soft flesh, sweet/sour taste, Move to Phase II
17/02/2025	B2-F48 (CH30-C16+17)	9	M-L	PinkOrange2; OrangeYellow8	6	8	7	6	15.4	Aroma – no strong flavour, very good internal quality, firm and hard when cut, nice sweet/sour taste, tropical flavour, and flesh is soft. Move to Phase II.
	A4-N1 (CH30-C22+23)	6	M-L	DarkRed5; YellowOrangeGreen5	8	7	8	8	16.2	Aroma – strong, exotic aroma, internal quality is good, excellent taste, strong tropical taste, and firm texture. Move to Phase II.
22/06/2025	Keitt (Clanwilliam)	11	L	Orange1; Yellow2; Green7	7	7	7	5	18.8	Good internal quality, slightly sour but with a nice mango taste.
	Autumn Gold (Clanwilliam)	12	M	Yellow3; Green7	7	8	7	6	16.7	Good internal quality, sour with a slight mango taste, very juicy.
	A4-N1 (Clanwilliam)	12	M-L	OrangeYellow2; Green1; DarkRed7	8	7	7	6	18.0	Very good internal quality, slight tropical flavor taste with a slight mango taste. Sweet.

01/07/2025	Blyde Late (Clanwilliam)	6	M-L	Red4; OrangeYellow2; Green4	6	7	8	8	23.6	Aroma – slight turpentine/tropical aroma, nice. Pale yellow internal colour, sharp point, excellent taste, very sweet with a slight turpentine/tropical taste, not a strong mango taste but very nice. Nice sweet/sour ratio.
------------	-----------------------------	---	-----	-----------------------------------	---	---	---	---	------	---

***1 = Poor and 10 = Excellent for columns 7 – 10 only**

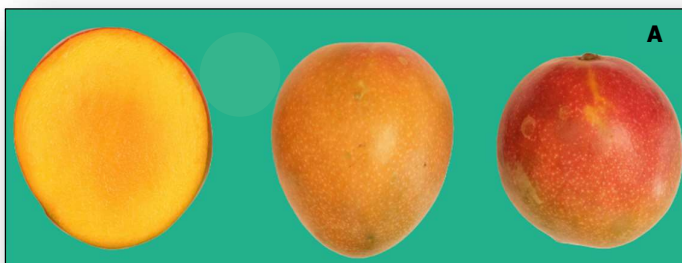


Fig. 6a: Selection CH31-P39+40 will be moved from Phase I extension to Phase II due to promising fruit attributes.

Evaluation date: 20 January

- **Small fruit size**
- **Taste: 7**
- **Fiber: 7**
- **Int. colour: 7**
- **Aroma: 7**
- **Brix: 16.9**
- **Remarks:** Aroma – normal mango aroma, some lenticels, external colour not very good, good internal quality, soft texture, sweet and nice mango taste but not too sweet, juicy.



Fig. 6b: Selection CH31-K18 will be moved from Phase I extension to Phase II due to promising fruit attributes.

Evaluation date: 13 February

- **Medium to large fruit size**
- **Taste: 7**
- **Fiber: 7**
- **Int. colour: 7**
- **Aroma: 8**
- **Brix: 17.7**
- **Remarks:** Excellent internal quality, tropical taste but somewhat bland, not very sweet.

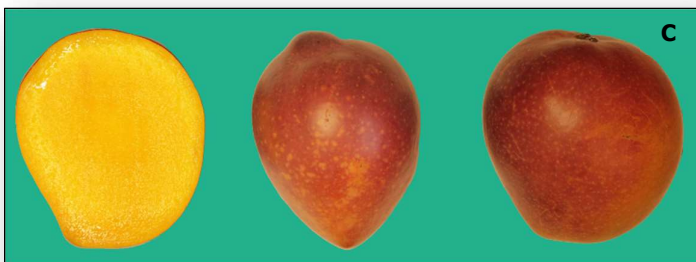


Fig. 6c: Selection B3-K24 will be moved from Phase I extension to Phase II due to promising fruit attributes.

Evaluation date: 15 January

- **Small to medium fruit size**
- **Taste: 7**
- **Fibre: 7**
- **Int. colour: 7**
- **Aroma: 7**
- **Brix: 15.3**
- **Remarks:** Normal mango aroma, good internal quality, good texture, nice mango taste, a bit of lenticels.



Fig. 6d: Selection CH31-I31+32 will be moved from Phase I extension to Phase II due to promising fruit attributes.

Evaluation date: 13 February

- **Small to medium fruit size**
- **Taste: 7**
- **Fibre: 7**
- **Int. colour: 7**
- **Aroma: 6**
- **Brix: 15.9**
- **Remarks: Bumpy shape, good internal quality, juicy, soft flesh, sweet/sour taste.**



Fig. 7a: Seedling CH31-L7 was identified for Phase I extension.

Evaluation date: 20 January

- **Medium to large fruit size**
- **Taste: 7**
- **Fiber: 7**
- **Int. colour: 6**
- **Aroma: 7**
- **Brix: 16.9**
- **Remarks: Aroma – very nice tropical aroma, skin feels a bit thick, good internal quality, exotic/tropical taste but not very juicy, "dry" texture.**

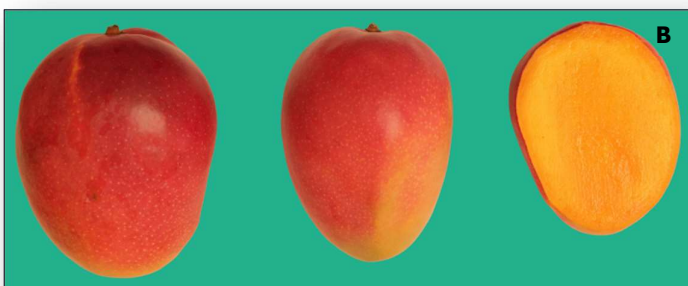


Fig. 7b: Seedling CH31-K4+5 was identified for Phase I extension.

Evaluation date: 17 January

- **Medium to large fruit size**
- **Taste: 6**
- **Fiber: 7**
- **Int. color: 8**
- **Aroma: 6**
- **Brix: 17.4**
- **Remarks: Aroma – no mango smell, good internal quality, normal sweet, mango taste.**



Fig. 8a and b: A4-N1 had a good production in Clanwilliam (left) and was not ready yet for harvesting on 9 April in Tzaneen (top).

Phase II

At Mohlatsi Farm in Hoedspruit, Phase I seedlings (seedling hybrids from the mango breeding program), Phase I extension selections (promising selections that are underperforming for immediate placement in Phase II), and Phase II selections (the best performers in terms of all attributes) are established to identify new, improved cultivars for both small-scale and commercial growers. After annual evaluations, the newly identified promising selections are topworked in Phase I extension and Phase II blocks in Hoedspruit, as well as in combination blocks for Malalane, Tzaneen, and Clanwilliam, to assess performance in specific climatic areas. The main objective of the project is to identify the best performers and release new, improved cultivars for the South African mango industry.

At this site, mango production is collected exclusively from the Phase II trial by the co-operative grower and results can be viewed in Table 5. During the current season, eight promising selections yielded over 34 tons per hectare, indicating strong performance in terms of

productivity. The top performer was selection CH32-G17, producing 64.1 tons/ha with an average tree yield of 76.9 kg (Fig. 9a and b). It also led production in the 2023/2024 season, reaching an impressive 72.9 tons/ha. CH31-N7+8 ranked second with 62.2 tons/ha, followed by CH31-P11+12 in third place with 57.0 tons/ha. Notably, one of the new cultivars, ARC-MAN-090 (selection CH31-M21+22), secured seventh position with 46.4 tons/ha. Its consistently high yield is considered one of its most outstanding fruit characteristics.

Table 5: Production data of the Phase II trial at Hoedspruit

<u>SELECTION/CULTIVAR</u>	<u>DATE TOPWORKED</u>	<u>AVERAGE YIELD (KG/TREE)</u>	<u>TOTAL YIELD (TON/HA) 4 X 3M – 833 TREES/HA</u>
1. CH32-G17	2017	76.9	64.1
2. CH31-N7+8	2017	74.6	62.2
3. CH31-P11+12	2016	68.4	57.0
4. CH32-F30+31	2017	68.4	57.0
5. CH32-D16+17	2017	58.9	49.0
6. CH32-F18	2017	58.3	48.5
7. CH31-M21+22	2016	55.7	46.4
8. CH31-O11+12	2016	51.0	42.4
9. CH31-M17+18	2016	38.6	32.1
10. CH32-D9+10	2017	34.4	28.6
11. C2D2-U1	2014	33.9	28.2
12. C2D2-Y3	2014	32.3	26.9
13. CH31-M9+8	2017	31.9	26.6
14. TAMARAK	2017	29.5	24.6
15. CH32-I36+37	2021	23.8	19.8
16. RHAPOZA	2021	22.4	18.7
17. CH31-M8+9 (EXTRA ROW)	2017	20.9	17.4
18. LADY JANE	2017	20.5	17.1
19. CH31-M17+18 (EXTRA ROW)	2017	19.8	16.5
20. CH31-Q12	2020	17.8	14.8
21. ORLI	2021	16.2	13.5
22. ANGIE	2021	11.8	9.8
23. LADY GRACE	2017	11.4	9.5
24. CH31-Q6	2020	8.5	7.1
25. CH31-Q3	2023	6.6	5.5
26. AGAM	2021	4.2	3.5
27. TALI	2021	3.2	2.6
28. K3-S25	2014	2.7	2.6
29. CH31-M24	2023	0.0	0.0
30. L3-S25	2023	0.0	0.0
31. CH31-R20	2023	0.0	0.0
32. C5-O3	2024	0.0	0.0
33. CH32-H25+26	2024	0.0	0.0
34. CH16-F29	2023	0.0	0.0
35. B3-N5	2023	0.0	0.0
36. CH16-I36	2024	0.0	0.0
37. CH16-H5	2024	0.0	0.0
38. B3-H3	2024	0.0	0.0
39. B3-L17	2024	0.0	0.0
40. B2-C38	2024	0.0	0.0

Maturity periods for the ARC selections were also determined using the SAMGA fruit ripening colour chart. This data is crucial for determining the exact harvesting period that can fill market gaps, which current cultivars cannot fill, and to identify if there are selections earlier than the earliest cultivar, 'Tommy Atkins', or later than the latest cultivar, 'Keitt'. For the local fresh market, an internal colour with a maturity value of 0.35-0.40 indicates that the cultivar is ready for harvesting. 'Agam', an Israeli cultivar, was the earliest and ready for harvesting on 10 December. The two new cultivars, ARC-MAN-089 (CH31-M17+18) and TS-MAN-088 (CH31-M8+9), were harvested after 'Lady Jane' and 'Lady Grace', two Australian cultivars. Nine selections were harvested on 7 January. None of the Phase II selections were earlier than 'Tommy Atkins' or later than 'Keitt'.

Cultivar days

An orchard walk and evaluation of the Phase II promising selections was conducted in collaboration with SAMGA and local growers (Fig. 9a). Selection CH32-G17 once again delivered excellent production and impressed the growers; however, the fruit was not yet ready for tasting (Fig. 9b). The new cultivar, ARC-MAN-089 (CH31-M17+18), was tasted, and received positive feedback for its outstanding fruit quality and flavour. Two early-season Australian cultivars, 'Lady Jane' and 'Lady Grace', were tasted but received negative feedback due to poor flavour and unattractive external appearance caused by prominent lenticels (Fig. 10a and b). Tree-ripened fruit from other available selections was also tasted during the visit.

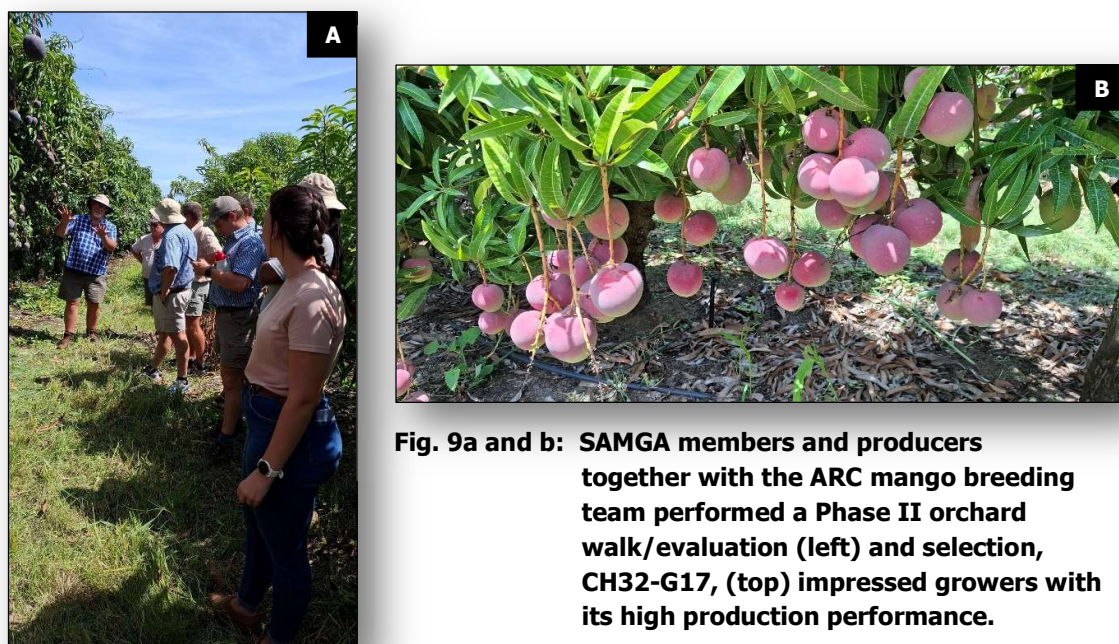


Fig. 9a and b: SAMGA members and producers together with the ARC mango breeding team performed a Phase II orchard walk/evaluation (left) and selection, CH32-G17, (top) impressed growers with its high production performance.



Fig. 10a and b: Australian cultivars, 'Lady Jane' (left) and 'Lady Grace' (right), had poor fruit quality after cold storage.

A mango cultivar day was hosted on February 6, 2025, where early- and mid-season promising selections were displayed and sensory evaluations were conducted by industry stakeholders (Fig. 11a and b). Industry stakeholders such as Woolworths and Blue Skies also participated in the event (Fig. 12). Eleven promising selections from the mango-breeding program were tasted, along with 14 cultivars, including the newly released ARC-TSC cultivars and the results are displayed in Table 6. Other cultivars are always included in the tasting panel to assess the performance of the promising selections. The Bavaria cultivar, J82, was the best performer, with the highest average score of 7.7 for all attributes, followed by 'Honey Gold' in second place. The ARC selection CH31-O11+12 ranked in 5th position, making it the best performer overall among all the ARC selections. Selection CH31-I36+37 had the highest brix value of 20.1.

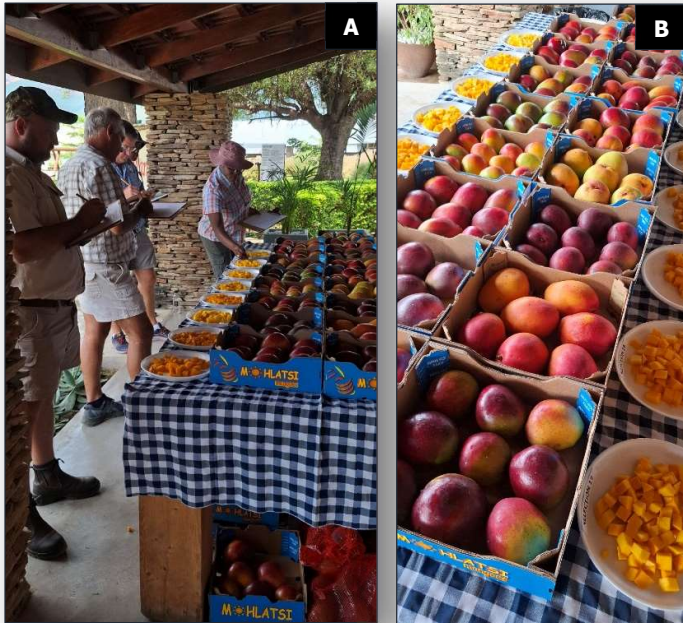


Fig. 11a and b: Mango producers and industry stakeholders attended the Hoedspruit cultivar day and evaluated promising selections from the ARC-TSC breeding and evaluation program.



Fig. 12: Woolworths and Blue Skies were impressed by a few ARC-TSC promising selections.

Table 6: Sensory evaluation of the promising selections and cultivars displayed at the Hoedspruit cultivar day

	<u>SELECTION/ CULTIVAR</u>	<u>FRUIT SHAPE</u>	<u>FRUIT SIZE</u>	<u>FRUIT COLOUR</u>	<u>TASTE</u>	<u>FIBRE</u>	<u>AVE.</u>	<u>BRIX</u>
1.	J82	8.0	7.9	8.3	7.1	6.9	7.7	17.5
2.	HONEY GOLD	7.8	7.3	7.2	7.7	7.4	7.5	17.0
3.	D70	7.3	7.8	7.3	6.6	6.4	7.1	19.3
4.	HEIDI	7.4	7.8	7.1	6.3	6.6	7.1	16.4
5.	CH31-O11+12	7.3	7.3	7.2	6.7	6.6	7.0	16.2
6.	CH32-H25+26	7.5	7.6	7.3	6.1	5.9	7.0	16.6
7.	G47	7.9	7.9	6.6	5.8	6.3	7.0	14.2
8.	LORMEY	7.6	7.8	6.3	6.1	6.5	6.9	11.8
9.	CH31-N7+8	7.8	7.9	7.7	4.5	6.4	6.9	12.8
10.	TAMARAK	7.0	7.3	7.3	6.4	6.4	6.9	15.7
11.	TOMMY ATKINS	7.4	7.7	7.3	5.9	5.7	6.8	11.8
12.	B3-L17	7.6	6.4	7.9	5.8	6.2	6.8	14.2
13.	C2	7.5	7.4	6.9	5.5	6.4	6.8	14.5
14.	CH31-M8+9	7.5	7.7	7.7	4.8	5.6	6.7	13.0
15.	K3-S25	7.8	7.9	6.5	4.7	6.3	6.7	11.3
16.	CH31-M17+18	7.5	7.2	7.0	5.0	6.4	6.6	13.7

17.	CH31-Q6	7.8	7.8	4.6	5.5	6.2	6.5	15.3
18.	C2D2-Y3	7.5	7.7	6.9	4.5	5.3	6.4	15.2
19.	CH31-F30+31	7.3	7.4	7.0	3.8	5.9	6.3	12.6
20.	CH32-F18	7.1	7.3	4.9	5.4	6.0	6.2	14.3
21.	C2D2-U1	7.1	7.3	7.3	3.8	5.5	6.2	14.4
22.	CH31-M21+22	7.1	7.1	5.7	4.8	6.1	6.2	16.2
23.	Q54	6.2	6.4	4.9	6.5	6.4	6.1	16.3
24.	CH16-I36+37	6.2	6.6	6.2	5.8	5.3	6.1	20.1
25.	CH31-P11+12	6.8	5.8	5.8	4.0	4.6	5.5	13.4

B. Clanwilliam - Tamarak Mango Estate

The mango production season in Clanwilliam, located in the Western Cape, differs significantly from that of the other three production areas in the northern provinces. The cultivar day was successfully held on 26 March, and sensory data for this area was collected (Fig. 13a & b). Sensory data for 20 of the ARC-TSC's promising mango selections and eight cultivars were gathered and is displayed in Table 7. The new cultivar, ARC-MAN-089 (CH31-M17+18) was the top performer (7.7) with B2-C38, one of the late selections that is at this stage later than 'Keitt', in second place. Another new cultivar, TS-MAN-088 (K3-S25), was in third place. The reason for including cultivars in the tasting panel was to provide controls for comparing the performance of the selections against industry cultivars. Growers and industry stakeholders, such as Woolworths and Sunworld, participated in the event. After the sensory evaluation, some of selections were also tasted and viewed in the orchard (Fig. 14a and b).



Fig. 13a: Sensory evaluations were performed at the Clanwilliam cultivar day.



Fig. 13b: Promising selections and cultivars were evaluated.



Fig. 14a: Some of the fruit were again tasted in the orchard.



Fig. 14b: Mango growers, Woolworths and Sunworld viewed the performance of the selections on the trees after the sensory evaluation.

Table 7: Sensory evaluation of the promising selections and cultivars displayed at the Clanwilliam cultivar day

	<u>SELECTION/ CULTIVAR</u>	<u>FRUIT SHAPE</u>	<u>FRUIT SIZE</u>	<u>FRUIT COLOUR</u>	<u>TASTE</u>	<u>FIBRE</u>	<u>AVE.</u>	<u>BRIX</u>
1.	CH31-M17+18	8.0	8.1	7.8	7.3	7.2	7.7	15.0
2.	B2-C38	7.9	8.1	7.1	7.9	7.0	7.6	20.7
3.	K3-S25	7.9	7.7	8.0	7.0	6.8	7.5	15.6
4.	TAMARAK	7.1	7.6	7.5	7.5	7.8	7.5	18.2
5.	CH31-M21+22	8.0	8.2	7.9	6.3	6.7	7.4	17.4
6.	HEIDI	7.8	7.9	7.5	6.9	6.8	7.4	14.1
7.	CH30-B34+35	6.8	6.9	8.3	7.2	6.8	7.2	14.1
8.	B3-H3	7.9	7.8	7.8	6.5	5.9	7.2	15.1
9.	A4-M2	6.9	6.8	8.1	6.7	7.4	7.2	24.7
10.	SHELLY	7.7	7.6	7.6	6.4	6.6	7.2	16.0
11.	CH32-D16+17	7.2	7.8	6.7	6.9	7.2	7.1	19.5
12.	CH32-D9+10	7.8	7.7	7.5	6.0	6.6	7.1	12.3
13.	CH31-Q6	7.5	6.6	6.8	7.2	7.4	7.1	19.6
14.	CH16-C22	7.4	7.7	6.6	6.5	6.9	7.0	19.4
15.	B3-L17	6.8	6.8	7.0	7.2	7.2	7.8	19.2
16.	CH31-M8+9	7.7	7.5	7.4	5.8	6.0	6.9	10.2
17.	A4-P12	8.2	8.1	8.0	5.3	4.8	6.9	15.3

18.	CH31-P11+12	7.3	7.1	6.5	6.5	6.8	6.8	18.1
19.	CH31-M24	7.6	7.6	6.2	5.2	7.3	6.8	16.4
20.	CH31-O11+12	6.8	6.8	6.4	7.1	6.8	6.8	21.7
21.	CH31-N7+8	7.4	7.5	7.3	5.7	5.8	6.8	11.7
22.	CH32-F30+31	7.6	7.8	7.9	4.7	5.6	6.7	11.2
23.	LORMEY	6.3	5.8	6.6	6.9	6.8	6.5	15.7
24.	CH32-F26+27	7.5	6.9	6.2	5.5	6.2	6.5	17.3
25.	OSTEEN	6.2	6.8	6.9	5.8	5.6	6.2	12.2
26.	CH16-G29	7.3	7.3	7.2	4.1	4.8	6.1	12.3
27.	B3-N10	7.3	7.3	5.5	5.2	5.0	6.0	12.5
28.	CH31-P39+40	6.7	6.5	5.2	5.9	5.4	5.9	14.0

C. Malalane - Radley Estate

The Malalane cultivar day was held on 31 January at Radley Estate, where 18 promising selections, four newly released ARC-TSC mango cultivars, and four Israeli cultivars were evaluated (Fig. 15a and b). The fruit attributes evaluated annually include fibre content, fruit shape, fruit size, taste, and external colour (Table 8). 'Noa,' the Israeli cultivar, had the highest average value of 7.6, with one of the newly released ARC cultivars, TS-MAN-088 (CH31-M8+9), in second place. 'Orli,' also an Israeli cultivar, scored the highest for taste, while the two new cultivars, TS-MAN-088 (CH31-M8+9) and ARC-MAN-089 (CH31-M17+18), had the highest scores for fruit colour (8.8) and fruit shape (8.1), respectively. The selection C5-O23 had the highest brix value of 23.0.

Attendees also viewed and discussed the count size (fruit size) of some of the selections and cultivars in boxes (Fig. 16a and b). Fruit attributes of the four new ARC cultivars were shared and discussed with the growers (Fig. 17).

Table 8: Sensory evaluation of the promising selections and cultivars displayed at the Malalane cultivar day

	<u>SELECTION/ CULTIVAR</u>	<u>FRUIT SHAPE</u>	<u>FRUIT SIZE</u>	<u>FRUIT COLOUR</u>	<u>TASTE</u>	<u>FIBRE</u>	<u>AVE.</u>	<u>BRIX</u>
1.	NOA	8.0	7.5	7.6	7.3	7.9	7.6	16.1
2.	CH31-M8+9	8.0	7.9	8.8	5.8	7.6	7.6	13.7
3.	ORLI	7.6	7.1	7.3	7.5	7.8	7.5	13.3
4.	CH31-M17+18	7.6	8.1	8.0	5.6	7.7	7.4	13.5
5.	E10-5/18	7.6	7.7	7.7	6.8	6.9	7.4	16.1
6.	B3-L17	7.9	6.7	6.2	7.0	8.2	7.2	15.4

7.	CH31-M21+22	7.7	7.4	8.0	5.5	6.7	7.1	20.3
8.	CH31-Q12	7.6	7.3	6.0	6.4	7.9	7.0	18.8
9.	C2D2-Y3	8.0	7.9	6.7	5.2	6.9	6.9	15.2
10.	CH31-P11+12	7.3	7.3	6.3	6.2	7.6	6.9	15.8
11.	B3-M2	7.1	6.5	7.1	5.3	7.2	6.6	15.0
12.	K3-S25	7.3	6.8	6.0	6.6	6.6	6.6	12.9
13.	C2D2-U1	7.6	7.6	6.6	5.8	5.0	6.6	19.1
14.	CH32-D16+17	6.7	6.9	5.7	6.1	7.0	6.5	13.5
15.	TALI	6.9	6.9	7.5	4.4	6.4	6.4	16.7
16.	CH32-H25+26	7.0	7.4	6.0	5.6	5.7	6.4	17.1
17.	C5-O3	7.5	7.9	5.4	5.3	5.3	6.3	16.8
18.	AGAM	6.4	7.1	5.6	6.2	6.1	6.3	15.8
19.	B3-I5	6.7	7.1	7.5	3.8	6.4	6.3	11.2
20.	B3-H3	6.9	6.7	5.3	5.7	6.6	6.3	16.3
21.	CH32-G17	7.1	7.3	5.7	4.4	6.3	6.2	12.4
22.	CH31-N7+8	7.1	7.1	5.7	4.6	6.1	6.2	11.6
23.	CH32-D9+10	7.2	7.1	6.3	3.8	6.0	6.1	10.9
24.	C5-O23	7.0	5.8	6.4	5.8	5.2	6.1	23.0
25.	CH31-P39+40	6.8	5.8	6.0	5.5	5.1	5.9	16.3
26.	CH32-F30+31	6.7	6.5	4.5	3.9	6.8	5.7	11.4

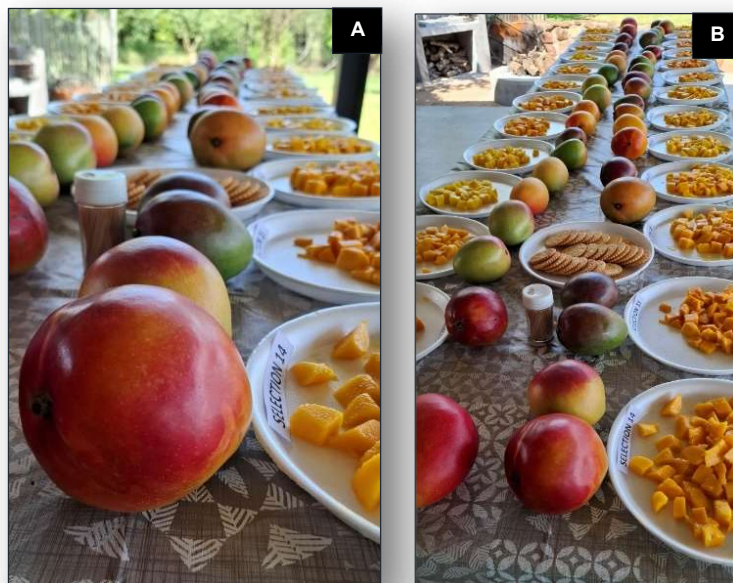


Fig. 15a and b: Promising selections from the ARC-TSC breeding program and cultivars were displayed at the cultivar day where sensory evaluations were performed.

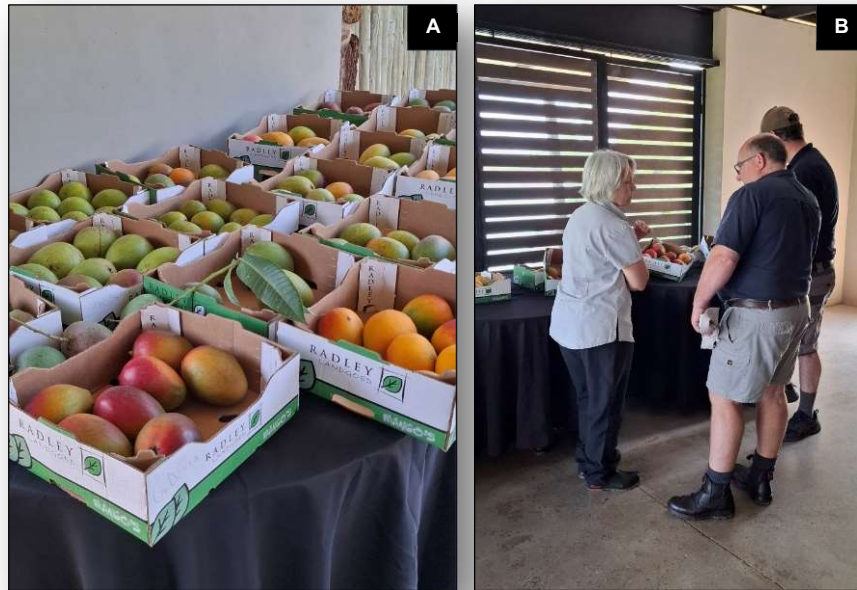


Fig. 16a and b: Selections were displayed in boxes to view fruit size (left) and information was shared with mango producers (right).



Fig. 17: The four new mango cultivars of ARC-TSC were displayed and fruit attributes were discussed with the producers.

D. Tzaneen – Lapland

No cultivar days were hosted at the Tzaneen site due to very low production. Extreme temperatures during fruit set resulted in this low production. However, some of the selections that were in production and cold storage were evaluated, as well as a few industry selections and cultivars (Table 9). Two selections, CH31-N7+8 and CH32-H25+26, were evaluated in the orchard for fruit attributes (Fig. 18a and b) and also performed well at the other three sites.

Table 9: Fruit attributes of promising selections and cultivars at Tzaneen

DATE	SELECTION/ CULTIVAR	FRUIT SIZE	EXTERNAL COLOUR	FIBER	TASTE	BRIX	REMARKS
03/02/2025	CH31-P39+40	Small	OrangeRed6; OrangeYellow4	8	8	17.7	Excellent taste but fruit size is somewhat small.
	Rosa	Small – medium	OrangePink6; OrangeYellow4	5	7	14.2	
	No. 5	Medium	DarkRed8; OrangeYellow2	7	9	17.3	Excellent taste, sweet/sour combination, attractive colour, very poor fruit shape.
	C5-T5	Small – medium	DarkRed4; OrangeYellow6	7	7	15.5	
	Rommie Red	Medium – large	DarkRed6; OrangeYellow3; Green1	7	6	12.5	Nice colour and shape.
	Maya	Small	OrangePink4; OrangeYellow6	7	8	19.5	Excellent taste and vibrant colour.
	Pairi	Small	YellowGreen6; OrangeBrown4	8	8	17.6	Brown prominent lenticels, sharp point, good taste, flowery and turpentine aroma, unattractive fruit.
	Dan 10	Small	DarkRed7; OrangeYellow3	5	7	21.3	
	CH31-N7+8	Medium - large	DarkRed8; OrangeYellowPink2	6	6	12.5	Excellent colour.
	No. 6	Medium	PurpleRed8; OrangeYellow2	7	6	14.4	Nice colour, watery taste.
	C2D2-Y3	Medium	PinkRed8; OrangeYellow2	7	7	15.7	Excellent colour, good internal quality.
	Indian delight	Small	OrangePink4; OrangeYellow6	4	5	12.2	Very fibrous, rose aroma.
	CH31-Q12	Medium	Red8; OrangeYellow2	7	6	12.0	Somewhat bland but has tropical taste, poor internal quality.
	NICO	Large	OrangePink7; OrangeYellow3	5	5	15.0	Internal breakdown, very sour taste.
	Leneyne	Medium - large	PinkRed4; OrangeYellow6	7	7	17.3	Very bad lenticels, good taste, bad internal quality.
	Dan 6	Small - medium	PinkRed5; OrangeYellow5	7	6	17.1	Poor internal quality.
	CH31-P11+12	Small - medium	PurpleRed6; OrangeYellow4	6	7	15.5	
	CH31-O11+12	Medium	PurpleRed8; OrangeYellow2	6	8	16.1	Excellent taste.
	CH31-M17+18	Small	DarkRed7; OrangeYellow3	6	7	16.0	Sweet and sour taste.
	CH31-M21+22	Medium	PurpleRed7; OrangeYellow3	7	7	17.8	Sweet.
	CH32-H25+26	Medium - large	DarkRed7; OrangeYellow3	7	6	16.5	
	No. 78	Medium	PurpleRed9; OrangeYellow1	7	8	15.6	Bad shape, sharply pointed, good taste.
	No. 2	Medium	PinkRed7; OrangeYellow3	7	5	13.0	Watery

***1 = Poor and 10 = Excellent**



Fig. 18a and b: Selections CH31-N7+8 (left) and CH32-H25+26 (right) have excellent external colour and taste.

FUTURE RESEARCH

1. Establish Phase I seedlings in the Breeding nursery at ARC-TSC.
2. Evaluate all bearing Phase I seedlings at ARC-TSC and Hoedspruit.
3. Evaluate Phase I extension and Phase II trees at Hoedspruit (Mohlatsi Farm).
4. Evaluate all bearing Phase I extension and Phase II trees at Clanwilliam (Tamarak Mango Estate), Tzaneen (Lapland) and Malalane (Radley Estate).
5. Expand Phase II selections at co-workers if desired.