TOP CULDEVCO LICENSED PLUM CULTIVARS

The Agricultural Research Council (ARC) and the South African Deciduous Fruit Industry formed a joint venture to commercialise all ARC-bred varieties.

Over the past decade, Culdevco Pty. Limited has established itself as a major player in the international arena of deciduous fruit licensing and the commercialisation of deciduous fruit varieties. Culdevco makes use of experienced independent evaluators, technical advisors, producers and other independent third-party organisations to further assist in identifying cultivars that will keep clients ahead of the competition.

Culdevco commercialised a number of plum cultivars to the South African Stone Fruit Industry during the last couple of years. Four of these plum cultivars have already made a significant impact on plum exports from South Africa. The intention of this article is to provide more information on these four plum cultivars for current and future plum growers and other stakeholders.

Information provided in this article was compiled with the assistance of the following experts in the industry: Charl Stander (Freshness First); Gielie Bester (In2stone); Arrie de Kock (Experico); Hein Agenbag (Culdevco) and Chris Smit (Consultant).

Culdevco licensed plum cultivars, which already made significant impact on plum exports from South Africa:

1. RUBY CRISP

CHARACTERISTICS AND RECOMMENDATIONS

- A dark-red (almost black when ripe) plum with a full-red fresh colour that ripens just before Laetitia. Ruby Crisp reaches full bloom during the middle of September (depending on the season).
- In excess of 50 000 standard cartons of Ruby Crisp were already exported during the 2017/18 season. Positive feedback on the appearance and eating quality were received from all EU, UK and Middle Eastern markets.
- Harry Pickstone and Fortune are recommended as cross pollinators for Ruby Crisp at a ratio of 10%.
- Ruby Crisp has a medium chilling requirement and grows well in areas such as Simondium and Robertson.
- Yields between 25 and 30 tons/hectare are achievable on V-hedge or open Palmet training system.
- The recommended rootstock is Marianna.
- Ruby Crisp has a normal growth habit and is easily trained on the standard training systems. Fruit are borne on both spurs and 1-year-old shoots.

THINNING

- Fruit thinning is required to garner a AA fruit size. As a guideline, follow a pruning procedure of 8 fruit / cm stem circumference to reach a fruit size that peaks at A / AA (see results of observational trial in Table 1)
- Thinning of the fruit, as for most other plum cultivars, takes place between 40 and 60 days after full bloom. Be careful not to overload trees as this will not only have a negative effect on fruit size, but also on sugar levels and fruit quality in general.

HARVESTING AND STORAGE

- A sugar level of between 12° and 14° Brix (measured with a refractometer) should be attained easily. The minimum export sugar content for Ruby Crisp export fruit is 11° Brix.
- Ruby Crisp possesses excellent cold storage ability. When fruit are harvested at a firmness between 5,5 kg and 9 kg, it may be stored for a period of up to 6 weeks, both at single and dual temperature (PD-7) storage regimes. However, a PD-7 storage regime is recommended for a deeper red flesh colour at the end of the storage period.
- Sporadic occurrence of shriveling was detected after storage at the single-temperature regime and therefore the necessary precautions should be taken to prevent it (for more detail see the prevention of shriveling in African Delight® below).

AVAILABILITY

- Plant material is readily available for propagation.

2. RUBY SUN

CHARACTERISTICS AND RECOMMENDATIONS

- Red plum with yellow flesh colour that overlaps with the second half of the ripening of Sapphire.
- Since the release of Ruby Sun during May 2012 almost 250 hectares of this cultivar have been planted up to the end of 2018. During the 2017/18 season

almost 173 000 standard cartons were exported from South Africa. It is expected that export volumes of this variety will continue to rise over the next 4 to 5 years.
- The cultivar reaches full bloom at the end of August/beginning of September (depending on the season and area) and the bloom season overlaps with Harry Pickstone. Harry Pickstone is recommended as cross pollinators for Ruby Sun at a ratio of 10% to 15%. Ruby Sun was very well received in all EU and UK markets up to the 2017/18 season.
- Ruby Sun has a medium chilling requirement and adapted well in Simondium and Robertson areas.
- Marianna rootstock is recommended for Ruby Sun.
- Freestanding, as well as intensive training systems such as V-hedge or open Palmet system, may be considered. When an intensive system is applied, producers should be careful not to bend shoots too early flat on the wires. Too flat scaffold branches can lead to upright regrowth. Tie scaffold branches at 30° to 40° angle to leader. Wait longer to flatten scaffold branches.
- This cultivar has a strong basal dominance growth habit. Cut back the leader to about 0,45 m – directly after planting – and cut back strong-growing side branches.
- Fruit set should not be considered until permissible spaces at the top of the intensive systems are filled. Fruit set will cause terminal shoot growth to stop and consequentiy negatively affects the yield of the orchard.
- Fruit are borne on spurs and 1-year-old shoots.

THINNING

- The thinning of the fruit, as for most other plum cultivars, takes place between 40 and 60 days after full bloom.
- Renewal cuts are necessary to create new bearing wood.
- A yield of 25 to 30 tons per hectare (with a plant spacing of 4 x 1 m on V-hedge or open Palmet system) is attainable. Higher yields will have a negative effect on fruit size and sugar levels.
- By using normal thinning practices this cultivar will peak quite easily at an A / AA fruit size.

HARVESTING AND STORAGE

- Ruby Sun retains its firmness well over an extended period of time.
- Ruby Sun is less prone to wind and rub mark.
- A sugar level of between 14° and 16° Brix (measured with a refractometer) should be attained easily. The minimum sugar content for Ruby Sun export fruit is 10° Brix.
- Ruby Sun possesses excellent cold storage ability. When fruit are harvested at a firmness between 5 kg and 9 kg, it may be stored for a period of 6 weeks at dual temperature (PD-7) storage regimes. Good cold storage results were also obtained by Experico when fruit was cold stored at -0,5°C for a period of 5 weeks.
- Shriveling has been detected as a minor problem within Ruby Sun, especially in warmer climates and sandy soils (for more detail see the prevention of shrivelling in African Delight® below).

AVAILABILITY

- Plant material is readily available for Ruby Sun.

3. RUBY STAR

CHARACTERISTICS AND RECOMMENDATIONS

- Late ripening red plum cultivar with a relatively high total soluble solids (TSS) content.
- Since the release of Ruby Star on 20 May 2009 almost 255 hectares of this cultivar have been planted up to the end of 2018. During the 2017/18 season almost 572 000 standard cartons were exported from South Africa. It is expected that export volumes of this variety will continue to rise over the next 3 to 4 years.
- Ruby Star is well received in all EU and UK markets (572 000 cartons exported 2017/18).
- There are indications that Ruby Star adapts better to cooler areas when compared with a cultivar such as African Delight®.
- Songold, Southern Belle (last mentioned in cooler areas), or both, are recommended as cross pollinators for Ruby Star in a 10% ratio. It is a good strategy to use both as cross pollinators to make provision for climate changes over time.
- This cultivar is very sensitive to blossom blight (and the necessary preventative spray applications should be applied timeously for this disease).
- Although Ruby Star has a moderate tree growth, which is easily manageable, the leaves tend to have a yellowish colour during spring. This unnatural appearance may be attributed to a copper deficiency. This may be rectified with a leaf application of a copper solution (contact your technical advisor for details).
- There are indications that this cultivar is also less sensitive to late rain and heat waves that often occur during January and February.
- Initially, the fruit has a prominent tip, but develops into a round fruit when ripe. In cooler areas the fruit tend to form a cavity in the tip (to date no split pit has occurred).
- It has an exceptional fruit size.
- Ruby Star is only recommended on Marianna rootstock as other rootstocks have not been evaluated with this cultivar.
- Optimal irrigation is recommended for Ruby Star – three weeks prior to harvest to avoid dryness of fruit tissue. This is especially true in cases where this cultivar is planted in sandy soils.

THINNING

- The thinning of the fruit, as for most other plum cultivars, takes place between 40 and 60 days after full bloom.
- With the correct cultivation practices this cultivar will peak quite easily at an AA / AAA size.

HARVEST

- Excellent cold storage ability at single and dual storage temperatures; (PD-7 trials) evaluated by Experico over a cold storage period of 6 weeks with great success for both storage regimes.
- Prone to shriveling; necessary precautions should be taken to prevent. In this regard the following recommendations are made:
    a. Fruit should be harvested during the coolest time of day to prevent transpiration and keep the loss of moisture to a minimum. Avoid harvesting of fruit at temperatures of 32°C and higher.
    b. Fruit should be harvested within a fruit firmness of 5,5 kg and 9 kg (measured with a penetrometer with a 11 mm tip).
    c. The minimum total soluble solid concentration (TSS) should be at least 12° Brix.
    d. Fruit should be packed as soon as possible after harvest. The same rules apply for Ruby Star as for African Delight®. For both cultivars it is important to not leave fruit on the pack house floor overnight, as this promotes transpiration and shriveling. If packing fruit the following day, overnight storage in a cold store set above dew point (12°C to 15°C) is recommended.
    e. Storage in crates in cold stores should be avoided. The warm fruit leads to a drop in the humidity in the cold room and this results in a loss of moisture in the fruit, causing shriveling.
    f. Pack all fruit in a perforated bag also used for grapes (54 holes of 2 mm each), in a standard plum carton (5,25 kg) to create an artificially high humidity, thus preventing shriveling.
    Standard fruit sheets can also be used instead of the perforated bags.

g. Cold storage should not exceed 6 weeks.

AVAILABILITY:

- Plant material is readily available for Ruby Star.

4. AFRICAN DELIGHT®

CHARACTERISTICS

- During the 2018/19 season, over 1,2 million cartons of African Delight® were exported and it is expected that there will be a further increase in export volumes over the following seasons.
- This late, bright red plum ripens just before Angeleno® and has particularly high sugar levels that results in an exceptional eating quality. The texture of the fruit is firm and fruit has a slow metabolism during ripening. As a result, this plum has excellent cold storage ability at the single temperature regime.
- African Delight® has previously been exported to the UK, EU, the Middle East, and the Far East with great success.
- African Delight® has a very easy, manageable growth habit and is very fertile.
- African Delight® manages to receive a premium price for plums in most EU, UK and Middle-East markets.
- Almost 70% of the fruit that was marketed had a size of AA or AAA.

RECOMMENDATIONS

1. PLANTING OF AFRICAN DELIGHT®:

a. Avoid the planting of African Delight® in areas that experience cold and wet conditions in mid to end August. The cold conditions during this period have a negative influence on the activity of bees and fruit set.
b. Areas such as the Koue Bokkeveld, certain areas in the Warm Bokkeveld and similar micro-climate areas in other regions will not be suitable for the cultivation of African Delight®.
c. Soil preparation should be exactly according to the standard procedure.
d. Freestanding as well as intensive training systems such as the Palmet or V-hedge system may be considered. When an intensive system is applied, producers should be careful not to bend shoots too early flat on the wires. This causes terminal shoot growth to stop and the permissible space will not be filled in the shortest possible time.

2. CROSS-POLLINATION:

a. African Rose® is recommended as a cross pollinator for most areas in South Africa at a 10% ratio. Where Pioneer is already used as a cross pollinator it is not necessary to work over to African Rose®. For areas with a later bloom period, a cultivar such as Reubennel may also be used as a cross-pollinator. African Rose® in combination with Reubennel is also a good cross-pollination alternative.
b. Bees should be used in orchards to optimise the pollination process.
c. The correct level of boron is critical for the growth of the pollen tube and the set of fruit. It is critical that the necessary boron applications be performed during the bloom period (contact your technical advisor for details).
d. The shrinking, black tips as well as the late fruit drop are typical symptoms of poor pollination.

3. SUMMER LEAF MANAGEMENT:

a. Insufficient foliage coverage, an abnormally high fruit load, specific training systems as well as severe pruning in summer may be some of the reasons for the occurrence of sunburn and shriveling. African Delight® is sensitive to sunburn. Technical experts all agree training and pruning practices that contribute to better foliage coverage will decrease in the occurrence of sunburn and shriveling. Therefore pruning and production practices should carefully be managed to ensure optimal fruit quality.
b. Sunburn is amongst others also the result of scaffold branches that are incorrectly bent flat at a too early stage and tied to the horizontal wires of the training system.
c. Pruning in summer should be finished by mid-November to encourage regrowth and leaf coverage to protect the fruit from sunburn.
d. Trimming of treetops is not recommended.
e. Take out strong water sprouts as a whole (do not cut through).
f. Contact your technical advisor for more information regarding pruning practices.
g. The correct post harvest fertilising programme, optimal irrigation and a good tree reserve status is necessary for optimal growth conditions.

4. FIRST HARVEST:

a. Trees should preferably only bear its first harvest in the 3rd growth season.
b. The first 2 years should be used for the shaping of the tree.
c. Only if wires are already filled at the beginning of the 2nd growth season, a light harvest may be considered.
d. The quality of fruit coming from trees in their second year is normally not good because of the imbalance in the leaf to fruit ratio.

5. THINNING OF FRUIT:

a. Thinning of fruit should preferably be done after mid-to end November (approximately 70 days after full bloom). This is necessary because the fall of fruit of African Delight® is later than most other plum cultivars. Thinning at this stage should be done to approximately 130% of the final thinning.
b. The final thinning of mainly poor quality fruit may be done up to mid December.
c. Thinning of fruit should be done to get an expected fruit size of AA. The production of the tree will depend on the age of the tree as well as the training system of the orchard, the size of the tree and whether the trees have shown sufficient growth. The following productions may act as guidelines:
    i. 3-year-old orchards between 12 and 20 tons per hectare
    ii. 4-year-old orchards between 20 and 35 tons per hectare
    iii. Mature orchards between 35 and 50 tons per hectare
d. Be careful not to overload trees as too high a fruit load will have a negative impact on sugar levels and general fruit quality (such as shriveling).

6. IRRIGATION:

a. A micro-irrigation system is recommended for African Delight® as this creates a bigger irrigation area and creates a favourable micro-climate in the orchard that prevents problems such as sunburn and shriveling.
b. If a drip system is used, it is recommended that a double drip line is used.
c. Keep in mind that the irrigation requirements increase during the season as the fruit size and temperature during the season increase.
d. The last month is much more critical with African Delight® in comparison to other plum cultivars. As heat waves occur just before harvest, irrigation should be adapted.
e. Pulse irrigation is recommended during heat wave conditions.

7. HARVEST OF FRUIT:

a. Fruit with a poor colour development should be harvested at a later stage. Maturity levels of such fruit should be monitored continuously so that fruit is harvested between the prescribed minimum and maximum levels of maturity. Fruit light of colour are more prone to cold storage defects and surface browning.
b. Harvest fruit during the coolest time of day to prevent transpiration and loss of moisture. Avoid harvesting at temperatures of 32°C and higher.
c. Fruit should be harvested between a minimum and maximum fruit firmness of 5,5 kg and 9 kg (measured with a penetrometer with an 11 mm tip). The minimum total soluble sugar concentration (TSS) should be at least 15° Brix.
d. When fruit complies with minimum ripeness requirements and colour development it is recommended that the fruit is harvested to eliminate further climate related risks such as rain and heat waves.
e. Fruit may be harvested at a maximum firmness of 10 kg but then the TSS should be at least 18° Brix.
f. The maximum allowed sunburn on Arican Delight® sunburn chart 28. A tolerance of 5% equal to picture 7 of the sunburn chart will be allowed. African Delight® or ARC PR-2 (variety name) with sunburn equal to picture 7 or higher is not allowed to be exported.

8. PACKING AND STORING:

a. Pack the fruit as soon as possible after harvesting. Avoid leaving fruit unpacked on the pack house floor, which promotes transpiration and shriveling. If packing fruit the following day, cold store under dew point (12°C).

b. The storage of crates in cold store should be avoided because the warm fruit causes a decrease in the humidity of the cold store. As a result there is a loss of moisture from the fruit, which leads to shriveling.

c. Pack all fruit in perforated bags, also used for grapes (54 holes of 2 mm each), in a standard plum carton (5,25 kg) to create an artificially high humidity in the carton, thus preventing shriveling.

9. COLD STORAGE:

a. Fruit should preferably be stored at a temperature of -0,5°C.
b. Fruit with a good colour that is harvested at optimum ripeness can be stored for 60 days at -0,5°C.
c. Fruit that does not have a good colour post harvest may be exported at dual temperature (PD10). Fruit with a light colour is prone to cold storage defects such as surface browning. This fruit should be sold within 5 weeks of going into cold storage.
d. Another method to improve poor colour is to use Smartfresh. Fruit that is treated with Smartfresh can be successfully stored for 60 days at dual temperature (PD10).

AVAILABILITY

- Plant material is readily available for African Delight®.

CULDEVCO (PTY) LIMITED
DR LEON VON MOLLENDORFF
Tel: +27 21 887 6823
Fax: +27 21 883 3487
Cell: +27 83 627 2284
Email: leon@culdevco.co.za
www.culdevco.co.za
Fleurbaix, Van Reede Street, Stellenbosch, 7600, South Africa

ARC INFRUITEC-NIETVOORBIJ
PROF BONGANI NDIMBA
Tel: +27 21 809 3100
Fax: +27 21 809 3002
Email: ndimbab@arc.agric.za
www.arc.agric.za
Nietvoorbij Farm, Klapmuts Road (R44), Stellenbosch, 7600, South Africa

Table 1. Thinning of Ruby Crisp fruit at Bien Donne and Robertson to obtain the best fruit size and yield.

Area	Code	Diameter	(kg)	%	Trunk (cm)	Fruit/ Tree	Fruit (cm ø)	Tree spacing (m)	Trees/ ha	Ton (ha)
BD52	AA A B C	55-60 50-55 45-50 40-45	7,32 7,72 1,84 0,00	40,9 48,8 10,3 0,0	30	253	8,4	4.0 x 1.25	2000	35,76
BD53	AA A B C	55-60 50-55 45-50 40-45	11,80 4,80 0,56 0,00	68,8 28,0 3,3 0,0	28	224	8,0	4.0 x 1.25	2000	34,32
BD54	AA A B C	55-60 50-55 45-50 40-45	10,00 4,16 0,00 0,00	70,6 29,4 0,0 0,0	29	204	7,0	4.0 x 1.25	2000	28,32
BD55	AA A B C	55-60 50-55 45-50 40-45	10,73 4,59 0,00 0,00	70,0 30,0 0,0 0,0	28	155	5,5	4.0 x 1.25	2000	30,64
RB22	AA A B C	55-60 50-55 45-50 40-45	4,80 16,54 8,85 1,38	15,2 52,4 28,0 4,4	30	440	14,7	4.0 x 1.25	2000	63,14
RB23	AA A B C	55-60 50-55 45-50 40-45	6,30 18,17 9,36 1,21	18,0 51,9 26,7 3,5	36	480	13,3	4.0 x 1.25	2000	70,08
RB24	AA A B C	55-60 50-55 45-50 40-45	11,90 21,70 9,18 1,13	27,1 49,4 20,9 2,6	32	500	15,6	4.0 x 1.25	2000	87,82