

TOP CULDEVCO LICENSED PLUM CULTIVARS

The Agricultural Research Council (ARC) and the South African Deciduous Fruit Industry formed a joint venture to commercialise the ARC-bred plum cultivars discussed below.

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 already made a significant impact on plum exports from South Africa. We added a fifth plum cultivar, namely Flavour Star, to the four commercial plum cultivars. The intention of this article is to provide more information on these five plum cultivars for current and future plum growers and other stakeholders. Find more information at www.culdevco.co.za.

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

Culdevco licensed plum cultivars bred by the ARC:



1. FLAVOUR STAR

CHARACTERISTICS AND RECOMMENDATIONS

- A red plum with conspicuous white lenticel spots and an orange-red flesh when fully ripe. Flavour Star ripens after Laetitia with Songold.
- This cultivar has an excellent sweet and very aromatic taste that exceeds all other plum cultivars bred by the ARC.
- The first semi-commercial plantings were made in 2015. Since then almost 20 ha of this cultivar have been planted up to the end of 2019. Culdevco and the ARC have not yet officially released this cultivar because it is still undergoing semi-commercial trials in different regions of the Western Cape on various rootstocks. However, interested growers are welcome to contact Culdevco should they wish to plant it.
- During the 2019/20 season almost 15 000 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 in the third week of September (Robertson region) and the bloom season overlaps with Laetitia and Larry Ann (slightly earlier), and Songold (slightly later). It is recommended to plant both pollinators to adapt for changes in the climate during Spring.
- Flavour Star has a medium to high chilling requirement and adapted well in areas such as Tulbagh and the Warm Bokkeveld. In warmer areas such as Robertson it is recommended to use a rest breaking agent.

- Marianna rootstock is recommended for Flavour Star. Some of the semi-commercial plantings of Flavour Star are also planted on clonal peach type rootstocks with good success.
- This cultivar has a semi-upright growth habit. Cut back the tree to about 45 cm above the ground directly after planting to encourage strong side branch growth.
- Freestanding as well as intensive training systems such as a V-hedge or Palmet system may be considered.
- Flavour Star does not have a strong growth habit and needs ideal conditions and special care for optimal growth, especially during the first three years. If optimal conditions do not prevail, it may happen that spaces between trees are not properly covered within the first 3 years.
- As mentioned, this cultivar has a semi-upright growth habit. Therefore, when an intensive system is applied, producers should be careful not to bend shoots flat on the wires too early. Scaffold branches that are too flat can lead to upright regrowth. Tie scaffold branches at 30° to 40° angles to the leader. Wait longer to flatten scaffold branches (contact your technical advisor for more detail).
- Frequent spur renewal is required for optimal annual yields.
- 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 consequently, it negatively effects 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.
- As in the case of African Delight®, insufficient foliage coverage, an abnormally high fruit load, specific training systems, as well as severe pruning in summer may increase chances of sunburn. Flavour Star is sensitive to sunburn. Training and pruning practices that contribute to better foliage coverage will decrease the occurrence of sunburn. Therefore, pruning and production practices should be managed carefully to ensure optimal fruit quality (for more detail contact your technical advisor).

- A yield of between 30 and 40 tons per hectare is attainable in adult orchards. Higher yields will have a negative effect on fruit size and sugar levels.
- By using normal thinning practices this cultivar will peak quite easily on an A/AA fruit size. In cooler areas such as Tulbagh, the fruit size tends to be even bigger.

HARVESTING AND STORAGE

- Flavour Star is less prone to wind and rub marks.
- A sugar level of between 14° and 16° Brix (measured with a refractometer) should be attained easily. The minimum sugar content for Flavour Star is 14° Brix.
- This cultivar possesses excellent cold storage ability when stored at single or dual temperatures (PD-7) for 42 days at 0.5°C.
- Fruit should be harvested at a firmness between 6.5 kg and 9 kg (11 mm tip) to achieve good storage ability.
- Shrivelling and softening of the shoulder of fruit may occur after rainy conditions. A minimum period of 48 hours is required for fruit to dry after rainy conditions, prior to picking. Due to the high sugars some cracking of fruit may occur after heavy rain spells.

ACCEPTANCE IN THE MARKETPLACE

- The strength of Flavour Star is in its exceptional taste and aroma. Therefore, all UK and EU supermarkets rated this cultivar very high and premium prices are achievable.
- A good income for growers is achievable if pack-outs of 70% can be reached on farm level.

AVAILABILITY

- Plant material is readily available for Flavour Star.



2. RUBY CRISP

CHARACTERISTICS AND RECOMMENDATIONS

- A dark-red (almost black when ripe) plum with a full-red flesh colour that ripens just before Laetitia. Ruby Crisp reaches

full bloom during early to mid-September (depending on the season).

- In excess of 50 000 standard cartons of Ruby Crisp were already exported during the 2019/20 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 Paarl, Simondium, Bonnievale and Robertson.
- Yields of 30 tons per hectare are achievable.
- The recommended rootstock is Marianna.
- Ruby Crisp has a normal growth habit and is easily trained on standard training systems. Fruit are borne on both spurs and 1-year-old shoots.
- Frequent spur renewal is required for optimal annual yields

THINNING

- Fruit thinning is required to peak at an AA fruit size. As guideline, follow a pruning procedure of 8 – 10 fruit per cm stem circumference, depending on the planting distance, to reach a fruit size that peaks at A/AA (see Table 1 at the end of the article).
- 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 negatively affect fruit size, 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 occurrences of shrivelling were 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 shrivelling in African Delight® below).

AVAILABILITY

- Plant material is readily available for propagation.



3. RUBY SUN

CHARACTERISTICS AND RECOMMENDATIONS

- A red plum with yellow flesh colour that overlaps with the second half of the ripening of Sapphire.
- Since the release of Ruby Sun in May 2012 almost 368 hectares of this cultivar have been planted up to the end of 2019. During the 2019/20 season almost 445 782 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.
- The cultivar reaches full bloom at the end of August (depending on the season and area) and the bloom season overlaps with Harry Pickstone. Harry Pickstone is recommended as a cross pollinator for Ruby Sun at a ratio of 10% to 15%. Ruby Sun was very well received on all EU and UK markets up to the 2017/18 season.
- Ruby Sun has a medium chilling requirement and is well adapted in Boland and Klein Karoo areas.
- Marianna rootstock is recommended for Ruby Sun.
- Freestanding and intensive training systems may be considered. When an intensive system is applied, producers should be careful not to bend shoots flat on the wires too early. Scaffold branches that are too flat can lead to upright regrowth. Tie scaffold branches at 30° to 40° angles to leaders. Wait longer to flatten scaffold branches.
- This cultivar has a strong basal dominance growth habit. Cut back the tree to about 35 – 45 cm above the ground directly after planting to encourage strong side branch growing.
- 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 consequently negatively effects 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 30 tons per hectare 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 on 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 marks.
- 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 were cold stored at -0.5°C for a period of 5 weeks.
- Shivering 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.



4. RUBY STAR

CHARACTERISTICS AND RECOMMENDATIONS

- A 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 316 hectares of this cultivar

have been planted up to the end of 2019. During the 2019/20 season almost 553 034 standard cartons were exported from South Africa.

- Ruby Star is well received on all EU and UK markets (572 000 cartons were exported in 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, or both, are recommended as cross pollinators for Ruby Star in a 10% ratio. Use both as cross pollinators to make provision for climate changes over time.
- Due to the late flowering period during the end of September, make sure the temperature during this time of the year does not exceed a maximum of 28°C in your area.
- This cultivar is very sensitive to blossom blight, therefore 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 tends to form a cavity in the tip (to date no split pit has occurred).
- Optimal irrigation is recommended 3 weeks prior to harvest to avoid fruit tissue dryness. This is especially true in cases where this cultivar is planted in sandy soils.
- Ruby Star is only recommended on Marianna rootstock as other rootstocks have not been evaluated with this cultivar.
- It has an exceptional fruit size.

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

- It has excellent cold storage ability at both single and dual storage temperatures. Trials were done by Experico over a cold storage period of 6 weeks with great success at both storage regimes.
- The cultivar is prone to shrivelling thus necessary preventative precautions should be taken. In this regard the following recommendations are made:
 - Fruit should be harvested during the coolest time of day to prevent transpiration and keep loss of moisture to a minimum. Avoid

harvesting at temperatures of 32°C and higher.

- Fruit should be harvested within a fruit firmness of 5.5 kg and 9 kg (measured with a penetrometer with a 11 mm tip).
- The minimum Total Soluble Solid concentration (TSS) should be at least 12° Brix.
- 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 not to leave fruit on the packhouse floor overnight, as this promotes transpiration and shrivelling. If packing fruit the following day, overnight storage in a cold store set above dew point (12°C to 15°C) is recommended.
- Storage in crates in cold stores should be avoided. The warm fruit leads to a drop in humidity in the cold room and this results in a loss of fruit moisture, causing shrivelling.
- Pack all fruit in plastic bags similar to those used for grapes (54 holes of 2 mm each), and in a standard plum carton (5.25 kg), to create an artificially high humidity and therefore prevent shrivelling. Standard fruit sheets can also be used instead of the perforated bags.
- Fruit of Ruby Star can be stored successfully at single and dual temperature (PD7). Cold storage should not exceed 6 weeks.

AVAILABILITY:

- Plant material is readily available for Ruby Star.



5. AFRICAN DELIGHT®

CHARACTERISTICS

- During the 2019/20 season about 1.2 million cartons of African Delight® were exported from South Africa.
- This late, bright red plum ripens just before Angeleno® and has a particularly high sugar level that results in exceptional eating quality. The texture of the fruit is firm and it has a slow metabolism during ripening. As a consequence, 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.
- Almost 70% of the fruit that was marketed had a size of AA or AAA.
- African Delight® manages to receive a premium price for plums in most EU, UK and Middle-Eastern markets.

RECOMMENDATIONS

1. PLANTING OF AFRICAN DELIGHT®

- Avoid planting in areas that experience cold and wet conditions in mid- to end August. The cold conditions during this period have negative influences on the activity of bees and fruit set.
- 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®.
- Soil preparation should be done exactly according to the standard procedure.
- Freestanding as well as intensive training systems may be considered. When an intensive system is applied, producers should be careful not to bend shoots flat on the wires too early. This causes terminal shoot growth to stop and the permissible space will not be filled in the shortest possible time.

2. CROSS POLLINATION

- 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 use African Rose®.
- Bees should be used in orchards to optimise the pollination process.
- 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).
- Shrinking, black tips and late fruit drop are typical symptoms of poor pollination.

3. SUMMER LEAF MANAGEMENT

- 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 shrivelling. African Delight® is sensitive to sunburn. Technical experts agree that training and pruning practices which contribute to better foliage coverage will decrease in the occurrence of sunburn and shrivelling. Therefore pruning and production practices should be managed carefully to ensure optimal fruit quality.
- Sunburn is, among others, the result of scaffold branches that are incorrectly bent flat too early and tied

to the horizontal wires of the training system.

- Pruning in summer should be finished by end November to encourage regrowth and leaf coverage to protect the fruit from sunburn.
- Trimming treetops is not recommended.
- Take out strong water sprouts as a whole (do not cut through).
- The correct post-harvest fertilisation program, optimal irrigation and a good tree reserve status are necessary for optimal growth conditions.
- Contact your technical advisor for more information regarding pruning practices.

4. FIRST HARVEST

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

5. THINNING OF FRUIT

- Thinning of fruit should preferably be done after mid- to end November (approximately 70 days after full bloom). This is necessary because African Delight® fruit falls later than most other plum cultivars. Thinning at this stage should be done to approximately 60% of the final thinning.
- The final thinning of mainly poor quality fruit may be done up to mid-December.
- 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:
 - 3-year-old orchards between 12 and 20 tons per hectare
 - 4-year-old orchards between 20 and 35 tons per hectare
 - Mature orchards between 35 and 50 tons per hectare
- Be careful not to overload trees as an excessively high fruit load will have negative impacts on sugar levels and general fruit quality (such as shrivelling).

6. IRRIGATION

- A micro irrigation system is recommended for African Delight® as this creates a bigger irrigation area and makes for a favourable microclimate in the orchard that prevents problems such as sunburn and shrivelling.

- If a drip system is used, it is recommended that a double drip line is used.
- Keep in mind that the irrigation requirements increase during the season as the fruit size and temperatures increase.
- The last month prior to harvest is much more critical in comparison to other plum cultivars. When heat waves occur during this period, irrigation should be adapted.
- Pulse irrigation is recommended during such heat wave conditions.

7. HARVESTING OF FRUIT

- 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 that are light in colour are more prone to cold storage defects and surface browning.
- Harvest fruit during the coolest time of day to prevent transpiration and moisture loss. Avoid harvesting at temperatures of 32°C and higher.
- 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.
- When fruit comply 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.
- Fruit may be harvested at a maximum firmness of 10 kg but then the TSS should be at least 18° Brix.
- The maximum allowed sunburn on the skin of African Delight® should be equal to or less than picture 6 on the African 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

- Pack the fruit as soon as possible after harvest. Avoid leaving fruit unpacked on the packhouse floor as it enhances transpiration and shrivelling. When packing fruit the following day, cold store under dew point (12°C).
- 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 shrivelling.
- Pack all fruit in perforated grapes bags (54 x 2 mm) in a standard plum carton (5.25 kg) to create an artificially high humidity in the carton, thus preventing shrivelling.

9. COLD STORAGE

- Fruit should preferably be stored at a temperature of -0.5°C .
- Fruit with a good colour that is harvested at optimum ripeness can be stored for 60 days at -0.5°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 browning on the surface of the fruit. Such fruit should be sold within 5 weeks from going into cold storage.
- Another method to improve poor colour is to use Smartfresh. Fruit that has been treated with Smartfresh can be successfully stored for 60 days at dual temperature (PD10).

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AVAILABILITY

- Plant material is readily available for African Delight®.

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