

LOW CHILL FRUIT INDUSTRY.

BY

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**FOR
LOW CHILL AUSTRALIA
UPDATE 2006**

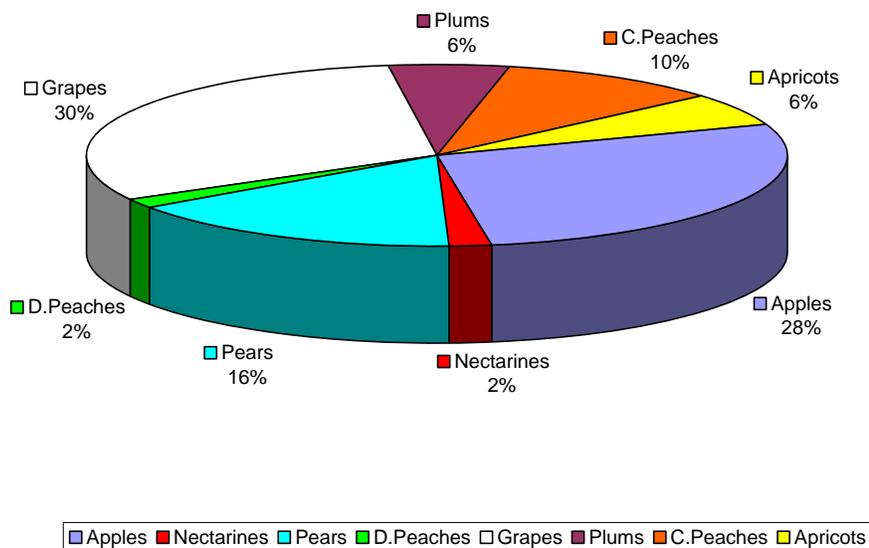
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THE SOUTH AFRICAN LOW CHILL FRUIT INDUSTRY OVERVIEW.

Introduction:

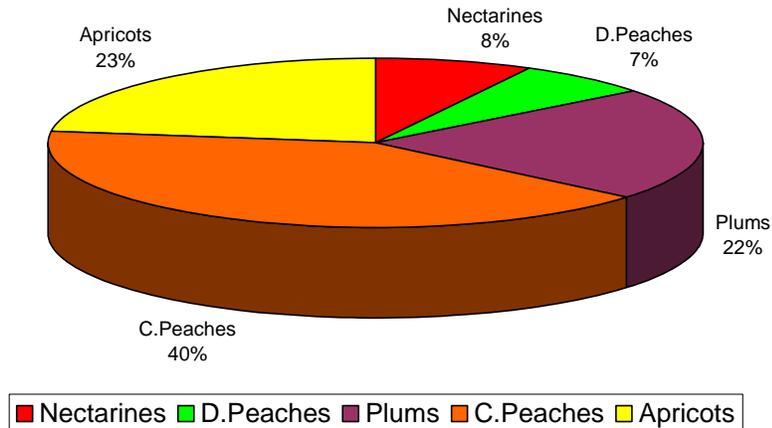
South Africa, comprising all of 1 221 000 Km² in area is less than ½ the size of Western Australia and makes up approximately 16% of the total Australian land mass of 7 660 000 Km². Of the 122.1 million hectares, approximately 13% is arable, of which only 22% can be considered high potential with just over 1.3 million hectares (1.1%) being under irrigation. According to the 2005 deciduous fruit survey, a total planted area of 74 247 hectares is currently established, with stone fruit comprising 18 905 hectares (25.5%), of which 1 768 hectares (9.3%) can be considered low chill.

Total 2005 RSA Deciduous Fruit
Area = 74 247 Ha.



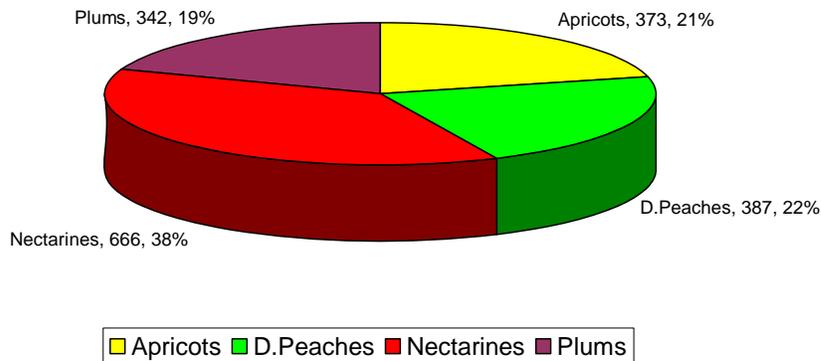
In South Africa the need to focus on lower chill cultivars has become very apparent given the influence of global climate change on our growing environment. 2005 recorded the warmest global temperature on record. The last 8 years have been the warmest in the last 100 years. The last century has been the warmest in the past 1200 years. In the Western Cape, the average temperature in May has increased 1.5°C over the past 40 years in 10 out of 12 stations monitored in various fruit producing areas. In 9 out of the 12 stations, the average temperature in August has also risen. Both the maximum and minimum temperatures have increased by 1°C. The long term forecast is that within 100 years, higher chill pome fruit will not be grown in the Grabouw region as a result of inadequate chilling.

RSA 2005 Stone Fruit
Area = 18 905 Ha



Low chill for the purposes of this discussion has been defined as trees having the ability to flower, set, grow and produce fruit having accumulated fewer than 400 chilling units, and/or flower at the latest with Sunlite nectarine and/or have been harvested by the end of week 48 (last week of November.)

RSA 2005 Low Chill
Area = 1 768 Ha.



Chill Models and Accumulation:

In South Africa we currently use three monitoring systems for chill accumulation. The Utah or Richardson model, measuring “Richardson Chill Units (RCU)” the Infruitec model, measuring “Infruitec Chill Units (ICU)” and the hours below 7.2°C are all utilized. In effect, for the earlier low chill stone fruit, the accumulations are made for the months of May, June and July. For the pome fruits, August is also very important. In effect, chill can only constructively accumulate, once the trees are endodormant, (where no growth occurs even under favourable conditions and in the absence of internal inhibition) until the trees start to move in the early spring and the early bud swell copper spray or rest breaking oil application is applied. From then on, the heat unit accumulation is very important. A mediocre winter from a chill unit accumulation point of view can easily be overcome by good heat unit accumulation in the spring.

The Richardson and Infruitec models accumulate the same way, with the exception that the Infruitec model does not allow one to lose units when the temperature exceeds 16°C once these units have been “banked” by not being forfeited within the first 24 hours after accumulation. So the accumulation tables are as follows:

<u>Temperature °C.</u>	<u>Richardson Units</u>	<u>Infruitec Units</u>
< 1.4	0	0
1.5 - 2.4	0.5	0.5
2.5 – 9.1	1	1
9.2 – 12.4	0.5	0.5
12.5 – 15.9	0	0
16 – 18	-0.5	0
> 18	-1	0

Heat Units:

In South Africa all night temperatures > 10°C from 18:00 until 06:00 in the morning are measured and accumulated as heat units, once the trees have “broken” dormancy and have started to develop in the spring. Obviously better heat unit accumulation in the spring is beneficial for fruit size and development and as such is essential for the low chill growing environment.

Growing Conditions in Low Chill Production Areas in South Africa:

The Northern Provinces of South Africa are climatically better suited to lower chill production, in that they receive the early winter chill and from July onwards the heat unit accumulation gets moving. From August on, the effective chill unit accumulation is very limited indeed. According to the Utah (Richardson) chill model, they tend to lose what they have gained in the way of chill overnight during the warmer days that follow. This is very applicable in August. The Infruitec model within reason caters for this, by allowing chill unit accumulation which has taken place overnight to not be forfeited providing they do not get “heated away” during the day after accumulation. In effect, 24 hours after the chill units were gained they are “banked” and may not be lost again. If however one looks at the hours below 7.2°C that are accumulated in these areas, they are far more productive than the Cape. This is obviously as a

result of the clear cold nights on the highveld followed by warm sunny days. The northern production areas harvest their fruit 3 weeks ahead of the Western Cape.

The following tables show the chill unit accumulation for a farm in Groblersdal in Mpumalanga province, with latitude 29° S. The associated heat units from July onwards are also depicted. From these figures one can see the good chilling gives way to excellent heating units in the spring once the trees are moving.

Groblersdal Cumulative Chill Units – 2002.

<u>Month</u>	<u>ICU</u>	<u>RCU</u>	<u>Hrs < 7.2°C</u>
MAY	26	0	123
JUNE	146.5	127.5	336
JULY	268	220.5	583
AUGUST	287	21	652

Groblersdal Heat Unit Accumulation – 2002.

<u>Month</u>	<u>Heat Unit Accumulation</u>	<u>Cumulative Heat Units</u>
JULY	133	133
AUGUST	227	360
SEPTEMBER	254	614
OCTOBER	342	956
NOVEMBER	328	1284

In the Western Cape, we tend to have milder and warmer autumns yet colder and wetter springs than the Northern Provinces. These Mediterranean Climatic conditions are unique to the Western Cape as we are traditionally a winter rainfall area as opposed to the rest of the country being summer rainfall areas. Again on the climate change front, in the Western Cape we are predicted to undergo an average temperature increase of 1°-2°C compared with the predicted global increase of 0.6°C. We are also predicted to get 30% less rainfall per annum and we will become more of a summer rainfall region, with higher intensity and less rainy days.

One can see from the following figures that the Western Cape in terms of chilling model units accumulated, is superior to the Northern Provinces, but regarding chilling hours <7.2°C, the northern provinces are a lot better off than the Western Cape. The farm Waterkloof in Stellenbosch with latitude of 33° S for the comparable period in 2002 (which was a very good chilling year in the W. Cape) recorded the following measurements:

Waterkloof Cumulative Chill Units – 2002.

<u>Month</u>	<u>ICU</u>	<u>RCU</u>	<u>Hrs < 7.2°C</u>
MAY	92	56	10
JUNE	333	269	49
JULY	602	520	113
AUGUST	778	602	155

Waterkloof Heat Unit Accumulation – 2002.

<u>Month</u>	<u>Heat Unit Accumulation</u>	<u>Cumulative Heat Units</u>
JULY	74	74
AUGUST	124	198
SEPTEMBER	183	381
OCTOBER	185	566
NOVEMBER	227	793

The heat unit accumulation in 2002 was about 10% below the long term average, given the cool spring.

Production Areas and Fruit Types:

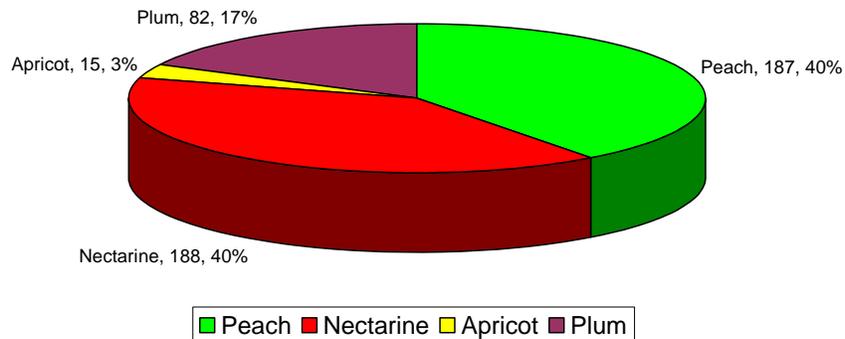
As per the South African map, the provinces have the following breakdown of low chill production:



Limpopo Province has a total of 472 hectares of low chill orchards. They mainly produce peaches and nectarines (40% of each) with 17% plums and 3% apricots. These growers are mainly catering for the early domestic market.

LIMPOPO PROVINCE

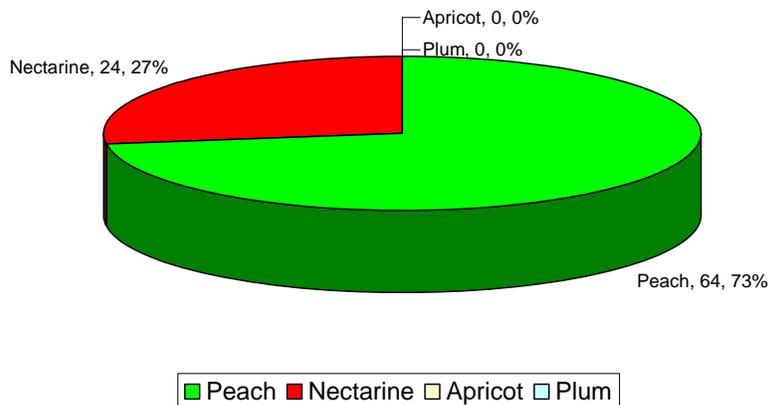
472 Ha.



Mpumalanga Province produces only early peaches and nectarines, again predominantly for the local market. Of the 88 hectares, 73% are peaches and the remaining 27% are nectarines.

MPUMALANGA PROVINCE

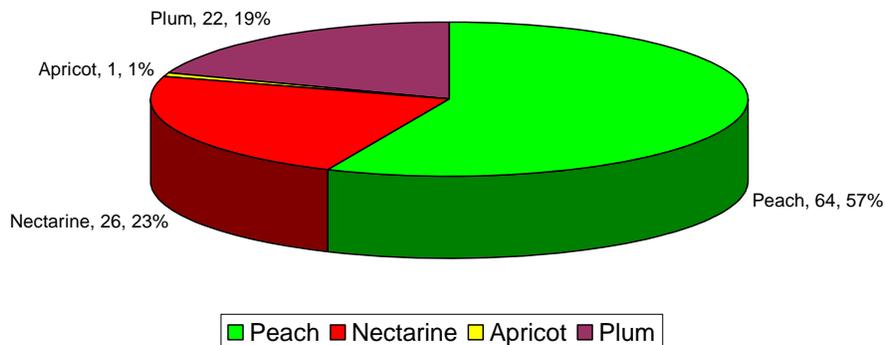
88 Ha.



The North West Province has a total of 113 hectares under low chill production, again mainly producing early peaches and nectarines. 57% of the total area is under peaches with 23% being nectarines, 19% being plums and 1% apricots.

NORTH WEST PROVINCE

113 Ha.

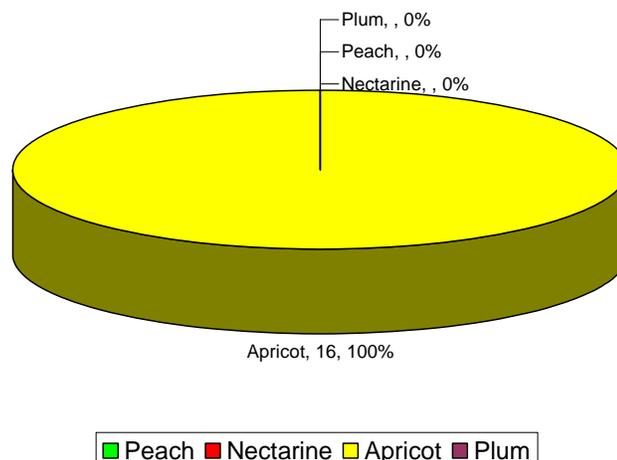


Smaller volumes of the above three area's produce may be exported via air freight. Being land-locked and far away from the shipping ports, early season air freight is the only viable solution.

The Northern Cape Province, produce a small amount of low chill apricots for export purposes. The total area of 16 hectares is all planted to apricots.

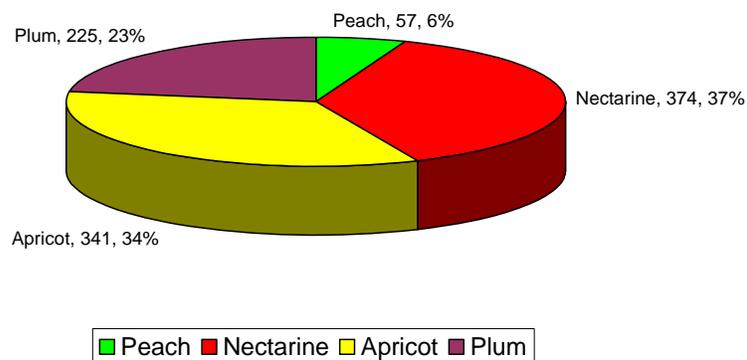
NORTHERN CAPE PROVINCE

16 Ha.



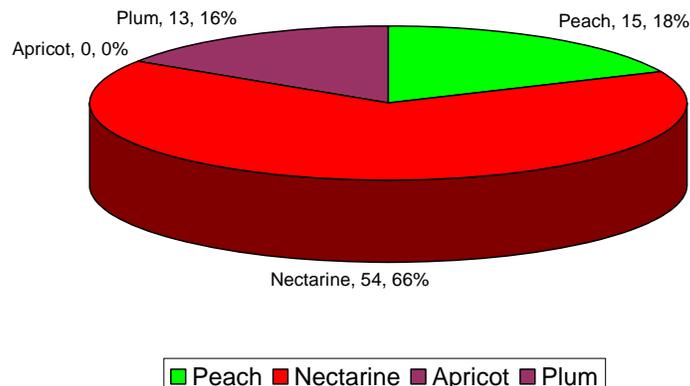
The Western Cape is the biggest producing area for low chill production, with a total of 997 hectares being planted. Nectarines comprise 37% of the total area, with apricots making up another 34%, plums being 23% of the total area and peaches comprising the remaining 6% of the area. All this fruit is primarily aimed at the export market. Local market deviations may and do occur based on how saturated the market is. Any mishap which may affect the Northern provinces' production, will create an opening for the Western Cape's producers.

W.CAPE PROVINCE
997 Ha.



The Eastern Cape Province has 82 hectares under low chill production. This too is basically aimed at the export market and also focuses on nectarines (66%) and peaches (18%) with the remaining 16% being under plum production.

E.CAPE PROVINCE
82 Ha.



South African Low Chill Breeder/Cultivar Matrix:

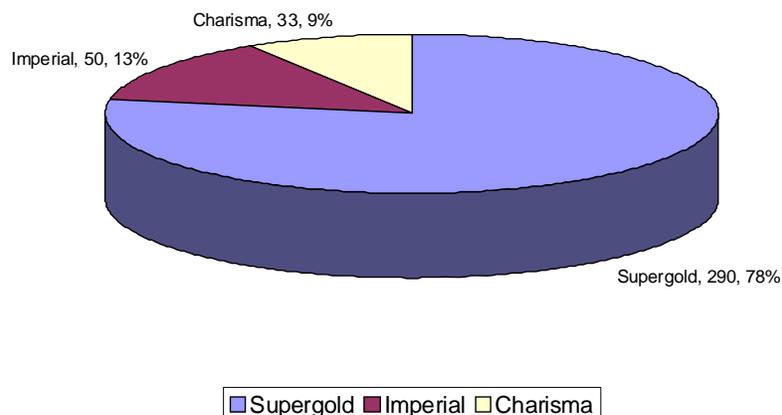
I am a firm believer in the good South African saying “Local is lekker!” Personally I have always found the locally bred selections perform just that much better under indifferent chilling years and growing conditions, than the older imported low chill cultivars. This is especially true on the fruit sizing front in the Cape, where our heat units are not what they could be. Under these conditions, the ability of the locally bred cultivars to size and grow is noticeably better than the imported range of cultivars.

Taking our picking dates as the major determining factor, as well as considering the flowering dates and chill demands, as to whether or not a cultivar makes the grade as low chill, in South Africa at this stage still, we only have locally bred apricots and plums. Of the low chill peaches 60% are locally bred and 40% of the nectarines are from the local ARC (Agricultural Research Council's) Infruitec breeding programmes.

Apricots:

Supergold is the main South African locally bred low chill apricot cultivar. At present there are 290 hectares of Supergold planted. It is the first apricot ready for picking and as such does not have the best size. Imperial is the second most planted low chill cultivar. Imperial only makes the week 48 cut-off in the earlier production areas of the country, but generally has a reasonable fruit size. Charisma is the newest locally bred cultivar making progress in the plantings and establishing itself in the international market. It too has good size and the big attraction is the magnificent red colouring of the skin, giving a very attractive blush for fresh market consumption.

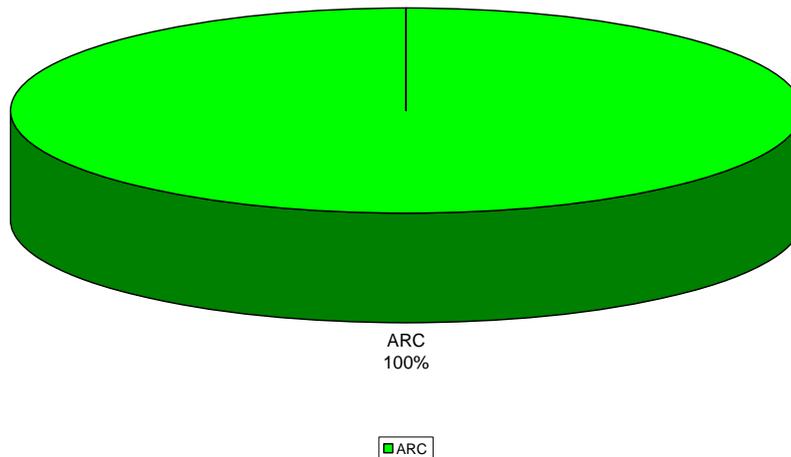
ARC Low Chill APRICOT Selections in RSA in 2005. 373 Ha.



Plums:

Pioneer is at present the only plum making the marketing window cut-off of week 48 for low chill classification. This plum also hails from the Infruitec programmes. At present there are 342 hectares of Pioneer in the ground in South Africa.

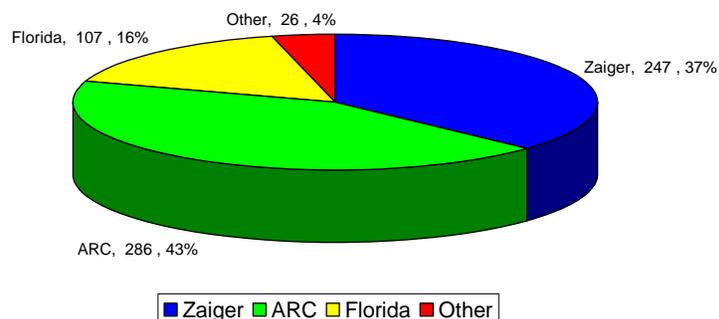
RSA 2005 Low Chill Plum Origin
Area = 342 Ha.



Nectarines:

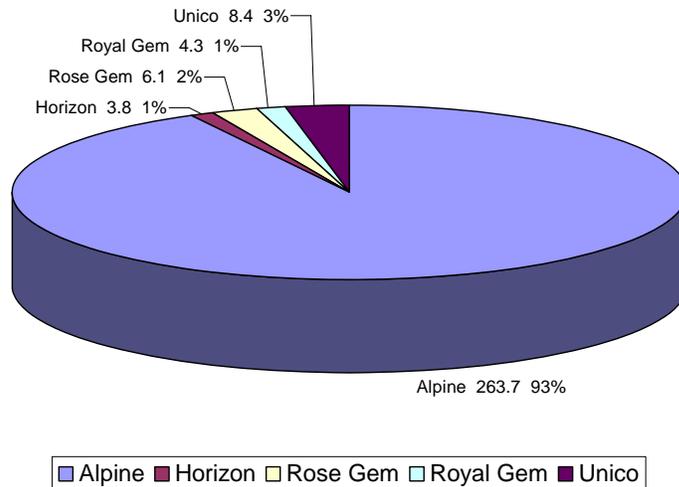
This is where South Africa has the greatest external input on the cultivar front. There are basically three main contributors to the cultivar status. The locally bred Infruitec range comprises 286 hectares, with Zaiger totalling 247 hectares and the Florida/Sherman range adding 107 hectares. There are small volumes of other nectarines.

RSA 2005 Low Chill Nectarine Origin
Area = 666 Ha.



Infruitec: The following are the main South African contenders:

**ARC Low Chill Nectarine Selections
in RSA in 2005.
286 Ha.**

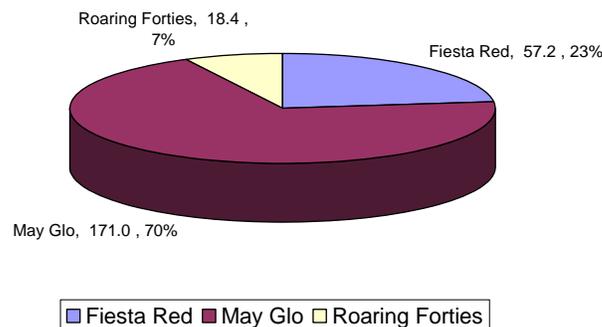


There are also a number of new exciting cultivars which will hopefully be released to the industry soon.

Zaiger:

The “Roaring Forties” are the new range from Zaiger which are looking very promising indeed, but obviously have their own growing quirks which also need to be mastered. All roaring forties cultivars are being planted within the ambits of a “grower club” format.

**Zaiger Low Chill Nectarine Selections
in RSA in 2005.
247 Ha.**



The main contributors already in the ground from Zaiger's Roaring Forties are the following selections. African Glo (4 Ha), April Glo (4 Ha), Arctic Star (2 Ha), Royal Glo (3 Ha), Silver Fire (2 Ha) Sun Glo (2 Ha) and Southern Glo (2 Ha).

Very aggressive plans are afoot to get the numbers of these cultivars planted boosted quickly to attempt to meet market demand, given the earliness of their picking windows.

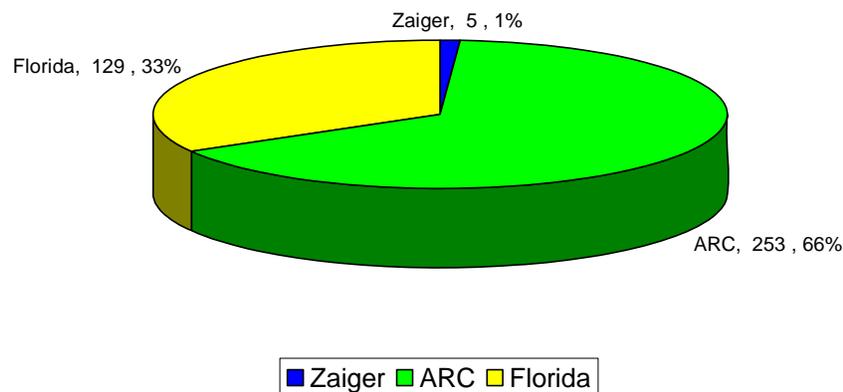
Florida:

The old stalwart Sunlite still has 107 hectares in the ground at present.

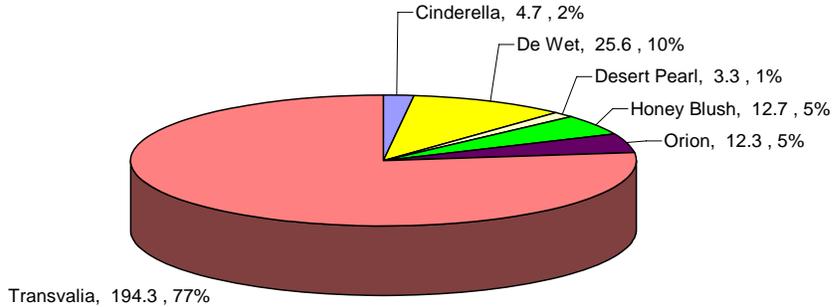
Dessert Peaches:

Here the South African range of Infruitec bred cultivars comprises 253 Ha (77%) of the total plantings of 387 hectares. The Florida peach range is the second most heavily planted comprising 129 hectares and the new boys on the block are Zaiger's Roaring Forties, with Superich having 5 hectares in the ground.

RSA 2005 Low Chill Peach Origins
Area = 387 Ha



ARC Low Chill Dessert Peach Selections
in RSA in 2005.
253 Ha.



Florida:

San Pedro with 85 hectares and Earligrande with 44 hectares are the contributors from Florida. These have been around for a long time but still the returns from these blocks is very acceptable.

Zaiger:

The Roaring Forties selections are destined to be planted aggressively given the marketing window. At present only Superich with 5 hectares is currently in the ground.

Conclusion:

With the projected impact of global climate change, I feel there is a “growing” need for low chill product development. Of change we can be certain. To remain competitive, we will have to adapt to climate change.

Of the 1 768 hectares of low chill stone fruit in South Africa, comprising 2.4% of the total deciduous fruit plantings in 2005, 1254 hectares (70%) is currently “locally bred” by ARC Infruitec. These figures are also going to change, with another local South African breeding programme starting to deliver cultivars. The “International” suppliers’ volumes are also increasing under the grower club banner and are projected to make great strides in the next 3-5 years.

Acknowledgments

1. Deciduous Fruit Producers’ Trust “Key Deciduous Fruit Statistics 2005.”