

# An overview of the export market situation and fruit quality during the 2000 avocado season

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## **ABSTRACT**

*Despite positive expectations for the 2000 avocado export season, returns to the growers were poor for a large portion of the season although fruit quality was in general of superior quality. It is apparent that the main contributing factor to poor returns was that of over supply to the European avocado market by the South African industry.*

*Comment is provided on a number of trends that have been observed in the European market place. European buyers are increasingly seeking Hass avocados, hence the market for green-skinned avocados is shrinking. There is also an increasing preference for smaller sized fruits. Quality control at the retailer level is becoming more detailed and stricter; agents will no longer accept fruits with quality defects. The foregoing makes the outlook bleak for the future marketing of Pinkerton avocados – large, green-skinned fruits that are often prone to severe quality defects. The industry also needs to exercise prudence in plantings of new avocado cultivars – it must be ascertained that there is a market for the new variety; problems have already been experienced with the cultivar Lamb Hass, which does not meet the requirements of traditional Hass markets. The characteristics of Lamb Hass are different to Hass.*

*Hass quality was good during the 2000 season, and the general use of Controlled Atmosphere for Hass transport contributed to hard arrivals and better shelf-life. Marketing difficulties were experienced once later season Hass started exhibiting grey pulp. Care should be taken to avoid exporting over-mature Hass*

*Virtually all Fuerte avocados were exported under Controlled Atmosphere conditions and arrived hard. Incidence of Black Cold injury was low but more common for specific packhouses and / or growers. Later season fruits showed some grey-pulp development – as for Hass, over-mature fruits should not be exported.*

*Ryan was the only cultivar to be exported in volume under Regular Atmosphere conditions, and many of these fruits arrived in a softer to ripe condition. The use of Controlled Atmosphere is recommended for all cultivars including Ryan.*

*Pinkerton remained the most problematic of the export cultivars during the 2000 season, being prone to severe Black Cold injury and internal Grey Pulp. These problems were exacerbated by the poor market during June and July. Some improvement with respect to Grey Pulp incidence was observed for Pinkerton fruits that were harvested earlier in the season than has traditionally been the case. Earlier harvesting of Pinkerton did not appear to have a beneficial affect on the incidence of Black Cold injury. In contrast, fruits that were harvested later in the season than is traditionally the case, exhibited a high incidence of both Black Cold and severe Grey Pulp. Pinkerton harvesting at low oil levels is therefore recommended to reduce the incidence of quality defects; it must however be emphasised that increased volumes of Pinkerton earlier in the season will coincide with the highest volumes of other green-skinned varieties. This could potentially exacerbate the marketing difficulties that are already being experienced for green-skinned avocados (as mentioned above).*

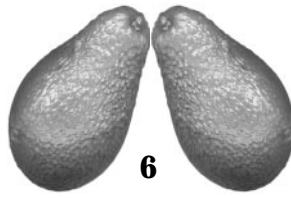
*Positive results were obtained for inland containerisation and transport of such containers to the harbour by rail, and this is recommended. There was a lower incidence of soft arrivals for railed / inland containerised fruit than for fruits containerised in the harbour. It is also recommended that shipping “deadline” fruit be avoided since the Overseas Technical Officer’s data showed that such fruit had a greater tendency to arrive soft.*

*Caution is advised when making use of the “Conventional Vessel” breakbulk controlled atmosphere system for avocado transport. Indications are that the system itself works well, but logistical and transport problems subsequent to offloading of the pallets at the European harbour may well be contributing to the rapid ripening of fruit.*

## **INTRODUCTION**

The 2000 export season will be remembered by the South African avocado industry as one in which for a large portion of that year poor prices were achieved on the traditional export markets of continental Europe and the United Kingdom. It would therefore seem logical to assume that South African avocados had been of inferior quality during 2000, and that it was this which was the primary cause of these poor prices. The industry had been concerned that there would be a high incidence of quality defects during 2000 as a result of the heavy rains which were experienced

in many of the production areas during the first few months of 2000. There were also a number of reports from overseas buyers of substandard fruit received during the most difficult marketing period, which suggested that there was indeed a high incidence of quality defects, however, the SAAGA Temperature Committee’s analysis of the quality data gathered by the SAAGA Overseas Technical Officer (“OTO”) during the course of the 2000 season indicates that the quality of South African avocados was in general very good. Indications are that it was rather prolonged storage which resulted in fruit quality deteriorating. It seems that this



was largely a result of the market having been oversupplied. This paper discusses quality trends observed following analyses of the OTO quality data. Only Fuerte, Hass and Pinkerton are discussed in detail – insufficient data was collected to allow for meaningful discussion of the quality of the other export cultivars. In addition, some insight is provided into market trends and the implications / results of oversupplying one's markets.

### **Market trends**

While the main focus of this report is on fruit quality, it is nevertheless important to highlight a number of trends regarding European market preferences. The European market is increasingly seeking Hass avocados in preference to green-skinned varieties. This is not to say that there is no market for greenskins – for example France, which has traditionally been a Hass market, still absorbs large volumes of greenskins (albeit usually at a lower price than that paid for Hass) and remains the industry's most important greenskin market. In contrast, the move towards Hass is more apparent in some of our traditional greenskin markets. In the UK, for example (where until about five years ago it was very difficult to sell Hass fruits), many supermarket chains are now seeking Hass and one or two of these no longer accept greenskins at all. The northern European markets (e.g. Scandinavia, Germany) remain good outlets for greenskins but there are indications that some of these markets may soon follow the trend already seen in the UK. Reports have been received that during 2000 some German buyers (for the first time?) were asking for Hass in preference to greenskins. This move towards Hass is motivated by the supermarkets, and does not necessarily imply a preference for Hass by the end-user. The supermarket chains, however, are becoming increasingly powerful and their preferences by and large determine European buying patterns. This is a trend which is unlikely to be reversible. There also seems to be an increasing preference for medium to smaller sized avocados. Irrespective of variety, the market for count twelve avocados appears to be shrinking and the market for any avocado larger than a count 12 has become extremely limited. At the other end of the scale, during 2000 a preference was shown by some UK supermarkets for very small Hass avocados – reports were received of Hass fruits smaller than count 30 achieving good prices. It is unclear how large the potential market for very small avocados is in the UK, or whether other European markets will eventually follow this trend.

It is clear that the South African avocado industry needs to bear in mind the preferences of the European markets if long-term survival in these markets is to be assured. The mind-set of the industry needs to change from one of "Europe will buy anything we send them, for a good price" to one of supplying what the market wants. It would appear that a significant proportion of the industry paid little heed to early reports from Europe (e.g. Leclercq, 1989) that Pinkerton was often affected by severe quality defects, with there being numerous new plantings of this cultivar in the following years. As a result, a large percentage of our potential export crop is now a cultivar which in addition to being very prone to quality defects is a greenskinned variety and produces

very large fruits (characteristics which, as mentioned above, the market has now deemed to be undesirable).

With the clear trend towards Hass, it is also important not to assume that the market will find any black-skinned avocado acceptable. This is perhaps the pertinent place to comment on the Lamb Hass variety. Unfortunately the OTO returned to South Africa before significant volumes of Lamb Hass were received on the European market, so very limited quality data could be gathered. However, other sources reported that some severe quality defects had been observed for this cultivar, in addition the cultivar possesses a number of characteristics which result in marketing difficulties:

- a) Count sizes tend to be very large.
- b) Although fruit are often already black upon delivery to Europe, such fruit can take a further two weeks to ripen. Traditional Hass markets such as France are used to avocados being edible once the peel has blackened.
- c) The peel of a Lamb Hass is smoother than a Hass fruit, it is therefore not considered to be part of the Hass family. Lamb Hass cannot, therefore, simply be marketed as late season Hass at Hass prices; it is a different cultivar.

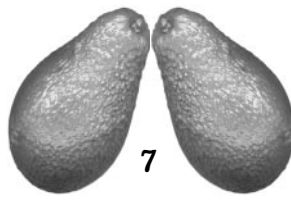
The industry is urged to consider the above before investing in new Lamb Hass plantings – a repetition of the problems faced with Pinkerton needs to be avoided at all costs.

### **COMMENTS ON THE OVERSUPPLIED EUROPEAN MARKET DURING THE 2000 EXPORT SEASON**

From mid-June until late-July 2000, the European avocado market was very difficult, with prices falling drastically and stocks building up in Europe. The primary cause of these marketing difficulties would seem to have been an oversupply of avocados, although there were a number of extenuating circumstances which exacerbated the marketing difficulties, namely:

- 1.) The European Summer was characterised by poor weather during 2000, and it was really only from the end of July and during the month of August that fair weather was experienced. It seems that during the Summer many avocados are used in salads. If the weather is poor there is a lower demand for avocados for this purpose.
- 2.) During May and June in particular, there was strong competition from locally produced melons for the same niche market – for use as a starter. There is always competition from this source at this time of year, but the problem was exacerbated during 2000 by local melons being available for unusually low prices.
- 3.) Local fruits in general (e.g. cherries, stone-fruits) were available for reasonable prices, there was also a surplus of various types of fruit from a variety of sources at very low prices (e.g. South African Citrus).

The foregoing notwithstanding, the main source of the problem appeared to be one of an oversupply of avocados. There was considerable postulation at the time that large volumes of Kenyan avocados were the primary cause of this oversupplied market. While it is certainly true that Kenyan fruit was indeed available,



these volumes were low in comparison with the large volumes of avocados being received from South Africa at the time. Some of the largest volumes from South Africa arrived during the most difficult marketing period. Slow stock turnovers caused many fruits to deteriorate to point where they were unsaleable or could only be sold for very poor prices. Offering fruit for lower prices will affect the going market price for avocados but (in mitigation) one cannot expect to achieve the same price for good quality fruit as for poorer quality fruit. It is important to stress that the stock build-up problem was largely confined to the greenskinned varieties (mainly Fuerte and Pinkerton). The OTO saw little evidence of Hass stocks building up – which confirms the growing preference for Hass as mentioned above. It was therefore particularly unfortunate that the greenskin stock-buildup and resultant falling greenskin market prices also impacted on the achievable prices for Hass. It would seem that supply of greenskins to the European market needs to be carefully managed if a repetition of the mistakes of 2000 is to be avoided.

#### **OTO SAMPLING PROCEDURES**

The OTO was based in Rungis, France from mid-March until late September 2000, his primary role being to monitor the quality of South African avocados both upon arrival and when ripe. Quantitative “arrival” and “ripe” quality data were provided to the industry on a weekly basis. Arrival quality was gauged by inspections of pallets on the day of delivery to the importer’s warehouse, ripe quality data from fruit in sample cartons collected during arrival inspections. The majority of arrival inspections were carried out at Rungis, more rarely warehouses in Rotterdam, Antwerp and England were venues for arrival inspections. The count / cultivar spread on any particular vessel, influenced the venues selected for arrival inspections.

#### **Evaluations**

A) **Arrival Evaluations:** The number of pallets evaluated on arrival was largely dependant upon the size of delivery from that week’s vessel and the timing of those deliveries to the importers’ warehouses. It was usual for at least two hundred pallets to be inspected per vessel. Pallet evaluations of fruit quality were of necessity usually very brief, their primary purpose being to estimate the firmness of the fruit and the percentage incidence of lentidamage and external chilling injury. Fruit firmness was established by hand testing (Very Hard to Hard, Firm to Break, Soft to Very Soft) of a number of randomly selected fruit; chilling injury and lentidamage incidence established by visual observation and expressed as a percentage (symptoms as defined by Nelson *et al.* 2000). Where feasible the arrival data were estimated from observations of the uppermost carton layer of each pallet. When top-layer observations were not possible, data were gathered from observations of fruit visible through the gaps in the side panels of the cartons. In the event of severe quality defects being observed during “top-layer” inspections, cartons lower down the pallet stack were also checked in order to verify whether or not percentage incidence of the quality defect was confined to the uppermost carton layers.

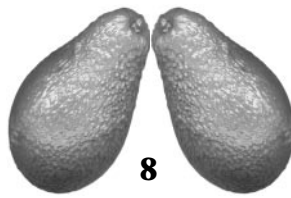
B) **Ripe Evaluations:** Approximately 25 standard avocado cartons were selected for detailed ripe analysis per vessel consignment delivered to Europe. Sample cartons were invariably selected from the uppermost layer of cartons in a pallet stack and a different pallet was used for each sample carton. In general, between ten and twelve randomly selected fruit per carton were cut when ripe (irrespective of count size). Ripe fruits were cut open into two equal halves along the longitudinal (proximal to distal) axes. Presence or absence of the following internal defects (as defined by Nelson *et al.* 2000) was recorded per fruit: Anthracnose, Stem-end rot, Grey pulp, Pulp spot, Vascular browning. With the exception of Hass avocados (where the ripe colour disguises external defects) incidence of external chilling injuries (Black Cold / Brown Cold / Dusky Cold / Lentidamage) was also recorded for ripe samples.

**Post season data analyses** concentrated on the following:

- 1) Percentage incidence at delivery of breaking to soft fruit, coupled to this the relationship between fruit age and fruit firmness.
- 2) Percentage incidence of external chilling injury
- 3) Percentage incidence of Anthracnose and / or Stem-end Rot.
- 4) Percentage incidence of internal disorders.
- 5) Comparison of quality data for fruit containerised in the port (Cape Town or Durban) versus fruit containerised at the packhouse and sent by rail to the port. These comparisons were only possible for containers railed from Tzaneen station (i.e. Tzaneen area or occasionally Levubu area origin fruit) since more southerly production areas did not have access to the rail service facility during the 2000 season.
- 6) For points 1 through 4, an attempt was made to discern whether there were any seasonal or regional differences in the percentage incidence of the quality defects.

#### **Quality Summaries per Cultivar Hass**

The arrival and ripe quality of Hass was generally superior to that for the other commercially exported cultivars. The overwhelming majority of Hass fruits evaluated during the 2000 season had been transported under Controlled Atmosphere (“CA”) conditions – this contrasts with the 1999 export season when a significant percentage of Hass exports were transported under Regular Atmosphere (“RA”) “porthole” containers. It was clear that the general move by the industry to CA transport for Hass had a very beneficial effect on fruit firmness and hence on shelf-life post-arrival in Europe. Incidence of softer Hass arrivals was very low in comparison with previous season, even in cases where fruit age was a few days older than generally considered desirable (e.g 30 days). The benefits of having hard arrivals cannot be overemphasised, especially in a season such as 2000, where the market was oversupplied and stocks built up in the European warehouses. CA transported fruit tends to have at least one further week of shelf-life under refrigeration (post-arrival i.e. once no longer under CA) compared with RA transported fruit. Thus the quality of CA fruit will deteriorate more slowly under prolonged cold-storage. The poor prices achieved on the overseas markets during the 2000 season could well have been considerably poorer had there been a higher



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percentage of soft arrivals.

The incidence of Black Cold Injury on Hass was generally very low, and during 2000 was not considered by the Trade to be a significant quality defect. Similarly, the incidence of stem-end rot and Anthracnose was low for Hass fruits.

The OTO's data showed that percentage incidence of severe lentic damage was low except for Class 2 fruit. A number of complaints were received from UK buyers concerning lentic damage and generally cosmetically unappealing fruit. This was in stark contrast to the situation on the European markets and stands out as a major change in perceptions of quality amongst the UK buyers compared with previous seasons. Until 2000, the UK Trade had tended to view Hass lentic damage as a relatively minor quality problem because most Hass are pre-ripened prior to sale, making lentic damage less easily discernible. It is suggested that during 2000 the South African industry shipped a relatively larger proportion of Class 2 Hass to the UK market, and that this increase in volumes of poor quality fruit altered the perceptions of the UK Trade regarding lentic damage and cosmetic defects on Hass fruits.

Later season Hass was observed to have a higher incidence of Grey Pulp. This caused a number of marketing difficulties especially in the UK market where pre-ripening of fruit and more detailed quality control exposed quality defects more readily than is the case in continental Europe (where fruit is generally sold hard). It was noted that where grey pulp was observed in sample fruits, these fruits often originated from consignments that had a large percentage of fruits that were already colouring (although often still hard) to ripe on the day of delivery. The fruit colour and the time of year when Grey Pulp was first observed in Hass samples, are strong indications that this fruit were over-mature at the time of harvest.

### Fuerte

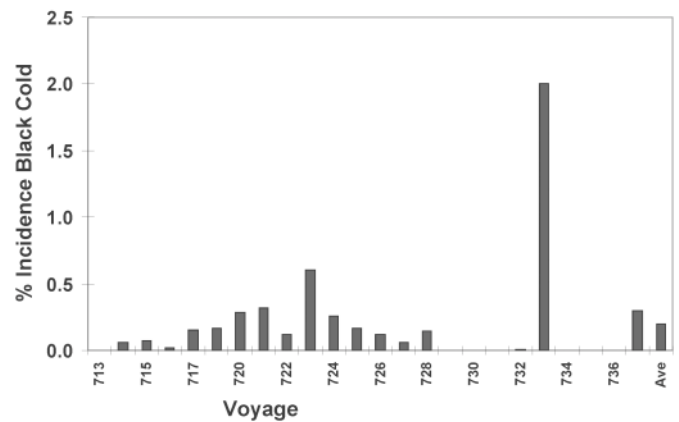
All fruit evaluated was transported under CA conditions, with the beneficial result that the incidence of soft arrivals was low.

The incidence of Black Cold injury was low through out the 2000 season, rarely exceeding an average of 0.5% incidence per vessel. It must however be stressed that while the mean percentage incidence of Black Cold was low, and while no regional trends were discernible, fruit originating from specific packhouses was observed to be more prone to Black Cold injury. This observation should not in itself be interpreted as inferring that inappropriate handling procedures or cooling systems / regimes at certain packhouses were necessarily responsible for a higher incidence of Black Cold injury. Packhouses are the OTO's point of reference since it is not always possible to distinguish differences in fruit quality according to grower origin. The foregoing notwithstanding there were a number of cases during the 2000 season where the OTO was indeed able to identify such quality differences. The most common example of this was where several growers' fruit were present in the same pallet yet the fruit from one or more of those growers was clearly of inferior quality to the fruit originat-

ing from the remaining growers represented on that pallet. Thus although the packhouse should be the starting point of investigation where reports of Black Cold have been received, the source of the problematic fruit is equally likely to be the root cause of its susceptibility to Black Cold. Grower-related factors which can influence a fruit's Black Cold susceptibility are:

- a) Incorrect nutrient balances in the orchard
- b) Microclimatic differences in different farms / orchards.

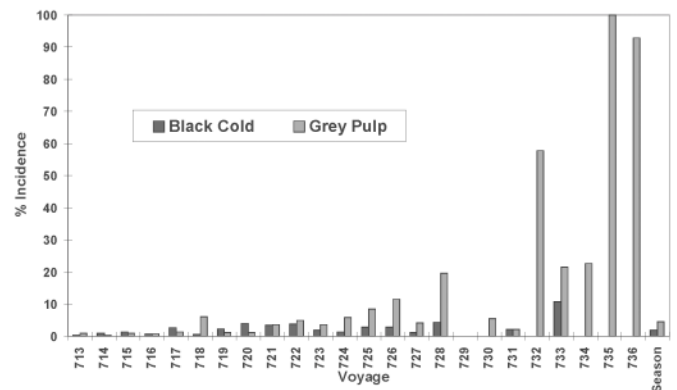
Inappropriately low shipping temperatures are often cited as being the primary cause of external chilling injury. While it is certainly true that this can cause the development of Black Cold, there have been a number of cases where the OTO has reported on a specific container carrying fruit from several packhouses / growers, yet only certain suppliers' fruit exhibited Black Cold symptoms.



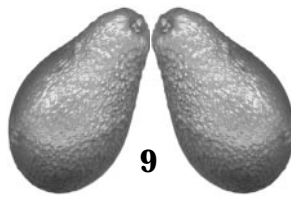
**Figure 1 Incidence of Black Cold in Fuerte on arrival in the E.U. during the 2000 season**

Clearly, in such cases the shipping temperature is unlikely to have been the primary cause, were that the case all suppliers' fruit in the container would be equally affected.

Figure 1 shows percentage incidence of Black Cold Injury in Fuerte through the 2000 season. It is clear from this graph that the percentage incidence of Black Cold was not confined to any particular part of the season, but occurs at low percentage incidence throughout. It must be explained that from Vessel 729



**Figure 2 Incidence of Black Cold and Grey Pulp in ripe Fuerte fruit exported during the 2000 season**



onwards, the volumes of Fuerte being delivered to Europe were low and originated from later production areas (mainly Natal). The 2000 quality data therefore differ from trends seen in previous seasons that Black Cold injury was more common for earlier season (i.e. less mature) fruit.

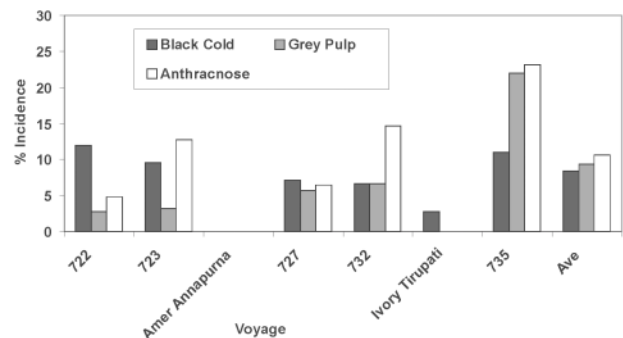
In line with previous seasons' observations, percentage incidence of Grey Pulp increased considerably towards the end of the season (Figure 2). This is again an indication of fruit having been over-mature and highlights the need for a maximum maturity picking standard.

The incidence of other quality defects such as stem end rot, Anthracnose, pulp spot, dusky cold and vascular browning was rare for Fuerte samples. With respect to Brown Cold Injury some interesting observations were made during the 2000 season. Brown Cold is an external discoloration which is rarely visible on arrival in Europe but develops after transport to the market place (R. Nelson, pers. obs.; Eksteen *et al.* 1997). Fuerte is the export cultivar most prone to this disorder, followed by Edranol and Rinton (R. Nelson, pers. obs.). Prior to 1998, Brown Cold was considered to be one of the most severe quality defects affecting South African avocados. For example, Eksteen *et al.* (1997) reported that brown cold was the most severe type of cold injury during 1996. Since the 1996 export season the industry has increasingly favoured CA for the transport of Fuerte avocados to the European market place, and during the 2000 season the overwhelming majority of Fuerte consignments were CA. One very positive result of this trend has been the virtual disappearance of the Brown Cold symptom as a cause of marketing difficulties. As already mentioned, CA Fuerte arrives hard; in addition sample fruits transferred to ambient conditions on the day of delivery do not exhibit Brown Cold injury either upon arrival or when ripened under ambient conditions immediately after delivery to Europe. However, during the most difficult marketing period of the 2000 season there was a considerable stock build-up in many fruit storage warehouses in Europe. The OTO personally counted numerous pallets of fruit that had been stored in these warehouses for more than three weeks after delivery. It was observed that most of the "old-stock" Fuerte were reaching an advanced state of ripeness and were displaying Brown Cold symptoms. It must be emphasised that this fruit had been transported under CA and had not displayed such symptoms on arrival. One may extrapolate from these observations that once CA Fuerte fruits are allowed to ripen under refrigeration they are as prone to develop Brown Cold as are fruit which are transported under RA and arrive in a breaking to soft condition. The parallels are obvious – once the (formerly) CA pallets are transferred to a European cold store they are now under very similar conditions as are fruit in RA port-hole containers. In other words more than three weeks of cold storage in Europe equates well to the transport time from the South African packhouse to the European warehouse in a RA container - the result being many softer fruit and a high percentage of brown cold injury. Random sampling of these older consignments also revealed a very high incidence of Anthracnose, stem end rot and internal disorders such as pulp spot and grey pulp.

### **Pinkerton**

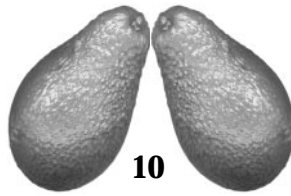
The OTO's inspection and sampling of Pinkerton avocados tends to be less frequent than is the case for either Fuerte or Hass. The reason for this is that the OTO is based in Rungis, France during the export season. France is preferentially a Hass market and, while large volumes of green-skinned varieties are nevertheless sold in France throughout the year, Pinkerton is an unpopular variety which achieves very poor prices on the French market. In consequence Pinkerton is sold preferentially in other markets (e.g. Northern Europe) that are still predominantly green-skinned markets. Most Pinkerton consignments are delivered to warehouses in the Netherlands and Belgium prior to forwarding to clients. The OTO thus made a number of trips to Benelux during the 2000 season, in order to inspect and sample Pinkerton. Travel times and costs were such that not all Pinkerton deliveries could be inspected, nevertheless enough Pinkerton was sampled at different stages of the season for seasonal trends with respect to quality to be observed.

Pinkerton fruits are commonly affected by Black Cold Injury and severe internal Grey Pulp. In addition, it became apparent early in the 2000 Pinkerton season that this cultivar was especially prone to Anthracnose infection (it is important to note that this latter trend has not been observed during previous seasons). Percentage incidence of Black Cold, Grey Pulp and Anthracnose per vessel (ripe sample data) are plotted in Figure 3. Vessels are plotted consecutively according to their dates of arrival in Europe. It is important to explain that while the data are averages for all samples from a vessel, irrespective of production area of origin, some production areas are more strongly represented than are others on specific vessels: For vessels 722 through 727, most samples originated from the Kiepersol / Hazyview area, whereas for later vessels most fruit originated from the Schagen / Barberton / White River production area. It must also be stressed that even for vessels where the samples were fairly homogenous in terms of production area of origin, percentage incidence of quality defects often differed considerably according to grower origin. Further explanation is required regarding the quality results for the samples originating from the vessels "Amer Annapurna" and "Ivory Tirupati". These were bulk-break vessels ("conventional vessels") with controlled atmosphere conditions being provided inside the vessels' holds. Most of the remaining samples (the



**Figure 3 Incidence of disorders in Pinkerton fruit evaluated in the E.U. during the 2000 season**

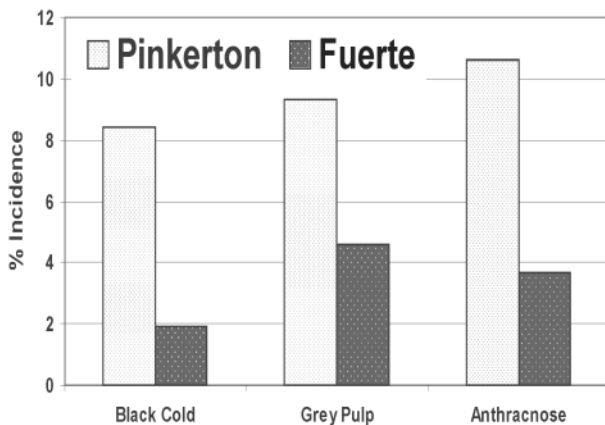




numbers representing the various voyages of SAECS vessels) originated from CA containers. Based on the results presented in Figure 3 it might be deduced that bulk-break CA transport resulted in better quality Pinkerton being delivered to Europe than was the case for containerised CA transport. It is important to stress that only a few samples were selected from the conventional vessels since these carried very little Pinkerton. The conventional vessel samples are therefore unlikely to be representative.

The aforementioned being taken into consideration, the following trends can be observed from Figure 3:

- 1) There was a high incidence of Black Cold Injury present throughout the season; there also appears to be a gradual decrease in Black Cold injury as the season progresses, except for the final vessel sampled (Vessel 735). The differences in Black Cold were, however, not statistically significant.
- 2) Percentage incidence of Grey Pulp is seen to increase as the



**Figure 4 Comparison of the incidence of disorders in Pinkerton and Fuerte fruit evaluated in the E. U. during the 2000 season**

season progresses.

- 3) Incidence of Anthracnose infection was high throughout the season.

One of the recommendations of the Pinkerton Growers' Forum for the 2000 export crop, was that Pinkerton should be harvested at a lower maturity level than has previously been the practice. It is interesting to note that the majority of the Pinkerton sampled from vessels 722 and 723 originated from the Kiepersol / Hazyview production area, which has traditionally been regarded as a high-risk area for Pinkerton. It is clear that the earlier shipments of Pinkerton from this area had a lower incidence of Grey Pulp, although the incidence of Black Cold remained high for these consignments. In contrast, vessel 735's fruit originated mainly from the Schagen and Barberton production areas, traditionally regarded as "low-risk" areas for Pinkerton. Vessel 735 had the highest incidence of quality defects of any of the vessels sampled. It is acknowledged that rates of maturation differ in the different production areas, thus the optimal picking maturity will be reached at different stages of the year. This notwithstanding Vessel 722 docked in Zeebrugge in the first week of June whereas

vessel 735 docked in the first week of September. Thus the Schagen / Barberton fruits from vessel 735 were harvested three months later than the Kiepersol / Hazyview fruits from vessel 722. It seems unlikely that optimal harvesting times should differ by such a lengthy period for regions which are geographically relatively close, climatic variations notwithstanding. It is postulated that over-maturity contributed significantly to the higher incidence of quality defects for vessel 735. It seems that the "picking window" for Pinkerton is very narrow and that, irrespective of market conditions, it is highly risky to export fruit outside of the maximum and minimum maturity tolerances.

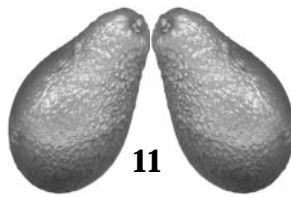
Resistance to the Pinkerton avocado is increasing in Europe, since this cultivar is perceived to have a far higher incidence of quality defects to other cultivars. Figure 4 compares the percentage incidence of Black Cold, Grey Pulp and Anthracnose for Pinkerton and Fuerte for the 2000 export season. The results are self-explanatory and show that the prejudices against Pinkerton are not without justification. The results for the 2000 season indicate that internal quality of Pinkerton can be improved by harvesting when less mature. A general application of this recommendation could however result in an additional marketing problem since more Pinkerton would then be received in Europe at a time when large volumes of South African and Kenyan Fuerte are also available. With the move towards Hass as mentioned earlier this is likely to exacerbate the problem which South Africa's already facing – that of having too many greenskins available. Such a scenario is likely to result in an oversupplied market unless volume supply can be properly managed.

**Ryan**

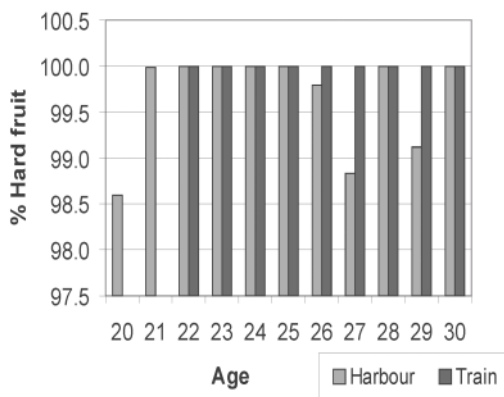
Ryan fruits were exported quite late in the 2000 season, and the OTO was only able to inspect the first couple of vessels' worth of Ryan consignments prior to returning to South Africa. Thus collection of data was limited, but some trends were nevertheless observed. Ryan was the only cultivar which was exported in any volume in RA containers during 2000. The decision by the industry to use RA for the transport of Ryan, was largely based on past season's experiences – RA Ryan consignments have tended to arrive in a hard condition, if anything the complaint from Europe has been that the fruit take too long to ripen. During the 2000 season a high percentage of Ryan RA consignments arrived in a breaking to soft condition. Many of these fruit were therefore sold at lower prices, meaning that the "savings" affected by not paying for the extra costs of CA were in fact not realised. It is possible that later harvesting of Ryan meant that fruits were more mature and hence prone to ripening more quickly under RA conditions. Regardless, the use of RA porthole containers for the transport of Ryan seems to carry as high a risk of soft arrivals as it carries for other cultivars.

**Train versus Harbour CA**

Fruit firmness upon arrival was compared with fruit age (from date of packing) for Fuerte containerised at the packhouse and placed under CA conditions at Tzaneen station, with Fuerte transported in refrigerated lorries from Tzaneen to Cape Town and



transferred to CA containers in the harbour. These data are presented in Figure 5. It is clear that, irrespective of fruit age, train CA fruit was uniformly hard upon arrival, while there was a higher percentage of breaking to softer fruit amongst consignments containerised in the harbour. It is important to stress that the data presented here are average values. Thus if the average value for hard fruit was (e.g.) 99%, the average of 1% softer fruit was a result of there having been a few pallets amongst the total number of pallets inspected which carried a high percentage (e.g. 30%) of softer fruit – which brings down the average firmness value. It is postulated that, over and above the Train system’s benefits of bringing the fruit under CA conditions a couple of days sooner than is possible of fruit containerised in the harbour, temperature management is also better than for road transport to the harbour prior to containerisation. The main reason for this is that there are additional, unavoidable breaks in the cold chain,



**Figure 5 Comparison of firmness on arrival of Fuerte avocados containerised and placed under controlled atmosphere either in the production region (train) or in Cape Town (harbour)**

during the offloading of the refrigerated lorry in Cape Town, and the later transfer of those pallets to a container. This likely explains the higher incidence of softer fruit amongst harbour consignments older than 25 days. A second very interesting observation can be made regarding fruit which were 20 days old on arrival in Europe. By definition, this fruit comes from so-called “deadline” consignments (two days transport from production area to Cape Town, then about seventeen days transport time from Cape Town to the European warehouse = 19 days in total). This deadline fruit was therefore packed no later than the final day before the lorry departed from the packhouse for the harbour, and was therefore unlikely to have been adequately cooled prior to lorry departure. The fact that 20 day old fruit had the highest percentage of softer arrivals, strongly suggests that deadline shipments should be avoided if the risk of soft arrivals is to be minimised. No differences were observed as regards percentage incidence of other quality defects (e.g. chilling injury, grey pulp) for train versus harbour containerised consignments.

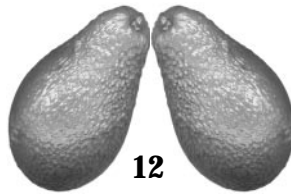
**Conventional vessels**

Considerable interest was generated in South Africa surrounding

the Bulk-break CA system being offered by Cool Carriers during 2000, with a number of exporters making use of this service. Unfortunately, the OTO was unable to gather sufficient data to allow for meaningful comparisons to be made between the conventional vessel CA and the container CA system. Nevertheless, observations made by the OTO, together with comments received from a number of European importing agents, have cast a shadow of doubt over the practicality of conventional vessel transport for avocados, even with the added benefit of controlled atmosphere. The OTO was present at the Dutch port of Rotterdam during the offloading of a number of conventional vessel avocado shipments and inspected as many pallets as offloading operations would permit. There was no indication from these pallet inspections that anything was amiss. On the contrary, fruits seemed to arrive in as hard a condition as is usually the case for container CA transport; further there did not seem to be any difference in incidence of chilling injury compared with CA containers. However, the OTO subsequently observed a high incidence of softer fruit in pallets delivered by refrigerated lorry from Rotterdam harbour to warehouses at Rungis; these observations coincided with reports from European agents that conventional vessel fruit was ripening more quickly than container CA fruit. Based on:

- (i) the high percentage of hard fruits delivered to Rotterdam, and
- (ii) the study of a number of air temperature monitors (e.g. “Ryan”, “Temptale”) which recorded major temperature fluctuations in periods coinciding with post-vessel handling times,

it is the considered opinion of the OTO that incorrect temperature management subsequent to vessel offloading was responsible for the rapid ripening of the fruit. It is important to stress that some of the more lengthy/ extreme temperature fluctuations took place at times which corresponded to the period in which the fruit were in transit from Rotterdam to Rungis – this indicates that temperature management was inadequate during this portion of the transport chain. Following reports by the OTO, there was considerable correspondence between the responsible parties in Rotterdam harbour, the OTO and Dr Gawie Eksteen of the PPECB, in addition to a number of meetings between the OTO and the management of Cool Carriers and their service providers in Rotterdam. As a result of the foregoing a protocol for post-vessel handling was drawn up by Cool Carriers to address shortcomings. If these protocols are followed, the risk of triggering fruit ripening either during the vessel offloading procedures or during refrigerated storage at the port of Rotterdam, should be considerably reduced. This notwithstanding, the transport of fruit from the port holding stores to the importer’s warehouse (e.g. at Rungis) remains the weakest link in the cold-chain – one which is outside of the responsibility of either Cool Carriers or the Rotterdam harbour service providers. It is urged that, should avocado exporters decide to use the conventional vessel CA service in future, their European agents be instructed to pay special attention to this final stage of the transport chain. During a large portion of the South African avocado export season ambient temperatures higher than 25 degrees Celsius are regularly experienced in north-western Europe. If correct refrigeration conditions are not maintained, exposure to higher temperatures for even a



relatively short period can be sufficient to trigger the rapid ripening of fruits which are considerably more physiologically mature than they were when packed three weeks earlier. When contemplating the use of CA conventional vessels, it should be borne in mind that the risk of soft fruit as a result of breaks in the cold-chain increases as the season progresses and the fruit become more mature.

### **Recommendations**

As a result of the observations and data analysis presented in this report, the following recommendations can be made:

1. Before the industry can release a new cultivar such as Lamb Hass on a fully commercial basis, all aspects of production, packing and cold storage must be thoroughly evaluated.
2. Growers and exporters of Pinkerton must regularly consult with SAAGA on the latest developments regarding export of this cultivar. The problems relating to cold storage have not been solved, but progress has been made in improving the situation. Research in this area is ongoing.
3. Breaks in the cold chain must be minimised. Methods of maintaining the cold chain should be continually investigated. Inland loading of integral containers has proven to be beneficial in this regard. Coupled to this, placement of fruit under CA as at containerisation inland is beneficial and further reduces the risk of quality deterioration.
4. Fruit should be cooled properly at the packhouse before loading into an integral container of refrigerated truck.

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- 2) The administrative and technical staff of SAAGA.
- 3) The technical staff of the PPECB, Cape Town.
- 4) The administrative, quality control and warehouse staff of importing agents in Rungis, Antwerp, Rotterdam and the United Kingdom.

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