

ANALYSIS OF INTERNAL AND EXTERNAL CULLING FACTORS ON EXPORTED AVOCADOS

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OPSOMMING

Oorsese inspeksieverslae is ontleed om vas te stel hoe bemerkbaar ons uitvoeravokados is met betrekking tot interne en eksterne vrugkwaliteit. Hoewel die inligting onbevredigend is, is dit duidelik dat antraknose en ander na-oesbederf groot Verliese veroorsaak. Die Fuerte cultivar was besonder onderhewig aan bederf wat deur antraknose veroorsaak word, terwyl Hass en Ryan baie goed gehou het.

Die Ryan temperatuur-registreerder het aangedui dat die temperature meer op die treine gewissel het as in die koelkamers in die dokke of op die skepe. Geen korrelasie is gevind tussen reistemperature en die bemerkbaarheid van vrugte nie, wat aandui dat ander faktore as temperatuur 'n rol speel by vrugkwaliteit.

INTRODUCTION

In order to have some measure of the quality of South African avocados in Britain, a routine inspection procedure was established in 1976. Samples were drawn at random from each shipment and the fruit examined externally upon receipt, and internally once they were edible.

It has also been the practice of several exporters to include Ryan temperature recorders in each shipment. These recorders, in the past, have in no way been connected with the fruit samples. Consequently the fruit report and temperature recording could not be correlated. In order to make the fruit quality reports more meaningful, the Ryan recorders and fruit samples which were to be inspected were strapped together from the time of leaving the packhouse to the time of inspection in London.

PROCEDURES

Inspection

In Southampton the specially marked bundles with the Ryan recorders were withdrawn, and sent to the South African Embassy for the inspection procedures to be carried out. Each bundle contained a minimum of 30 fruit. A separate Inspection Report Form was filled in for each tray, i.e. two report forms per bundle.

The following procedures were laid down to be followed:

- (i) on arrival all fruit are to be examined externally. Soft fruit were to be cut

lengthwise and examined internally. Any discolouration which is immediately visible is noted. The cut fruit is examined again after 30 minutes and any discolouration which has developed is noted. The fruit is then discarded;

- (ii) the second, third and fourth inspections are done at convenient intervals after the first inspection. Once again the total number of fruits are inspected for softness. The soft fruit is inspected externally and internally in detail. The firm fruit is kept for later inspection and very soft fruit discarded.

Once the Inspection Services in Pretoria received the reports, copies were sent to S.A.A.G.A. who in turn forwarded a copy of each report to the shipper or export agent.

Co-ordination and Interpretation of Results

- (i) Unfortunately, the inspection and documentation was not done according to the procedures outlined above. The reports received are very sketchy, and there appeared to be no consistency in reporting through the season. Consequently it was extremely difficult to interpret the reports and the accuracy thereof is suspect.
- (ii) In anticipation of the overseas inspection results the C.S.F.R.I, were approached and requested to assist with the setting up of a computer analysis of the results. Two statisticians from the Department of Agricultural Technical Services in Pretoria spent a day in Nelspruit examining the results and the procedure for inspection in 1977.

Results and Discussion

Following a lengthy investigation it was found that the results in their present form could not be computerized. This conclusion came very late in the avocado season and no changes in the inspection procedure could be implemented.

The overseas inspector expressed his dissatisfaction with the inspection procedure at the end of the season.

Thus, it is obvious that if a routine inspection of fruit is to be undertaken again in 1978 the inspection procedure will have to be changed to allow for computer analysis. The percentage marketable fruit of the varieties Fuerte, Edranol, Hass and Ryan in each shipment and for each exporter are shown in Tables 1 to 7. No entries have been made against several shipments, the reason being that no inspection reports were received for these vessels. These results can be summarized as follows:

Fuerte

This variety accounts for the major portion of the export crop. Unfortunately, it is also the variety which has given the most problems. For individual growers throughout the season the percentage marketable fruit varied between 63% and 92%. The quality of the fruit seemed to vary tremendously from shipment to shipment, with some ships

having 100% of the fruit marketable, and other shipments having all fruit inspected listed as being unmarketable. Often there seemed to be no trend or reason for the poor quality fruit. There seemed to be little correlation between temperature and fruit quality (see later). There were instances where fruit quality of some exporters declined late in the season (Hall and Hippo), indicating that the avocados were possibly too mature at the time of picking.

Table 5 shows the cull factors for this variety. *The main external cull factor for most growers was anthracnose, with the bruises, cuts and scratches varying in incidence from exporter to exporter. The main internal disorders were anthracnose, stem end rot, lead discolouration, pulp spot and general bruising. While the reasons or cures for many of the disorders may not be known, there are various culling factors which can be prevented. It is up to each grower to look at his own results and take the necessary remedial action where this is possible.*

Edranol

Generally the quality of this variety was superior to Fuerte, with some growers having had all of their avocados passed as being marketable. The main external cull factor was anthracnose, with bruising being significant with some growers. The main internal disorders were anthracnose, lead discolouration, vascular bundle browning, general browning, and bruises, but there was a marked variation in the incidence of these factors amongst the different exporters.

TABLE 1: Percentage marketable Fuerte avocados in each ship consignment

Ship	Date	Halls	Hippo	Westfalia	Koolkat	Warings	Letaba	Sabi
Vaal	15/3			100	83	97	100	
Andal. Star	22/3			100	98	92	99	99
Southampton	29/3				23	39	50	98
Tzaneen	1/4				90	84	97	73
Windsor	12/4			100	94	97	72	94
Goodhope	19/4			65	83	95	46	71
Zebediela	22/4	0	50	4	13	68		98
S.A. Vaal	3/5	90		100	92	58	97	94
Andal. Star	10/5		91	91	88	42	97	58
Southampton*	17/5							
Tzaneen*	20/5							
Windsor	31/5	29	18	90	86	97	100	95
Goodhope*	9/6							
Zebediela	10/6	100			100	95		96
Vaal	21/6	75	100		100	43	77	
Southampton	5/7	100	88		89	76	96	100
Tzaneen	8/7	100	97			100	100	
Windsor	19/7	66	76		94	83	100	100
Goodhope	26/7	50	75		77	97	80	100
Zebediela	29/7	22	50		71	88	50	98
Africa*	5/8							
Vaal	9/8				100	100	70	94
Andal. Star	16/8				98		100	100
Southampton	23/8				100		100	100
Hexrivier	26/8				56	0		
Av. % marketable		63	72	81	82	79	85	92

*No reports available

TABLE 2: Percentage marketable Edranol avocados in each ship consignment

Ship	Date	Halls	Hippo	Westfalia	Koolkat	Warings	Letaba	Sabi
Zebediela	10/6			100				
Vaal	21/6			100	96	100		100
Southampton	5/7					56		
Tzaneen	8/7					100		
Windsor	19/7				84	72		
Goodhope	26/7				100			
Zebediela	29/7				100	35		
Vaal	9/8	100	100		100	100		
Andal. Star	16/8	75	100		100	66		
Southampton	23/8	100			100	16	100	
Hexrivier	26/8	100	100					
Av. % marketable		94	100	100	97	68	100	100

TABLE 3: Percentage marketable Hass avocados in each ship consignment

Ship	Date	Westfalia	Koolkat	Letaba	Sabi
Southampton	5/7	96			
Tzaneen	8/7				100
Zebediela	29/7		100	100	
Vaal	9/8			100	
Andal. Star	16/8			100	
Southampton	23/8	100			
Hexrivier	26/8		100	100	
Av. % marketable		98	100	100	100

TABLE 4: Percentage marketable Ryan avocados in each ship consignment

Ship	Date	Westfalia	Koolkat	Warings	Letaba
Vaal	21/6		100		
Good Hope	26/7	100			
Southampton	5/7		100	100	100
Windsor	19/7		96		
Good Hope	26/7			100	100
Zebediela	29/7	100			
Vaal	9/8	100	100	100	100
Andal. Star	16/8	100	100	100	100
Southampton	23/8		100	100	
Hexrivier	26/8			98	100
Av. % marketable		100	99	100	100

TABLE 5: Incidence of cull factors of Fuerte variety averaged throughout the season for each exporter

	Halls	Hippo	Westfalia	Koolkat	Warings	Letaba	Sabi
<i>External inspection</i>							
No. fruit examined	406	280	642	2 128	2 067	956	950
% Marketable	79	87	95	94	82	89	97
% Anthracnose	40	33	10	26	23	1	17
% Cuts and scratches	—	9	0,3	1	1	0,1	1
% Bruises	8	4	4	1	2	2	2
% Cold damage	—	—	—	0,1	0,05	—	0,2
<i>Internal inspection</i>							
No. fruit examined	406	272	629	2 102	2 041	928	932
% Marketable	63	64	82	83	79	84	87
% Anthracnose	9	9	3	3	2	6	0,2
% Stem end rot	—	—	3	3	3	2	2
% Lead discolouration	9	6	5	7	3	6	4
% Pulp spot (immed.)	—	—	2	2	1	3	2
% Pulp spot (after 30 minutes)	—	—	9	6	2	7	3
% Vascular bundle browning	—	1	0,3	1	0,2	0,3	0,1
% General browning	—	—	4	2	2	4	1
% Bruises	—	0,4	—	0,1	0,5	—	0,2
Av. % recovery	63	64	82	83	79	84	87

TABLE 6: Incidence of cull factors of Edranol variety averaged throughout the season for each exporter

	Halls	Hippo	Westfalia	Koolkat	Warings	Sabi	Letaba
<i>External inspection</i>							
No. fruit examined	112	84	148	243	346	36	32
% Marketable	100	100	100	100	82	100	100
% Anthracnose	17	5	14	8	12	—	—
% Cuts and scratches	—	—	—	—	—	—	—
% Bruises	—	—	3	0,4	1	—	—
% Cold damage	—	—	—	—	—	—	—
<i>Internal inspection</i>							
No. fruit examined	112	70	148	223	346	36	32
% Marketable	93	100	100	97	76	100	100
% Anthracnose	—	—	—	2	1	—	—
% Stem end rot	—	—	—	—	1	—	—
% Lead discolouration	3	—	—	1	14	—	—
% Pulp spot (immed.)	—	—	—	—	—	—	—
% Pulp spot (after 30 minutes)	—	—	—	—	—	—	—
% Vascular bundle browning	—	—	—	—	4	—	—
% General browning	—	—	1	0,4	1	—	—
% Bruises	8	—	—	—	1	—	—
Av. % recovery	93	100	100	97	76	100	100

TABLE 7: Average percentage marketable fruit of each variety and exporter throughout the season

Variety	Halls	Hippo	Westfalia	Koolkat	Warings	Letaba	Sabi	Variety average
Fuerte	63	72	81	82	79	85	92	78
Edranol	94	100	100	97	68	100	100	94
Hass			96	100	100		100	99
Ryan			100	99	100	100		100

TABLE 8: Temperatures at, below and above optimum for the various exporters averaged throughout the season while being exported via the S.A. Railways, Safmarine and while in Cape Town cold stores

Exporter	S.A.R.			Cape Town Docks			Safmarine			Entire journeys		
	1*	2	3	1	2	3	1	2	3	1	2	3
Halls	44,5	9,1	46,4	57,8	13,2	29,0	51,5	23,5	24,9	51,6	19,4	29,0
Westfalia	18,0	2,6	84,6	38,0	6,1	55,9	44,8	30,8	24,4	40,3	22,8	36,9
Koolkat	31,8	10,4	57,8	43,4	20,2	36,4	54,8	30,4	14,8	49,5	26,5	22,1
Warings	17,9	9,0	73,1	21,8	10,7	67,6	58,3	15,9	25,9	46,8	13,8	39,4
Letaba	25,3	1,4	73,2	52,7	22,6	24,8	48,3	29,1	22,6	46,2	21,6	32,2
Average	27,5	6,5	67,0	42,7	14,6	42,7	51,5	25,9	22,5	46,9	20,8	31,9

*1 – % days at optimum temperature
 2 – % days below optimum temperature
 3 – % days above optimum temperature

Hass

Excellent results were attained with this variety with virtually 100% of all fruit inspected being passed as marketable.

Ryan

In spite of this variety being regarded locally as a poor quality avocado, excellent results were reported with almost 100% of the fruit being passed as marketable.

Co-ordination of Ryan Recorder Results

Instructions were issued that all avocados were to be exported at a temperature of 5,5°C. In an analysis of the results temperatures were divided into three categories:

Optimum temperature, which was taken to be temperatures between 5,0°C and 6,0°C;

Below optimum, being temperatures below 5°C;

Above optimum, which were temperatures above 6°C.

Table 8 shows the temperatures at, below and above optimum temperature for the various exporters, averaged throughout the season, while being transported by the S.A. Railways and Submarine, and while at Cape Town docks. While on S.A. Railways, temperatures were above optimum for a large part of the time. In several cases the truck temperatures were considerably above the optimum temperature, or were very

erratic. It appeared that in several cases the avocados had not been pre-cooled to 5,5°C prior to loading into the trucks. These trucks will not bring down the fruit temperatures much, especially when the truck is fully laden.

Generally temperatures in the Cape Town cold rooms were satisfactory. The high percentage of above optimum temperatures shown was due to the short stay in Cape Town, so that for a period of time the fruit was re-attaining cold store temperature after unloading from the train.

Ship temperatures were generally satisfactory, though there were holds where temperatures were not maintained at the correct levels.

An attempt was made to correlate temperatures on the journey with quality inspection report results, but no correlation was found.

These results indicated that factors other than temperature are contributing more towards poor quality.

SUMMARY

Overseas inspection reports were analyzed to determine the marketability of our avocados in relation to internal and external fruit quality. Although the information received was unsatisfactory, it is evident that anthracnose and other post-harvest decays cause considerable losses. Fuerte appeared to be more susceptible to anthracnose, while Hass and Ryan exhibited good keeping qualities.

The Ryan recorder results indicated that temperature varied more on the trains than in the cold rooms or on the ships. No correlation was found between journey temperatures and the percentage marketable fruit, indicating that factors other than temperature are involved in effecting fruit quality.