

## EFFECT OF EXTERNAL CULL FACTORS ON INTERNAL QUALITY

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### **OPSOMMING**

*Resultate dui aan dat sekere eksterne beskadigings en stingelloosheid minder invloed op inwendige kwaliteit het as wat die uitvoerstandaarde impliseer. Verskurwing van die skil, meganieseskade en haelskade het baie geringe of geen uitwerking op interne kwaliteit nie.*

The avocado grower has up till now generally been less exposed to a wide range of pests and diseases than for example the citrus grower. However, mother nature provided the avocado fruit with a very sensitive skin that amplifies all that happened to it during its life cycle. What the grower identifies as carapace spot is the result of a leaf rubbing against the fruit when it was small (Home, 1929). Russetting is caused by thrips (Smith, 1929, Coit, 1929). There are a host of external blemishes that spoil the appearance of the avocado which either lower its market grade or force it completely from the market.

An investigation to determine the effect of external cull factors on internal quality was initiated by S.A.A.G.A. Grading regulations can only be relaxed after sufficient proof is produced to ensure that the quality of the product is not affected by the blemish. This investigation was conducted to find whether there are any externally blemished fruit that conform to acceptable internal quality standards.

The experiment was conducted in two phases. Fuerte avocados that were allowed to ripen without a cold storage period constituted the first phase. In the second phase, Edranol avocados were subjected to a twenty eight day cold storage period and then allowed to ripen at room temperature. The assessment of the effects of external blemishes on internal fruit quality was conducted according to the same system each time. A range of blemish intensities for each factor was chosen but more of the severely damaged fruit was selected to determine definite effects. Hail damage was included in the Edranol survey because there was a significant number of fruit exhibiting hail blemishes. Fruit-fly and false codling moth damage were treated as one factor.

An indexing system was used to detect differences in the effects of the range of blemishes on internal fruit quality. Index values of one indicated no effect and values of five severe effects. It was established that there is no direct correlation between anthracnose infection and any of the external blemishes. Subsequently anthracnose infection of the fruits were ignored and only the effect of the blemishes on internal quality noted.

Data was analyzed statistically and the significance of the differences between the

means were tested with the Student-Newman Keuls' Test.

According to the test the effect of the different blemishes can be divided into four groups ranging from the worst to the least effected.

1. Fruit-fly and false codling moth.
2. Hail, yellow and dark sunburn blemishes.
3. Mechanical damage.
4. Button less fruit, Carapace skin and Russetting.

The statistical data was supplemented with general observations and a combination of the two lead to the following conclusions: (Table 1)

- a. Carapace spot and russetting are unsightly blemishes but they have no detrimental effect on internal fruit quality.
- b. Mechanical damage has very little effect on internal quality of the avocado. The effect of the blemishes on the internal quality reduces as the size of the injuries decreases.

Hail damage can be included with mechanical injuries. The smaller the injury the smaller the possibility of secondary infection. Large and more specifically deep scars caused by hail tend to become infected and are responsible for the high index value in Table 1.

- c. Dark sunburn and yellow sunburn present a more complicated problem. Where the sunburn blemish is obvious and worse to the point where the fruits are misformed, uneven ripening occurs. The flesh underneath the sunburn blemish has a watery texture and taste. In cases where the sunburn blemish is slight and does not detract from the "normal" appearance of the fruit the uneven ripening phenomenon is generally absent. There are however exceptions and no hard and fast rules can be laid down. Avocado fruit are graded by appearance. In the survey it was found that 38% of the fruit that did not pass the current grading standards had acceptable internal quality on ripening. This indicates that the grading standards for sunburn fruit should not be lowered.
- d. Fruit-fly and false codling moth lesions are subject to secondary infections. Internal quality is poor, even at low infestation rates. Only very small lesions are relatively resistant to secondary infections.

**TABLE 1: Index of the effect of external blemishes on internal quality of Fuerte and Edranol avocados**

Factors	Carapace spot	Russetting	Buttonless fruit	Mechanical damage	Dark sunburn	Yellow sunburn	Hail damage	Fruit-fly and false codling moth damage
Fuerte Index (Mean Index values)	1,0	1,0	1,2	1,4	2,6	2,0	—	3,4
Edranol Index (Mean Index values)	1,0	1,0	1,1	1,3	2,0	2,3	*2,7	3,7

\*The hail damage index value is disproportionately large because a relatively great number of fruit with excessive blemishes were included in the sample

Analyses of the cull factors and their impact on production of marketable fruit at Hall's revealed the following (Table 2):

**TABLE 2: Cull percentages from export due to individual factors**

Factor	Carapace spot	Russetting	Buttonless fruit	Mechanical damage	Dark sunburn	Yellow sunburn	Hail damage	Fruit-fly and false codling moth damage
Local I & II %	6,91	0,02	3,27	0,34	0,80	1,04	0,40	0
Factory %	2,09	0,02	—	0,41	0,39	0,13	0,06	4,83
Total loss %	9,00	0,04	3,27	0,75	1,19	1,17	0,46	4,83

From Table 2 it is obvious that Carapace spot is the largest single factor reducing the export pack out. Fruit-fly and false codling moth losses are the next highest, followed by button less fruit and then sunburn. However, the incidence of each of these cull factors is likely to vary considerably from area to area.

The results indicate therefore that as far as internal quality is concerned, the grading standards could be relaxed for Carapace spot, Russetting, mechanical and hail damage and button less fruit. Sunburn standards should not be relaxed. Fruit-fly and false codling moth damages are only acceptable when the blemishes are barely visible.

## REFERENCES

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