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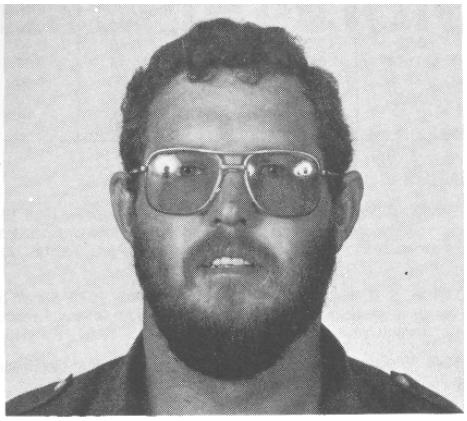
SHRINK WRAP MATERIALS AS POST-HARVEST TREATMENT



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OPSOMMING

Die effek van hoëdigtheidspoliëtileenkrimpomhulsels op die raklewe van avokados wat teen verskillende temperature geberg is, is bepaal.

Volgens die resultate het 'n kombinasie van die Jaffa film en die standaard Tag waks die beste resuitaat gelewer ten opsigte van verlengde raklewe en goeie kwaliteit.

SUMMARY

The effects of high density polyethylene shrink wraps on the shelf life of avocados stored at different temperatures were evaluated.

According to the results the Jaffa film in combination with the standard Tag wax application produced the best results as far as extending shelf life but retaining quality is concerned.

INTRODUCTION

Several studies in avocado storage were aimed at extending the shelf life of avocados. Reducing the oxygen concentration in the atmosphere around stored avocados substantially retarded the onset of the climacteric rise and consequently the ripening time of avocados (Biale, 1946). Controlled atmospheric storage (CA) and hypobaric storage were two logical developments after the principle was established. However, these two methods require major infrastructural changes in established avocado packhouses etc. The Israeli Division for storage of fruit and vegetables of the Volcani Center experimented with waxes and polyethylene wraps. They found that polyethylene wraps progressively created the same conditions as required in CA storage and if the wraps were removed up to three weeks after wrapping the fruit is still

capable of resuming the climacteric and normal softening (Aharoni *et al* 1968).

A new high density polyethylene (HOPE) wrapping material was developed and extensively tested on citrus fruits (Ben Yehoshua, 1978). These experiments have created interest in storage of other fruits and vegetables.

In South Africa where the extension of shelf life is vitally important, due to the great distance separating us from the European markets, a low cost method such as HOPE or LDPE wrapping had to be tested. This is a report on a pilot trial with shrink wrap materials.

METHODS

Three shrink wrap HOPE materials were tested. The "Jaffa" wrap from Israel, Clysar by du Pont (USA) and Cryovac (USA). Eight fruits were wrapped in each treatment and the wraps shrinked at 200 °C for 30 sec. Treatments were the following:

(i) Two storage temperatures namely 4,5 °C and 11 ° for 28 days and then softened at 21 °C.

(ii) Both of the temperature treatments had similar wrapping treatments:

a). Control unwaxed.

b). Control waxed*.

c). Cryovac unwaxed.

d). Cryovac waxed*.

e). Clysar unwaxed.

f). Clysar waxed*.

g). Jaffa unwaxed.

h). Jaffa waxed*.

* Commercial Tag wax application.

Assessments of the ripening times, degree of stem-end rot and anthracnose infections and eating quality were made at daily intervals where possible.

RESULTS AND DISCUSSION

The results are summarized in Table 1. In both the temperature treatments, there were highly significant differences in the ripening times between the different wrapping treatments. There was also a highly significant difference between the ripening times for the different wrapping materials at the different temperatures. Clysar extended ripening time most with Cryovac, Jaffa, waxed and unwaxed, in descending order of storage life extension.

Unwaxed fruit in Jaffa wrap exhibited the lowest incidence of stem-end rot which was significantly different from the other treatments at 11 °C storage temperature. In all other treatments the differences were not significant.

Waxed fruit in Jaffa wraps on the other hand had a significantly lower anthracnose infection than any of the other treatments at 11 °C. Differences between all the other treatments were statistically not significant.

When considering eating quality, the unwaxed control, waxed control, unwaxed Cryovac

unwaxed Jaffa and waxed Jaffa, were significantly better than other treatments at 11 °C storage temperature. All other treatment combinations were not significantly different from each other although Jaffa waxed and unwaxed had the best eating quality at 4,5 °C storage temperature.

The values of stem-end rot, Anthracnose and eating quality are the average coded values for every treatment. Stem-end rot and Anthracnose were coded as follows: nil = 0,1, slight = 0,5, severe = 0,9. Eating quality was coded as follows: good = 0,1, poor = 0,9. A value of 0,3 therefore means that about an equal number of fruit were slightly infected and not infected at all.

The following trends are apparent from the table:

1. An average waxed fruit with or without shrink-wraps took longer to soften than non-waxed fruit. Waxed fruit tends to soften over a longer period i.e. some fruit softens quickly and other takes a very long time. Non-waxed fruit soften over a shorter time period i.e. the difference between ripening times is less.
2. Control fruit and Jaffa wrapped fruit exhibited the least post-harvest disease symptoms, while Cryovac and Clysar exhibited progressively more severe disease and physiological disorders respectively and in that order.
3. Both Cryovac and Clysar smothered 1 fruit (12,5%) in the 4,5 °C storage trial, before the wraps were taken off. Smothering is defined by moisture ac cumulating in the shrink-wrap until the fruit is totally enveloped in a fluid that turns brown as the skin of the fruit turns brown. The fruit mummifies without softening after removing the shrink wrap. The fluid around the fruit has a rotten smell.
4.

TABLE 1. Shrink-wrap trial results at different temperatures.

	28 days @ 11 °C				28 days @ 4,5 °C			
	Days ripening time	Stem-end rot	Anthrac-nose	Eating quality	Days ripening time	Stem-end rot	Anthrac-nose	Eating quality
Control — unwaxed	1,00	0,30	0,45	0,1	9,38	0,25	0,50	0,30
Control — waxed	2,50	0,20	0,35	0,1	9,88	0,25	0,25	0,10
Cryovac — unwaxed	8,25	0,25	0,55	0,1	17,38	0,35	0,50	0,30
Cryovac — waxed	13,63	0,55	0,75	0,70	19,00	0,40	0,45	0,40
Clysar — unwaxed	13,63	0,55	0,70	0,50	18,00	0,40	0,45	0,30
Clysar — waxed	13,25	0,60	0,80	0,60	19,25	0,50	0,70	0,40
Jaffa — unwaxed	4,25	0,10	0,25	0,10	10,88	0,10	0,35	0,10
Jaffa — waxed	6,25	0,20	0,10	0,10	12,88	0,15	0,35	0,10

This was a pilot trial and another similar trial with a few modifications and expansions Is currently underway. Clysar and Cryovac films tend to smother the fruit when softened at room temperature (21 °C) when the wraps are not removed. In the current trial the wraps will be removed when the fruit are taken out of cold storage to remove the CA effect.

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