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USE OF FRUIT WAXES FOR POSTHARVEST TREATMENT OF RABBITEYE BLUEBERRIES

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INTRODUCTION

Fruit waxing is utilized as a postharvest treatment for a variety of fruit crops including apples, peaches, pineapples, citrus, and kiwi. Waxes are used to improve appearance, reduce dehydration, control spoilage organisms, and extend storage life. Little work concerning use of fruit waxes on blueberry fruit has been reported, and no wax has been formulated for blueberry use. Blueberries have a relatively short storage life, even with refrigeration. Quality factors which change most readily during storage include losses in sugars (soluble solids), acids, and moisture, accompanied by increases in mold development. This study was initiated at the Texas A&M Agricultural Research and Extension Center at Overton to determine the effects of fruit waxes on postharvest storage life of rabbiteye blueberries.

MATERIALS AND METHODS

'Tifblue' blueberries were mechanically harvested on July 21, 1983, hand sorted to remove green and damaged fruit, and divided into 1 - pint lots. Lots were dipped in the wax solution for 15 seconds, air dried, placed in vented 1 - pint molded pulp containers and weighed. Pints were overwrapped with plastic film. Six fruit waxes (Table 1), and a control of nonwaxed fruit were evaluated.

The fruit samples were placed in storage at 73°F (room temperature) for 6 days (0 + 6) or at 34°F for 21 days (21 + 0) and an additional 6 days at room temperature (21 + 6). Initial samples (0 + 0) were taken of each wax treatment and the control. At termination of each storage treatment percentage weight (moisture) loss and mold were determined and samples frozen for later quality analysis.

For quality analysis, samples were thawed, blended, and percentages of soluble solids and titratable acidity were measured. Lightness or darkness (L) of the fruit puree was determined using a Gardener Color Difference Meter.

RESULTS AND DISCUSSION

Wax treatment had little effect on weight (moisture) loss; no treatment was significantly different from nonwaxed fruit (Table 2). Storage at 34°F reduced the rate of weight loss compared to fruit stored at 73°F (room temperature).

Mold development was reduced by use of Peach, Nectarine, and Plum (P, N, & P) Lustr 274 and Kiwi Lustr 227, both containing fungicide (Table 2). Apl-Lustr 217 had highest mold counts with up to 100% mold development after 6 days at room temperature with or without previous storage at 34°F (Figure 1). Mold growth was inhibited by storage at 34°F, but when stored at 73°F, mold development increased (Figure 1, Table 2).

Soluble solids (essentially sugars) and titratable acidity were relatively unaffected by wax treatment (Table 2). Fruit treated with Pineapple Lustr 201 had highest soluble solids, but when adjustments were made for the concentrating effects of weight (moisture) loss, soluble solids were not different from other wax treatments. During storage, sugars appeared to increase. However after compensating for moisture loss, sugars actually declined when held at room temperature (Table 3). Acidity also declined during storage. Reductions in both sugars and acids over time indicate reduction of fruit quality.

Non-waxed fruit were darkest in color, as indicated by the low L value of both adjusted and unadjusted readings (Table 2). Fruit treated with Pineapple Lustr 201 had a lighter color. Fruit color appeared to change little with holding time during storage. When readings were adjusted to compensate for the concentrating effects of moisture loss, color darkened with time to a greater degree when stored at room temperature (Table 3).

CONCLUSIONS

Fruit waxes for blueberries appear to show potential for reducing mold development during storage if a fungicide is incorporated into the wax material. Waxes of the type used in this study appear to have little benefit for improving other postharvest quality parameters. All fruit appeared to store well at 34°F for up to 21 days, but postharvest quality deteriorated rapidly at room temperature.

Table 1. Fruit wax treatment, rate, and fungicide content.

Fruit wax	Rate*	Fungicide
Pineapple Lustr 201	25%	none
Decco Lustr 202	28.6%	none
Apl-Lustr 217	100%	none
P, N & P Lustr 251	25%	none
P, N & P Lustr 274	20%	Botran 0.105% Benlate 0.035%
Kiwi Lustr 277	20%	Botran 0.1%

*Percentage of concentrated wax in final solution. Dilutions were made with distilled water.

Table 2. Main effect means of wax treatment on quality and color of 'Tifblue' blueberries.

Wax treatment	Wt. loss (%)	Mold (%)	Sol. Solids(%) Act*	Sol. Solids(%) Adj+	Tit. acy (%) Act*	Tit. acy (%) Adj+	L Act*	L Adj+
Pineapple Lustr 201	4.6	20.2	12.0	11.4	.46	.43	10.0	9.5
Decco Lustr 202	4.0	16.5	11.7	11.2	.43	.41	8.1	7.8
Apl-Lustr 217	4.3	51.4	11.7	11.2	.45	.43	9.6	9.2
P, N & P Lustr 251	3.4	13.7	11.7	11.3	.43	.42	8.4	8.1
P, N & P Lustr 274	3.7	8.7	11.6	11.1	.44	.42	8.5	8.2
Kiwi Lustr 277	3.5	5.0	11.5	11.1	.44	.43	8.8	8.5
No Wax	4.0	15.8	11.7	11.2	.43	.42	8.0	7.7
LSD @ 5%	0.7	2.8	0.2	NS	NS	NS	0.6	0.6

*Actual = means not adjusted.
+Adjusted = means adjusted to compensate for the concentrating.

Table 3. Main effect means of storage time on quality and color of 'Tifblue' blueberries.

Storage Time (days 1 C + days 23 C)	Wt. loss (%)	Mold (%)	Sol. Solids(%) Act*	Sol. Solids(%) Adj+	Tit. acy (%) Act*	Tit. acy (%) Adj+	L Act*	L Adj+
0 + 0	0.0	0.0	11.5	11.5	.45	.45	9.0	9.0
0 + 6	4.5	29.2	11.5	11.0	.44	.42	8.5	8.1
21 + 0	3.4	3.1	11.9	11.5	.42	.41	8.8	8.5
21 + 6	7.8	42.6	11.8	10.8	.46	.42	8.8	8.1
LSD @ 5%	0.6	2.1	0.2	0.2	.02	.02	NS	0.4

*Actual = means not adjusted.
+Adjusted = means adjusted to compensate for the concentrating.

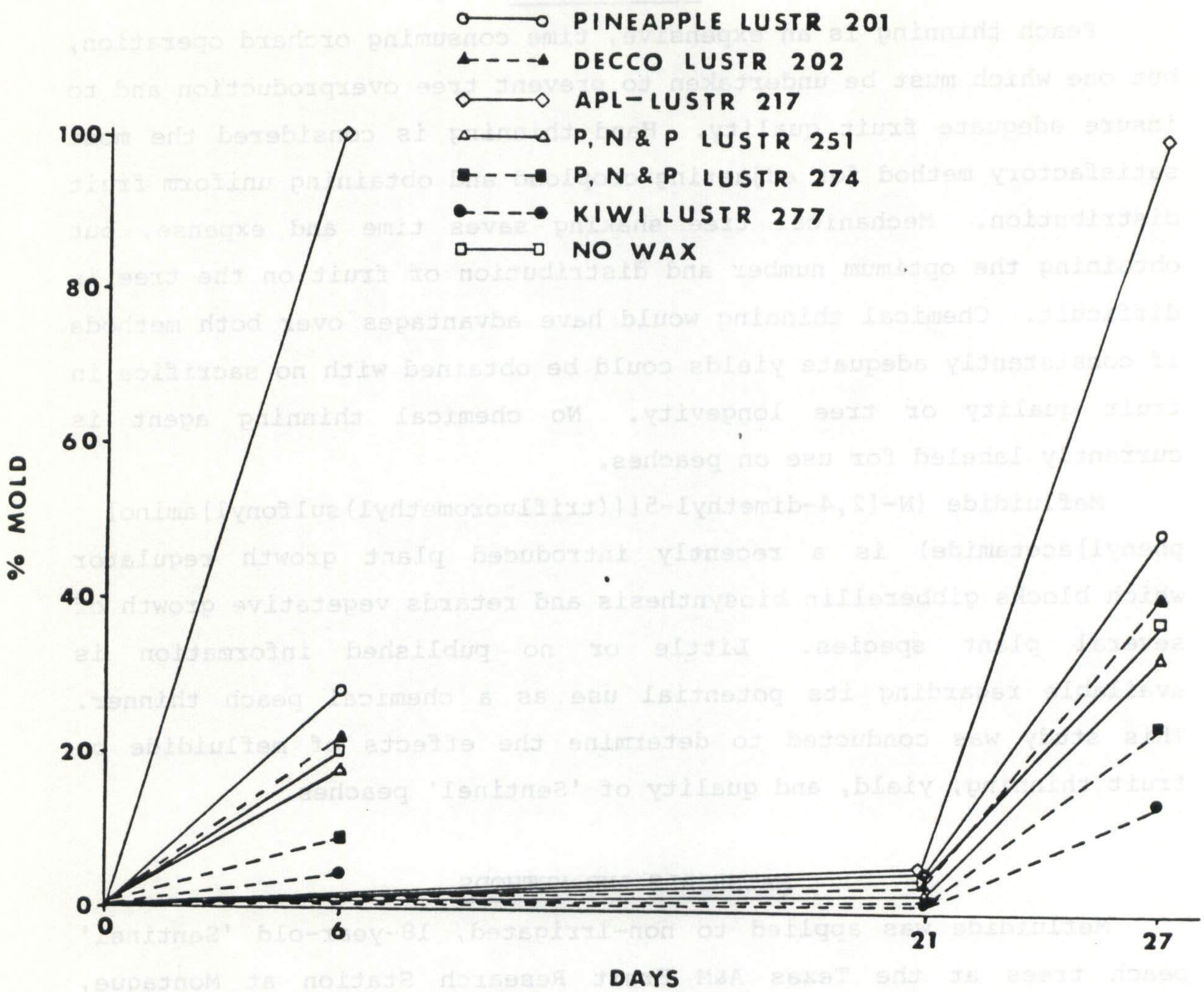

Figure 1. Interactive effects of storage time and wax treatment on mold development in 'Tifblue' blueberries.