Table 2. Cost of and fruit production required to pay for fall pruning lychees trees.

Treatment	Number of prunings (range)	Avg time per tree	Cost per tree[z]	Harvest per tree required to pay for pruning[y]
AUG	1-3	8.6	$1.22	< 1 lb
OCT	1-2	9.0	$1.26	< 1 lb
NOV/CON	—	—	—	—

[z]Based on a labor cost of $8.50/hr.
[y]Based on an average price of $1.60/lb.

to the pruning treatments. However, if fall pruning initiates blooming in other cultivars, such as 'Mauritius' or 'Brewster', and the trees set fruit, it would warrant adoption of this practice in commercial production. It cost between $1.22 and $1.26 per tree for the pruning treatments, assuming a real cost of $8.50/hr for labor (Table 2). At this cost, less than a pound of fruit per tree would be necessary to pay for the treatments, assuming a price of $1.60/lb for the fruit. The pruning treatments used in our study would obviously be more difficult on larger trees, requiring the use of ladders and incurring considerably more expense. These treatments could possibly be mechanized. However, on young orchards these pruning treatments appear to be an economically viable way to get consistent blooming in lychee.

Experiments conducted in the mid 1950s (Young, 1955; Young, 1956) began to develop a research-based approach to decrease variability in lychee flowering. These techniques included pruning and root pruning, which have gained new interest in temperate fruit for control of fruiting without the use of agriculture chemicals. This work drew considerably on knowledge and techniques used in traditional lychee producing regions such as China and India. This research was terminated largely as a result of reductions in the lychee industry of Florida, but with a resurgence in interest in commercial lychee production these techniques of bloom induction should be re-considered. Also, recent advances in Israel and possibly other locations present new tools to be tested.

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AN EVALUATION OF TWO EXPERIMENTAL POLYSACCHARIDE NATURE SEAL® COATINGS IN DELAYING THE POST-HARVEST BROWNING OF THE LYCHEE PERICARP

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Abstract. **Two experimental polysaccharide coatings were evaluated in order to determine if browning in lychee pericarps is reduced following coating. 'Brewster' lychees were harvested from two farms in Homestead, Florida in June 1994. Treatments were imposed and evaluations made at the EcoScience laboratory in Orlando, FL. Pericarp browning was measured by evaluating change in hue angle (h°) over an 18-day period. Pericarp browning was delayed significantly by both polysaccharide coatings. Treatment effects on pericarp browning were not, however, substantial enough to make these formulations attractive commercially. Further formulation development to increase the control of pericarp browning is needed before polysaccharide coatings can become commercially useful to the Florida lychee industry.**

Additional index words. Litchi chinensis, polysaccharide coatings, pericarp browning.

Lychee fruit (*Litchi chinensis* Sonn.) are increasing in popularity with U.S. consumers. The fruit is attractive for its bright red color and sweet agreeable flavor. The harvest season typically lasts only 6-8 weeks (May-July) in the lychee growing area of south Florida. Lychee fruit are highly perishable. The principle post-harvest problem of lychee is rapid browning of the pericarp. This phenomenon is attributable to the natural process of senescence, although fruit which are stressed by either temperature extremes, water loss, or physical damage exhibit accelerated pericarp browning. Two experimental polysaccharide coatings (from the Nature Seal® 2000 series) were evaluated along with an uncoated control in order to determine if browning is delayed following coating.

Materials and Methods

Lychee fruit (*Litchi chinensis* Sonn. 'Brewster') were harvested and packaged on the morning of 9 June 1994 from two orchards in Homestead, Fla. At each orchard, 10 lb of fruit were sorted and placed in 2 plastic bags containing 6 lb of fruit respectively. The bags were placed in standard commercial fiberboard boxes. The fruit from Orchard 1 was not refrigerated during the time between harvest and the time the fruit was picked up for transport to EcoScience lab in Orlando, Fla. Fruit from Orchard 2 was cooled to 6.6C immediately following harvest until the time of transport. All fruit were placed in styrofoam ice coolers during transport. Ice was placed in the coolers, but direct contact between the fruit and

Table 1. Farm 1 hue values (h°).

Treatment	Day 1	Day 7	Day 11	Day 18
NS-1	29.7	29.7a	31.2a	35.6a
NS-2	29.7	30.9a	32.5a	36.9a
Control	29.7	31.7b	34.0b	39.6b
	NS	*	*	*

*P < 0.05, NS means not significantly different.
h° = hue angle (0° = red-purple, 90° = yellow, 180° = bluish-green, 270° = blue).

Table 2. Farm 2 hue values (h°).

Treatment	Day 1	Day 7	Day 11	Day 18
NS-1	30.6	31.3a	33.0a	36.9a
NS-2	30.6	32.1a	33.9a	38.9b
Control	30.6	33.2b	36.0b	40.7c
	NS	*	*	*

*P < 0.05, NS means not significantly different.
h° = hue angle (0° = red-purple, 90° = yellow, 180° = bluish-green, 270° = blue).

the ice was avoided. All fruit was transported to Orlando on the same day as harvest.

At the EcoScience lab in Orlando the fruit was destemmed and prepared for treatment. From the sample populations collected by farm, 30 fruit samples were selected at random for each treatment. Each treatment was repeated 3 times. As such, there were 90 total fruit per treatment for each farm. The treatments imposed were experimental Nature Seal 2000 #R3417-143-1 (NS-1), experimental Nature Seal 2000 #R417-139-1 (NS-2), and an uncoated control. All treatments were imposed on 9 June. Fruit were stored overnight at 16C and initial evaluations were done on 10 June. Color evaluation was done with the Minolta Chromameter 300 (Osaka, Japan). The LCh scale was used in order to facilitate interpretation and statistical analysis. Evaluations were made on days 1, 7, 11, and 18 following coating.

Results and Discussion

Upon coating, both Nature Seal formulations caused a decrease in hue angle values of lychee pericarps from Farms 1 and 2 (Tables 1 and 2). Chroma and lightness were not effected by either Nature Seal coating at the outset of the trial. Due to the initial difference in hue angle values, the treatment means for hue angle were significantly different on the first day of the trial. As such, the data were subjected to covariance analysis in order to allow for meaningful comparisons of treatment means.

The data indicate that there were significant differences between the two Nature Seal experimental coatings and the uncoated control. On the treatment lychees from both farms, the experimental formulations of Nature Seal had lower hue angles over time as compared with the uncoated control. Visually, however, none of the lychees were considered marketable with respect to color after day 11 due to pericarp browning across all treatments. The experimental Nature Seal formulations did reduce changes in hue angle, but not to the extent desired by producers wishing to maintain the fruit color at harvest for several weeks. While there is still promise for reducing the rate of pericarp browning in lychee with the use of polysaccharide coatings, further formulations development and field testing are required.

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AN UPDATE ON GRAFTAGE METHODS FOR LYCHEE

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Additional index words. Rootstocks, cultivars, cambium, anatomy, *Litchi chinensis.*

Abstract. **A resurgence of interest in growing lychee (*Litchi chinensis* Sonn), both in Florida and other parts of the world, has created a need to learn grafting techniques developed in the past for this fruit tree. Rootstocks that are tolerant of less than optimum soil conditions must be used to establish varieties unable to grow well on their own roots as air layers, or from cuttings. Growers who are adept at grafting will be able to hasten the process of rootstock testing, essential for determining rootstock influence on yield and quality of lychee under South Florida conditions. This information will enable us to grow new varieties on our high pH soils.**

Renewed interest in growing lychees in Florida has again brought attention to the importance of grafting newer cultivars onto rootstocks that have shown tolerance to the high calcium soils of South Florida. Although no research has been done on grafted trees on any rootstock, the major cultivars planted for fruit production, 'Brewster', 'Mauritius', and 'Bengal', are the most logical choice to test as rootstocks until other cultivars can be found. Currently, trees are grown either from airlayers or from rooted cuttings.

An example of a cultivar that does not thrive on its own root as an airlayer or rooted cutting is the famous lychee, 'No mi ts'z', considered to be one of the best in China according to Groff (1921). It is being grafted onto rootstocks that have shown tolerance for high pH soils, both in South Florida and in Israel. Another cultivar that is being grafted onto 'Brewster', 'Mauritius', and 'Bengal' is the 'Emperor'. It has been a failure when attempts have been made to establish it as an airlayer on calcareous soils.

Methods used for grafting lychee have been inarching, chip and shield budding, and side veneer grafting. Some research was reported by Cobin (1948) on cleft grafting. Groff (1921) in his famous book, *The Lychee and Lungan,* describes cleft grafting as the main method the Chinese have used to top-work large lychee trees. Nelson (1954a; 1957) described graftage methods for lychee, using chip buds, shield buds,