250 produce items (8). Firms spend most of their promotion efforts on the top 25 or 30 moneymakers, and limes are not one of them. Volume figures for fresh limes cited earlier vividly reflect the marketing problem confronting the Florida lime industry. The small contribution that fresh limes typically make to produce departments' profitability (in absolute terms) explains merchandisers' lack of enthusiasm for and lack of knowledge about the product. Other produce items with greater volumes get the lion's share of their attention.

Trade relations

Although limes are available on a year-round basis, a special "lime season" promotion for the heavy volume portion of the year may get merchandisers' attention, and such a promotion could possibly foster a better understanding of the supply situation and improve good will. Some of the merchandisers were apparently unaware of the availability of larger fruit sizes. A "reminder" could possibly move additional quantities of limes and alleviate surpluses of larger sizes during peak production.

New or different display ideas and point-of-purchase materials are welcomed by most produce merchandisers. Besides providing Florida limes with greater trade visibility, merchandising efforts can be directed at educating consumers in expanded uses for fresh limes.

Special displays of tropical fruits which include limes and tie-ins with other items should be stressed. Occasional large displays of limes could possibly be encouraged through display contests for produce managers, if held during the peak availability period and if held in conjunction with price specials. However, efforts aimed at increasing "normal" display space for limes are doomed. Most merchandisers feel that they are already allocating sufficient or excessive space to fresh limes given current levels of consumer demand.

Point-of-purchase materials can provide a double-barreled promotional effect. Price cards, recipes, and similar items offer a means of getting retailers' attention and, if used, communicate directly with consumers.

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SUITABILITY OF MANGO AS A LONG-TERM HOST OF THE CITRUS BLACKFLY[1,2]

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Abstract. **I studied the developmental time and survivorship of the citrus blackfly,** *Aleurocanthus woglumi* **Ashby on mango,** *Mangifera indica* **L. (Anarcardiaceae). There was no significant difference in the developmental time as compared to a citrus control. However, survivorship was significantly ($p < 0.01$) poorer on mango. Of each cohort of 1706 eggs, 855 adults can be expected to emerge on citrus and only 40 on mango. Each female** *A. woglumi* **must lay 107 eggs for $R_0 = 1$ on mango. The continued presence of** *A. woglumi* **on mango appears dependent upon constant immigration of gravid** *A. woglumi* **females from nearby infested citrus.**

Since its discovery in south Florida in 1976, the citrus blackfly *Aleurocanthus woglumi* Ashby (Homoptera: Aleyrodidae) has become the subject of a joint state-federal eradication effort and extensive research (1, 4, 6-8). In previous studies (7, 11) exotic and native plants of south Florida were screened for their ability to support complete development of *A. woglumi.* Recently I began studies to determine which of the previously studied non-citrus hosts are capable of sustaining populations of *A. woglumi.* Here my results dealing with the suitability of mango, *Mangifera indica* L. (Anarcardiaceae) as a long-term host of *A. woglumi* are reported.

Methods and Materials

I infested 'Hayden' mango trees (1.2-1.8 m tall) with *A. woglumi* by placing them within 1 m of an infested grapefruit (*Citrus paradisi* Macf.) tree for one week. This was done on 2 occasions in 1977 (February—5 trees and March—2 trees). They were then taken to the laboratory, placed in a 5 x 3 x 3 m screened room and watered and fertilized as needed. A 12 cm band of Tree Tanglefoot(R) was used around the trunk to exclude ants.

The number of egg spirals on the 7 trees were counted. I also followed the survivorship and development of 61 egg spirals (N = 1706 eggs) distributed among the plants infested in February. Each leaf harbored from 1-4 spirals and the *A. woglumi* on the leaves were censused weekly until all adults had emerged. From these data a life table of *A. woglumi* on

[1]Florida Agricultural Experiment Station Journal Series No. 780.
[2]I thank Bryan Steinberg for his help in this study.

mango was constructed with mortality expressed in k-values *(10)* ($k = \log_{10}$ initial # $- \log_{10}$ survivors and $K = \Sigma k$). k-Values are additive and independent of population size. The developmental time was measured from a graphically determined median number of 1st instars to median 4th instars. This was done in order to eliminate the influence of temp on the non-feeding stages (egg and late 4th instar). Six citrus plants were infested with the mangos and maintained in a separate room. These plants were used for survivorship and developmental time comparisons. The 7 infested mango trees were kept together and periodically inspected to ascertain if further generations of *A. woglumi* would follow.

Field observations were also made on infested mango trees of several varieties.

Results and Discussions

There were 2,828 egg spirals on the 7 mango trees. At an average of 31 eggs/spiral there were 87,668 eggs in the initial population in the screenroom. There was no significant difference between the developmental time on mango (29 days) and the citrus control (30 $\pm$ 3 days). Egg mortality was the same on mango and the citrus controls ($k = 0.12$), but the mortality of the succeeding stages was greater on mango (Table 1). This contributed to a K for mango of 1.63 compared to 0.30 on the citrus controls. In other terms, we can calculate that from each cohort of 1706 eggs, 855 adults would emerge from citrus and only 40 from mango.

Table 1. Life of table *A. woglumi* on mango.

X	lx	dx	k[z]	k of citrus control[y]
eggs	1706	425	.12	.12
1st instar	1281	845	.47	.08
2nd instar	436	281	.45	.03
3rd instar	155	47	.16	.02
4th instar	108	68	.43 (K — 1.63[v])a	.05 (K = 0.30)b
Adult	40	40		855[w]
Male	24			
Female	16[x]			

[z]$k = \log_{10}$ initial number $- \log_{10}$ survivors; $K = \sum k$ (10).
[y]Data from citrus control.
[w]Based upon an initial cohort of 1706 eggs.
[v]Differ at $P < 0.01$ determined with a paired Chi-square analysis (d.f. = 1). Values were multiplied by 10 prior to testing.

The mango cohort yielded 16 female *A. woglumi* each of which would have to lay 107 eggs for the population to exactly replace itself ($R_0 = 1$). Although this is within the reported fecundity of *A. woglumi* (3), a search of the mango leaves indicated that the second generation in the screen room was <1/10 the size of the first. There was no evidence of a third generation.

I commonly found single infested mango trees in yards in Broward County, Florida. In all cases, these trees were in close proximity to an infested citrus. Interestingly, no *A. woglumi* were found on mango trees within a small grove (25 trees) despite the presence of a heavily infested citrus tree within it. The grove is within an area that has had heavy *A. woglumi* for at least the last 8-12 months. The lack of *A. foglumi* within the grove correlates with the inability of the *A. woglumi* population in the screen room to sustain itself despite a large initial population.

Although *A. woglumi* is reported as not infesting mango in Asia (2), new world reports of its doing so are common (2, 9, 5). Despite this, there are still questions as to whether mango alone can sustain a population of *A. woglumi*. Based upon the data presented herein, I believe that mango alone is incapable of sustaining a population of *A. woglumi* and that the presence of *A. woglumi* on mango is dependent upon a continual immigration of large numbers of gravid females from nearby infested citrus.

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COMMENTS ON MANGO POLLINATION

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A general feeling exists that deficient fruitfulness of the mango is related to a lack of pollination. From the country of origin of the mango, the Indian Union, comes a considered opinion of Gangolly (1), "Unless the difficult but fruitful aspects of flowering are solved urgently, any effort . . . to step up acreage . . . [will] prove a miserable failure." Florida mango producers question many factors affecting mango fruit production of favored mango cultivars. Reference is made herein to infestations of flower thrips, family Thripidae, and to honey bee foragers.

Flower thrips are ubiquitously present in nearly all flowers and have been considered a factor in mango unfruitfulness causing blossom "blast" and loss of the young em-