

mango was constructed with mortality expressed in k-values (10) ($k = \log_{10} \text{ initial \#} - \log_{10} \text{ survivors}$ and $K = \sum k$). 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 ± 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	l_x	dx	k^*	k of citrus control ^f
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) ^a	.05 (K = 0.30) ^b
Adult	40	40		855 ^w
Male	24			
Female	16 [*]			

* $k = \log_{10} \text{ initial number} - \log_{10} \text{ survivors}$; $K = \sum k$ (10).

^fData from citrus control.

^wBased upon an initial cohort of 1706 eggs.

^aDiffer 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. woglumi* 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-

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bryonic fruit. Thrips, contrariwise, may increase mango fruit set by pollination of the flowers. Low populations, 4-10 per flower, of the tiny insects is a common observation. This number may remain harmless or even increase pollination. If the number becomes 18-25 per flower, blast and loss of fruit may occur unless control measures are taken.

Twenty mango trees, each about 14 feet high, were used in a spray test to reduce thrips populations in the flowers. Dieldrin, an insecticide generally accepted as providing good thrips control was used as were 3 other common insecticides. Insecticidal treatments and unsprayed (check) trees were arranged in randomized plots in which 4 weekly applications were made to wet the trees. Twelve to 15 thrips per flower were found in the flowers previous to the spray applications. Three days after the last application approximately 4 thrips per flower were found in the dieldrin sprayed flowers. Approximately 15 per flower were found in the unsprayed flowers. Flowers on the trees sprayed with other than dieldrin had means of from 6 to 10 thrips each. Previous to harvest, the numbers of fruit were counted per tree.

A summarization of the data showed significant mean differences in thrips populations and insignificant mean numbers of fruit harvested from the trees. This is taken to indicate that reduction of thrips in the flowers resulted, but that no consequent change in fruit production resulted from the spray treatments.

In cooperation with Mr. James Miner, a Boynton Beach member of our Florida State Horticultural Society, a larger field experiment was conducted. Twenty rows, each of 31 trees, 12-14 feet high were set aside for the treatments. There were 4 spray treatments and an unsprayed check,

arranged in 4 replications, one row in each. Nine weekly spray applications were made during the flowering period of the trees. Mild infestations of the thrips were present. Although no count of thrips was made, a census of the fruit was made previous to the harvest. Only slight differences were found in the numbers of fruit produced by the trees. No effort was made for statistical analysis.

Observations were made of honey bees foraging mango flowers on trees around a 13-colony apiary. Trees were flowering around the apiary in the 4 cardinal directions to 700 feet or more.

Honey bees on trees were counted per unit of time in each direction. Bees were counted on the trees nearest and to distances therefrom. Two or 3 bees per 3 minutes time was the usual count. Fruit counted on trees previous to harvest were practically equal on nearby trees and on those more distant. This showed no response of distance from the apiary affected fruit production.

More seasons of observations of honey bee foragers on mangos are needed since growers report that more honey bees are seen on mangos some seasons than others. Competition of different species or kind of flowers for honey bees is often observed. Hence, further work is needed to determine mango fruitfulness through pollination.

A lead in mango pollination may have been obtained by Dr. Robert J. Knight, Jr., Horticulturist, USDA Subtropical Horticulture Research Unit, Miami, Florida, through the use of carrion flies.

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EVALUATION OF PEACH ROOTSTOCKS FOR ROOT-KNOT NEMATODE RESISTANCE¹

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Abstract. The widespread occurrence of root-knot nematodes in Florida soils represents a major problem in peach production. Rootstocks resistant to *Meloidogyne incognita* and *M. javanica* have been available and widely used for a number of years; however, galls produced by a biotype have appeared in the past decade. Field and tank screening tests conducted over the past several years have yielded several selections which have potential as rootstocks for peaches and nectarines grown in Florida.

Two species of root-knot nematodes, *Meloidogyne incognita* and *M. javanica* commonly occur in commercial peach and nectarine orchards in Florida. Their damage has led to the widespread use of resistant 'Nemagard' as well as 'Okinawa' seedlings as rootstocks in Florida. Root-knot galling on 'Nemagard' and 'Okinawa' seedlings growing in Gainesville breeding blocks was observed in 1966. In addition, all but 1 of the selections previously screened for *M.*

incognita and *M. javanica* resistance had galls. This selection also escaped infestation the following season but died during the third year (3).

Part of the peach rootstock breeding program has been directed since 1966 toward finding selections resistant to the biotype of root-knot nematode. The most promising selections so far have been derived from crosses involving 'Okinawa' x *Prunus davidiana* (1, 2, 4). This study was initiated, as an integral part of the breeding program, to screen selections for possible resistance to the nematode biotype as well as to *M. incognita* and *M. arenaria*.

Materials and Methods

For several years after the new root-knot biotype was first observed, the roots of established trees growing in an infested area were examined annually for the presence of galling.

Three raised concrete tanks located in an uncovered greenhouse structure became available for use in 1975 enabling the extension and refinement of the field evaluation procedure. Soil temp was maintained above 75°F at all times with hot water circulated in pipes in the bottom of the tanks. Two of the tanks were filled with soil and fumigated with methyl bromide for 48 hours. One was subsequently inoculated with tobacco roots infected with *M. incognita*. The second tank was inoculated with peanut

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