In the spring of 1990A, weevil emergence from beneath treated trees was significantly different compared with the checks in May and June for *Diaprepes* and April and May for *P. litus*. Biovector reduced adult emergence by 82% and 57% for *Diaprepes* and *P. litus* respectively: both significant reductions for the May-October period.

During the 4 months of the summer 1989 experiment, Biovector provided a significant 82% reduction in *Diaprepes* emergence and a 59% reduction in *P. litus* captures.

In the spring of 1990B, Biovector reduced weevil emergence by 59% and 70% at 5 mil and 2 mil nemas per tree rates, respectively. Significantly fewer weevils emerged in Biovector treatments compared to the untreated checks.

S. carpocapsae reduced *Diaprepes* emergence 68% and *P. litus* emergence 69% in infested Winder series soils. The nematode was found effective in reducing field populations of *P. litus*, expanding its capability beyond the nursery and greenhouse situations determined in prior investigations (Montes et al., 1981).

While eradication has not been achieved in the experimental work conducted for control of *D. abbreviatus* or *Pachnaeus* spp. to date, the use of *S. carpocapsae* soil drenches in concert with adulticide foliar sprays would provide an IPM program that Florida citrus growers could use to minimize the tree injury that the pest can cause.

Acknowledgment

We thank Bob Pelosi (Univ. of Florida, IFAS, AREC, Fort Pierce) for technical assistance and Randy Martin (Biosys) for statistical advice.

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GROWER SURVEY OF POSTBLOOM FRUIT DROP INCIDENCE IN SOUTHWEST FLORIDA

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Additional index words. Colletotrichum gloeosporioides, citrus.

Abstract. **Outbreaks of postbloom fruit drop (PFD) were numerous and often severe in southwest Florida during the spring of 1993 presumably due to the simultaneous occurrence of temperatures which prolonged the bloom period and abundant precipitation. The impact of PFD on citrus production in the area during 1993 and its incidence over the last decade was assessed by means of a grower survey. Survey data indicated that PFD affected 13 citrus varieties in 33 groves encompassing 32,051 acres. estimates of the percentage of bloom infected and yield reduction in 1993 varied greatly by both grove and citrus variety. Percentage of bloom infected and yield reduction ranged, from 1% to 50%, and 0.5 to 37%, respectively, with Navel, Ambersweet, and Valencia sweet oranges, Orlando tangelo, and Tahiti lime being the most severely affected. Based on the grower survey, the incidence of PFD in southwest Florida Appears to have Been higher in 1993 than in the preceding ten years and has generally increased over the same period.**

Introduction

Postbloom fruit drop (PFD) caused by a distinct strain of the fungus *Colletotrichum gloeosporioides* (Penz.) Penz. and Sacc. in Penz. (Agostini et al., 1992) was first detected in Florida in certain Tahiti lime (*Citrus latifolia* Tan.) and sweet orange [*C. sinensis* (L.) Osbeck] groves in Immokalee in 1983 (McMillan and Timmer, 1987). Since that time the disease has also occurred in eastern and central production areas of the state, and remains a sporadic problem. The petals of all citrus species are susceptible to PFD although the disease is more prevalent on sweet orange and Tahiti lime than on

Florida Agricultural Experiment Station Journal No. N-00845. The use of trade names in this publication does not imply either endorsement or criticism of these products by the authors or the University of Florida.

grapefruit (*C. paradisi* Macf.). Navels and Valencias appear to be particularly susceptible. Under severe disease pressure all stages of flowers, starting with the pinhead stage are susceptible.

PFD is a rapidly developing disease and symptoms usually occur within 2-3 days following infection under ideal environmental conditions. Early symptoms consist of brown to orange, water-soaked lesions on petals. These lesions rapidly enlarge blighting individual flowers and entire flower clusters. The infected petals turn orange, become hard and dry and remain attached to the basal disk. In contrast, normally senescing petals turn a light brown color starting with their tips and readily fall. Fruitlets drop off at their ovary bases leaving the basal disk and calyx ("button") firmly attached to its stalk (peduncle). These buttons continue to grow and may remain attached to the tree for a number of years. When disease pressure is high, flower buds may be infected and drop without the formation of buttons.

Primary inoculum of *C. gloeosporioides* is provided by germinating appressoria (specialized infection/survival structures) which produce a few spores. Abundant spores are produced on blighted blossoms. Infection is greatly enhanced by rain and overhead watering which disseminate fungal spores to new infection sites. It appears that the critical factors in predicting severe outbreaks of PFD are the occurrence of the disease early in the bloom period and abundant rainfall (Timmer and Zitko, 1993).

Outbreaks of postbloom fruit drop (PFD) were numerous and often severe in southwest Florida during the spring of 1993 due to the simultaneous occurrence of unseasonably mild temperatures resulting in a prolonged bloom period extending from early February through late April and abundant precipitation. The impact of PFD on citrus production in the area during 1993 was assessed by means of a grower survey.

Survey Methods

In July, 1993 a PFD questionnaire was sent to grove owners/managers in southwest Florida (Charlotte, Collier, Glades, Hendry, and Lee counties), with a follow-up sent in August, 1993. The questionnaire solicited the following information: the respondent's company or identity (optional), size of grove(s) in acres and location (county), the date that PFD was first observed and its duration in the grove, cultivars of citrus affected and acreage of planting, estimated percentage of the bloom infected, estimated percentage of yield reduction, and the past years during which PFD was observed. A brief description of the symptomatology, epidemiology and management of PFD accompanied each questionnaire.

Survey Results and Discussion

Data representing 13 citrus cultivars in 33 groves encompassing 32,051 acres were received from approximately 25% of all citrus grove owners/managers surveyed. The acreage affected by PFD represented approximately 33% of the total bearing citrus acreage in southwest Florida (Commercial Citrus Inventory, 1992). Growers reported initial occurrences of PFD in all three months of the bloom period [February (30.7%), March (42.3%), and April (27%)]. Most indicated that the disease extended until late April or early May. Estimates of the percentage of bloom infected in 1993 also varied greatly by grove and citrus variety. Percentage of bloom infected in individual groves ranged from 1% to 55%, while projected loss reduction ranged from <1.0% to 37% (Table 1). Navel, Ambersweet, and Valencia oranges, Orlando tangelo (*Citrus reticulata* Blanco × *C. paradisi* Macf.), and Tahiti lime appeared to by the most severely affected. Based on the grower survey, the incidence of PFD in southwest Florida was higher in 1993 than during the previous 10 years, and has generally appeared to increase over the last decade (Table 2). However, not all grove owners viewed PFD as a major problem; two questionnaire respondents growing fruit for the fresh market indicated that at a low incidence the disease was actually beneficial because it induced the formation of fewer but larger fruit.

Table 1. Incidence of Postbloom Fruit Drop by Citrus Cultivar in Southwest Florida During 1993.[z]

Cultivar	Acreage	Infection %[y]	Est. Yield Reduction %[x]
Sweet Oranges			
Ambersweet	18	25	25
Hamlin	8,665	7	2
Navel	970	44	29
Pineapple	390	10	10
Valencia	18,712	31	23
Mandarins and Mandarin Hybrids			
Fall Glo	13	10	15
Nova	40	1	<1.0
Orlando	217	55	35
Robinson	13	50	15
Sunburst	48	35	15
Grapefruit	2,440	15	9
Kumquat	25	N.A.[w]	10
Tahiti lime	500	N.A.	37

[z]Based on the results of grower survey of 33 groves in Southwest Florida.
[y]Estimated percentage of bloom infected.
[x]Estimated yield reduction percentage.
[w]Data not available.

Table 2. Occurrence of Postbloom Fruit Drop in Southwest Florida by County, 1983-1993.[z]

County	No. Groves	Acreage	% of Groves with PFD Observed										
			1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993
Charlotte	3	108	—[y]	—	—	—	—	—	—	33	66	—	100
Collier	8	11520	12	12	12	12	25	37	12	37	50	37	100
Glades	2	44	—	50	50	50	—	—	—	—	—	—	100
Hendry	12	19359	—	—	—	—	—	18	25	18	41	36	91
Lee	8	1020	12	12	—	12	12	12	12	25	25	25	75

[z]Based on the results of a grower survey of 33 groves in Southwest Florida representing 13 citrus varieties on 32,051 acres.
[y]Postbloom fruit drop not detected.

Presumably, PFD outbreaks were generally numerous and severe throughout southwest Florida in 1993 because of the above normal rainfall during the bloom period. Precipitation was recorded for every day except one from 3/17 to 3/25. Precipitation recorded at the Southwest Florida Research and Education Center during February, March, and April exceeded the 34 year average for those months by 0.81, 0.82, and1.36 inches, respectively.

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