PREFACE

CARIBBEAN FRUIT FLY STATUS, ECONOMIC IMPORTANCE, AND CONTROL (DIPTERA: TEPHritidae)

P. D. GREANY* AND C. RIHERD*

*Insect Attractants, Behavior, and Basic Biology Research Laboratory
Agricultural Research Service
U.S. Department of Agriculture
Gainesville, FL 32604

*Division of Plant Industry
Florida Department of Agriculture and Consumer Services
P.O. Box 147100
Gainesville, FL 32614-7100

ABSTRACT

The history of the Caribbean fruit fly (caribfly), Anastrepha suspensa (Loew), in Florida, its economic status, pre- and post-harvest control measures, and future control strategies are briefly discussed to introduce a series of more detailed presentations by authorities on these issues. The initiation and development of the Caribbean Fruit Fly Protocol (fly-free zone concept) is emphasized

Anastrepha suspensa (Loew), became established in Florida in 1965 and within a few years had spread throughout its potential ecological range, occasionally infesting more than 80 different fruit and vegetable hosts in the state (Swanson & Baranowski 1972, Von Windeguth et al. 1972). An eradication program was not initiated upon discovery since the fly had been studied for some 30 years in Puerto Rico and had been observed to cause little damage to citrus fruit, the primary concern in Florida (Anonymous 1966; Weems 1966). Also, no suitable attractant was available to delimit the geographic range of the caribfly, reducing the likelihood of a successful eradication effort.

We now know that citrus fruit, while not the preferred hosts, may be successfully attacked by caribfly females, especially when the fruit are senescent (Greany et al. 1985). The primary economic impact of the caribfly has resulted from quarantine restrictions imposed on Florida by important domestic and foreign export markets, rather than from direct yield losses from infested citrus fruit.

When this fly was found infesting commercial grapefruit on March 18, 1968, quarantines were enacted by Arizona, California, Hawaii, and Texas, plus Bermuda and Japan. Citrus fruit and certain other hosts must now be certified free of the caribfly to be eligible for shipment to these destinations. Korea also is considering regulations against the caribfly, causing concern in the citrus industry because this may restrict access to the increasing market potential in that country. Official letters of protest from the Florida Department of Agriculture and Consumer Services (FDACS) and the United States Department of Agriculture (USDA) expressed the view that such an action
would not be biologically justified considering that the Korean climate would be inhospitable for reproduction by the caribfly.

Currently, shipments of grapefruit, orange, lemon, lime and other citrus, plus tomato, bell pepper, lychee, mango, avocado, guava, and carambola are affected by quarantine restrictions. Until 1984, most commodities were disinfested by ethylene dibromide fumigation, but this was banned at that time by the U. S. Environmental Protection Agency (EPA). Substantial resources have since been committed by the State of Florida, the USDA, and the fruit and vegetable industry to develop alternate methods to certify commodities fly-free, including not only postharvest measures, but also preharvest control strategies. The various options being pursued for control of the caribfly are outlined in the papers that follow. Those generally fall into either of two categories: postharvest treatments or preharvest strategies.

**Postharvest Treatments**

Presently there are three postharvest treatment methods approved for certification of specific fruits: methyl bromide fumigation, cold treatment and hot water treatment. Methyl bromide fumigation is approved for citrus and mangos. Cold treatment is approved for citrus and carambola, and hot water treatment is approved for mangos. All three postharvest methods present certain difficulties.

Methyl bromide fumigation, conducted in chambers operated by the FDACS, is being used preferentially for most citrus fruit being shipped to California. However, recent action by the EPA to abrogate damage to the ozone layer may result in methyl bromide, like ethylene dibromide, being banned from continued use as a fumigant. Cold treatment, normally done on board ship due to the time required (10-24 days), can cosmetically damage early season grapefruit. While hot water treatment has been approved for certification of mangos, no such facility has been constructed in Florida because of the limited market for mangos, and no hot water (or hot air) treatment has been certified for citrus. Temperature management quarantine treatments and their effect on product condition and quality are described in detail in the following papers by Sharp and by McDonald et al., respectively.

Use of irradiation as a postharvest treatment to disinfest fruits from the caribfly is also being explored by the FDACS. Construction of an irradiation facility for this purpose is described in the paper by Smittle. There also is a private commercial facility (Vindicator Inc., Mulberry, FL) interested in performing fruit irradiation.

**Preharvest Strategies - the Fly-Free Zone Concept**

Along with the approved postharvest treatments, the FDACS is certifying grapefruit and oranges from production areas if they are certified to be free of the caribfly. Production areas can be certified based on combinations of the following approaches: (1) geographic separation of the production area from infested areas, plus (2) use of prophylactic malathion bait sprays, or (3) trapping systems that verify the absence of fly infestation ("negative trapping"). Also, fruit from certified areas must be properly labelled to prevent co-mingling with fruit from non-certified areas. Development of the Caribfly Fly-Free Zone Certification Protocol is described in detail in the paper contributed by S. Simpson. During the 1990-91 season, almost 9 million cartons of citrus valued at over $110 million were certified from 111,020 acres (note added in proof: this increased to over 151,000 acres certified during the 1992-1993 season). The annual cost of this certification is approximately $1 million, which is fully supported through grower participation fees of $3.00 per acre per month.
One of the criteria used in certifying a grove as being fly-free is the use of "negative trapping" for fruit fly adults in the grove. Currently, McPhail traps baited with food attractants are used for this purpose, but better attractants and traps are needed. Heath et al. contributed a paper describing development of better attractants for monitoring the caribfly in and around groves, as well as food, pheromone, visual, and acoustical cues.

Research on biologic methods to reduce populations of the caribfly in citrus growing regions of Florida also is being performed as a complement to the fly-free approach. This includes caribfly population reduction through use of augmentative releases of fruit fly parasites and/or sterile fly releases, as described in the papers by Baranowski et al., and by Holler and Harris, respectively.

Research to enhance and extend the innate, early-season resistance of citrus fruit to attack by the caribfly is described in a paper by Greany and Shapiro. Finally, future directions likely to be taken for control of the caribfly are described in the paper by Calkins. Overall, this set of papers encompasses many of the active research areas directed toward improved control of or coexistence with the caribfly.

The caribfly has had considerable economic impact on the State of Florida, despite its infrequent attack on commercial citrus fruit. However, the billions of dollars of economic gain achieved from finding ways to manage the caribfly since its establishment in Florida in 1965 offsets the millions of dollars that have already been spent in finding ways to deal with this pest.

REFERENCES CITED


