the current problems of application exposure and spray drift.

7. No large tractors would be needed for cultivation or spray application.

Despite these apparent advantages, there are some serious questions that will have to be addressed before such a system can become a commercial reality. For example, how much energy will it take to move the mobile units from the field through a packing/spray/steam sterilization facility, and how will plants be irrigated and freeze protected? Perhaps the most obvious and important question is what will the system cost and what is its potential productivity?

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REOCCURRENCE OF PAPAYA MOSAIC POTEXVIRUS IN FLORIDA

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Abstract. **Papaya mosaic potexvirus was first reported from Florida in 1964. After that time papaya mosaic was not encountered again until 1991. This new occurrence was found in a 2-acre commercial papaya planting on Pine Island in Collier County, Fla. The infected bearing papaya plants exhibit a mottling of leaves. Papaya mosaic potexvirus was confirmed by SDS-immunodiffusion tests.**

Papaya has always had a place in south Florida agriculture, with an average of 400 acres per year and gross sales of over $2,000,000 (Anonymous, 1990). The greatest limiting factor in papaya production in Dade County has been papaya distortion ringspot (PRV) (Conover, 1964). However, another viral disease, papaya mild mosaic, caused by papaya mosaic potexvirus (PMV), was reported by Conover in 1964. The primary symptom of papaya mosaic is a mild green mottle of the foliage which is most easily seen in the young leaves. The young leaves develop a vein clearing, which is generally followed by rugosity of the laminae (Cook, 1975). The young leaves are slightly reduced in size and the trees are stunted. There is no evidence that the virus affects fruit quality or yield. The only method of transmission is mechanical, and vectors are unknown. Attempts to transmit the virus by aphids were not successful (Conover, 1964). Papaya mosaic was not observed during Florida surveys for papaya viruses in 1982 by Wan (Wan and Conover 1983). In 1991 papaya mosaic was found in a papaya grove on Pine Island in Charlotte County, Fla. This was the first sighting of this disease in 27 years, and it occurred 200 miles from the original sighting. In 1991 60% of the trees were showing typical symptoms of papaya mosaic.

The objective of this study was to confirm that this papaya disease was papaya mosaic potexvirus.

Materials and Methods

One leaf sample, from each of four papaya plants, was harvested and sent by overnight mail to Cornell University, New York State Agricultural Experiment Station, Geneva Campus, Department of Plant Pathology, Geneva, NY 14456-0462, for virus verification. Leaf samples were homogenized in 0.01M phosphate buffer (1:10) and used to inoculate the indicator host range of *Carica papaya* L., *Gomphrena globosa, Chenopodium quinoa, Nicotiana benthamiana, Nicotiana tabacum* L. variety 'Havana 423', *Cucumis metuliferus* and *Cucurbita pepo* L.

Symptom expression was monitored. Leaf samples were collected from infected tissue and used in SDS-immunodiffusion tests as described by Gonsalves and Ishii (1980). Two tests were conducted, one with antisera against the mild papaya ringspot virus (PRV) from Hawaii and the other with antisera against PMV which was kindly supplied by D. Purcifull. These tests were repeated several times with similar results.

Results and Discussion

Symptom expression on the indicator hosts is summarized in Table 1. The typical PMV symptoms were expressed on *Gomphrena* which is the reported assay host of the virus (Purcifull and Hiebert, 1971). No symptoms were expressed on the PRV diagnostic species *Cucumis metuliferus* or squash, *Cucurbita pepo* (Purcifull et al., 1984). There were no serological reactions with the samples and antisera to PRV HA 5-1, attenuated form of papaya ringsport virus, but clear precipitin lines were observed with tissue infected with the mild PRV HA 5-1. This polyclonal antisera reacts with PRV

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Table 1. Virus symptom expression on indicator hosts inoculated with papaya mosaic virus.

Indicator Host	Days for symptom expression	Symptom expression
Carica papaya	9	Chlorosis
Gommphrena globosa	5	Chlorotic
Chenopodium quinoa	14	Necrotic lesions
Nicotiana benthamiana	14	Chlorosis which coalesced
Havana 423	14	Chlorosis
Cucumis metuliferus	0	No symptoms
Cucurbita pepo	0	No symptoms

isolates collected from a number of different countries. However, there were clear precipitin lines with the antisera to PMV and the infected tissue from *Gomphrena* and *N. tabacum* 'Havana 423'. There was no reaction between this antiserum and PRV HA 5-1-infected tissue.

Where this virus may have been residing for the past 27 years is not known. How it reached Pine Island is not known, but ornamental and tropical fruit plants have made their way to the area from southern Dade County area over the past 70 years. Mangos were planted on the island in the late 1920s. This the first report of papaya mosaic in papaya plants from Pine Island. Townsend and Andrews (1940) reported virus-like symptoms in Florida papayas but they never demonstrated the viral nature of the disease. Harkness (1900) at the Subtropical Experiment Station, Homestead, Fla. recognized papaya viruses as a limiting factor in papaya production in Florida. Conover (1964) proved the viral nature of the papaya virus diseases in South Florida and showed that papaya mosaic potexvirus could not be transmitted by aphids but could be easily transmitted to host plants by mechanical means. Conover (1964) and Cook (1972) reported numerous alternate hosts, such as other species of *Carica, Catharanthus rosea* and *Zinnia elegans*. All of these plants were grown in South Florida going back to the early 1900s, and could have been introduced to the island by its inhabitants.

We hope this outbreak of papaya mosaic was confined to this single papaya planting which has since been destroyed, and will not occur in future papaya fields. However, an effort should be made to determine if papaya mosaic potexvirus is in alternate hosts on Pine Island since a new planting of papaya is being set out at this time. Great care should be taken to not infect the new planting with this virus. Maintenance of a virus-free planting is possible with good sanitation practices. Planting and harvesting crews should be required to maintain virus-free hands by washing with soap and water.

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WATER USE AND IRRIGATION SCHEDULING OF YOUNG BLUEBERRIES

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Abstract. **Results of a study of blueberry growth during the first three years after transplanting are presented. Two-year-old container-grown rabbiteye (*Vaccinium ashei* Reade), and highbush (*Vaccinium corymbosum* L.) blueberry plants were grown in a field lysimeter system at Gainesville, Fla. Treatments consisted of irrigation scheduled at 10 kPa, 15 kPa, and 20 kPa soil water tensions with pine bark mulch as ground cover. The 10 kPa treatments exhibited the highest growth rate and required the most irrigation. The rabbiteye displayed a more vigorous growth than the highbush. The highbush variety exhibited more sensitivity to soil water depletion than the rabbiteye.**

Blueberries have shown much promise as an alternative crop in Florida. The importance of irrigating young blueberry plants has been recognized for some time and is docu-

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