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**THE EFFECTIVENESS OF A NET BARRIER
IN EXCLUDING THE FRUIT PIERCING MOTH
FROM TOMATO FRUIT IN AMERICAN SAMOA**

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ABSTRACT

Tomato, *Lycopersicon esculentum*, an important cash crop in American Samoa, is often severely damaged by the fruit piercing moth (FPM), *Othreis fullonia* Clerck. This study examines the effectiveness of netting in excluding the FPM from trellised tomato plants. Five rows of tomatoes were planted 1 m apart. Each row contained 9 to 12 plants approximately 0.5 m apart. At the onset of flowering a nylon net with 2.5-cm diameter holes was draped around and over the plants in one row, secured to wooden stakes at the four corners of the row. Harvested fruit were brought to the laboratory and examined for damage. A comparison of damage of fruit in the netted row against fruit in unnetted rows showed that half of the fruits in the unnetted rows sustained puncture wounds, but only 10% of the fruit under a net were damaged. Damage in the netted row occurred when the net was close to or touching a tomato fruit. Damage by birds was also reduced in the netted rows, but fruitworm damage was observed in all rows. Netting around the tomato plant can be recommended to farmers as one method of minimizing FPM damage.

The Fruit Piercing Moth (FPM), *Othreis fullonia* Clerck, is a widespread pest found in Africa, India, Southeast Asia, Australia and the Pacific Islands. A wide variety of fruits and vegetables are attacked by the adult moth (Cochereau, 1977; Waterhouse and Norris, 1987) which is active at night. In American Samoa, tomatoes, green peppers, eggplants, citrus, and star apple are the most common hosts (Comstock, 1963; Maddison and Vargo, personal observations).

Various control measures have been suggested, ranging from hand capturing moths at night, attracting moths to baits, bagging of fruit, and repelling adult moths with deterrents (Baptist, 1945; Banziger, 1982; Cochereau, 1972). A complete review of FPM control methods has been made by Waterhouse and Norris (Waterhouse and Norris, 1987). Prospects for biological control have been evaluated (Waterhouse and Norris, 1987; Sands and Broe, 1991), and cooperative biological control projects in the Pacific have been initiated.

ed (Muniappan and Sands, personal communication). In an attempt to compliment biological control initiatives, this study will examine the effectiveness of using a net barrier to exclude FPM from tomato fruit.

MATERIALS AND METHODS

Tomato, *Lycopersicon esculentum*, cv. King Kong was planted as described elsewhere (Vargo et al., 1991). Once the plants began to flower, a nylon net with holes about 2.5-cm in diameter was draped around and over the plants in a penultimate row. The net was secured to wooden stakes at the four corners of the row and held down by rocks at the base of the net. From August 21 to September 20, 1989, tomatoes were harvested and examined in the laboratory for damage due to caterpillars, birds, and the FPM.

RESULTS AND DISCUSSION

The net prevented FPM damage to approximately 90% of the tomatoes in the netted row. In constrast, over half (51%) of the fruits in the netted rows sustained FPM damage. Damage to netted tomatoes was low throughout the experiment except for tomatoes harvested on September 14 (Fig. 1). On that date, many fruits were found to be touching the net, which gave the FPM easy access. Consequently, it is important to build a framework for the net barrier with adequate space or allowance for expansion to keep the FPM from the fruit.

The net was virtually 100% effective in eliminating damage done by birds (Fig. 2) except during the August 21 harvest when a breach in the net was discovered and 40% of the total amount harvested that day was found damaged. The net was ineffective in keeping out the adult moth of a tomato fruitworm, possibly *Heliothis armigera*. Caterpillar damage by the tomato fruitworm was not significantly different between netted and unnetted rows (Fig. 3).

The adult fruitworm moth is smaller than the FPM. The wingspan of *H. armigera* is about 4 cm compared to 9 cm for the FPM. Fruitworm damage was higher on two dates (August 25 and September

1) in the unnneted rows, and at almost equal levels (20 to 25%) on August 21 and August 29 in both the netted and unnetted rows. From September 4 to September 20, fruitworm damage was not observed. No explanation is currently offered for this observation.

In Integrated Pest Management (IPM) systems, various methods are employed to minimize the damage of pests on a crop. With increased concern for the environment, nonchemical methods are a priority. Employing the exclusion principle by using a net barrier significantly reduced FPM damage to tomato fruits. The use of netting with smaller diameter holes may also be effective in keeping out the tomato fruitworm. Construction of the net before the flowering stage may also prevent infestation by *H. armigera*. Eggs of *H. armigera* take from 2 to 4 days to hatch, so it is important to construct the net before fruits are present.

While further replication and observation are necessary, we believe that the net barrier method would be a suitable IPM technique to recommend to farmers. Together with an active biological control program, we believe that the net barrier would be an important part of an IPM system of FPM control in American Samoa and elsewhere.

ACKNOWLEDGEMENTS

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TOMATO FRUIT DAMAGED BY THE FRUIT-PIERCING MOTH
IN NETTED AND UNNETTED PLOTS

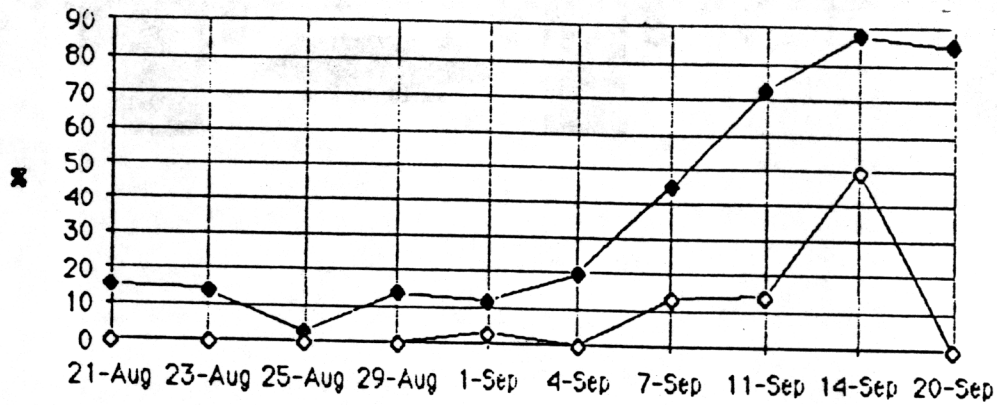


FIG. 1

◆ UNNETTED
◇ NETTED

1989

TOMATO FRUIT DAMAGED BY BIRDS
IN NETTED AND UNNETTED PLOTS

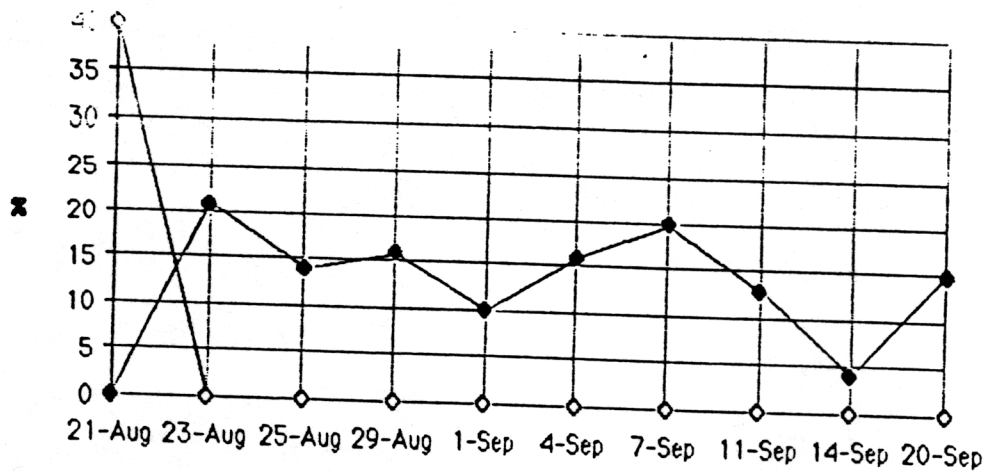


FIG. 2

◆ UNNETTED
◇ NETTED

1989

TOMATO FRUIT DAMAGED BY TOMATO FRUIT WORM
IN NETTED AND UNNETTED PLOTS

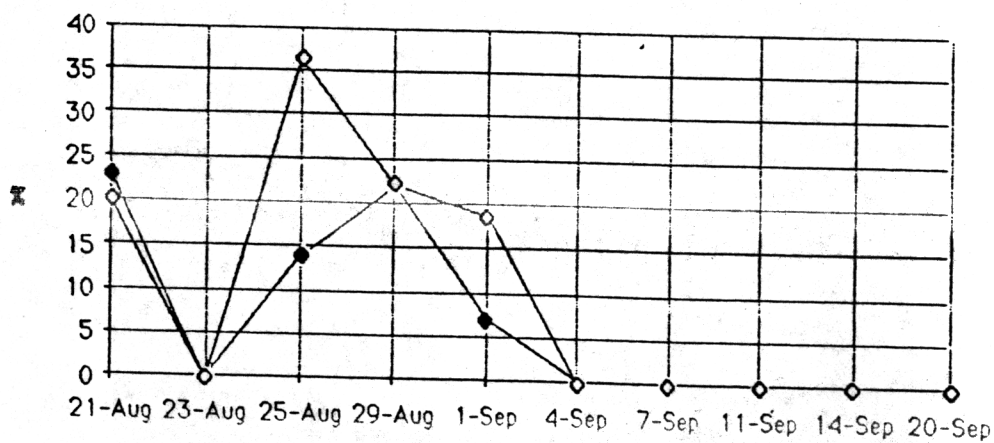


FIG. 3

◆ UNNETTED
◇ NETTED

1989