CI-203
Handheld Laser Leaf Area Meter

CASE STUDY

Assessment of Attractiveness of Plants as Roosting Sites for the Melon Fly, *Bactrocera cucurbitae*, and the Oriental Fruit Fly, *B. dorsalis*.

The Researcher

Dr. Grant McQuate is a researcher with the USDA Agricultural Research Service (ARS) in Hilo, Hawaii. With over 24 years of experience in research in insect ecology, Dr. McQuate has focused much of his work on the attraction, ecology, host status and suppression of tephritid fruit flies.[1]

■ *Dr. Grant McQuate*

The Study

Fruit flies cause direct damage to fruits and vegetables through oviposition and larval feeding and restrict movement of commodities across national and international borders. Bait sprays are commonly applied as a means of preventing infestation of fruits and vegetables. For some fruit fly species, such as melon fly, *Bactrocera cucurbitae*, bait sprays are commonly applied to plants found in crop borders, where adult flies may seek shelter ("roost").

Establishment of preferred roosting hosts in crop borders may help improve suppression of fruit fly species by providing sites for bait spray applications. As reported in papers published in 2007 and 2011, Dr. McQuate and his research team assessed the attractiveness of different plant species as roosting hosts for melon fly and oriental fruit fly, *B. dorsalis*, using the **CI-203 Handheld Laser Leaf Area Meter** to measure leaf areas of different plant species to permit the standardization of fly catch by leaf area. This standardization was needed because equivalent leaf areas could not readily be presented for all plant species tested.

■ *Melon Fly*

■ *Oriental Fruit Fly*

The study was conducted in an open field along the border of a papaya (*Carica papaya*) orchard in Kapoho, Hawaii because the papaya orchard had good populations of both fruit fly species. Test roosting host plants were placed in pots clustered around a protein bait trap about 20 meters from the orchard. Potential roosting host plants included plants that could be planted as border plants, common weed species, agricultural crops and fruit trees. Relative attractiveness of different host plant species was based on the average number of flies trapped in the protein bait traps associated with the different plant clusters.

The CI-203 Portable Laser Leaf Area Meter was used to directly (and non-destructively) measure the area of leaves of plant species which had relatively large leaves, but with a width narrower than 15.0 cm. This included avocado (*Persea americana*), corn (*Zea mays*), guava (*Psidium guajava*), mango (*Mangifera indica*), sorghum (*Sorghum bicolor*), sugar cane (*Saccharum sp.*), and tiger's claw (also referred to as wiliwili; *Erythrina variegata*). In order to estimate the leaf area of several plant species for which leaf width exceeded 15.0 cm (e.g., cassava [*Manihot esculenta*] and castor bean [*Ricinus communis*]) regression equations were developed which used non-destructive leaf measurements. Leaf areas needed for the development of these equations were obtained by cutting leaves into pieces that were small enough (maximum dimension < 15.0 cm) to be measured by the **CI-203 Portable Laser Leaf Area Meter** with a **CI-203 Conveyor Attachment**. For plant species with many small leaves (e.g., panax [*Polyscias guilfoylei*]) a gravimetric means was used to estimate leaf area.

The Results

Based on average trap catch data, castor bean, panax, tiger's claw and guava were identified as preferred roosting hosts for melon fly with castor bean, panax and tiger's claw also being among the plant species identified as preferred roosting hosts for the oriental fruit fly.
The attractiveness of cassava was found, in a subsequent test, to not be significantly different than the attractiveness of castor bean for both fruit fly species. Comparison of catch standardized by leaf area gave similar results, though the order of preference among the different plant species sometimes changed.

The Conclusion

The results of these studies show that some plant species are preferred roosting hosts for melon fly and for oriental fruit fly. Establishment of such plant species along crop borders may help to improve suppression of these fruit fly species by providing good sites for bait spray applications. Further research, though, is needed to assess the influence of such factors as plant phenology, plant density and planting pattern.

■ ***Footnotes:***

1. **https://www.ars.usda.gov/pacific-west-area/hilo-hi/daniel-k-inouye-us-pacific-basin-agricultural-research-center/tropical-crop-and-commodity-protection-research/people/grant-mcquate/**

McQuate, G.T., and R.I. Vargas. 2007. Assessment of attractiveness of plants as roosting sites for the melon fly, *Bactrocera cucurbitae*, and oriental fruit fly, *Bactrocera dorsalis*. Journal of Insect Science 7:57. **http://www.insectscience.org/7.57**

McQuate, G.T. 2011. Assessment of attractiveness of cassava as a roosting plant for the melon fly, *Bactrocera cucurbitae*, and the Oriental fruit fly, *B. dorsalis*. Journal of Insect Science 11:30. **http://www.insectscience.org/11.30**

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