AREA WIDE SUPPRESSION OF *BACTROCERA* FRUIT FLIES IN DRAGON FRUIT IN BINH THUAN, VIETNAM


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*Tien Giang, 2019*
VIETNAM AGRICULTURE

Source: VAAS
Major economic hosts in Mountainous Region:

Fruit/vegetation types:
- Plum, Peach, Apricot, Pear, Citrus, Papaya, Longan, Persimmon...
- Fruiting vegetable, Wild solanum...
- Rain forest
Major economic hosts at Central Regional
Major economic hosts at Southern Regional

Magosteen, Guava, Star apple,..

Malpighiales species
Dragon fruit is cultivated mostly in some provinces such as Binh thuan, Tien giang... The total cultivated area is approximately 53,000 ha

(VN People News, 4/2019)

Dragon fruit cultivation has been rapidly expanded and commonly grown by smallholder farmers.

About 80% of dragon fruit production has been exported to external markets such as China, Korea, Japan, S.E. Asia, the Middle East, Europe and the USA.
Dragon fruit production in Binh Thuan province

- Largest producer: 29.447 ha of dragon fruit; 591,965 tons of yield;

Natural condition:
+ Hot and dry weather
+ Two distinctive seasons: rainy season and the dry one
+ The average temperature is 26-27°C, 75-85%; and rainfall is 800 - 2000 mm per year.
+ The total hours of sunshine are 2459 hours / year
+ The number of appropriate areas for development of Dragon fruit trees is 458.462 ha accounting for approximately 58.68% of natural areas.
Majoir Disease and Pests damaged Dragon fruit

Xanthomonas campestris; Enterobacter sp.
(Photo credit: Ngoc N.T.B)

Brown Spot Disease (Neoscytalidium dimidiatum)
(Photo credit: Khai L.Q.)

(Photos credits: Kyung San Cho, Hien NTT)
Dragon fruit production in Binh Thuan province

- Thousands of families, 23 co-operatives and 2 onions → Selling dragon fruit is plays an important role to income of local people.

- 7 - 9 crops/year → Fruit flies fed Dragon fruit all year around
Fruit Flies & International market

The European Union (EU) began strict phytosanitary inspections on agricultural imports. Fresh citrus fruits and mangoes, must be planted in certified orchards, and must not be affected by oriental fruit flies.

https://en.vietnamplus.vn/eu-enhances-inspections-on-vietnams-agricultural-products-from-sept-1/159835.vnp

Taiwan to begin importing mangosteen fruit from Thailand

A ban on the fruit has been in effect for over a decade due to problems with fruit flies.

The import of mangosteen fruit to Taiwan has been suspended since 2003 due to the spread of fruit flies, bactrocera carambolae and bactrocera papayae, in the fruit which are prevalent in Southeast Asia.

EN.VIETNAMPLUS.VN
EU enhances inspections on Vietnam's agricultural products fro...

Oriental Fruit Fly Eradication in Florida 2015–2016 Program Implementation, Unique Aspects, and Lessons Learned

Gary J Steck, Abbie J Fox, Daniel Carrillo, David Dean, Amy Roda, Nancy D Epsky, Trevor R Smith


Published: 07 June 2019

Fruit fly (Diptera: Tephritidae) are among the top threats

Fruit flies are greatly important in the process of expanding the export markets of fruit, as a national priority policy.
- Before 2004: Small scale fruit fly management was applied in separate orchards (Peach, Cherry, jujube, citrus, guava, luffa, bitten luffa ...) the effectiveness was low.

- 2004- 2008: Large scale fruit fly management conducted in hamlet on Peach, Cherry babados, jujube

- Since 2012- now: AW- IPM fruit fly management conducted on large area (village) on Dragon fruit, Malpighiales species, star apple
Pilot demonstration at Ham Hiep commune
(Ham Thuan Bac dist. Binh Thuan province)
Pilot demonstration at Ham Hiep commune
(Ham Thuan Bac dist., Binh Thuan province)

Total pilot project areas is 1567 ha

Core zone (581 ha)

Buffer zone (986 ha)

Control zone (16 ha)
Core zones: Three methods applied for fruit fly control

1/ Male Annihilation Technology (MAT)
- Using fiberboard block about 1 cm thick (5 x 5 cm);
- Place at 50m intervals, replaced every 2 - 3 months, maintained continuously throughout the year in the field to suppress the population of males.

2/ Protein Bait spot spray
- Ento-pro 150 DD + insecticide + water
- Spot sprays of around 50 ml of the mixture per tree (dragon or other tree nearby).
- Volume 400 points/ha
- Spraying at 10 days intervals; re-sprays if rainy

3/ Sanitation
Remove & destroy all fallen dragon fruit (plastic bag/ burned/ buried)
Buffer zones: Two measures applied for fruit fly control

1/ Male Annihilation Technology (MAT)

2/ Sanitation
Farmer practice

Spraying chemical

Male annihilation traps
Supporting activities for demonstration

Survey on host status
Surporting activities for demonstration in Ham Hiep village (Binh Thuan) (cont.)

Survey the fruit fly population, present/absent

Survey on host status: infested level, number of host, sensitive period,...
## Seasonable of major host

<table>
<thead>
<tr>
<th>Fruit</th>
<th>Month</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1 2 3</td>
</tr>
<tr>
<td><strong>Mango</strong> <em>(Mangifera indica)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Cherry</strong> <em>(Malpighia glabra)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Guava</strong> <em>(Psidium guajaba)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Dragon fruit</strong> <em>(Hylocereus undatus)</em></td>
<td></td>
</tr>
<tr>
<td><strong>Star fruit</strong> <em>(Averrhoa carambola)</em></td>
<td></td>
</tr>
</tbody>
</table>
The surveillance traps system in the demonstration

- Plastic trap with cotton wick
- Content: Methyl eugenol attractant.
- Re-new wick every 2-3 months
- Record the data Fly/trap/day
### Results of fruit fly suppression programme in Binh Thuan (2018)

<table>
<thead>
<tr>
<th>Content</th>
<th>Core zone</th>
<th>Buffer zone</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Average number of flies per trap per day (fly)</td>
<td>0.22-2.20</td>
<td>0.26-4.11</td>
<td>2.31-28.93</td>
</tr>
<tr>
<td>Damaged dragon fruit (%)</td>
<td>1.20-2.67</td>
<td>1.30-3.67</td>
<td>11.00-24.67</td>
</tr>
</tbody>
</table>
Suppression methods such as MAT, bait spot spray, sanitation brought high efficiency for fruit flies control in dragon fruit demonstration in Vietnam

<table>
<thead>
<tr>
<th>YEAR</th>
<th>AREA</th>
<th>HECTARES</th>
<th>OBJECTIVE</th>
<th>STRATEGY</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017 - 2019</td>
<td>5 communes</td>
<td>2000</td>
<td>Area-Wide Suppression</td>
<td>MAT- BAT- PILOT SIT</td>
</tr>
<tr>
<td>2019 - 2020</td>
<td>10 communes</td>
<td>5000</td>
<td>Area-Wide Suppression</td>
<td>REDUCE MAT- INCREASE SIT</td>
</tr>
<tr>
<td>2020 - 2024</td>
<td>All communes</td>
<td>20,000</td>
<td>Area-Wide Suppression. Fruit Fly Low Prevalence</td>
<td>SIT</td>
</tr>
</tbody>
</table>
Researchs support to sterile insect technique (SIT)

Mass rearing

Survival under stress condition

Flight ability

Sparial

Longevity, Maturation

B. dorsalis: 90Gy
B. correcta: 80Gy

Sexual competitiveness

Others trials
Future plans and support expected from other organizations

**Overall Objective:** To extend sustainable Dragon fruit production areas for improvement of farmers’ income in Binhthuan province

- a model of AW-IPM and SIT

[Garac dor, 2011]
ACKNOWLEDGEMENT

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Thank you for your attention