

IPM on Citrus with an Emphasis on Citrus Psylla Control in Tan Phu Thanh Village

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Abstract

In the demonstration of Mat orange with 500 plants on 6,700 m² at Tan Phu Thanh village, IPM was practiced this consists of cultural practices, biological control with the exploitation of green ants, chemical control with less pesticides and more oil spraying with emphasis on Integrated Control of psylla (vector of Huanglong bin disease), and Integrated Orchard Management for sustainable citrus cultivation. One year work has brought some fundamental data and good progressive results as well.

1. Introduction

Hoang long Bin (HLB) is of serious diseases which caused considerable loss for citrus industry in the Southern of Vietnam. The disease spread out through vegetative propagation and, beside that, citrus psylla (*Diaphorina citri* Kuwayama) play also an important role as the vector for the disease transmission (Aubert, 1984; Aubert 1987, Capoor et al, 1967). The result of pests and diseases investigation in Southern of Vietnam carried out by Huynh *et al* . 1995 showed that there was high population and wide distribution of psylla in the area. Therefore, to enhance the progress of citrus improvement, citrus psylla must be efficiently controlled.

This IPM practice was established at Long An, Tan Phu Thanh village in a demonstration of 6,700 m² with 500 Mat orange trees with the following objectives:

- To identify the pests and diseases and their natural enemies on citrus at Tan Phu Thanh village
- To control citrus psylla (vector of HLB) by IPM program application emphasis on management of green ants and oil spraying.
- To develop an IPM along with a training program for citrus growers at Tan Phu Thanh village.

2. Methodology

Location: Long An, Tan Phu Thanh village, in the 4- years -old orchard, area cover 6.700m², cultivar sweet orange, density 500 trees in total, the high of tree average 2,5 - 3m and canopy about 2,5 diameters.

Orchard management: Main activities could be:

- Pruning after harvesting
- Organic fertilizer application
- Minimize chemical fertilizer and pesticide application
- Good water management
- Orchard sanitary and fruits.

Integrated Pest Management (IPM):

- Monitoring schedule every week on the key pests and diseases of citrus
- Establishing the green ant colony to protest against citrus pests for reducing of pesticides application
- Selection of pesticides to maintain well green ant colony.
- Citrus psylla control by applying horticultural mineral oil (HMO), Applaud and Actara.

- Recording the presence of psylla by monitoring, trapping by yellow color trap and attractant plant (*Murraya panicula*)
- Establishing wind break

Observations:

- Every week the key pests and diseases population include citrus psylla, citrus leaf miner, citrus aphids, mealy bug, scale, thrips and citrus canker disease by monitoring 30 trees
- Hoang long Bin is detected by symptom observation and PCR test 1 time a year on the dry season (March to April)
- Quality of fruit: (color, mite/thrips blemish, scale infestations, canker infestations)
- Yield: (fruit number, fruit weight)

4. Result And Discussion

Results of integrated orchard management:

Table 1: Farming practical done in the orange demonstration orchard (Tan Phu Thanh, Cantho, 2001)

No	Activities	Performance	Dated
1	Observation to check the infested trees by symptom	168 trees	2/2/001
2	Cutting the infested trees after sprayed insecticides to control citrus psylla (two times after harvested)	168 trees	07/01
3	Investigation of pests, diseases and natural enemies		
4	Monitoring schedule weekly on the orchard		02/01
5	Set up yellow sticky traps	5 traps	2/2/01
6	Planting <i>Murraya paniculata</i> around the orchard (attractant agent to citrus psylla)	100 plants on 4 sides of the orchard	21/7/01
7	Holding a farmer meeting at Tan Phu Thanh	80 farmers attended	15/6/01
8	Removing the infested branches and fruit of citrus canker		
9	Spraying pesticides	12 times	
10	Pruning trees after the last harvest fruits		4/01;6/01
11	Planting water apple for the wind break trees in the remaining side of the orchard		6/01
12	Establish the colony of green ant	37 nets of green ants established	3/01

There were 168 trees with the typical and heavy symptom of Huanglong bin disease. After the last harvested on mid of June, all the infested trees of HLB were cut down and moved out after the cover spray insecticide for ensure no psylla presented in the infested trees. In the first year we could not observe the yield and quality of fruit, because the demonstration was conducted in the time of fruit developing stage.

Table 2: List of pests and diseases on citrus at Tan Phu Thanh, Can Tho

No	Common name	Scientific name	Part of tree damage	Severity
	Pests			
1	Citrus psylla	<i>Diaphorina citri</i> Kuw	Shoot, leaf	+++
2	Black citrus aphid	<i>Toxoptera citricida</i> (Kirkaldy)	Shoot, leaf	+++
3	Citrus leaf miner	<i>Phyllocnistis citrella</i> Stainton	Shoot, leaf	+++
4	Mealy bug	<i>Nipaecoccus viridis</i> (Newstead)	Fruit, branch	++
5	Thrips	<i>Scirtothrips dorsalis</i> Hood	Young fruit	++
6	Green coffee scale	<i>Coccuss viridis</i> (Green)	Fruit	+
7	Broad mite	<i>Polyphagotarsonemus latus</i> (Banks)	All tree	++
8	Citrus rust mite	<i>Phyllocoptruta oleivora</i> (Ashmead)	All tree	++
9	Red mite	<i>Panonychus citri</i> (McGregor)	Leaf, branch, fruit	+
10	Spined citrus bug	<i>Rhynchocoris humeralis</i>	Leaf, branch, fruit	+

11	Citrus butterfly	<i>Papilio demolus</i>	Leaf	++
12	Citrus butterfly	<i>Papilio polytes</i>	Leaf	+
13	Citrus rind borer	<i>Sprays endocarpa</i>	Fruit	+
14	White cicada moth	<i>Lawana conspersa</i>	Branch	+
Diseases				
1	Huang long Bin	<i>Liberibacter asiaticus</i>	All tree	+++
2	Tristeza	<i>Tristeza virus</i>	All tree	+++
3	Citrus canker	<i>Xanthomonas campestris var citri</i>	Leaf, branch, fruit	+++
4	Scab	<i>Elsinoe fawcettii</i>	Leaf, branch, fruit	++
5	Foot rot	<i>Phytophthora sp</i>	Root, stem	+
6	Black spot	<i>Guignardia citricarpa</i>	Fruit	+
7	Greasy spot	<i>Collectotrichum gloeosporiodes</i>	Leaf	++
8	Brown spot	<i>Alternaria sp.</i>	Leaf	+
9	Melanose	<i>Phomosis citri</i>	Fruit	+
Natural enemies				
1	Green ant	<i>Oecophylla smaragdina (Fab.)</i>	-	+
2	Green lacewing (*)	<i>Chrysopidae</i>	-	+
3	Transverse ladybird	<i>Coccinella transversalis</i>	-	++
4	Syrphid (*)	<i>Syrphidae</i>	-	+
5	Spider (*)	<i>Acarina</i>	-	++
6	Psylla parasitoid	<i>Tamarixia radiata</i>	-	++
7	Psylla parasitoid	<i>Diaphorencyrtus aligarhensis</i>	-	+

Note: (*) not yet identified +: to +++: increasing of severity

Basing on the investigation of identification pests and diseases in the orchard (Table 2), we set up the monitoring schedule and detecting citrus psylla present in the orchard. Besides, total of 5 yellow sticky traps have also been set up in the orchard. Collecting for data recording and replacing the traps were done every two weeks. *Murraya paniculata* known as a the best host of psylla but not pathogen was planted to attract citrus psylla. Water apple trees was planted at the remaining side of the orchard as wind break trees .

The cultural techniques applied to enhance the health of trees were consisted of pruning two times after harvesting on March and June, applying fertilizers and organic fertilizer (10kg/ each tree). In addition, orchard sanitary was usually done by removing all the infested part of the tree citrus canker damaged twigs and leaves was included (Table 1).

The green ant colony population was developed by supplying enough foods and development connecting all the trees in orchard by the nylon ropes to support green ant reproduction. The beginning, we started with three nets of green ant and now it developed to 37 nets located mainly on mango, durian and hot plum that planted mixing in the orchard.

Farmer meeting was hold in mid -June at Long An, Tan Phu Thanh village with total of only from Tan Phu Thanh but also its neighbors villages. Purpose and practical done in the demonstration were introduced and discussed with the farmers. It is expected that the cultural techniques in the demonstration would give a good effect on the community and more farmers will follow them.

Pests and diseases

We determined 14 species of insects, 7 kind of diseases, 5 predators and 2 citrus psylla parasitoids (Table 2). The key pests of citrus were Citrus leaf miner (CLM), citrus psylla, thrips, scale, and mite, major disease were HLB, CTV (Tristeza virus) and canker, particularly canker made a lot damage on leaves, branches and even fruits and caused fruit drop. 4 times of removed the infested parts of leaves, branches and fruits and spraying fungicide (cocide and kasuran) to were done to manage the pest and disease in the orchard.. The natural enemies identified very common were ladybird and spider *Tamarixia radiata*, the primary parasitoid of citrus psylla was also recorded (Table 2).

The population dynamics of pests

The recording population dynamics of key pests on the demonstration from Feb to August 2001 shown in fig 1. In general, the pests were not developed high population in the orchard.

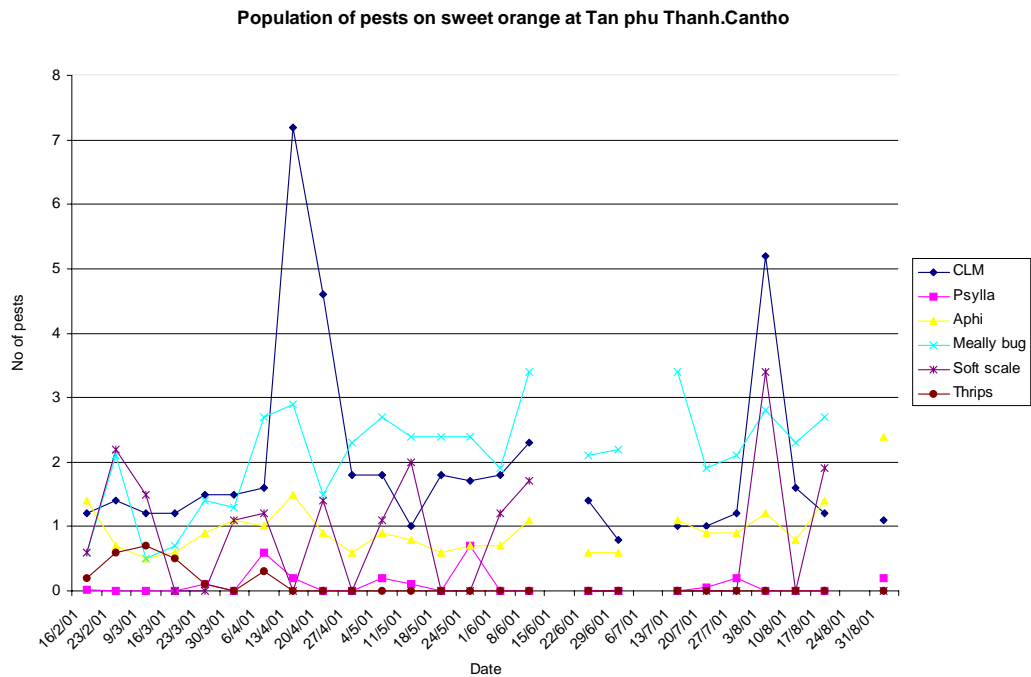


Fig 1: Population dynamics of pests on sweet orange at Tanphuthanh village

Citrus leaf miner was present all time in orchard with the numbers of larvae changed from 0.8 to 7.2 , and had two picks of developing in a flushing time on 13th April (7.2 larvae) and on 3rd August (5.2 larvae). This was in the flowering time; therefore, we applied HMO to control both the leaf miner and citrus psylla .

Citrus psylla was recorded 9 times present in the orange trees and 1 time on 26th September on yellow sticky trap (1 adult), and no psylla was seen in *Murraya paniculata* may be because of young trees. The number of larvae varied from 0.02 to 0.7 of larvae per shoot.

Aphids species recorded in demonstration was mainly Black citrus aphid with a small colonies. It was sometimes in young shoot. The control of citrus leaf miner and citrus psylla done flushing could also decrease the developing of aphid in the orchard.

Soft scales and mealy bugs were high population on fruits. Due to the citrus 2-3 times of harvesting a year in Can tho. Hence, pests and diseases may have condition to attack fruits all year around including thrips and mites. To manage this, spray HMO to controlling (Table 3).

Table 3: Spraying for pest control in citrus demonstration Tan Phu Thanh (Can tho, 2001)

Date	Products	Target pests
10/2/01	Suprsacide	Scale and mealy bug
25/2/01	Kocide	Canker, scab
15/3/01	D.C Tron Plus + Actara	CLM, Psylla, Mite, Mealy bug, scale
31/3/01	D.C Tron Plus + Actara	CLM, Psylla, Mealy bug, scale
21/4/01	D.C Tron Plus + Actara	CLM, Psylla, Mealy bug, scale
17/5/01	D.C Tron Plus + Actara	CLM, Psylla, Mealy bug, scale
10/6/01	D.C Tron Plus	Mite, Thrips
2/7/01	D.C Tron Plus	Mite, Thrips
20/7/01	D.C Tron Plus	Mite, Thrips
25/7/01	Kasuran	Canker
14/8/01	D.C Tron Plus + Actara	CLM, Psylla
20/9/01	D.C Tron Plus + Actara	CLM, Psylla

Integrated Orchard Management and Integrated Pest Management is going on Data so far recorded above may help for technical strategy in details in the demonstration.

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