



## **RATES PROJECT**

### **Improvement of Rural Agricultural Technology Extension System in Asia**

# **INTEGRATED MANAGEMENT TECHNIQUES FOR SNAILS DAMAGE TO DRAGON FRUIT**



**Pham Hong Hien, Ngo Van Dung, Dao Thi Hang, Trinh Xuan Hoat, Nguyen Thi Chuc Quynh, Nguyen Thi Hoa, Pham Van Son, Ha Thi Kim Thoa, Phung Quang Tung, Bach Thi Diep, Nguyen Thi Ngoc Truc, Tran Ngoc Phu Tinh, Do Duc Sang, Nguyen Nam Giang, Bui Quang Dang, Hoang Van Hong**

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## MANUAL

# INTEGRATED MANAGEMENT FOR SNAILS ON DRAGON FRUIT

## I. GENERAL INFORMATION

### 1. Name of technique

Integrated management process for snails on dragon fruit.

### 2. Authors

Pham Hong Hien<sup>1</sup>, Ngo Van Dung<sup>2</sup>, Dao Thi Hang<sup>2</sup>, Trinh Xuan Hoat<sup>2</sup>, Nguyen Thi Chuc Quynh<sup>2</sup>, Nguyen Thi Hoa<sup>2</sup>, Pham Van Son<sup>2</sup>, Ha Thi Kim Thoa<sup>2</sup>, Phung Quang Tung<sup>2</sup>, Bach Thi Diep<sup>2</sup>, Nguyen Thi Ngoc Truc<sup>3</sup>, Tran Ngoc Phu Tinh<sup>3</sup>, Do Duc Sang<sup>4</sup>, Nguyen Nam Giang<sup>1</sup>, Bui Quang Dang<sup>1</sup>, Hoang Van Hong<sup>5</sup>

<sup>1</sup>: Vietnam Academy of Agricultural Sciences;

<sup>2</sup>: Plant Protection Institute;

<sup>3</sup>: Southern Fruit Research Institute;

<sup>4</sup>: University of Natural Sciences; <sup>5</sup> National Agricultural Extension Center

Presiding organization: Vietnam Academy of Agricultural Sciences.

Address: Vinh Quynh, Thanh Tri, Hanoi

Tel: (+84) 24.38615487

Fax: (+84) 24.38613937

Website: <http://vaas.vn>; <http://vaas.org.vn>

### 3. Source of manual

The manual is established based on the research results "Research on integrated management measures for snails harmful to dragon fruit and orange trees in some southern provinces" of the Vietnam Academy of Agricultural Sciences. The technique is applied in the project "Improvement of Rural Agricultural Technology Extension System in Asia" in Binh Thuan with the support of AFACI. It is adjusted to fit with local conditions.

## II. TECHNIQUE CONTENT

### 2.1. Contents of the technical process

#### Cultivation treatment:

- Pruning and cutting treatment:

+ For dragon fruit fields in the basic construction stage, it is necessary to regularly clean and prune branches, especially those along the pillars. After pruning, it is necessary to collect and process the cut parts, not to scatter them in the field or at the root pillar of the dragon fruit tree.



+ For dragon fruit fields in the business stage, producers need to collect and treat the old and diseased branches when pruning branches and flowers. Branches and flowers can be used as traps to attract and eliminate snails after collection at the beginning of the rainy season.

- Fertilization: Manure 20 - 23 kg/pillar/year; nitrogen fertilizer 1 - 1.3 kg/pillar/year; phosphate fertilizer 3.6 kg/pillar/tree; potassium 0.7 - 0.8 kg/pillar.

### **Snail detection investigation**

Regularly inspect dragon fruit fields (check on trees and the ground) to detect the presence and damage of snails and take appropriate preventive measures.

### **Manual treatment:**

- Catch and eliminate snails by hand while visiting the fields, taking care of dragon fruit trees,

- Collect plant residues and clean grass.

- During the dry season, producers can take advantage of packaging (fertilizer packaging...) placed under the dragon fruit canopy (combined with flowers and dragon fruit branches if available) to attract snails to gather and eliminate (The number of bags and distance depends on the conditions of the people, places with high snail density need more).

Note: collect in the early morning (5-6 am) or evening (8-9 pm).

### **Biological and herbal treatment**

- Use herbal medicine containing Saponin after the rain at the end of the dry season

- The beginning of the rainy season (April to May).

Note: when using, choose the right time for the drug to affect the snails fully.

### **Chemical measures:**

- Use attractant food combined with chemical drugs:

+ Step 1: Collect dragon fruit flowers and dry them. Dragon fruit flowers are collected and dried (during the dry season when snail density is low and inactive, January, February, and March every year) or collected and used directly (at the beginning of the rainy season in April and May).

+ Step 2: Soak the flowers (collected and dried) in water for about 30 minutes to soften the petals or use flowers picked directly from the garden, place them in a pile/point (diameter about 0.5m<sup>2</sup>), can combine with dragon fruit branches after pruning (do not use diseased branches to avoid spreading the disease).

+ Step 3: Spread granular chemical drugs evenly on the points with food (dragon fruit flowers and branches) to destroy them. Use drugs containing active ingredients



Metaldehyde, Niclosamide, or a combination of both active ingredients, the dosage of granular drugs for each trap is about 20 grams/point.

Application time: early rainy season (April, May every year).

- Treatment with chemical drugs: chemical drugs are treated in the evening (after 18:00), treated after watering, and best after afternoon showers. You should use granular chemical drugs containing active ingredients such as Metaldehyde and Niclosamide or a combination of both active ingredients for treatment, with the dosage according to the recommendation on the packaging.

## **2.2. Application locations**

Dragon fruit growing areas of Binh Thuan, Tien Giang provinces, and neighboring dragon fruit growing areas with similar ecological conditions.

## **2.3. Scope/conditions of application**

- The process is applied for the integrated management of *Acusta tourannensis* snails that damage dragon fruit in Binh Thuan, Tien Giang and neighboring areas with similar ecological conditions.

- Chemical pesticides containing active ingredients Metaldehyde and niclosamide; biological and herbal pesticides containing Saponin are only recommended after being registered in the List of pesticides permitted for use in Vietnam to prevent snails on dragon fruit trees.



## APPENDIX

### INSTRUCTIONS FOR DISTINGUISHING SNAILS THAT DAMAGE DRAGON FRUIT TREES

#### 1. Composition of snail species that are harmful to dragon fruit trees

8 snail species that are harmful to dragon fruit trees in Binh Thuan province were identified, including 6 snail species (*Allopeas gracile*, *Lissachatina fulica*, *Subulina octona*, *Acusta tourannensis*, *Bradybaena similaris*, *Succinea tenella*) and 2 slug species (*Laevicaulis alte*, *Valiguna siamensis*), belonging to 4 families (Achatinidae, Camaenidae, Veronicellidae, Succineidae), belonging to 2 orders (Stylommatophora, Systellommatophora).

#### Composition and prevalence of snail species that are harmful to dragon fruit

No	Name	Family	Frequency of popular						
			6	7	8	9	10	11	12
I	<b>Bộ Stylommatophora</b>								
1	<i>Allopeas gracile</i> (Hutton, 1834)	Achatinidae	0	0	0	+	0	0	0
2	<i>Lissachatina fulica</i> (Bowdich, 1822)	Achatinidae	0	++	++	+	0	0	0
3	<i>Subulina octona</i> (Bruguière, 1789)	Achatinidae	0	+	+	++	0	0	0
4	<b><i>Acusta tourannensis</i> (Souleyet, 1842)</b>	<b>Camaenidae</b>	+++	+++	++++	++++	+++	++	++
5	<i>Bradybaena similaris</i> (Férussac, 1822)	Camaenidae	0	0	0	+	0	0	0
6	<i>Succinea tenella</i> Morelet, 1875	Succineidae	0	0	0	-	0	0	0
II	<b>Bộ Systellommatophora</b>								
7	<i>Laevicaulis alte</i> (Férussac, 1822)	Veronicellidae	0	+	++	++	0	0	0
8	<i>Valiguna siamensis</i> (Martens, 1867)	Veronicellidae	0	0	+	++	+	0	0

*Note:*

-: Very rare or rare, frequency of occurrence <5%;

+: Rare, frequency of occurrence > 5 - 20%;

++: Moderately common, frequency of occurrence > 20 - 50%;

+++ : Common, frequency of occurrence > 50-70%;

++++: Very common, frequency of occurrence > 70%

#### 2. Characteristics of the main snail species that are harmful to dragon fruit trees

**Common name:** Small snail, Land snail.

**Scientific name:** *Acusta tourannensis*

**Morphological characteristics:** Medium-sized snail, spherical shell, shell with 5½-6 swollen spirals. Shell color varies from light yellow to yellowish brown, with a purple mouth rim. There are many raised ridges on the surface of the shell, arranged in a radial pattern. The navel is wide, and about 1/3 of the area is hidden by the cylindrical edge of

the mouth rim. The body is located at the top of the shell, the mantle sometimes protrudes outside the shell and is clearly visible. The spiracle is large, and breathing can be observed.

Biological and ecological characteristics: *Acusta tourannensis* is active in high-humidity environments, especially after rain or after the garden is watered. They are often active in the evening or early morning when the weather is cool, and there is a lot of dew. During the day, when the weather is hot and sunny and the soil humidity is low, they often take shelter under layers of litter, rotten leaves, or piles of crop residues. They often cause severe damage during the rainy season (from April to November every year). During the dry season (from November to April of the following year), when the environmental conditions are unfavorable, this species can secrete mucus to create a false mouth cap, milky white, sealing the shell opening. The main food consists of fresh plants such as leaves, young stems, flowers, fruits, and rotting plant parts in dragon fruit gardens.



Seven snail species appear in the dragon fruit garden A: *Allopeas gracile*, B: *Lissachatina fulica*, C: *Subulina octona*, D: *Acusta tourannensis*, E: *Bradybaena similaris*, F: *Succinea tenella*, G: *Laevicaulis alte*, H: *Valiguna siamensis*



Adults, eggs, and newly hatched snails of the main snail species that damage dragon fruit trees

*Acusta tourannensis*



Adult snail shells of the species *Acusta tourannensis* damage dragon fruit.



The snail *Acusta tourannensis* species damages parts of dragon fruit plants.

**3. Harmful effects of *Acusta tourannensis* snails on dragon fruit**

- Snails directly eat parts of the plant such as buds, young branches, flowers, young fruits, and ripe fruits, affecting the growth and development of the plant.
- Snails eat the fruit peel, creating slime on the fruit peel and fruit ears, affecting the appearance of the fruit, and reducing the price of dragon fruit when put into trade.

#### 4. Image of creating attractive points to prevent snails



Dragon fruit flower combined with chemical drugs



Dragon fruit branches combined with chemicals



Flowers and dragon fruit branches are placed between pillars at about 10m/point.