

Golden Apple Snail (GAS) in Vietnam: Introduction, Impact and Management

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Introduction of Golden Apple Snail (GAS) in Vietnam

GAS belongs to genus *Pomacea*, family Ampullariidae, order Mesogastropoda, class Gastropoda, phylum Mollusca.

GAS origins from Amazon Basin, South America. It was introduced into Asia and Southeast Asia in late 1970s and early 1980s (Cowie, 2001). Firstly, GAS served as protein sources for local people but after escaped to the field, they rapidly become a major pest for agriculture, especially for rice.

In Vietnam, GAS was introduced from many sources without quarantine inspection to the Southern (Ho Chi Minh City) in late 1980s. At first, GAS was reared in small pond with few individuals (2-3 pairs) to provided protein for people. Before 1988, GAS was reared by only some household for their protein demand. Without knowledge about GAS's origin and damages; farmers were encouraged to rear the snail for their food like others animals: fish, duck...

After that, GAS was brought via the Central to the Northern part of Vietnam for commercial culture. In 3/1990, the company of Fishery service brought GAS to the Northern Vietnam and grazed them at the company's branch. That may be the first introduction, and due to that, GAS spread to 19 places of the Northern provinces.

With favourable condition (especially in the Southern part), GAS multiplied and spread rapidly and caused serious damages on different crops, particularly on rice and morning-glory.

Impacts of GAS to agricultural production

Due to its short life cycle, and suitable climate; GAS developed and spread rapidly. In addition, heavy rains and flood help GAS to disperse faster and more widely. Humans also brought GAS from one part to other parts of the country without understanding about its harmful effect. Preliminary experiments of Plant Protection Department (PPD) showed that: GAS destroys 7-15 days seedlings seriously. Up to 10/1994, GAS was recorded in 38 out of 53 provinces in the whole country.

Table 1: Statistical survey data of areas infested by GAS 1994-1997 in Vietnam.

Years	Areas infested by snails			
	Rice (ha)	Morning-glory (ha)	Ponds & lakes (km ²)	Canals and rivers (km ²)
1994	1.678	140,3		
1995	3.872	205	8.723	1.050
1996	57. 863	2.087	12.923	2.744
1997	109. 715	3.479	15.182	3.886

Source: Project TCP/VIE/6611

During the dry season (winter season) due to low temperature (some time below 12 °C); GAS density and quantity in Northern Vietnam are much fewer than in the Southern part. However, in some provinces where the temperature is usually above 20 °C, GAS reproduced very fast and destroyed wide areas of rice. In 1994, Nghe An province had 260 ha infested with an average density of 200-250 snail/m². Quang Tri province had 4.000 ha of morning-glory crop infested heavily. In some areas of Thua Thien Hue province, a lot of young rice paddies were seriously destroyed: There were times when farmers had to reseed several times.

Management of GAS

Recognizing the serious danger of GAS, particularly posed to rice and morning-glory crops, the Government of Vietnam gave a clear policy measures and full support for the control of GAS.

1. Policy and control measures:

- 31/3/1994, Ministry of Agriculture and Food Industry (now is Ministry of Agriculture and Rural Development - MARD) published the list of plant quarantine pests of Vietnam. GAS was considered a plant quarantine pest group II: "Pest not widely distributed in territory of Vietnam". Then, in May 1998, it was listed in group III: "Dangerous pests of potential serious damage for Vietnam".
- 29/9/1994, the Prime Minister of Vietnam launched a Directive number 528/TTg on prohibition of rearing, selling and transportation of GAS.
- 11/3/1995, the Prime Minister of Vietnam launched second Directive number 151/TTg emphasizing on the mobilization of all human resources for emergency GAS control.
- A National Steering Committee on GAS control was set up with three Ministries involved: Ministry of Agriculture and Rural Development, Ministry of Science-Technology-Environment, Ministry of Fishery.
- Two GAS control campaigns were launched in the country (from 9/1994-6/1995). During the campaigns many farmers, pupils, students, soldiers... were mobilized to participate in GAS control.
- The PPD has printed several millions of leaflets, pictures, posters and provided free of charge to farmers.

Because of these activities, GAS had been collected and destroyed thereby limiting the infestation.

Table 2: Weight of GAS and egg masses collected and destroyed in provinces in Vietnam.

Years	GAS (tonnes)	Egg masses (tonnes)
1994	548,2	147,0
1995	11,4	1,8
1996	87,2	17,9
1997	328,6	38,5
1998	86,5	8,6

Source: Plant Protection Department, 2000

However, the infested areas had increased from year to year. Up to now, GAS appears through out the country.

The policy and control measures as well as the mass media like television, radio, and newspaper were involved in dissemination of information and the Directives of Prime Minister making people aware of the damages and control measures of GAS. Farmers had used many methods to prevent and destroy GAS frequently.

2. Management methods of GAS in Vietnam

- Use Geographical Information System (GIS) to determine the infested areas
- The best simple and easy way to control GAS is handpick
- Chemical method: According to Le Duc Dong, 1998 (PPD), Bayluscide 250 EC (applied at 0,12 ml/m²) provided excellent control of GAS 5 days after treatment. Padan 98% WP (0,12 g/m²) in 7 days and Meta 6% (0,80 g/m²) 10 days after treatment; Lime (65 g/m²), Meta 5% (1,20 g/m²), CuSO₄ (0,55 g/m²) showed a lower efficacy to GAS.
- Rotex 5% (3g/m²) provided excellent control of GAS 7 days after treatment.
- Most of applied chemical and botanical pesticides were toxic to fish. However, Meta 5% (1,20 g/m²) and Meta 6% (0,80 g/m²) were shown to be safe for fish.
- Botanical method: Ricinus leaves, papaya leaves, cassava leaves, jackfruit skin, taro leaves were used to attract GAS.
- Biological method: Use natural enemies of GAS to control them (fish, duck).

In Southern Vietnam: hybrid catfish was identified as a good species which can easily to release and had a good effect on snail's eating. Percentage of eating of snails is 80-90%.

In Northern Vietnam: common carp and black carp reduced substantially density of snail. The result obtained in the experiments in Nghe An province showed that: percentage of snail's eating of two species is 73% and 87%.

- IPM method: This method has been popularly used in Vietnam and gained good results in control GAS.

➤ Before transplanting:

- ❖ Herd duck and handpick GAS in rice paddies
- ❖ Chemical method can be used when the water level in the paddies is 3-5 cm.
- ❖ Use botanical substances to attract GAS and handpick them.
- ❖ Set up bamboo screen or nylon screen on the water inlet to prevent adult snail.
- ❖ Use some other physical methods like conduct small canal in the paddies.

➤ During transplanting:

- ❖ Transplant old seedlings (most use for Northern part)
- ❖ Herd duck after 30-45 days after transplanting and continue to handpick adult snails and egg masses
- ❖ Put bamboo sticks in the paddies to attract adult snails to lay eggs
- ❖ Continue using the botanical methods to attract snails

➤ After harvesting:

- ❖ Duck pasturing, handpicking and dry land preparation
- ❖ Plant other kinds of vegetable if possible to keep land dry

Conclusions

GAS appears in the whole country now but due to good policy measures of the Government of Vietnam and other activities, GAS' development has been reduced and limited. However, all of the activities will be difficult in flooded condition, as flooding occurs frequently in Vietnam. Therefore, frequent and continuously activities are necessary for controlling of GAS. In the future, we should promote researches and collaborations between countries to find out the best way to control GAS infestation and use GAS as a useful material for human everyday life.

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