

GOLDEN APPLE SNAIL DAMAGE AND MANAGEMENT PRACTICES IN RICE FARMERS' FIELDS IN THE LAO PDR

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INTRODUCTION

Geographic setting

The Lao PDR or Laos, formerly known as the “Country of Million Elephants” is situated in the center of the South-East Asia peninsula. It shares border with China in the North, with Thailand and Myanmar in the West, Vietnam in the East, and Cambodia in the South. This geographic situation renders Laos as a land-linked, which provides favorable basis for the country becoming the centre of economic, cultural and environmental crossroads, if appropriately managed.

The altitude for two thirds of the country ranges from 200 to 2820 m. It is a country of rolling mountains and plateaus (about 85 percent of its territory), which is a barrier to development of economic infrastructure, transportation, communication and production, but which creates wide variations in climate, soils, and ecological niches leading to locally adapted and diverse biota, which calls for a variety of agricultural practices and lifestyles.

Two seasons predominate, a monsoon season from May to September and a dry season. Annual rainfall varies from 1,300 to 3,000 mm, but often falls short of the level needed for paddy rice farming. Localized drought and flooding create periodic crop failures, resulting in food a shortage, which hits severely the pockets of heavy poverty.

The Mekong River, originating in the Himalayas, traverses the entire length of the country. It provides fertile floodplains for agriculture and also serves as a main artery of transport and water. Most of the country's rivers flow into it. The tributaries of the Mekong River within the country hold a tremendous potential for national hydropower development.

Socio-economic setting

The Lao PDR remains predominantly a rural society with only 18 % of the population being classified as urban in 1991, 25 % being expected to be urban by the year 2000. Its population is composed of three main ethnic groups, which assemble 48 ethno-linguistics groups and therefore engenders a cultural and custom diversity.

Although much efforts and energy have been invested since 1975, and particularly since 1986, the adoption of the New Economic Mechanism, to upgrade the education of the population, there are still inadequate education facilities and poorly developed communication and transportation infrastructure, which seriously affect the rural areas of the country. This is the result of many factors, but mostly related to the lack of capital for public spending.

The agriculture and forestry sectors will still remain as the basis of the national socio-economic development. Therefore, the Government strives to protect this resource base from wasteful utilization and degradation.

The socio-economic development plan 2001-2005 features two main goals: firstly, to ameliorate the economic base of the country, and secondly, to eradicate poverty of its population in order to improve the living conditions of its people. Furthermore, the Government has developed the following eight national priority programs: Food self-sufficiency, stop slash and burn shifting cultivation, market production, basic infrastructure development, improve economic cooperation with other countries, rural development, human resources development and development of the service sector.

It is a declared goal of the Government to lift the country out of poverty by the year 2020, so that it would be among the developing countries (i.e. no longer among the least developed countries).

Environment setting

The main environment issue in Lao PDR is deforestation, mainly due to mismanaged logging and conversion of forest land to other uses under rapid population growth, activities of local resource users in maintaining a subsistence base in the face of external competition for the use of the forest resource. The key elements are: (i) the lack of a system of a forest management and lack of incentives for concession operators to carry out conservation management practices, (ii) encroachment of upland areas by lowland farmers, (iii) declining productivity of shifting cultivation practices, and (iv) impact of forest fires. As a consequence of

rapid disappearance of forest, there is severe soil erosion, particularly along important bank rivers, biological resources loss, and watershed degradation.

Lao PDR ranks as one of the biological richest countries in the region, not because of its high rate of taxonomic diversity or endemism, but because of a significant area of the country is covered by primary forest. It provides habitat to more than 250 species of wildlife, which are either unique to the country or considered as threatened or endangered internationally: 67 percent of the large mammals, 53 percent of the bats, 6 percent of the insectivore, 14 percent of the murid rodents, 22 percents of the birds, 25 percent of the reptiles, and 2 percents of the amphibians¹.

Laos's rich biological and cultural diversity have given rise to a diversity of agro-ecosystems, such example, 13,600 genetic varieties of rice have been identified in the country. This is second in the world only to India, a country with 14 times the area as Laos and 200 times as many people (IRRI, cited by the State Planning Committee 2000).

I. Area under rice production

Table 1. Rice Area under Rice Production.

Year	season	Cultivated rice area (ha)	% of extent damage by GAS
1991	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	387,453 13,134	
1992	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	387,495 15,500	
1993	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	350,520 13,000	
1994	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	378,000 11,000	
1995	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	430,140 13,300	
1996	<ul style="list-style-type: none"> • Rain-fed lowland • Irrigated rice 	434,010 18,300	
1997	<ul style="list-style-type: none"> • Rain-fed 	454,725	

	lowland • Irrigated rice	25,755	
1998	• Rain-fed lowland • Irrigated rice	447,427 54,212	
1999	• Rain-fed lowland • Irrigated rice	480,792 87,030	
2000	• Rain-fed lowland • Irrigated rice	510,000 100,000	

II. Extent of damage by GAS

GAS (*Pomacea* spp. from Thailand) were first introduced at Sikhotabong District of Vientiane Municipality in 1991 and spread out in three villages namely: Viengsavanh, Nahai and Phosi. First damages to lowland rice fields were reported in 1992. Few years later (1994), they were brought from Vietnam to Northern provinces of the country, mainly as a source of food.

Since then, GAS has spread to 10 of 17 provinces of the country mainly by way of connecting waterways such as irrigation canals and rivers as well as by people. GAS does most attack young rice seedlings (seedbed up to 20 days after transplanting), and consequently fields infested with GAS have to be re-planted several times in order to replace the missing hills.

The shell can cause severe injures to people working in the field. Collecting GAS in the field has become inefficient in severely infested areas, and due to labor constraints farmers turn to use unspecific chemicals for help (e.g. Niclosamide or Baylucide, and copper sulfate...). But these chemical products pollute water and are serious threat to other aquatic organisms living as well as to the health of people working in the paddy fields.

Meanwhile many different control techniques were developed by the Agricultural Extension Center and have been already transferred to farmers. The core of technologies was focused on integrated apple snail management by a combination of different techniques applied simultaneously such as: protection of entrance of snails to the rice field, hand picking, transplanting with old seedling, reduction of water level in the rice field, using a variety of local experiences, and particularly controlling action should be done seasonally. Many people in the Lao PDR are still unaware of the threat; therefore they are attracted by the snails' colorful egg masses and bring it with them as a delicacy.

Existing programs

To protect the environment as well as the consumers from harmful effects to health caused by misuse and mostly of unregistered pesticides, the Lao government

strongly discourages their use. Several research programs in the Lao PDR have been set up to find suitable alternatives (notably the use of ecological products) to conventional pesticides for the control of pests:

- The National Agricultural Research Center, in cooperation with the Lao-IRRI project, has initiated research experiments testing the efficiency of several biological controls against GAS.

These activities are still underway and searching for appropriate and effective solutions to these issues.

III. Pesticide used to control GAS

Farmers were used chemicals to immediate kill such as:

- Niclosamide 70% WP
- Metaldehyde 5%
- Copper sulphate WP

IV. Farmer's criteria for the choice of a chemical

Most of farmers were used criteria the choice of a chemical, first is immediate kill. Second is ease of application. Thirst is cost and the last is efficacy.

V. Utilization of GAS by rice farmers (%) for:

Table 2. Utilization of GAS by rice farmers.

Utilization	%
Food	85
Farm animal feed	14
Liquid bio-fertilizer/compost	1
Bio-control of weed in rice fields	-
Any other use	-

VI. CONCLUSION AND SUGGESTIONS

The prevention and management of GAS in Laos are still at the infancy stage due to the lack of qualified staff, financial constraint, the short of appropriate information, and the lack of legal framework, notably on its implementation, as well as the low level of the Lao society awareness on the negative impacts of alien species to the health of the population, and to the economy as well as the environment of the country.

However, there is a crucial need for the Lao Government to take into serious consideration, since the outset, destructive impacts of GAS before this issue to be spread out into the entire country.

Therefore, in order to effectively prevent and manage GAS in the Lao PDR, there is a necessity to consider these suggestions:

1. Promotion and development of the economic incentives on the sustainable use and conservation of national biological resources, specifically on the indigenous species;
2. Promulgation of appropriate legislation, particularly related to the introduction of invasive alien species, emphasizing on the cooperation and support of local communities;
3. Strengthen capacity of local staff, notably on taxonomy, tropical botany and zoology;
4. Establishment of National Network or Working Group related to the prevention and management of GAS;
5. Promotion of researches on the positive and destructive impacts of GAS, notably on the destructive effects of invasive alien species;
6. Promotion of awareness on the destructive impacts of GAS at all level of the Lao society and at school;
7. Creation of the National Biodiversity Conservation Fund in order to effectively address the GAS in a sustainable manner;
8. Cooperation with relevant institutions at the sub-regional, regional and international level related to this issue, such as information sharing, capacity strengthening and collaboration of research.