EL CARAGOL ACUATICO (*Ampularia canaliculata* L.) PLAGA DEL ARROZ BAJO RIEGO EN REPUBLICA DOMINICANA

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Introduction

In the last decade of 20th century, new pests affected rice production in Dominican Republic. Among those, there is the aquatic golden apple snail (GAS) of rice. This pest is considered the most important because of the direct damages caused to the crop and the effects of the chemical control on the environmental pollution.

The biological aspects of GAS and the characteristic of the rice production system prevalent in the country, based on the application of irrigation by flooding have allowed the development of its population dynamic, rapid dissemination in the rice production areas, and the contamination of rivers and water dams.

Its presence has implicated social, agrological and economical problems, causing an expansion of panic situation among farmers, institutional conflicts, introduction of new agronomic practices, poisoning of water for irrigation, increase in production cost and pest control, besides the reduction of profit from the crop.

The magnitude of its importance is so big that government institutions from the Dominican rice sector had realized joint efforts oriented to the development and technology transfer to reduce and to slow down its effects on the production.

GAS Origin

This pest was detected damaging of the rice plantation in Jayaco, Bonao, Dominican Republic in 1991. It is not an endemic species, possibly introduced from Taiwan as a herbivore to clean ponds used for fish production.

Distribution and Importance

98% of Dominican rice production area is cultivated under irrigation by flooding, contributing to the rapid multiplication and dissemination of the GAS that has been infested 80% of the zones. Damage ranges are estimated in a range from 5 to 20%. At national level, technical staff of the State Secretary of Agriculture has reported the infestation of northcentral, northwest, northeast and south paddy areas.

Meanwhile the damage of this pest has been reported in Guyana, Surinam, Philippines, Florida, Taiwan, Brazil, Argentina, and Colombia.

Classification

Kingdom: Animal

Phylum: Mollusca

Group: Mollusc

Class: Gasteropod

Subclass: Eutineuros

Order: Pulmonate

Suborder: Estilomatoforos

Family: Ampularidae

Genus: *Ampularia*

Species: *canaliculata*

Description

The aquatic GAS of rice is a mollusc; its body is composed externally of four parts:

1. Shell. It is a rough and rigid structure, with channels and sharp borders, giving the body a spiral formed development.

2. Foot. It is a muscular mass with a mantle aspect, used to float and move in its habitat, sliding by undulatory contractions of the muscles. GAS foot secretes mucus that enables them to shift on solid surfaces.

3. Mouth. It is located in the ventral part of the head and it is used to carry the intact food to its digestive organs, where it will later be digested and decomposed.

4. Head. It has two long retractile tentacles with an eye at each end. Also, two short tentacles or feelers, which are useful for orientation in its habitat, can be observed.

GAS Behavior

This mollusc proliferates in aquatic environments, in recently drained rice fields it closes its shell and it makes holes to burrow itself, protecting itself from the adverse conditions. It eats fresh or rotted organic matter, and also aquatic microfauna. In rice fields it can consume pregerminated seeds, rice plants of less than 35 days old and weeds in early development stages. The GAS has a very intense sexual life. It is oviparous, with preference for night oviposition habits; its eggs were deposited in the channel banks, dams or walls, on the stem of rice plants, over any vegetation and material above the irrigation water level. An oviposition can have a mass of 20 to 400 eggs that at early stages are reddish and viscous, looking like a bunch of grapes. Egg eclosion occurs at 15 to 20 days after oviposition. Oviposition period is every five days from three months old. On average, the GAS species can live for two to three years.

Direct Damage

GAS can consume pregerminated rice seeds and rice plants of less than 35 days old to nourish itself during its growth and development stages. Damages to crop are greater on the direct sowing practice and in areas with leveling problems. The greater rate of foliage consumption takes places during the first 20 to 30 days in its life cycle, when a GAS with four centimeters tall and weighing 22.0 grams consumes a daily average of 32 seedlings in the stage with two to four

leaves. A population of 40 GAS per square meter can consume 60% of sown seedlings. This mollusc has not been observed making any damage to paddy fields after the stage of or after 40 days of cycle, surviving from other feeding options.

Indirect Damages

This mollusc causes difficulties to the agronomic management and harvest because those affected areas need to be sowed again increasing the production cost and contamination, due to the control practices and the application of molluscicide in the irrigation water.

GAS Management

Management practices applied in Dominican Republic have been pilot projects carried out with government support for the manual re-collection and destruction of eggs and GAS in affected areas with high populations. Dominican government has carried out research programs for the chemical control of GAS, allowing campaign for molluscicide application, monitoring before and after the application, offering farmers a technology to fight against this gastropod. The monitoring before and after the application has shown the effectiveness of the chemical products used (See figure 1).

Incidence of Chemical Control on Production Cost

Dominican farmers perform one or two applications of fungicide with molluscicide action to control GAS of rice. This involved the consumption of 30,000 to 50,000 liters or kilograms of plaguicide, whose active chemical ingredient is Fentin, tin acetate or Fentin tin hydroxide. Chemical control of this plague has a cost close to US$4,350,000 in a rice production area of 91,195 hectares. Farmers due to the presence of this GAS do not earn this percentage that represents 3.46% of the total cost of production of US$125,788,166.7.