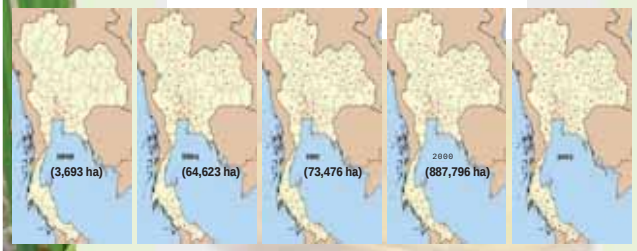
Spread Prevention & Control of Apple Snail: Country Report in THAILAND

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1/ RICE DEPARTMENT
2/ DEPARTMENT OF AGRICULTURE

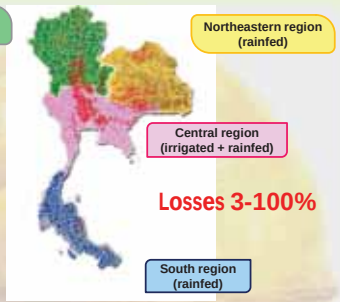
Patterns of Spread of GAS

Progressive map of the spread



Area infested

Serious in northern and northeastern region



Losses 3-100%

Internal spread

- Irrigation (canal)
- Water supplied inlet
- Human food
- Ploughing and harvesting machine





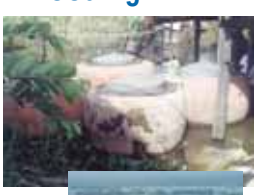
Perception on the problems

- Not serious problem for policy makers because the losses was not effected yield.
- Areas damaged are not seriously reported.
- Farmers in rainfed areas became more affected.



Other factors

- **Flooding**









Invasion pathways of GAS

•Introduced from Japan to Thailand in 1982 as an aquarium pet and farm for export, known as



"Hoi Cherry"

• Some snails escaped to the wild and became a serious pest in paddy rice fields.

• In 1989 newly seedling was first damaged in 8 provinces in the central plains

Utilization of GAS (Fertilizer)



Impacts of GAS infestation

LEVELS	IMPACTS
Agriculture Ecosystem Levels	Farmer's misused(abamectin) causing BPH outbreaks.
Community level	Competition with native snail (*Pila ampullacea*) for food and space.
Species level	New species was not reported.
Farm workers & health Hazards	-Intermediate host of the rat lungworm (a human endoparasite) and nematodes (that causes eosinophilic meningoencephalitis) -Broken shells -Toxic hazards to farmers or to non-target organism
Environmental Level	-water pollution including loss of biodiversity in waterways as a result of increase in pesticide misuse/abuse -Lower water quality
Economic losses	No record

Utilization of GAS (Animal feed)



Fishes, duck, Poultry





Utilization of GAS (Food)







Utilization of GAS

- **Handicrafts**







- **Brick**



Public Education



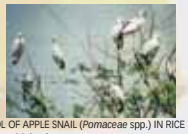



Future Threats Of GAS

Prevent spreading

➢ Biological control



Public Education

Leaf let



Poster



Future Threats Of GAS

Suggesting prevent spreading

Campaign





Future Threats Of GAS

- After big flood, the spread still have occurred in central plain and continued to northeastern and northern region.
- The infestation are increased in the rainfed areas.
- The present control did not effective in rainfed areas
  - ❖ could not control water level in the fields.
  - ❖ molluscicides had lower efficient.

Natural product

- **Plant traps to collect adult GAS after planting**
- **Use plants that contain toxic substances against GAS (saponin substance)**
- **Fertilizers**



- **Animal and fishes feed**



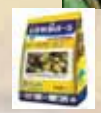
Management guidelines

- **Mostly used**

Molluscicides

- **Tea seed powder**
- **Niclosamide**
- **Metaldehyde**





New Paradigms

Innovative lesson learn>>> "GAS Village" Launching



Management guidelines

- **Most effective (Integrated Pest Control)**

Natural control

- **Herd duck**
- **Birds (Asian Openbill, Greater Coucal)**
- **Tea seed powder**





Knowledge Gaps

Technical

- **Few research in population dynamics and fluctuation (Forecasting)**
- **Taxonomy (new species surveillance)**
- **Yield loss measurement(economics)**

New Paradigms

New research on GAS

- ✓ **Plant substances toxics** (such as neem, derris, citronella grass, pepper, curcuma cashew nuthell and bitter bush)
- ✓ **Collecting machine**
- ✓ **Mechanical trap**



Lessons Learned

The most effective method of control **IPC (Integrated Pest Control)**

- Place a screen on the main water inlet and outlet for collecting GAS
- Fertilizers
- Human food campaign
- Tea seed application (molluscicides)





Lessons Learned

1. GAS Protection and Extension Campaign Project since 1982 by DOAE
2. International Workshop on Ecology and Management of GAS in Rice Production in Asian. 1997 (FAO organizer)
3. In-country Workshop on GAS controlling Strategy by DOA
4. Innovative implemented (Prevention Village)

Information Sharing

Publication sharing

- Efficiency of Soapberry Extraction on Cell and Mortality of Golden Apple Snail. Proceedings of 41th Kasetsart University Conference: Science, Natural Resources and Environmental Economics: 208 - 213 (2004)
- Efficiency of Soapberry Extract (*Sapindus emarginatus* Wall) and Diethyl malate on Mortality of Golden Apple Snail (*Pomacea canaliculata* Lamarck) and Impact on Nile Tilapia (*Oreochromis niloticus*). Proceedings of 42nd Kasetsart University Conference: Science, Natural Resources and Environmental Economics: 393 - 401 (2003)

Knowledge Gaps

Control management

- Control method
- Microbial / Physical/mechanical by mechine
- By product research

Policy (depend on economics)

Information Sharing

Publication sharing

- Genetic Diversity and Molecular Markers in Introduced and Thai Native Apple Snails (Pomacea and Pila). Journal of Biochemistry and Molecular Biology, Vol. 37, No. 4, July 2004, pp. 493-502
- GENETIC DIVERSITY OF INTRODUCED (POMACEA CANALICULATA) AND NATIVE (PILA) APPLE SNAILS IN THAILAND REVEALED BY RANDOMLY AMPLIFIED POLYMORPHIC DNA (RAPD) ANALYSIS. AJSTD Vol. 20 Issue 3&4 pp. 289-306 (2003)

Information Sharing

Publication sharing

- Effect of Aestivation on Sperm Quality and Reproductive Organ in Male Golden Apple Snail, *Pomacea canaliculata* Lamarck. Proceedings of 44th Kasetsart University Annual Conference : Science: 410 - 417 (2006)
- The Utilization of Cashew Nut Shell Crude Extract for Golden Apple Snail (*Pomacea Canaliculata)*
- Effect of Molasses on Golden Apple Snail Silage Production .Kasetsart J. (Nat. Sci.) 40 : 135 - 140 (2006)
- Application of Natural Substances and Microbial for Golden Apple Snail Control.

Information Sharing

Publication sharing

- The Golden Apple Snail, *Pomacea canaliculata* Research and Management in Thailand. International Workshop on Ecology and Management of GAS in Rice Production in Asian. 1997
- Environmental and Hormonal Factors in Sex Reversal of Golden Apple Snail *Pomacea canaliculata* (Orbigny). MS Thesis
- Investigation on Sex Reversal of the Golden Apple Snail, Pomacea canaliculata (Orbigny). MS Thesis

Government Policies & Regulations

- Cross-border Collaborations
  - No collaborative in the past
  - May be in ASEAN country collaborative project
- Regulations
  - ❖ Plant quarantine/SPS

Thank you for your attention



Action Plan in Mitigating GAS Spread & Infestation

- Fertilizer production promotion
- Innovative Pilot Village Lauching





Conclusions

- ❑ Will be important in rainfed rice fields
- ❑ Can spread to neighboring country
- ❑ Need more research in ecological system impact
- ❑ Launching GAS village