Towards Eradication of giant African snail *Achatina fulica* in Trinidad and Tobago

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Introduction

- Giant African snail, *Achatina fulica* Bowdich (Mollusca: Achatinidae) is a serious pest
- One of the worlds worst 100 invasive alien species
- Attacks over 500 species of economic plant species – prefers:
  - breadfruit (*Artocarpus sp*.)
  - cassava (*Manihot esculenta*)
  - cocoa (*Theobroma cacao*)
  - most species of legumes, crucifers and cucurbits

Distribution

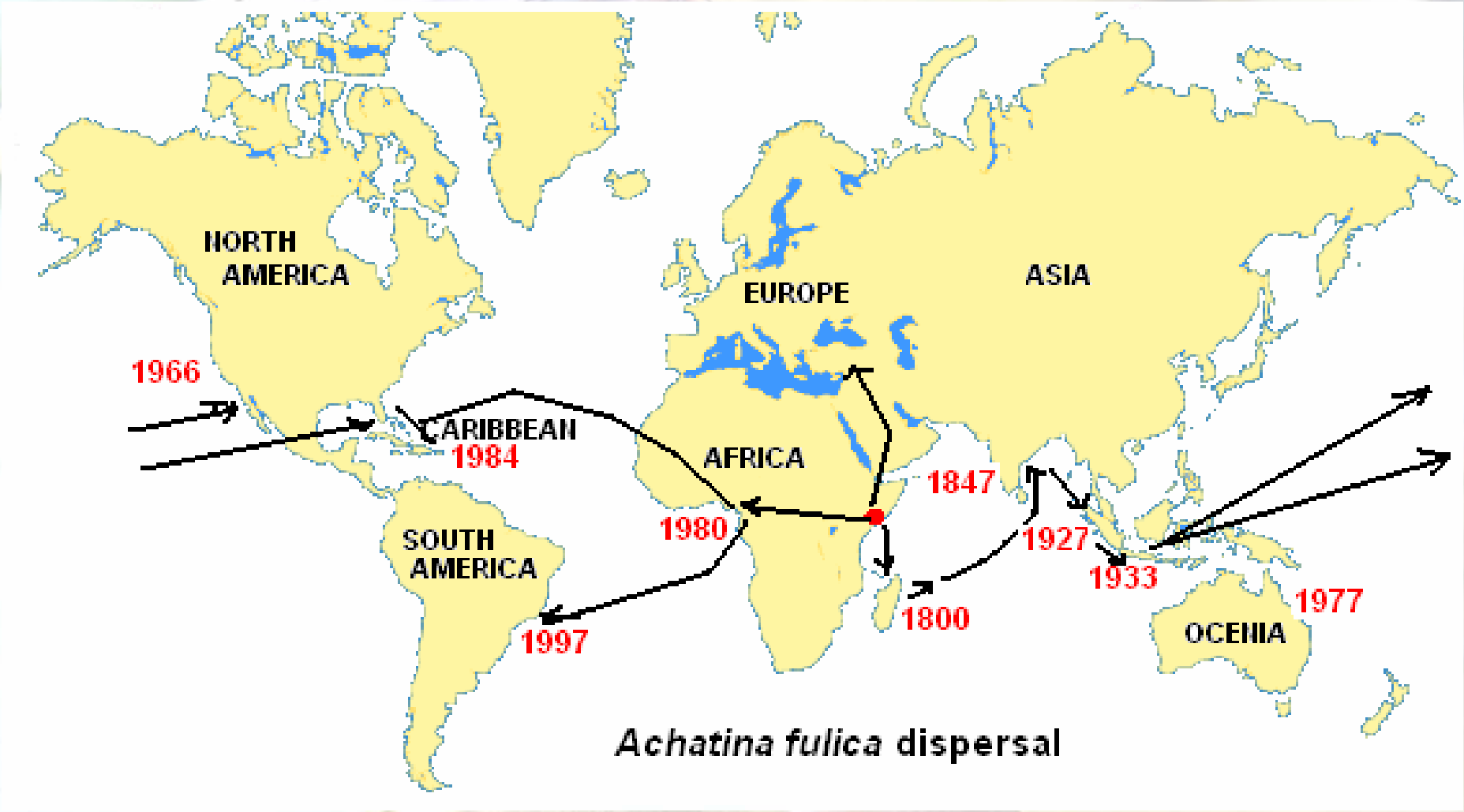


Figure 1: World distribution of *A. fulica*

Distribution (cont'd)

Figure 2: Distribution of giant African snail in the Caribbean Region

Biology and Ecology

- Eggs are pale yellow or cream in colour, oval in shape, 4-5mm in diameter

- Laid in clutches from 100-400 three to four times per year

- Lay more than 500 per clutch depending on maturity of the snail, environmental conditions

Biology and Ecology cont'd

- Most eggs are laid:
  - during the wet season
  - in soil debris
  - in depressions
  - under objects
  - and hatch in 1-17 days

Biology and Ecology cont'd

- Average live span of *A. fulica* is 4-5 years
- Lives up to 9 years
- Rapidly multiplies and establishes itself in a relatively short time in a new environment
- *Achatina fulica* is nocturnal
- More active in the rainy season
- More abundant after heavy rains

Biology and Ecology cont'd

- During the day it hides in cool sheltered areas
- Can be found
  - on and in bricks
  - in crevices on walls
  - on plant detritus,
  - within the plant canopy
  - under plants

Biology and Ecology cont'd

- Signs of snail presence:
  - Defoliation
  - Extensive rasping
  - Slime trails
  - Ribbon-like faeces

Biology and Ecology cont'd

A. fulica :

- may aestivate during dry weather
- emerges from aestivation when conditions become humid and wet to feed
- is a hermaphrodite
- produces viable eggs by reciprocal copulation
- could store sperms for > 1 year sperm after a single mating
- can establish a whole colony (single fertilized snail)

Survival in Trinidad

In the Northern Range due to:

- soil with high calcium carbonate content
- year round maintenance of shrubs, lawns and trees
- high rainfall and humidity during the wet season
- absence of predators or natural enemies

Plant Damage

- Frequently reported on crucifers, cucurbits, and legumes
- Not observed in Diego Martin
- Some damage observed:
  - Diego Martin - *Heliconia sp, Spathiphyllum sp*.
  - Guadeloupe - sugar cane seedlings, cucumber, yam, dasheen, banana and papaya
  - St. Lucia - papaya, mango, breadfruit, and some ornamentals
  - Barbados - breadfruit, sweet potato, cabbage and cucumber

Damage of *A. fulica* on *Heliconia sp.*, and *Spathiphyllum sp.*

Heliconia sp.

Spathiphyllum sp.

Nuisance Factor

Multiplies in such large numbers resulting in

- Nuisance on households/housing communities
- Not possible to walk a pathway without crushing the snail
- Defacement of walls leaving ribbon-like faeces
- Slime trails on walls, floors and concreted areas
- Dead and decomposing snails that leave an obnoxious scent on properties

Examples of Nuisance

Vector

- *Angiostrongylus cantonensis*, the rat lungworm
- Causes eosinophilic meningitis in humans
- Bacteria - *Aeromonas hydrophilia* and *Salmonella* - cause several health problems
- Plant pathogens - *Phytophthora spp*.

Eradication

- Quite costly
- In Florida, estimated that an annual loss of $US 11 million in 1969 without control measures
- Florida - successfully eradicated in 1975 at a cost of $US 1.0 million
- In Gordonvale, Queensland, Australia an outbreak was successfully eradicated in 1977
- Currumbin Valley, Australia 1984

Objectives

- Eradicate *A. fulica*

- Fulfill the requirements to determine pest free status for *A. fulica* in Trinidad and Tobago.

Methodology

Delimiting Surveys

- Determine the boundaries of the four infested areas

- Core zones
  - Protection
  - Public Outreach Zones

Eradication Strategies

Four-pronged approach:

- Surveillance
- Collection and destruction of snails
- Application of snail baits
- Public education.

In Addition:

- National Task Force on *A. fulica*
- Recommendations were made to declare *A. fulica* a Notifiable Pest
- Samples screened for *Angiostrongylus cantonensis*

Eradication Strategies (cont'd)

- Every plot of land in each of the core zone was surveyed
- Beyond the core zone random checks were made 50 m apart to in all directions
- Snails were sought
  - under leaf litter
  - discarded boxes
  - walls and shrubs
  - drains
- Snail baits containing 3.0% metaldehyde were applied every two weeks

Eradication Strategies (cont'd)

- Each property was baited an average of 16 times
- Others were baited over 28 times
- More than 1,000 properties were surveyed
- 10,000 cumulative properties were treated with 2.0 tonnes of snail bait

Monitoring Surveys

- Conducted every two weeks
- Determine changes in the population over time
- Assess the efficacy of the implemented programme
- Five (5) residential plots were randomly selected within the core zone
- Data collected fortnightly
- Counts of live and dead snails plots

Public Awareness

- 15,000 brochures and fact sheets on *A. fulica* were distributed
- 5000 brochures were distributed to county offices
- Five seminars and two Town Meetings held
- A full page advertisement was placed on three daily newspapers in August/September 2009
- A 30-second advertisement was aired on three television stations from September to December 2009

- Ministry's website http:www.//agriculture.gov.tt

Testing for *Angiostrongylus cantonensis*

- Nine samples (a sample consist of 6-9 GAS) of snails were sent to the Veterinary Laboratory

Notifiable Pest Status for *A. fulica*

- Request was made to have *A. fulica* declared a Notifiable Pest under Act 13 of 1975

Results and Discussion

Delimiting Surveys

- *A. fulica* was confirmed within <1.0 km² area at each of the four (4) core zones

Collection of snails

- Approximately 5546 snails (*A. fulica*) were collected over a 17 month period
- greater number of dead snails than live snails

Table 1. The Number of *A. fulica* collected November 2008 – March 2010

Year	**No. of *A. fulica***
2008	1349
Jan 2009 – March 2010	4197
Total	5546

Figure 3. The Total number of *A. fulica* collected from January 2009 – March 2010

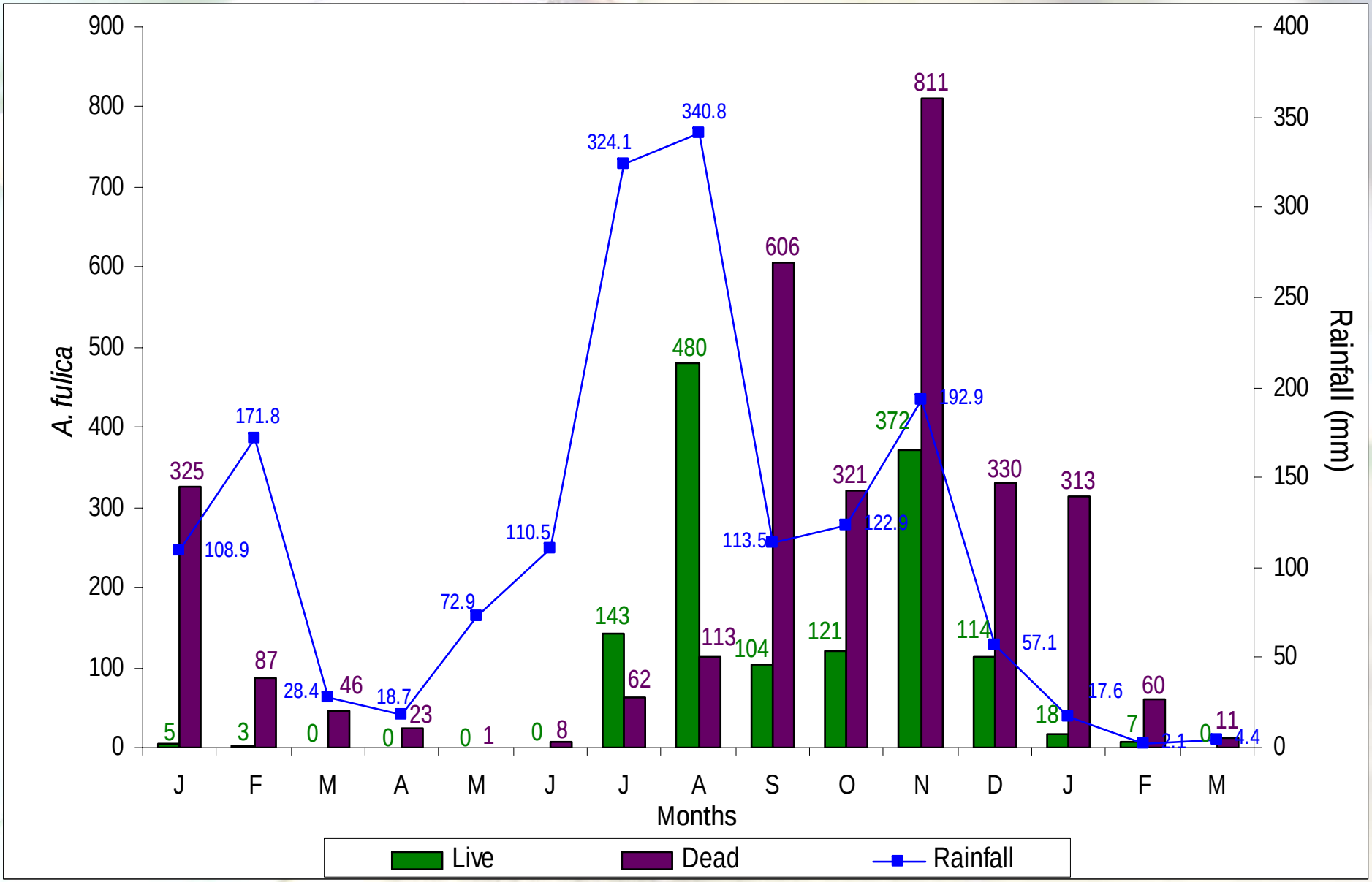
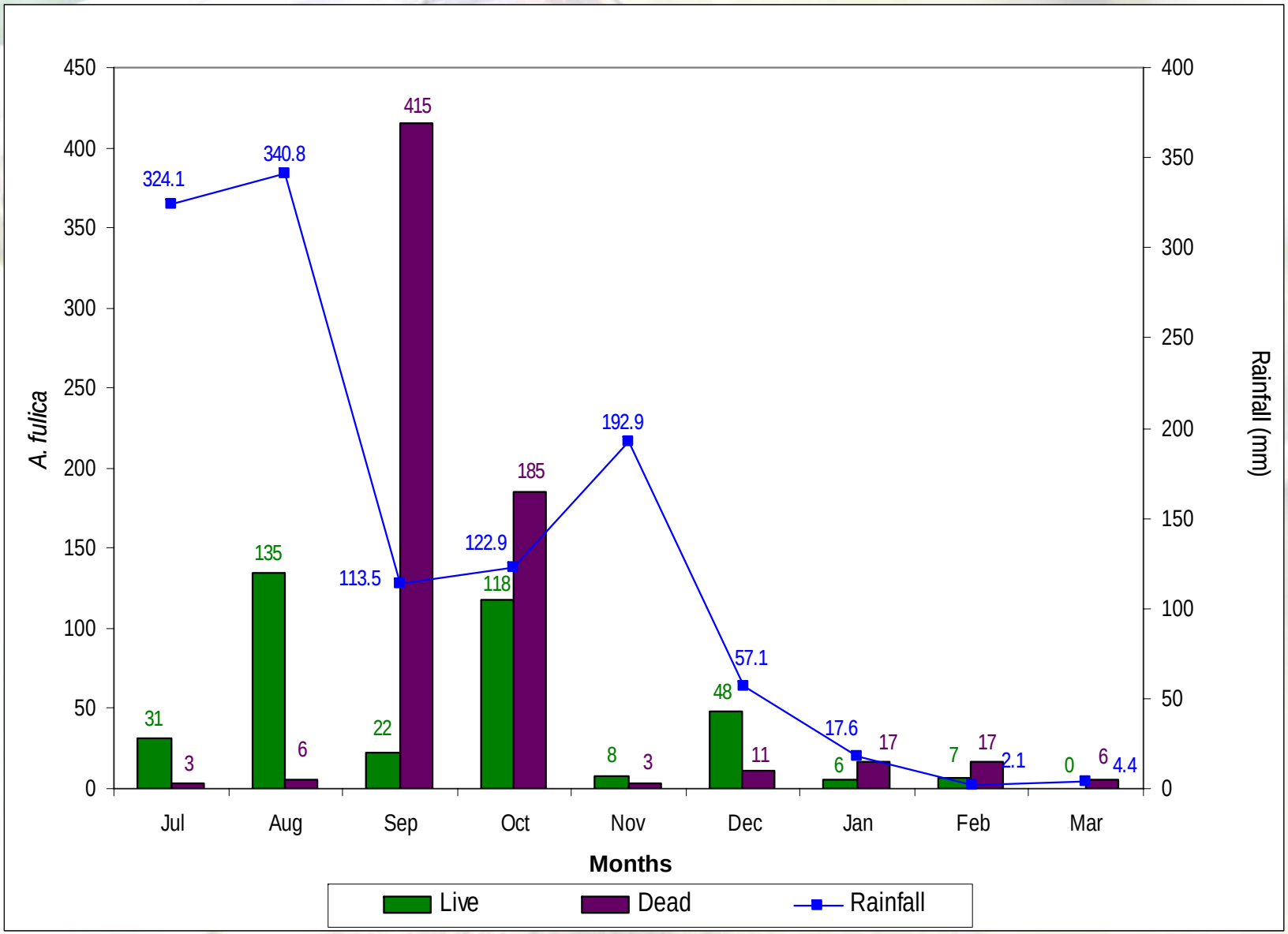


Figure 4. Total *A. fulica* Population Dynamics from July 2009 to March 2010



Core Zones

Alyce Glen and Environs

- No live snail were collected from March to July 2009
- Resurgence in August
- Snail numbers had declined to two in December 2009
- March 2010, no live snails were collected

Blue Range/Goodwood Gardens Westmoorings

At Blue Range

- December 2009, the numbers of live snails collected had drastically reduced to one
- March 2010, no live snails were collected

At Goodwood Gardens

- Live snails decreased from 103 in July 2009 to one by January 2010 to zero in February and March 2010

At Westmoorings

- a decline in live snails to zero by March 2010

Westmoorings

Snail Decline

Decline in the number of live snails may be attributed to:

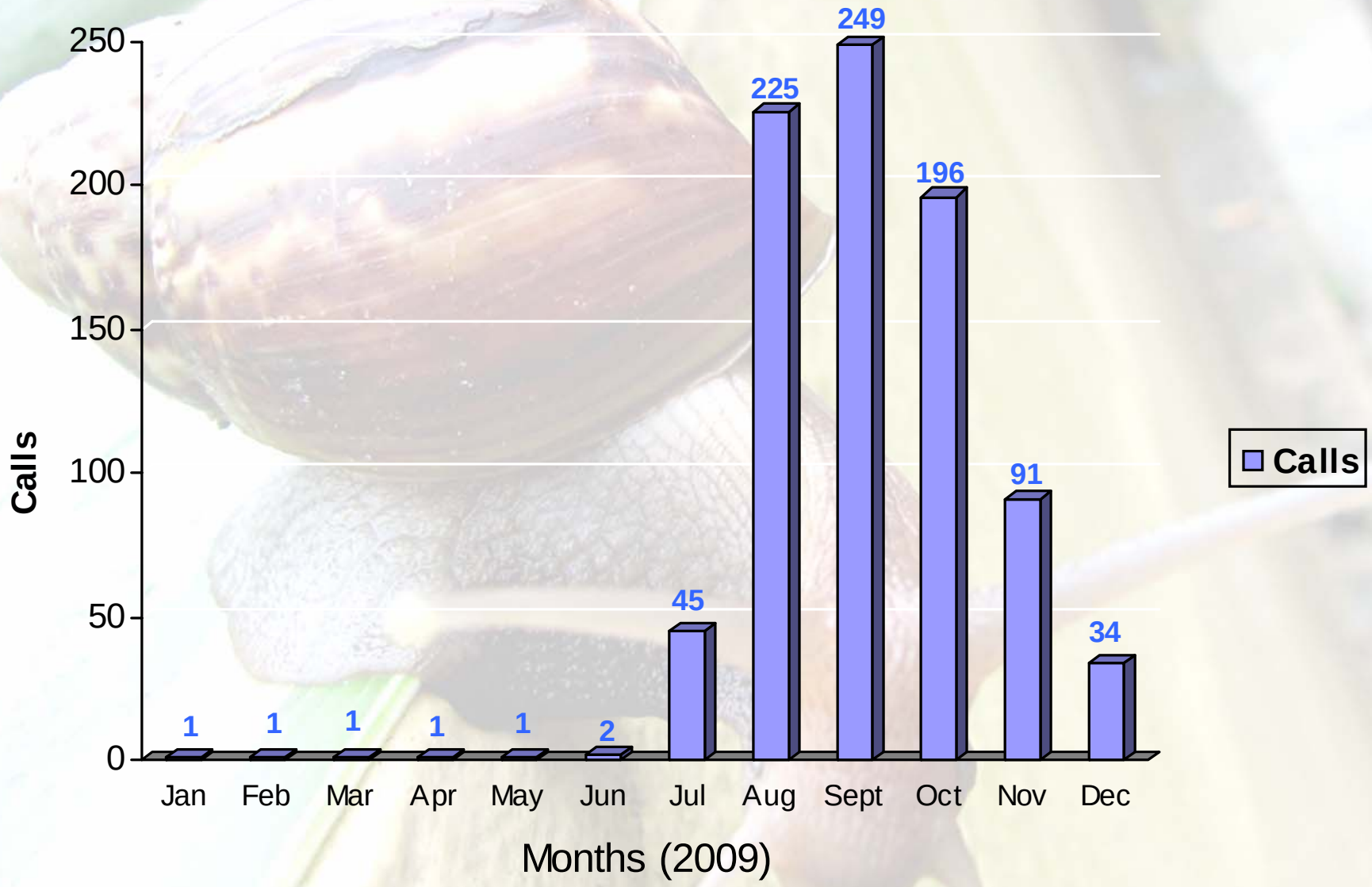
- Dry weather conditions
- Intensive baiting and collection activities

Monitoring Surveys

Population Dynamics

- Number of live snails peaked in October 2009
- Fluctuated during the drier months from December 2009 to March 2010
- Indication of the effectiveness of the eradication programme

Figure 5. The number of hotline calls received, January to December 2009



Total number of calls received was 852 of which 841 was investigated

Table 2. The number of hotline calls received and investigated in 2009, Trinidad

County/Location	Calls received	Calls Investigated	Calls positive for GAS	Calls negative	*Calls unknown
St. George West:					
- Petite Valley	82	81	11	42	28
- Diego Martin	267	261	9	192	60
- Westmoorings	66	66	3	41	22
St. George West - other areas	208	207	0	146	61
St. George East	115	115	0	82	33
St. Andrews/ St. David	2	2	0	1	1
Caroni	34	32	0	26	6
Victoria	67	66	0	49	17
St. Patrick East	2	2	0	1	1
St. Patrick West	7	7	0	5	2
Nariva/Mararo	2	2	0	2	0
Total	**852**	**841**	**23**	**587**	**231**

* No snails were observed at these properties

Testing for Angiostrongylus cantonensis

- *Strongylus sp*

Notifiable Pest Status

- March 2010, - *A. fulica* a Notifiable Pest: citizens are now obligated to report all sightings of giant African snail in their properties

Outlook

- Study is preliminary
- Requires a period of 2-4 years of monitoring after the last snail sighting to declare an area to be pest free
- Eradication efforts are therfore ongoing through:
    - Public awareness
    - Collection and destruction of snails
    - Application of snail baits
    - Surveillance

Towards achieving pest free status for giant African snail

Acknowledgements

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THANK YOU