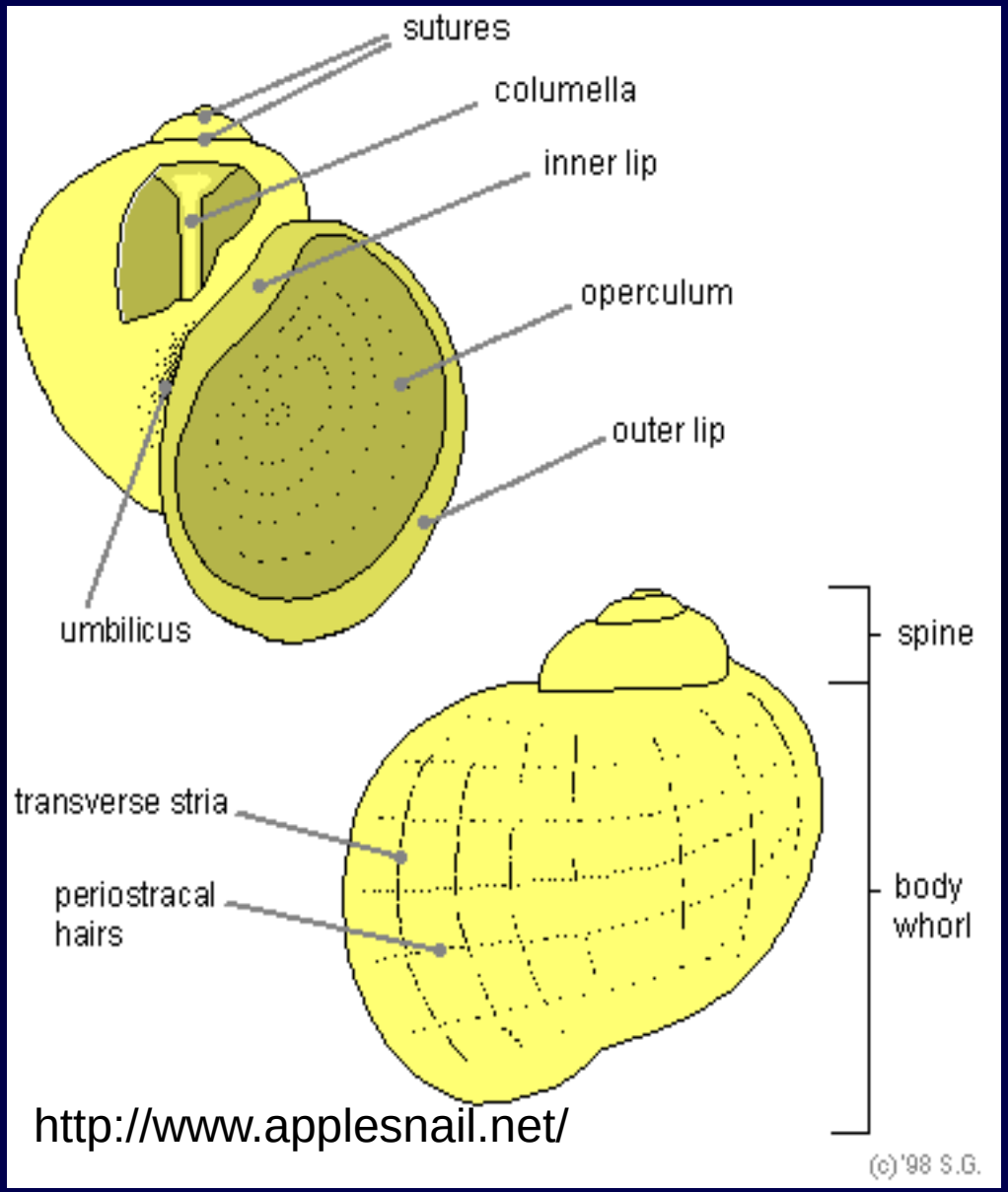
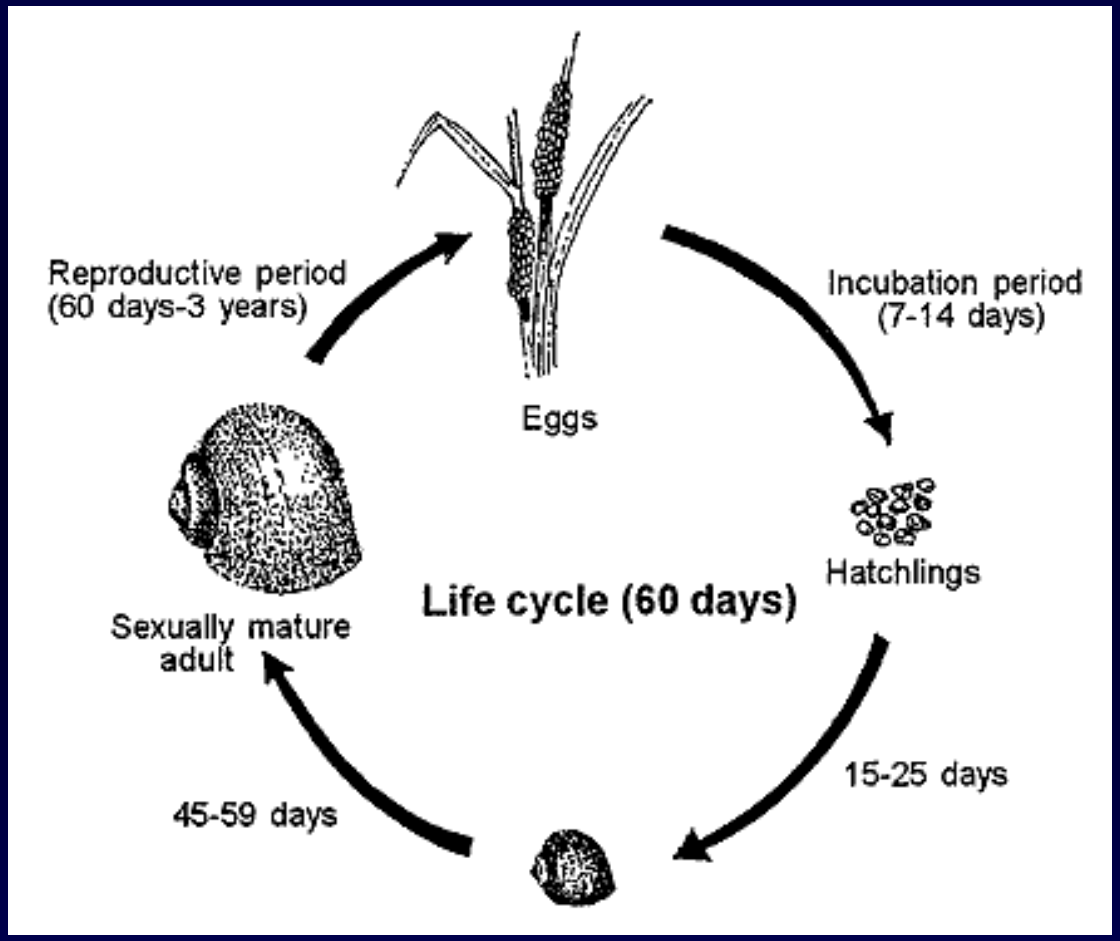
Preliminary Investigation of Island Applesnail (*Pomacea insularum*) Distribution and Control Methods Applicable for Natural Areas in Southern Louisiana.


sutures
columella
inner lip
operculum
outer lip
umbilicus
spine
transverse stria
periostracal hairs
body whorl
http://www.applesnail.net/
(c)'98 S.G.

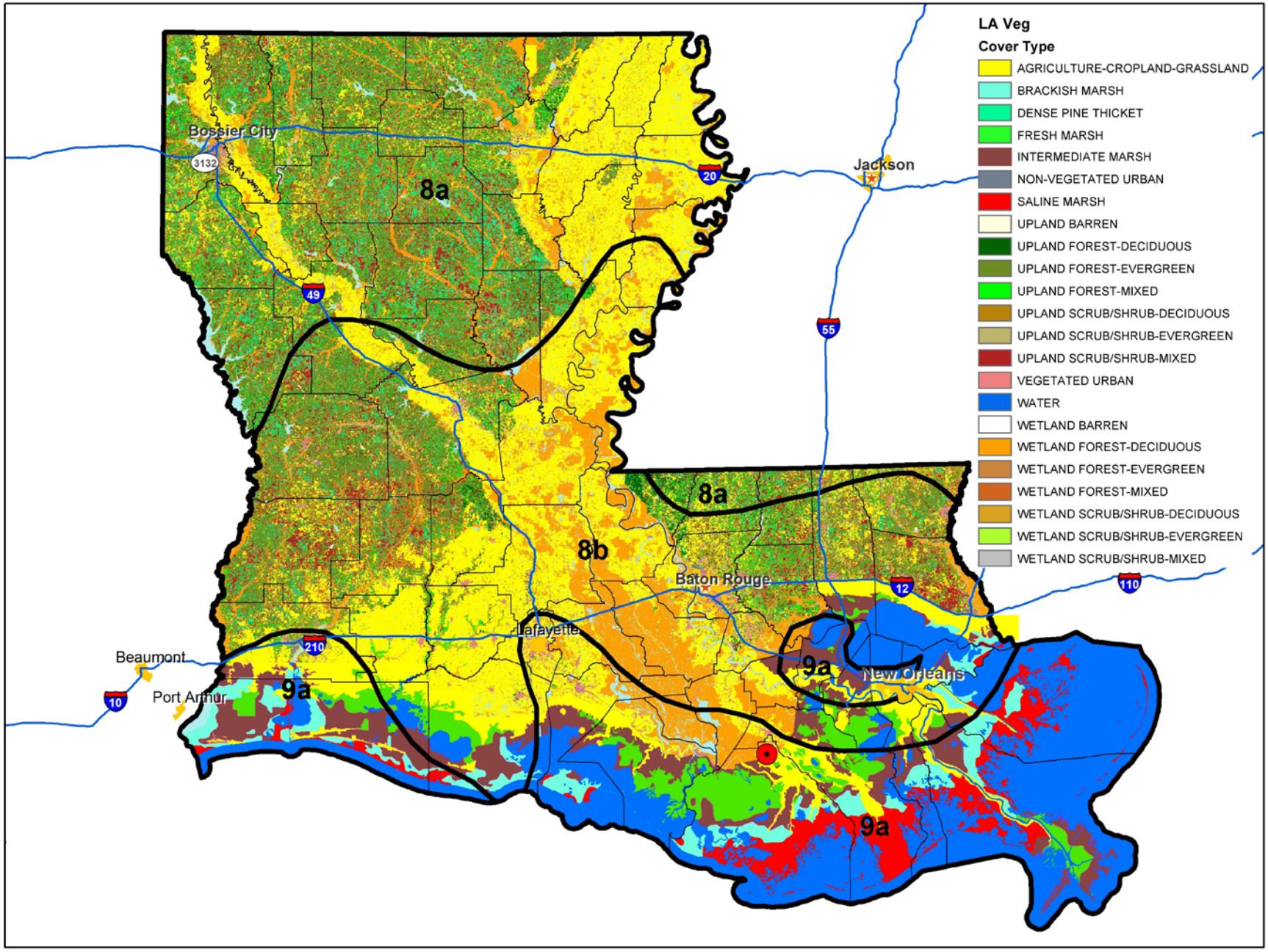
Life Cycle

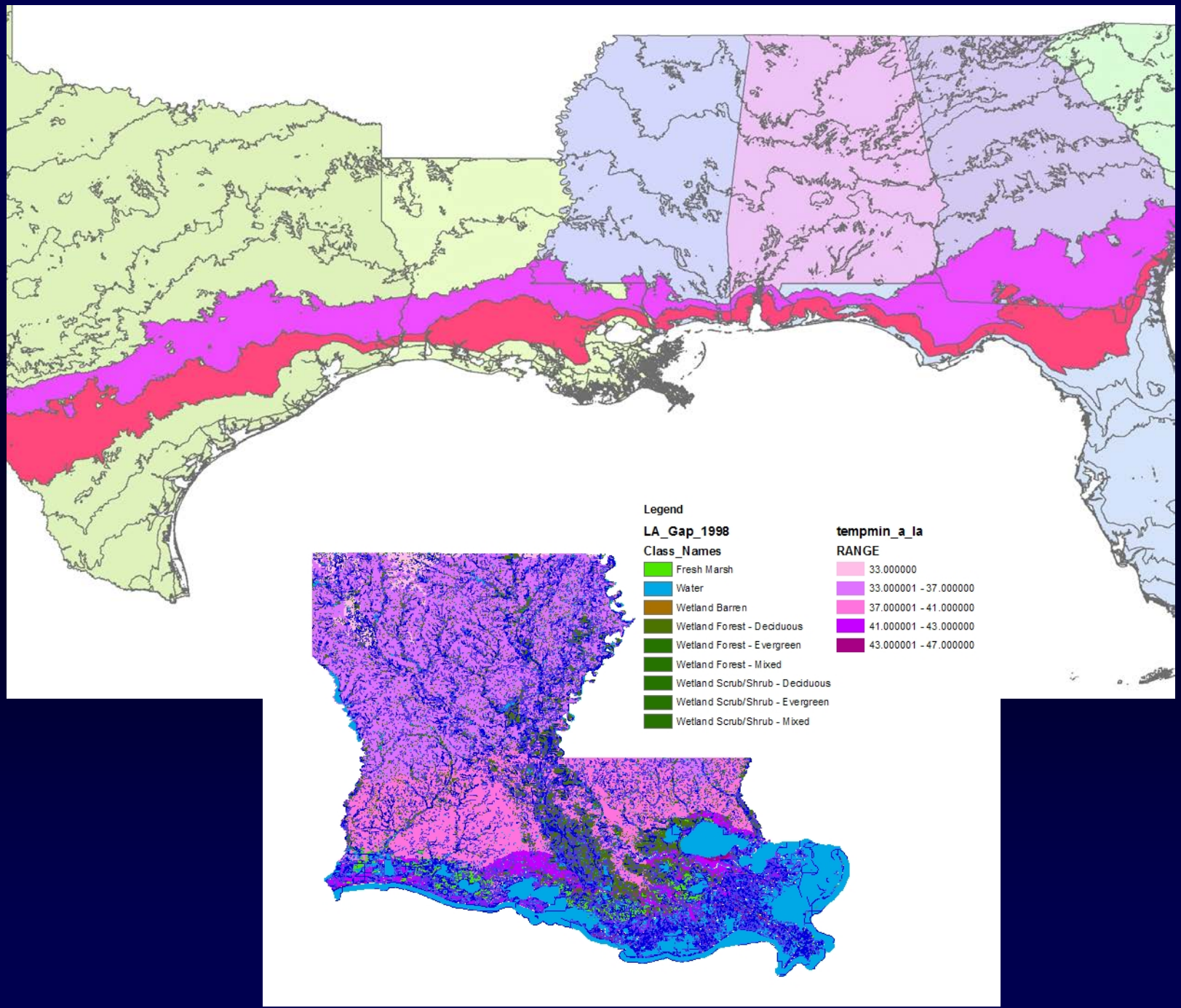
(Can aestivate for months!)

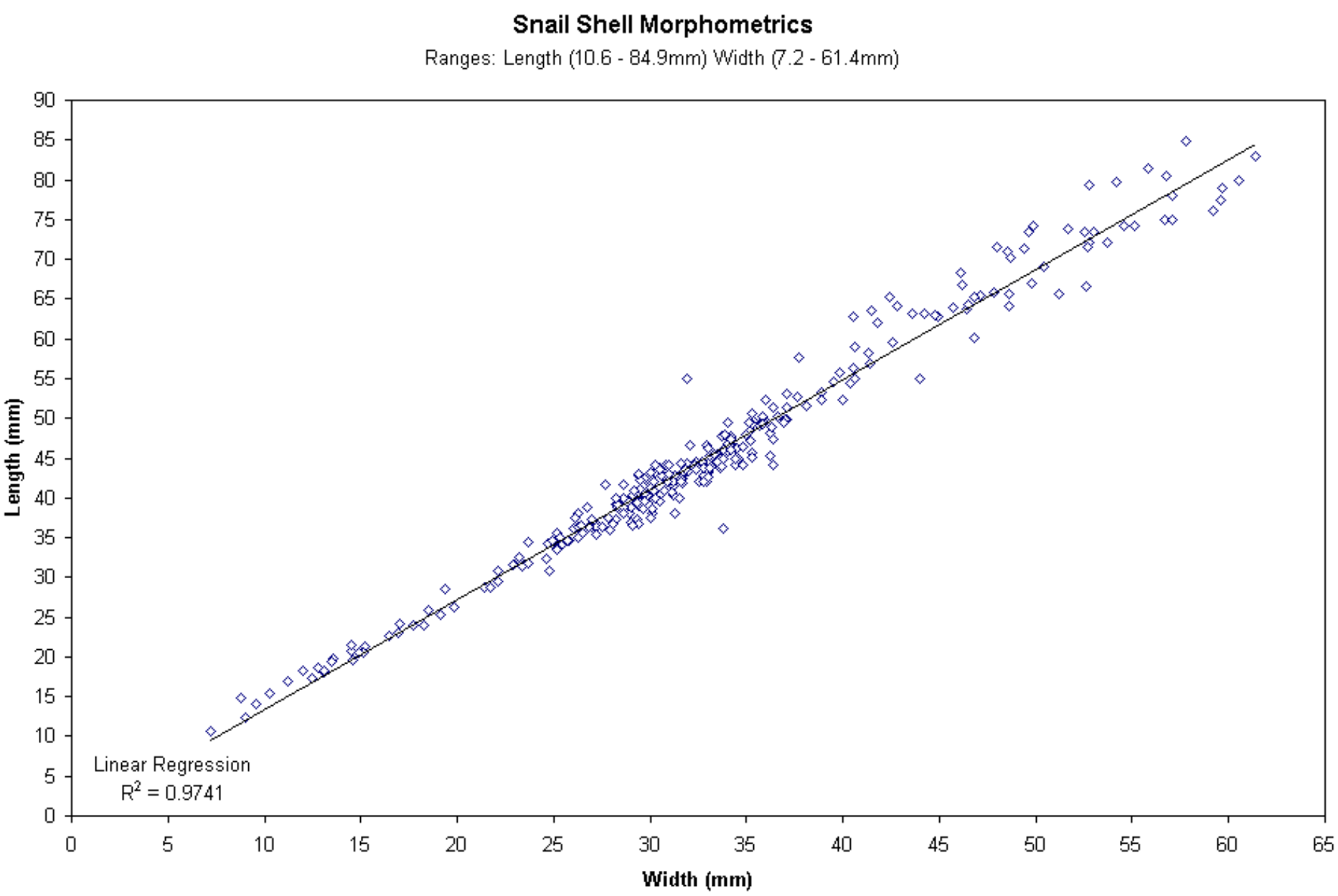


A literature review of their natural history indicated that two possible weak points are:
(1)Salt water intolerant
and
(2) Freeze intolerant.

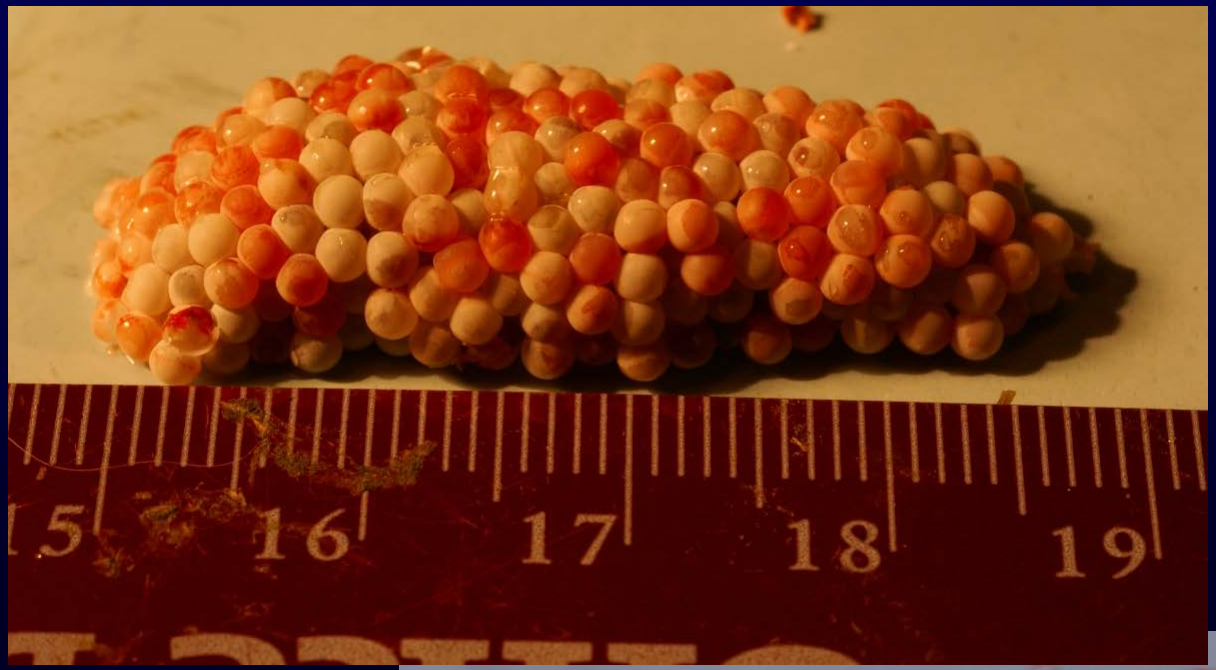
Image from: http://www.applesnail.net/pestalert/management_guide/pest_management.php


LA Veg
Cover Type
AGRICULTURE-CROPLAND-GRASSLAND
BRACKISH MARSH
DENSE PINE THICKET
FRESH MARSH
INTERMEDIATE MARSH
NON-VEGETATED URBAN
SALINE MARSH
UPLAND BARREN
UPLAND FOREST-DECIDUOUS
UPLAND FOREST-EVERGREEN
UPLAND FOREST-MIXED
UPLAND SCRUB/SHRUB-DECIDUOUS
UPLAND SCRUB/SHRUB-EVERGREEN
UPLAND SCRUB/SHRUB-MIXED
VEGETATED URBAN
WATER
WETLAND BARREN
WETLAND FOREST-DECIDUOUS
WETLAND FOREST-EVERGREEN
WETLAND FOREST-MIXED
WETLAND SCRUB/SHRUB-DECIDUOUS
WETLAND SCRUB/SHRUB-EVERGREEN
WETLAND SCRUB/SHRUB-MIXED
Bossier City
3132
Jackson
20
49
55
8a
8b
8a
Baton Rouge
12
110
Lafayette
Beaumont
210
10
Port Arthur
9a
9a
New Orleans
9a


Legend
LA_Gap_1998
Class_Names
Fresh Marsh
Water
Wetland Barren
Wetland Forest - Deciduous
Wetland Forest - Evergreen
Wetland Forest - Mixed
Wetland Scrub/Shrub - Deciduous
Wetland Scrub/Shrub - Evergreen
Wetland Scrub/Shrub - Mixed
tempmin_a_la
RANGE
33.000000
33.000001 - 37.000000
37.000001 - 41.000000
41.000001 - 43.000000
43.000001 - 47.000000


Snail Shell Morphometrics
Ranges: Length (10.6 - 84.9mm) Width (7.2 - 61.4mm)
Length (mm)
Width (mm)
Linear Regression
R2 = 0.9741
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90

Egg masses, ~ 1 week old



Need better focus – dissecting scope images..

Egg mass, hatching ~2 weeks old

Biological Control

(many potential options, we just tested one)

Feeding Trial- Do Crawfish eat snail hatchlings?

Need pictures of crawfish tanks and up close crawfish.

20 trials: experimental setup = 1 crawfish + 20 snails (snails 0-14 days old) in a 3L plastic container & observed for 20 hours.

Controls: 5

Results:

average # snails eaten	12.6 (± 5.4)
min	0
max	20

Mechanical Control

(May be difficult to implement widely- tested a commonly used method)

In experiments a portion of the eggs in the masses ‘knocked’ into the water hatched out.

When removing eggs from substrate- important to smash eggs, especially if close to hatching.

Molluscicide Modes of Action:

Contact poison

Ingested poison

Classes of Molluscicides:

Metal Salts

Metaldehyde

Acetylcholines Inhibitors

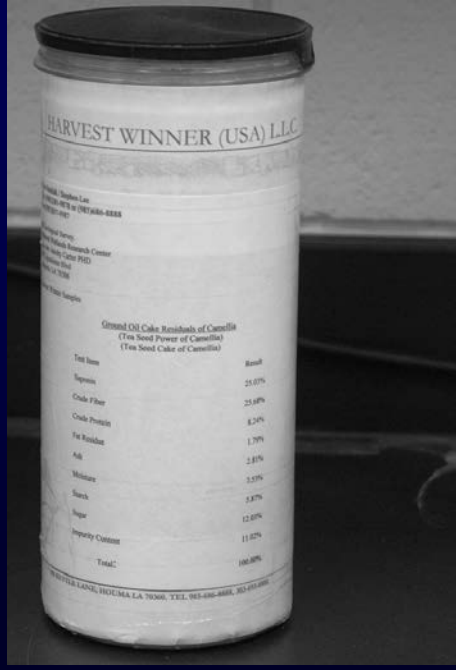
Saponins*

Niclosamides*


Melaleuca

Harvest Winner

(6% saponin, causes hemolysis)



Melaleuca **is a genus of plants in the myrtle family (Myrtaceae).**
There are well over 200 recognized species, most of which are endemic to Australia

Aborigines - chewing the young leaves to alleviate headache.
The softness and flexibility of the paperbark itself made it an extremely useful tree to Aboriginal people: cradles, bandage, sleeping mats, wrapping food for cooking (like Al foil today),as a disposable raincoat and for building humpies.

Modern uses - Tea tree oil made from *Melaleuca alternifolia* is a highly effective topical antibacterial and antifungal, although it may be toxic when ingested internally in large doses or by children.
The oils of Melaleuca can be found in organic solutions of medication that claims to eliminate warts.

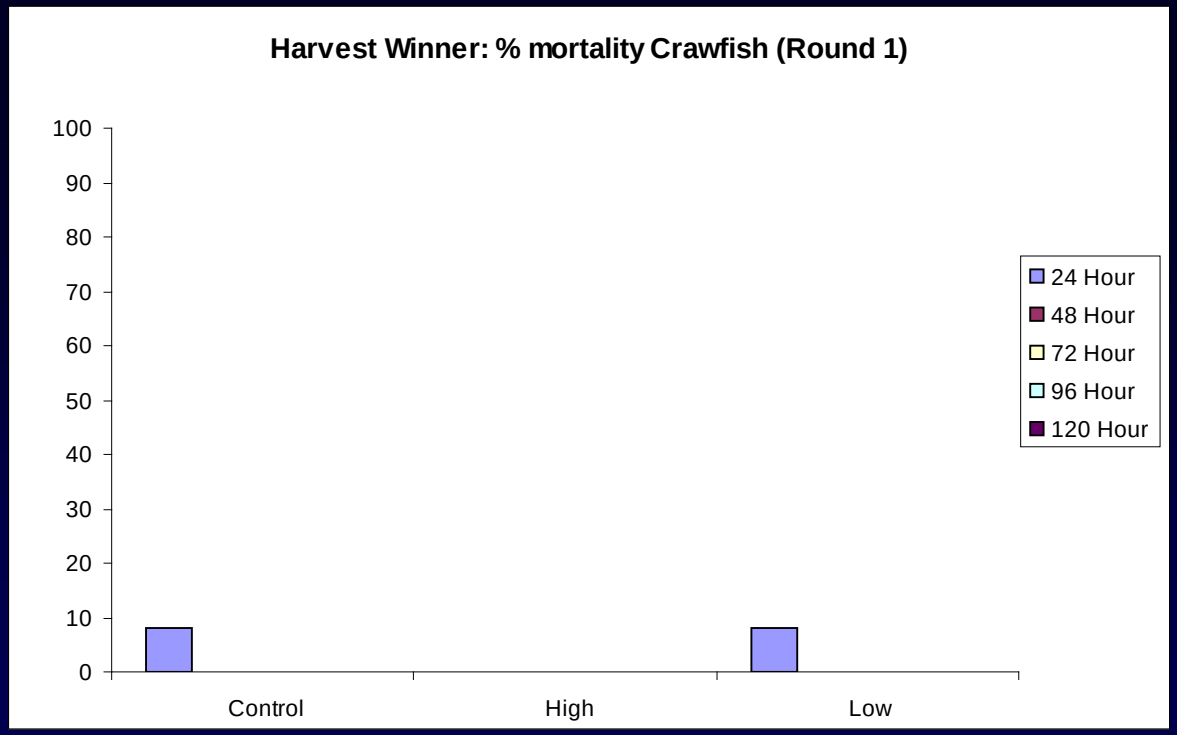
Harvest Winner as Molluscicide

Exposed snails & crawfish for 24 hours to molluscicide (ALL experiments).

Round 1 dosage: high=0.002g/L low=0.001g/L

Round 2-4 dosage: high=0.03g/L low=0.015g/L (high equivalent to recommended dose 30g/metric ton).

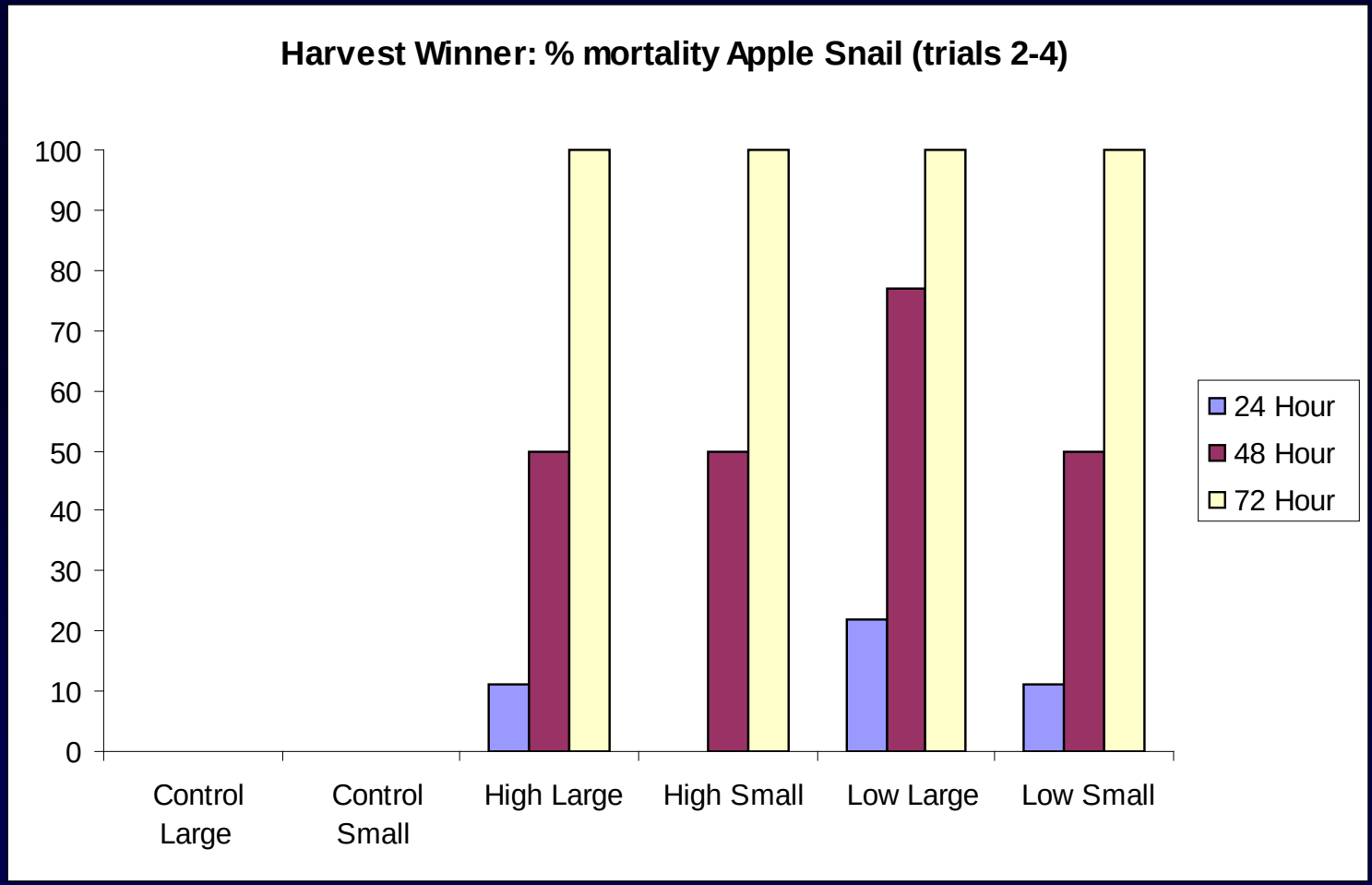
Snail size: large >38mm aperture length; small 22-38mm aperture length



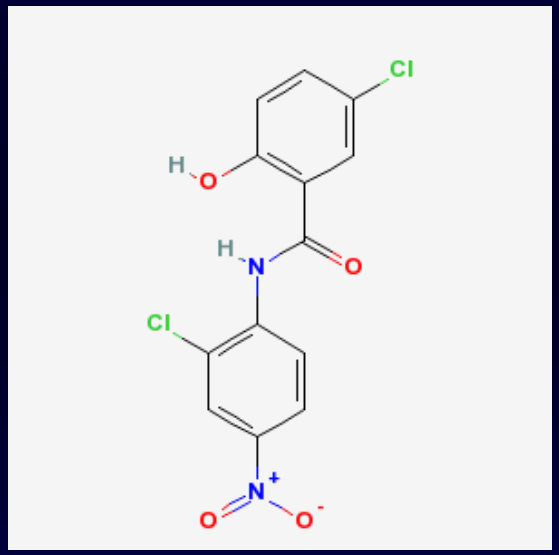
Harvest Winner results:

100% snail mortality 72 hours after initial exposure in trials 2-4 (higher doses than trial 1). We didn't track snails past the initial 24 hours in first trial, where all snails survived initial treatment.

No crawfish died in the 72 hours after exposure in trials 2-4. During trial 1, 1 crawfish died in each of the control & low dose replicates.



SYNOPSIS: Niclosamide is a relatively selective, non-cumulative chlorinated aromatic amide pesticide; principally used against aquatic snails but also as an antiparasitic drug in human and veterinary medicine. It is of very low toxicity to mammals, can be toxic to aquatic vertebrates (e.g. fish and amphibians) and crustaceans. Niclosamide is non- persistent in the aquatic environment, has a slight effect on aquatic plants and zooplankton but is not generally phytotoxic at field concentrations.



Bayer 2353; Bayluscid

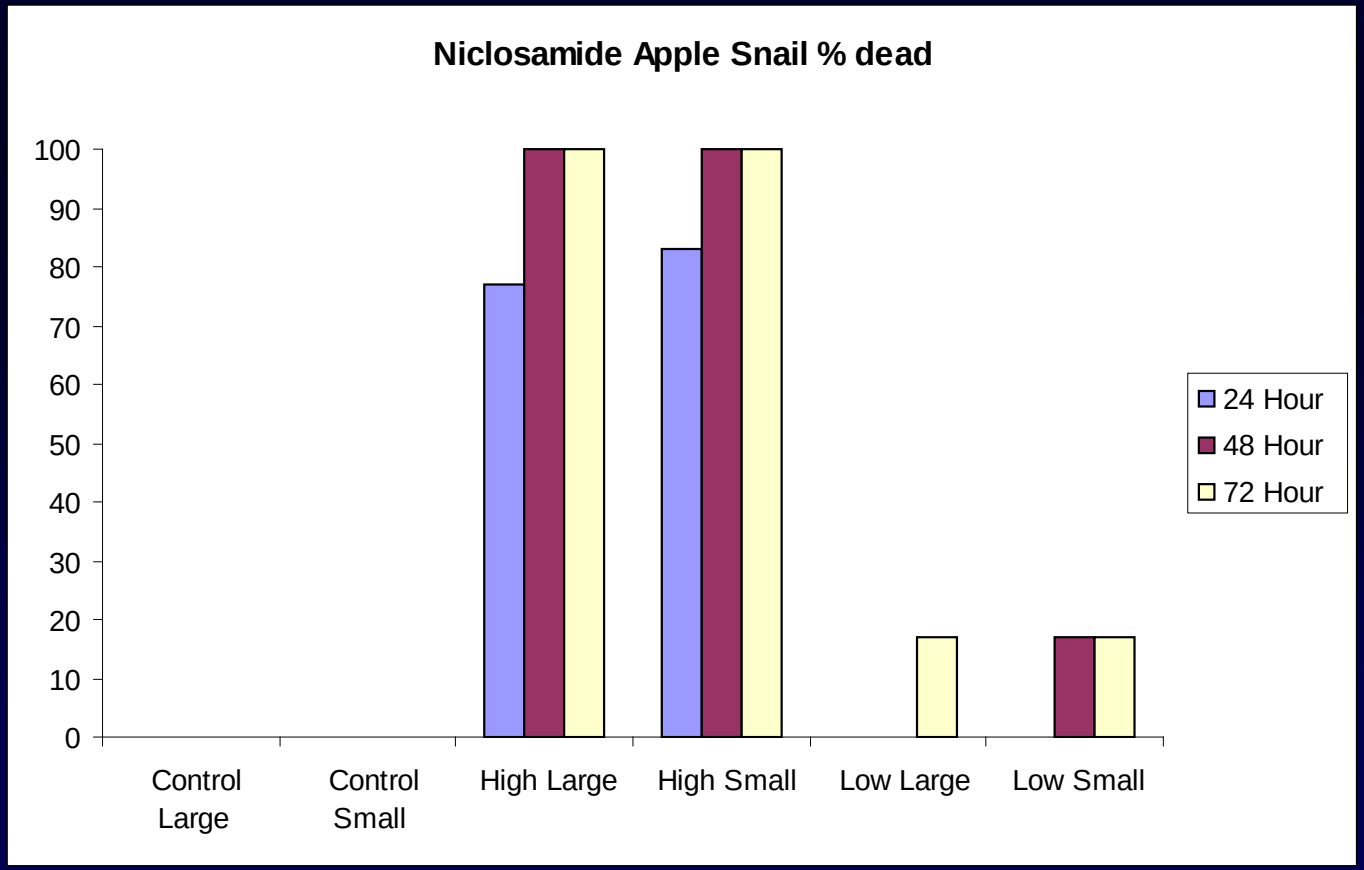
2 hydroxy 5 chloro N benzamide

An antihelminthic that is active against most tapeworms.

Only commercially available molluscicide recommended by WHO
For large scale use in Schistosomiasis control.
Mutagenicity data available! Must research and put in table.

Niclosamide trials

- Dosage: high=1.3mg/L low=0.13mg/L dissolved in 250 uL ETOH
- Snails & crawfish exposed for 24 hours
- → Zero mortality in crawfish
- 100% snails dead 48-72hrs after initial exposure at high dose



Conclusions

(1) The apple snails could become extensively distributed without early intervention.

(2) There ARE potential control options and an integrated pest management control approach may be successful. This would include:

(A) Mechanical and Chemical Control.

(B) Biological Control.

(C) In areas where possible use of saltwater.

(3) We tested two chemical control agents, one approved and one not. Both have their respective advantages and disadvantages.

(4) We tested one mechanical and one biological control option (biocontrol selected due to availability for commercial production but others should work).

(5) Will test ‘spray on’ molluscicide for egg mass control.