

Snails

Michael Nash

To manage we must understand.

To understand, science counts.

First we must identify.

Together we can make science count!



Small pointed snail

Prietocella barbara (L.)

Rainfall > 450 mm
Opt. Moisture Rh > 90%

Soil Clay – sand
pH > 5 – 7.5

Lifespan up to 1-2 years

Semelparity, Outcrossing
hermaphrodites

Avestation in the ground
Feeds on green plant material



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ratio of length to diameter = 2
or less 8-10mm long



MA Nash Copyright

Common garden snail

Cantareus aspersus (Müller)

Opt. Temperature 5 – 21°C

Rainfall

Opt. Moisture

Soil Moisture

Soil Loam

pH 7.5-8 High Calcium

Time to maturity 3.5 years

Lifespan up to 12 years

Eggs avg. 800-1,500 max 5,000



25-40mm, does not have umbilicus

White Italian snail

Theba pisana (Müller)

Temperature 19-44°C day
Rainfall 300 – 450 mm
Opt. Moisture 1-5mm, Rh > 90%

Soil Sandy – Loam
pH > 7.5 High Calcium

Lifespan up to 1-2 years
Eggs 339-1524

Semelparity, Outcrossing
hermaphrodites
Feeds on green plant material

Avestation up on plants



partly closed, semi-circular

umbilicus, 10-30mm

Common white snail

Cerņuella virgata (Da Costa)

Opt. Temperature 20-30 °C day

Rainfall 300 – 450 mm

Opt. Moisture Rh > 85%

Soil Moisture > 9%

Soil Sandy – Loam

pH > 6 High Calcium

Lifespan up to 1-2 years

Eggs avg. 400 max 1620

Semelparity, Outcrossing hermaphrodites

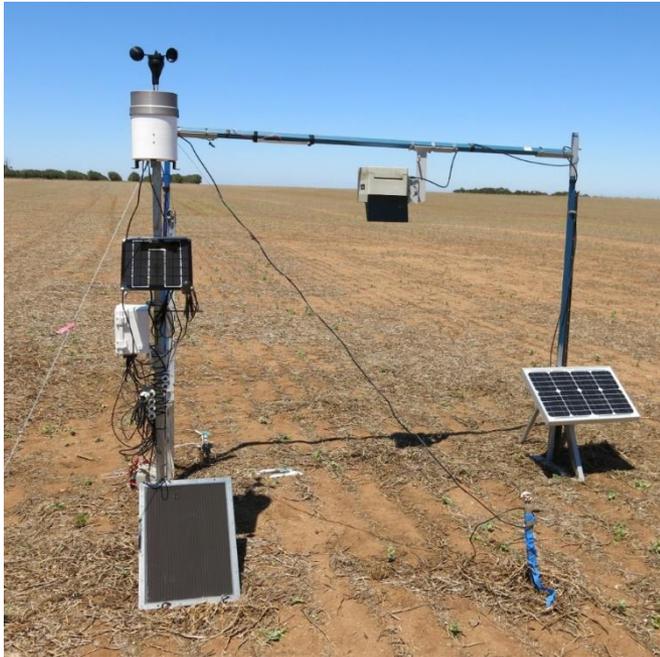
Microphagous i.e. not green plant material

Avestation in the ground or up



open, circular umbilicus
10 – 20mm

Climate data collection and snail activity monitoring



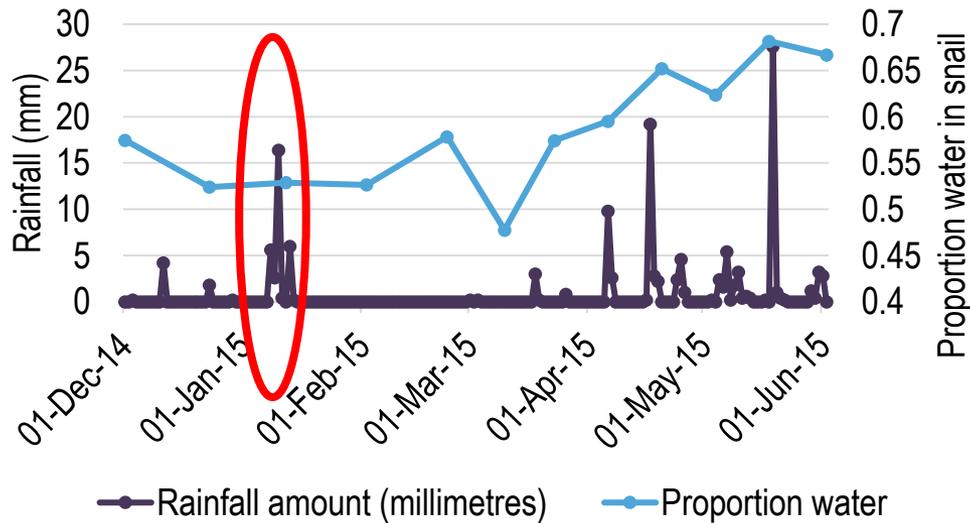
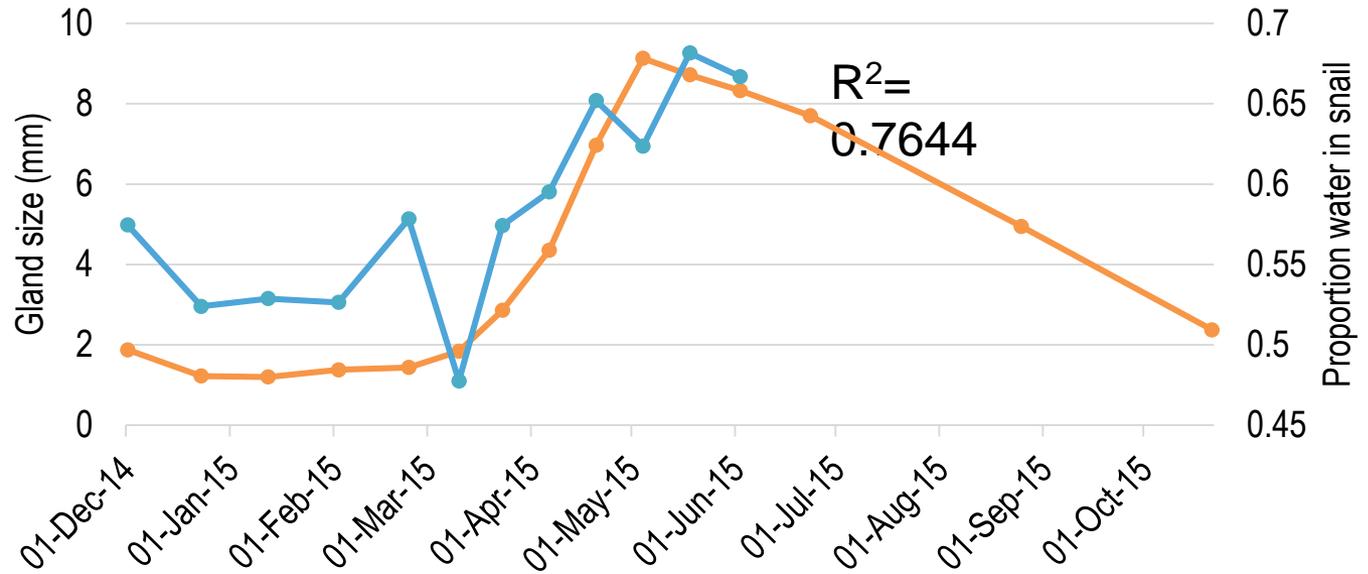
Sensors:

- Temp & RH (ground, ambient & stubble)
- Rainfall
- Air pressure
- Light intensity



C. virgata at Minlaton

- Albumen gland size (mm)
- Proportion water in snail

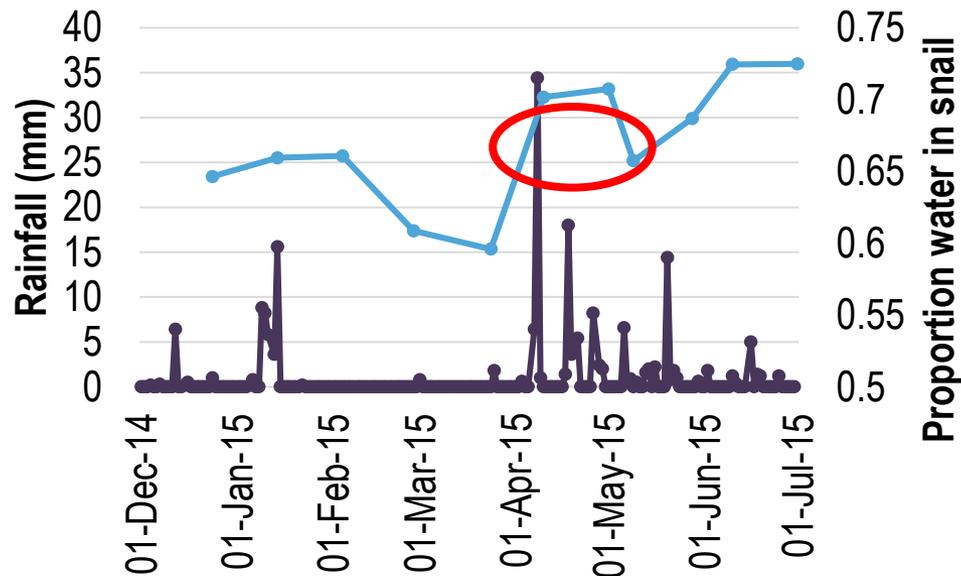
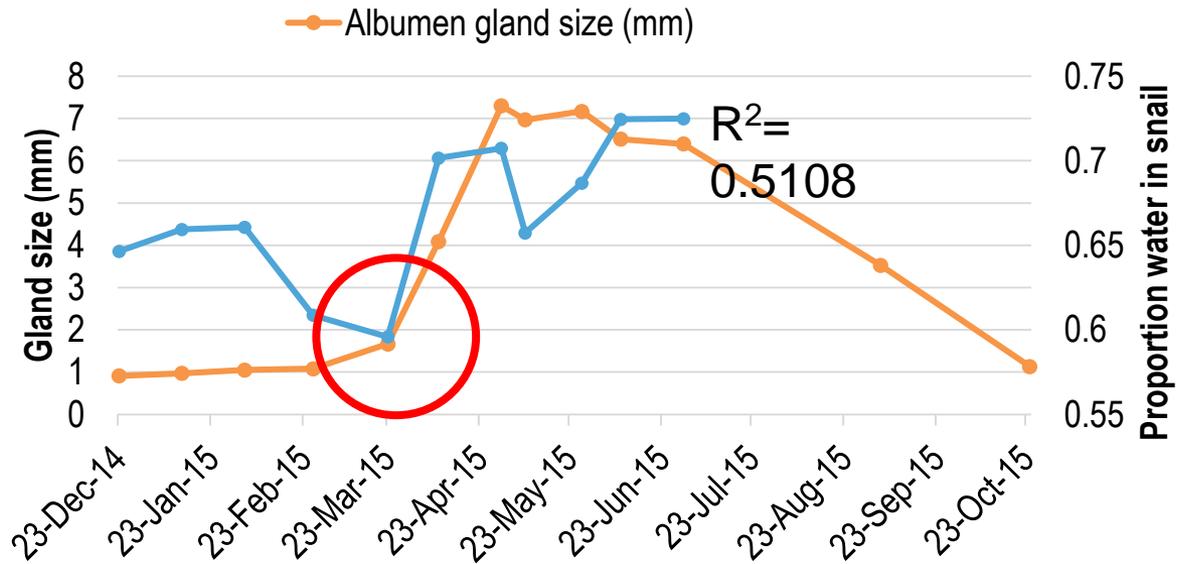


C. virgata at Palmer SA

BOM rainfall data

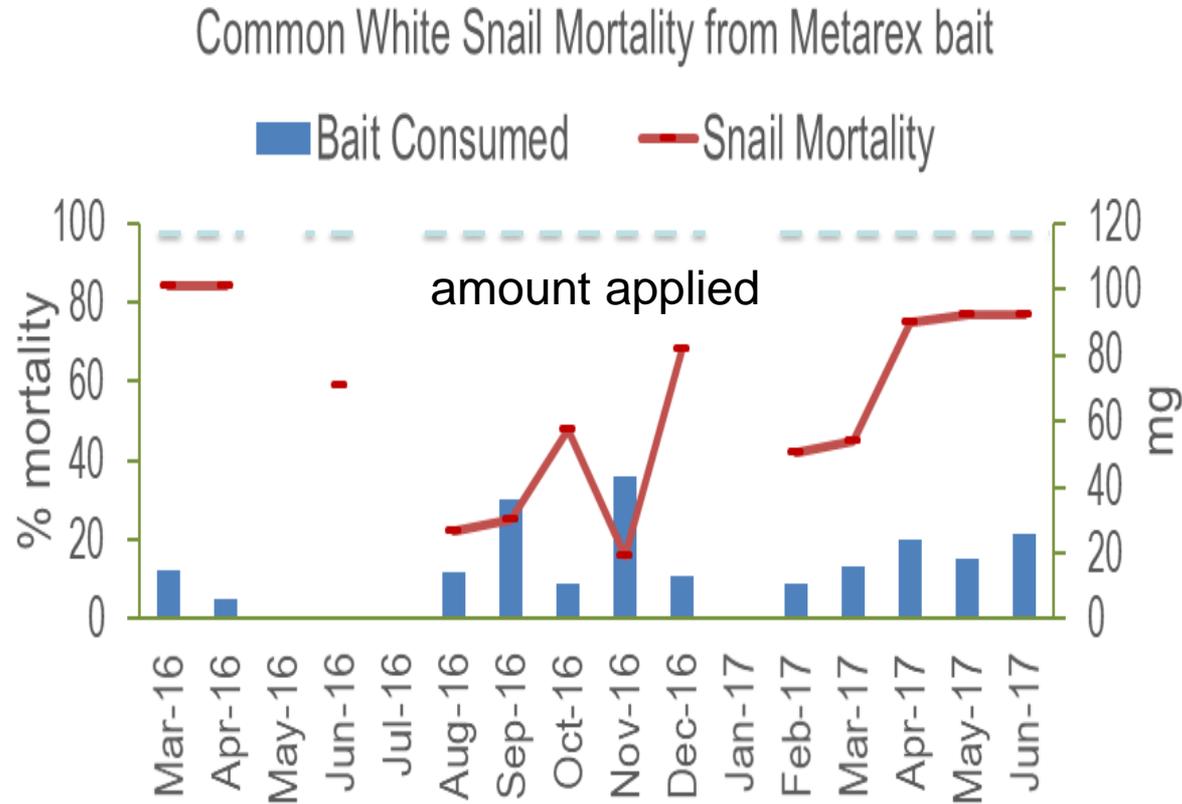
Albumen gland increases before body moisture?

Is rainfall a good predictor of body moisture?



● Rainfall amount (millimetres) ● Proportion water in snail

Life stage response to bait



Snails collected monthly from the paddock, taken to laboratory and baited in a controlled constant environment (22 C 100% rH)

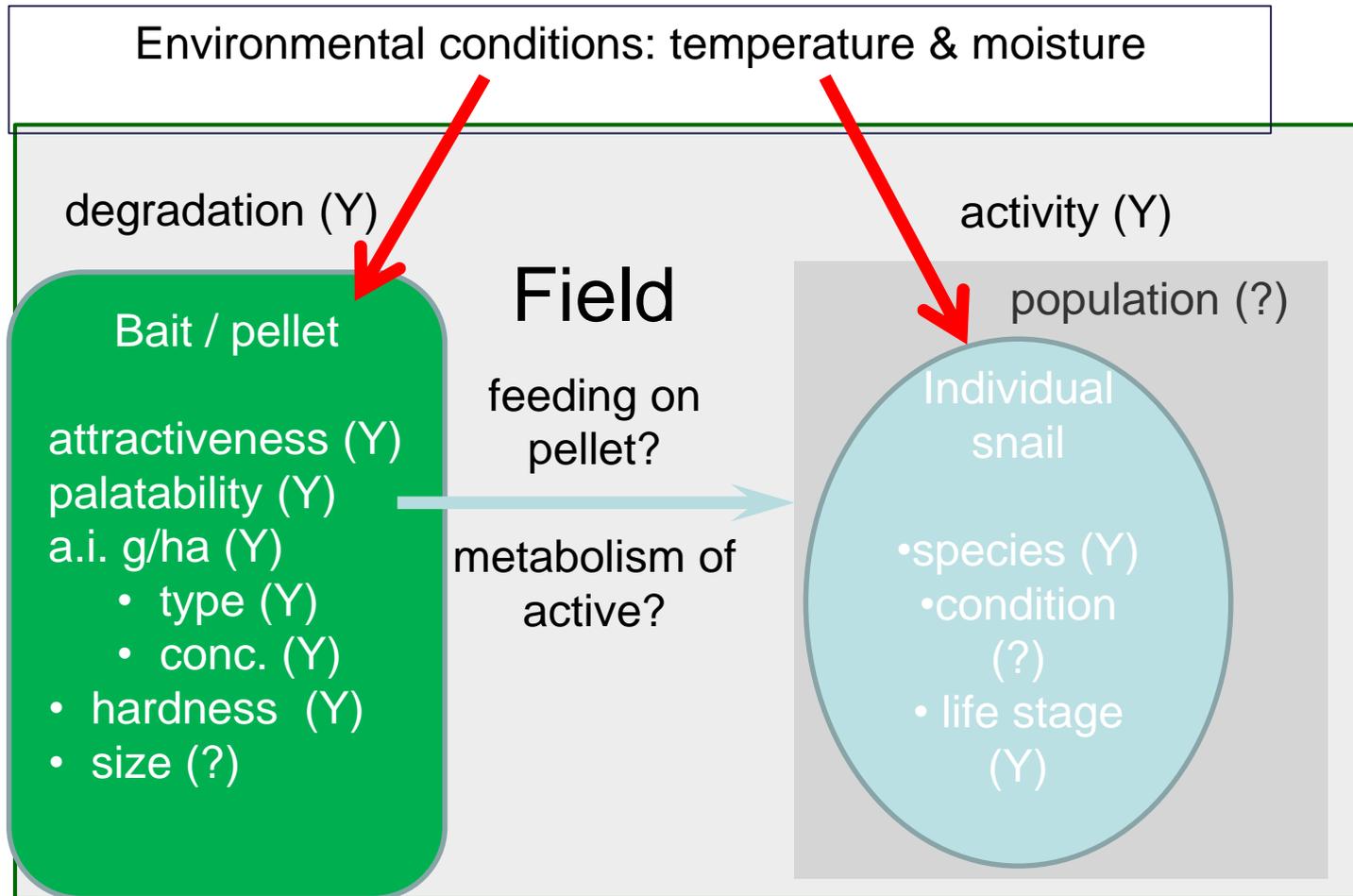
Individual Condition

Common white snails were from same population

Date	Treatment	Snail condition		%Mortality	Consumption (mg)	
		(g)	(mm)		Bait	Placebo
30.12.14	Aestivation	0.54	12.57	8.0 - 36.0	3.1 - 12.8	9.9
30.12.14	Feed in Lab	0.62	12.52	32.0 - 64.0	3.2 - 4.5	15.3
16.01.15	After rain	0.61	12.90	66.0 - 74.0	5.2 - 7.7	15.0
16.01.15	After rain, Feed in Lab	0.65	12.71	76.0 - 78.0	4.8 - 5.6	18.2

Common white snails eat more once hydrated?

Factors influencing efficacy?





Bait Basics



Dry Process →

Bran (Chook food)

Steam Process →

Wet Process

Flour (pasta)

Before 1980

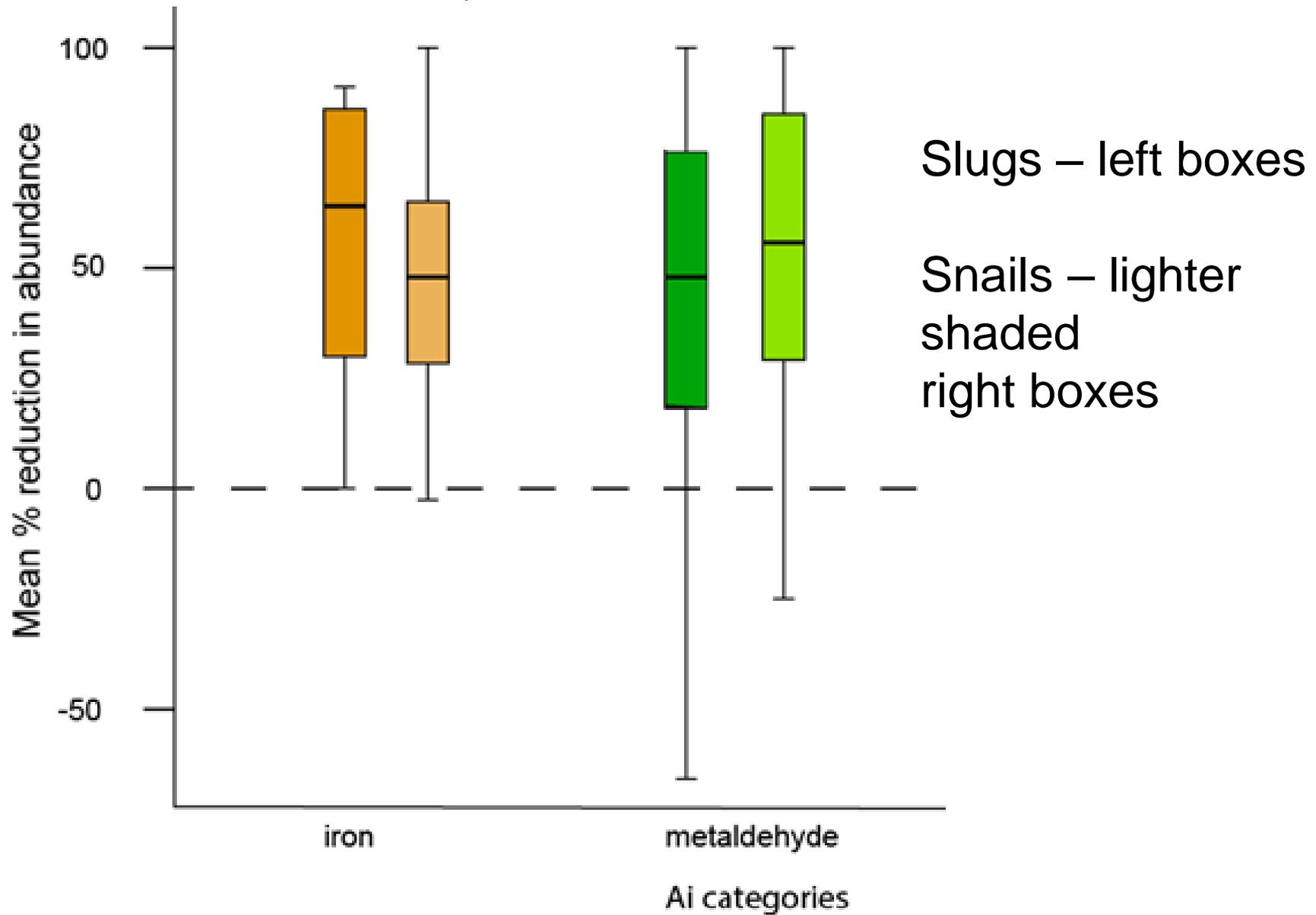
1990' -2000's

cost
rain fastness
palatability
[metaldehyde
]

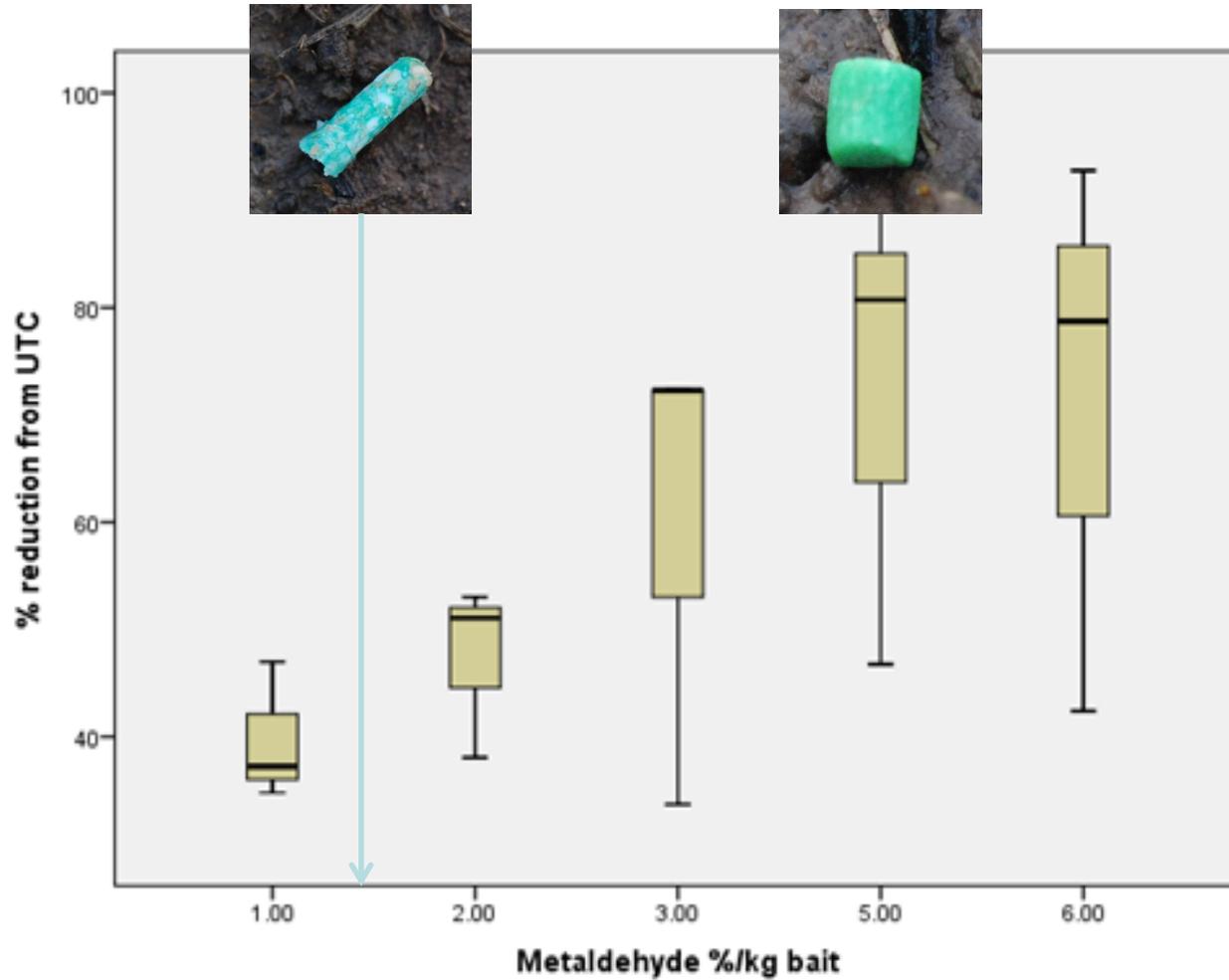
Dust &
size ←



Comparison of actives

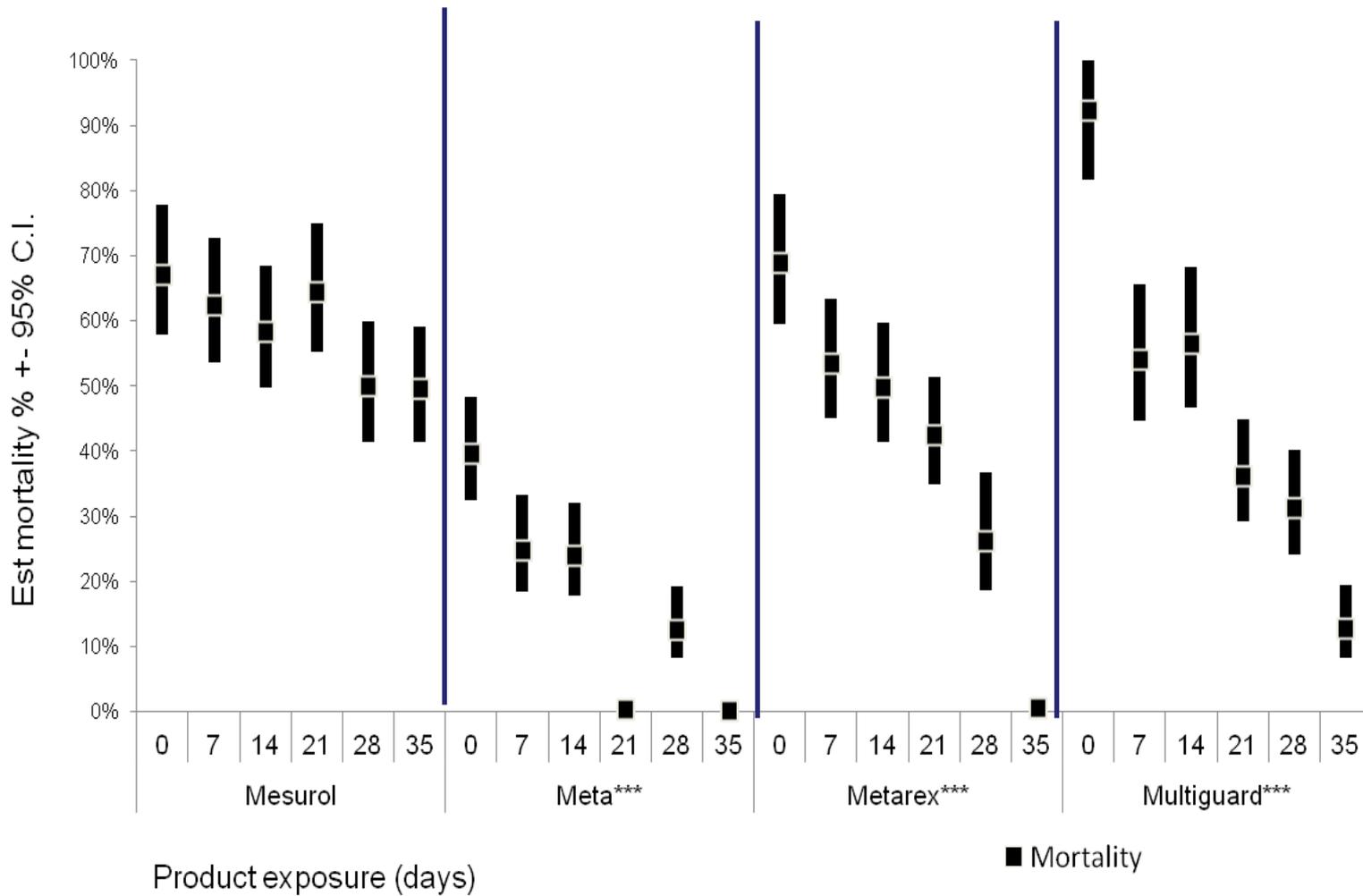


Metaldehyde concentration



Data from JB Coupland 1996

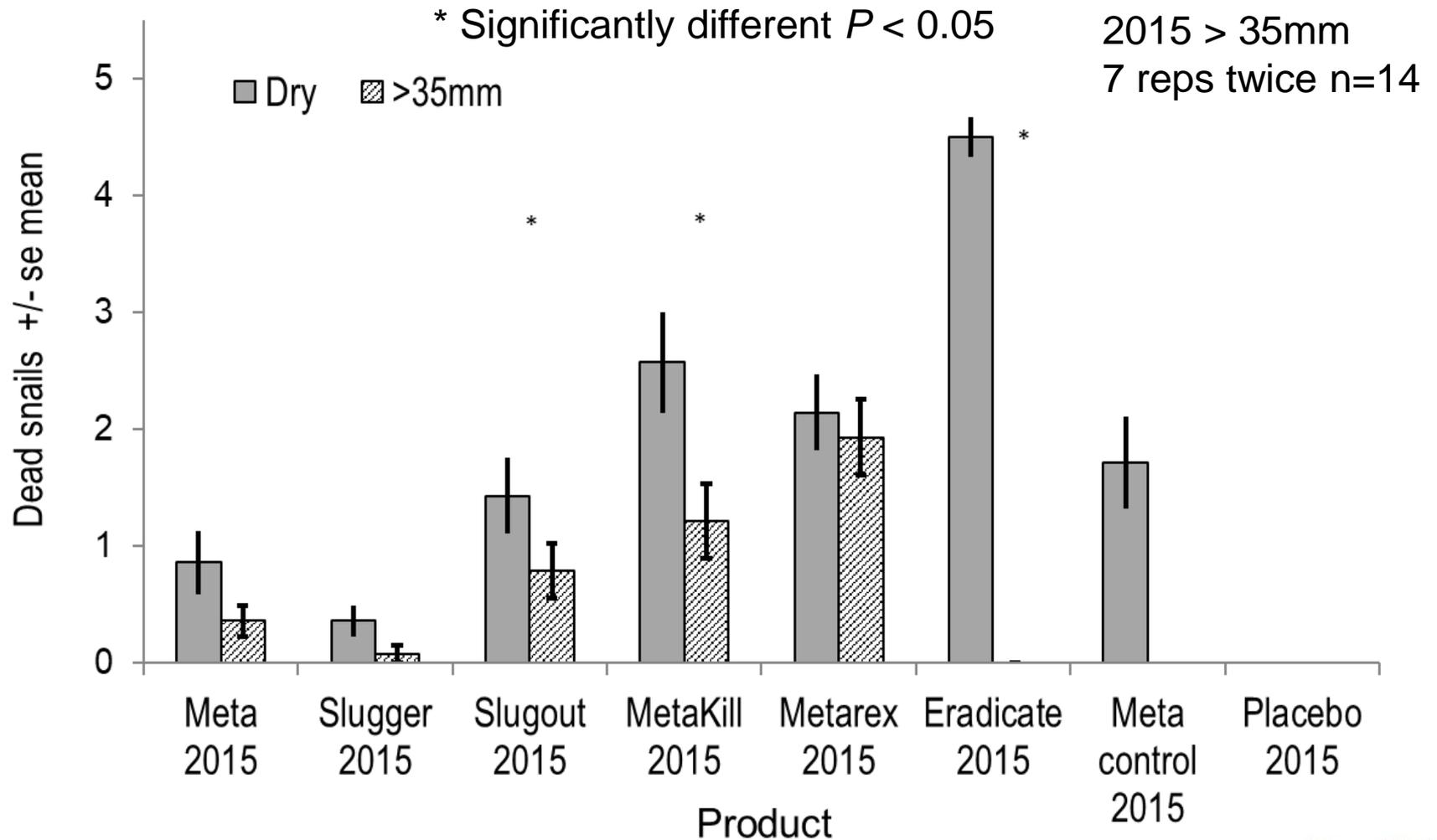
Bait degradation



Bait life recommendations

- Rainfall erodes physical integrity of bran-based baits
- Mould on products did not influence bait consumption nor efficacy
- Reduction of a.i. by rainfall (metaldehyde & iron chelate) is most important
 - individuals are more likely to consume a sub lethal dose
- Don't use current Iron based baits when >10mm rain is expected
- Temperature, not UV light, degrades metaldehyde baits
- Commonly used bran products need to be re-applied < 2 weeks, more expensive products will last 3-4 weeks.
 - Work out the cost benefit yourselves!

Product comparisons: rainfall 2015



Key factors for bait efficacy

“The chief obstacle to improving chemical control of slugs is not the lack of molluscicidal materials but the difficulty of getting them into the animal”

([Briggs and Henderson, 1987](#))

Chance of encounter:

1. activity
2. attractiveness of bait
3. number of baits per unit area
4. complexity of habitat

Consumption of active:

1. enough bait
2. enough toxicant in the bait
3. palatability

Copper spray repellency

Copper sulphate @ 5% & 10% reduced common garden snails for up to 10 wks in citrus (Du Toit & Brink 1992)

Copper oxychloride [4.5%] was found not be as effective

In vines common garden snails were reduced by copper sulphate spray:

[5%] 58% s.e. 1.28% & [10%] 66% s.e. 0.44 30 days

[5%] 46% s.e. 0.97% & [10%] 50% s.e. 0.33 70 days

Rates damaged vegetative parts of the vine

(Schwart & Capatos 1990)

Copper cuprous oxide has been suggested as best form

Copper silicate

Applied as a spray prevented movement of common garden snail into canopies for up to 10 wks (Davis *et al* 1996)
spray 82% & granules 51% reduction live snails in vines after 33days

BUT

- ineffective preventing small brown citrus snail movement into citrus trees (Lush PhD thesis)
- ineffective in deterring small pointed snails from causing crop damage. (Micic *et al* 2013 GRDC report)



Ducks

Khaki Campbell mallard cross
@ 5-10 /ha reduced golden apple snail
from 5 to 1 / m² (Teo 2001)

Khaki Campbell 5-8 / ha
CCW Fact sheet No 5 Snails in Vineyard 2006



Decision timeline for snails



Monitoring record problem areas

Biological Control

Control weeds & keep bare between vines

Fungicides that contain copper

Fungicides that contain copper

Barriers prevent movement into canopy

Baiting*

Harvest

Baiting*

Bud burst

Barriers prevent movement into canopy

Chemical control

Cultural control

* Pending monitoring results and moisture