Decision Making
for Insect Management
in Grain Crops

Integrated Pest Management in Mungbeans and Soybeans

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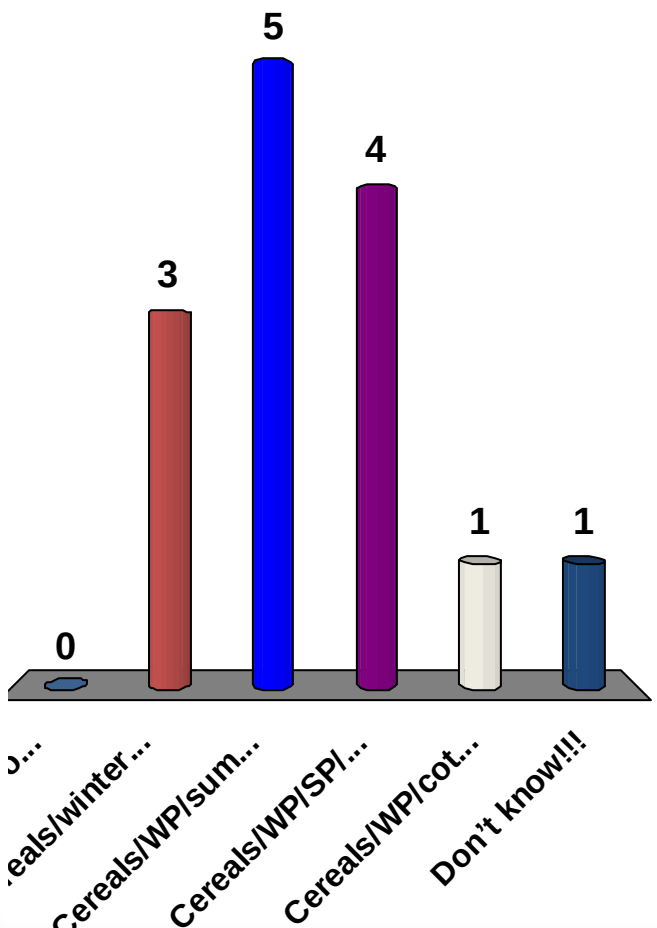
Decision Making for Insect Management in Grain Crops

What crops do you scout regularly for clients?

1. Cereals inc sorghum only
2. Cereals/winter pulses
3. Cereals/WP/summer pulses
4. Cereals/WP/SP/Cotton
5. Cereals/WP/cotton
6. Don't know!!!



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Mungbeans, a brief description

- Short-season, indeterminate tropical pulse
- Seed quality **critical** to achieve to top $$
- IPM IS CHALLENGING BUT ---------
- NOT IMPOSSIBLE

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Soybeans, a brief description

- A longer season summer pulse/oilseed
  - Determinate cultivars in northern Australia
  - Indeterminate cultivars in southern Australia
- More tolerant of pests than other pulses
- Seed quality critical for edible market
- IPM driven by SLW/mites

Mungs in particular a fast crop so beat sheet regularly!

Monitor pests, beneficials & crop stage

Key mungbean/soybean pests

Decision Making for Integrated Pest Management in Grain Crops

Attack leaves, buds, flowers & pods

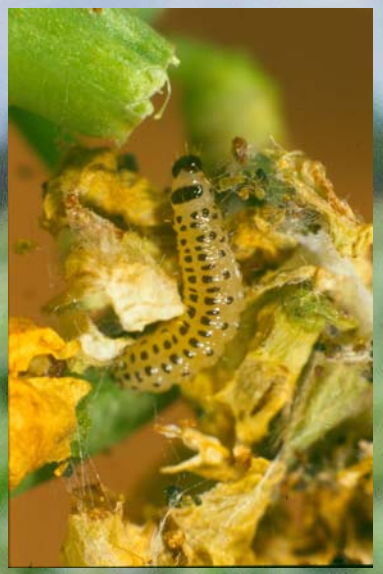
Suck pods reducing seed quality

Attack buds, flowers, pods
Major tropical mungbean pest

Threaten soybeans but not mungbeans. Flared by hard pesticides

Attack buds, flowers
Major mungbean pest but not in soybeans

Bean podborer



Lesser pests

Mainly leaf feeders but can attack flowers

Mungbeans only. Infest stems & pods

Soybeans only. Above threshold ppns. delay harvest maturity

Seedlings & flowers

Under leaves – flared by hard pesticides

Soybeans only. Common at low densities but spasmodically occurs in huge numbers

Etiella in vegetative soybeans *Jan 2013*

Watch for unusual symptoms

IPM drivers in mungbeans and soybeans? Choose 2

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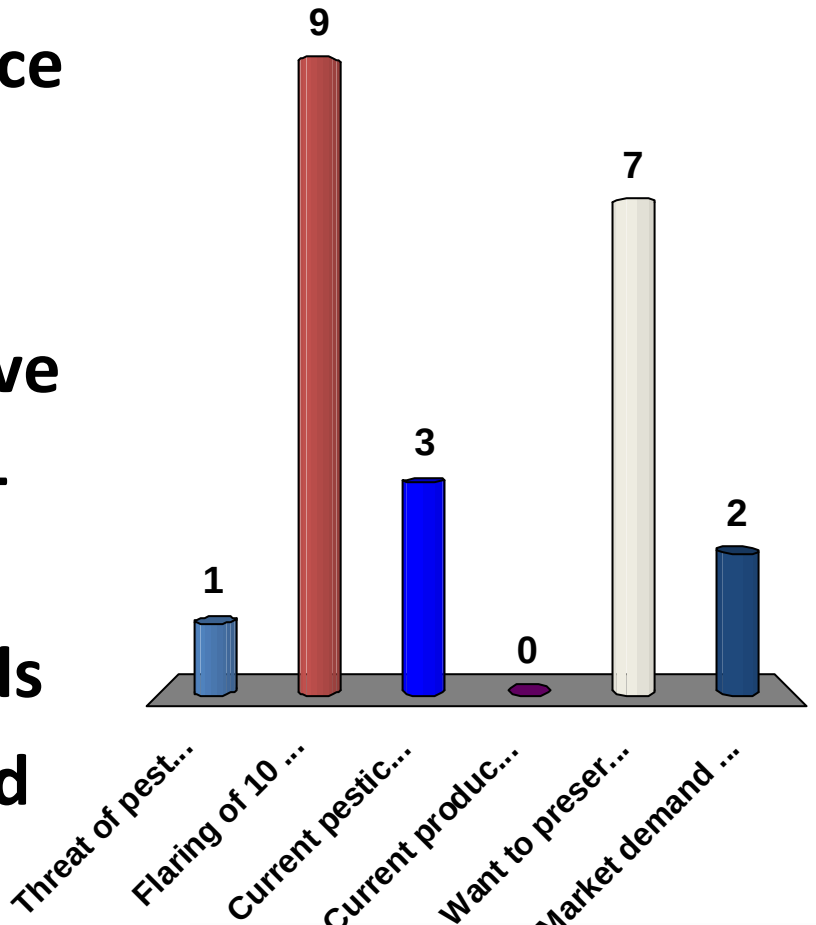
1. Threat of pesticide resistance in *H. armigera*
2. Flaring of 1^0 & 2^0 pests
3. Current pesticides ineffective
4. Current products too toxic - e.g. methomyl
5. Want to preserve beneficials
6. Market demand for reduced pesticide use



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Integrated Pest Management?

What cards do we have?

- Paddock selection to avoid/minimize pests
- Best practice agronomy – increases pest tolerance
- Conserve natural enemies – free control - by using 'more-selective' 'softer' pesticides
- Only spray above-threshold pest populations saves $$ and conserves natural enemies

Key IPM messages
"Go Soft Early"

"Beneficials save you money!"

IPM best bets/opportunities

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Vegetative mungbeans & soybeans - loopers

- **Tolerance of early damage opens door for biopesticides**
- **Up to 33% looper defoliation no yield loss**
- **Bt (Dipel) effective against loopers**

Which leaf has 30% defoliation?

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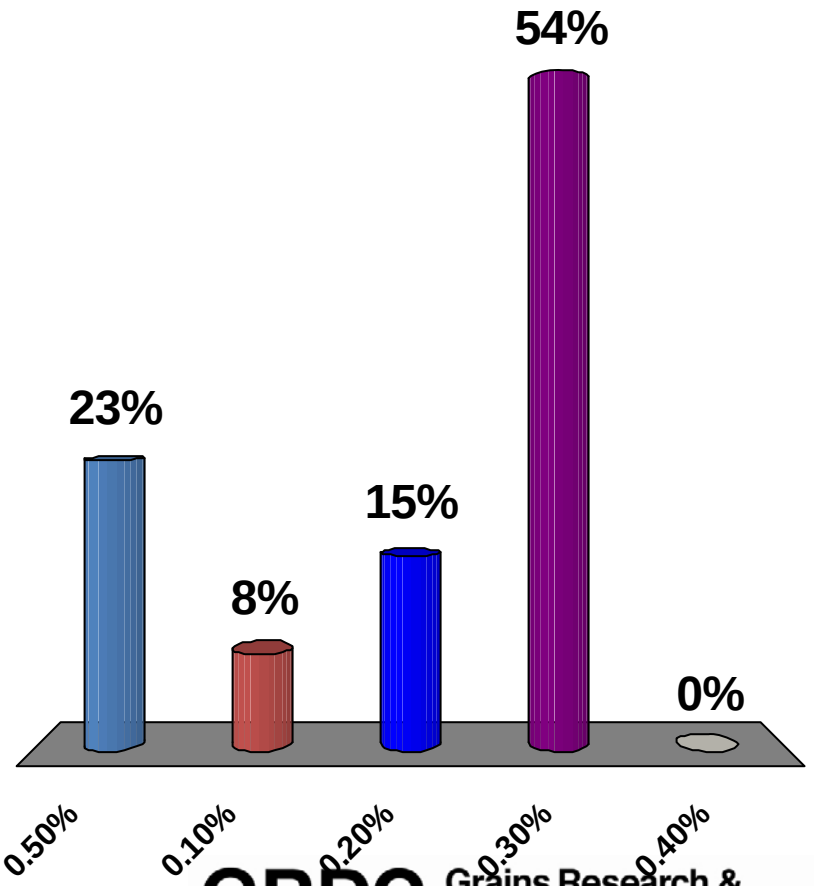
1.

2.

3.

4.

5.



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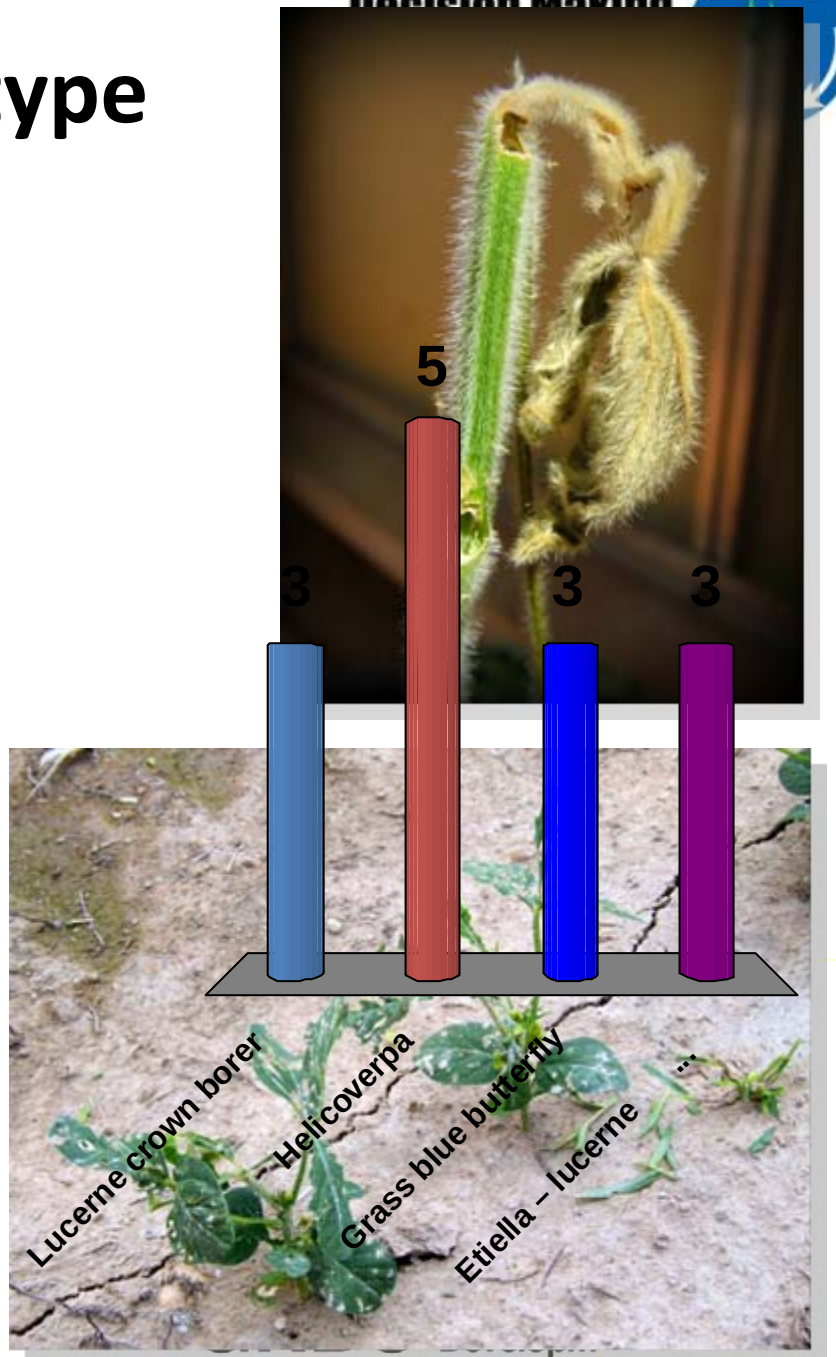
What might cause this type of damage in young soybeans/ mungbeans?

1. Lucerne crown borer
2. Helicoverpa
3. Grass blue butterfly
4. Etiella – lucerne seed webmoth



Grass blue butterfly slug like larva

Lop terminals & buds

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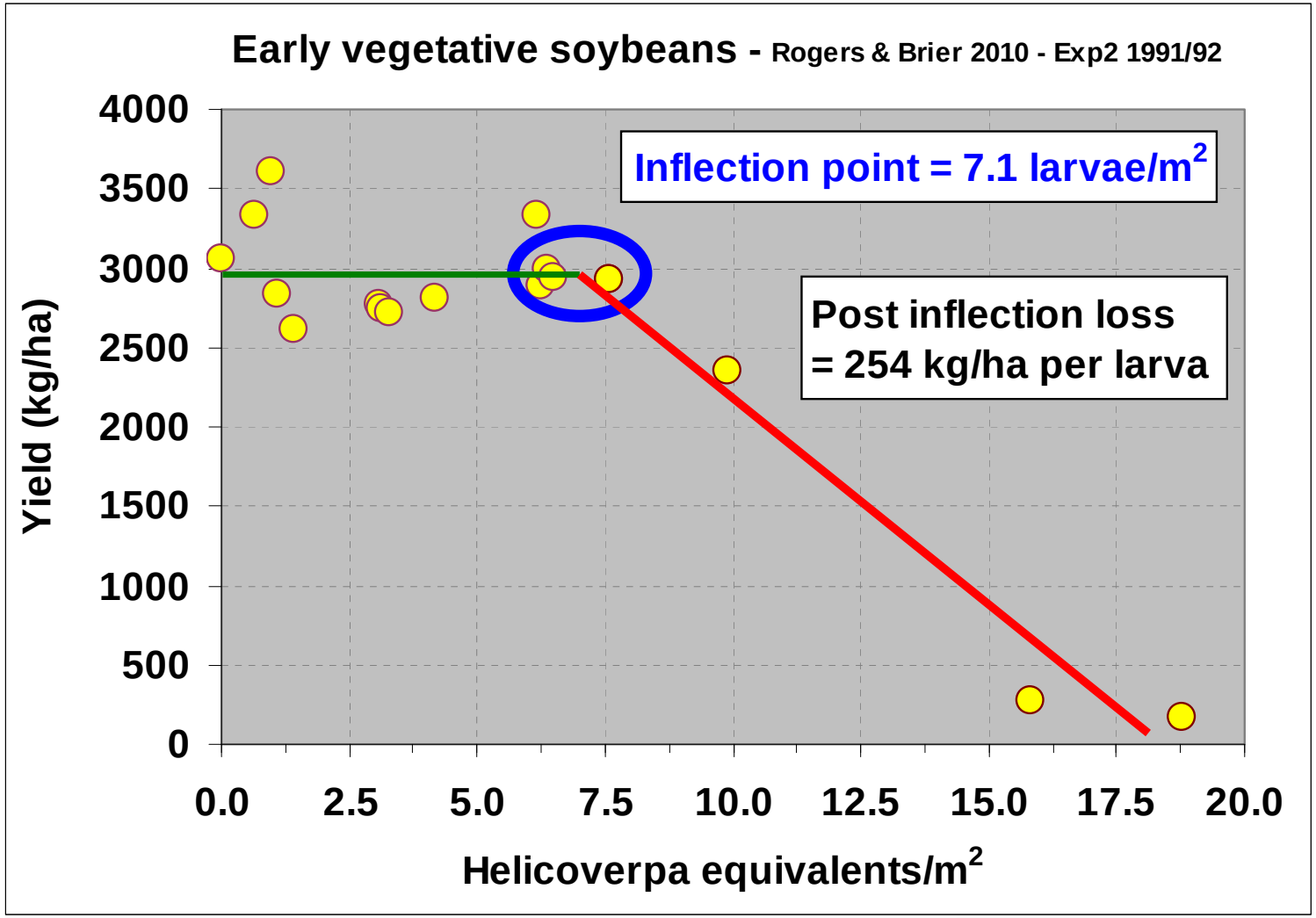
Why might NPV (Vivus, Gemstar) be the preferred heli option in vegetative crops?

1. Resistance management
2. Conserve beneficials
3. Conserve 'big guns' for flowering/podding stages
4. Don't need to kill every heli in vegetative stage
5. No yield loss if up to 7/m^2 soys & 5/m^2 mungbeans

Heli NPV in vegetative soybeans and mungbeans

- Timely detection
- 'Optimal' adjuvant, timing & coverage

Vegetative soybeans – Helicoverpa IPM target - Keep larvae <7/m^2



IPM best bets/opportunities
Mirids in mungbeans
at budding/flowering/podset

- **Optimize spray timing & low rates**

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Scenario 1:

***Mirids** are **at threshold** & **helis** are **below threshold** in early flowering mungbeans*

- No net gain if spray as mirids are at 'break even'
- Full dimethoate rate can flare helicoverpa
- Re-assess in 4 days time
- If mirids increase markedly, consider low rate dimethoate + salt adjuvant (0.5%)

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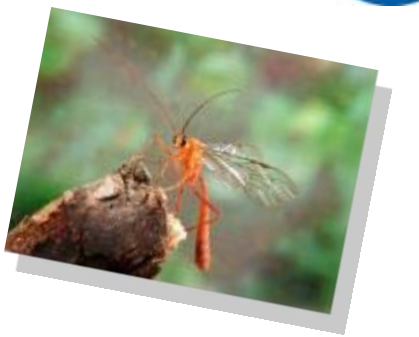

Further information to consider for Scenario 1

Economic Threshold Table for Mirids in Flowering Mungbeans

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Control Cost $/ha	Threshold (adults + nymphs/m^2) at crop values below					
	$ 400	$ 500	$ 600	$ 700	$ 800	$ 900
$ 10	0.4	0.3	0.3	0.2	0.2	0.2
$ 15	0.6	0.5	0.4	**0.4**	0.3	0.3
$ 20	0.8	0.7	0.6	0.5	0.4	0.4
$ 25	1.0	0.8	0.7	0.6	0.5	0.5
$ 30	1.3	1.0	0.8	0.7	0.6	0.6
$ 35	1.5	1.2	1.0	0.8	0.7	0.6
$ 40	1.7	1.3	1.1	1.0	0.8	0.7

- Cross-reference Control Cost vs Crop Value
- For Cost of Control = $15/ha & Crop Value = $700/t, ET =0.4
- Threshold based on mirid damage in crop for up to 4 weeks

- **Mirid thresholds are low because dimethoate is cheap**

- **Mirid thresholds are based on sustained attack over 28 days**

Scenario 1 background information

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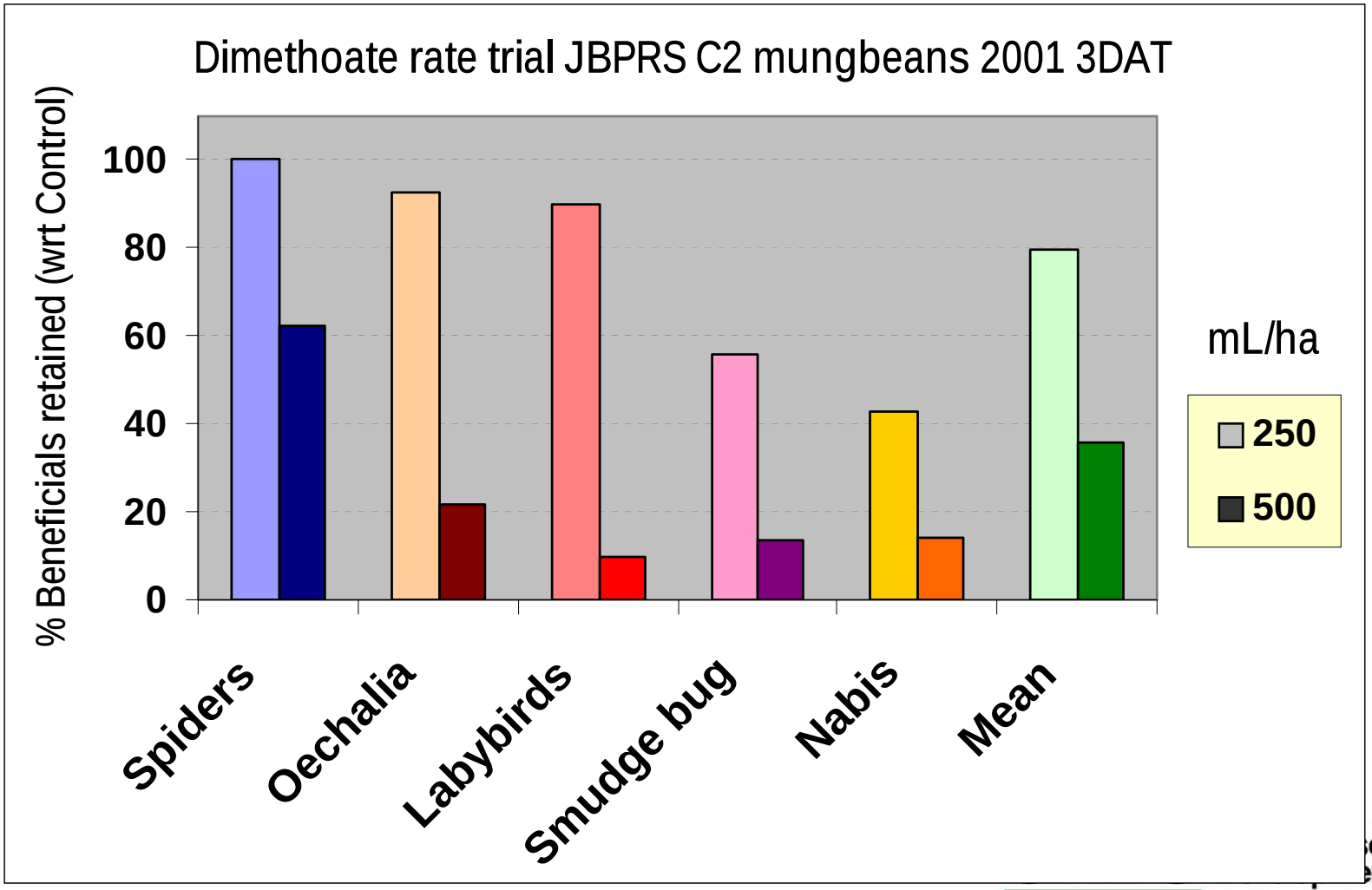
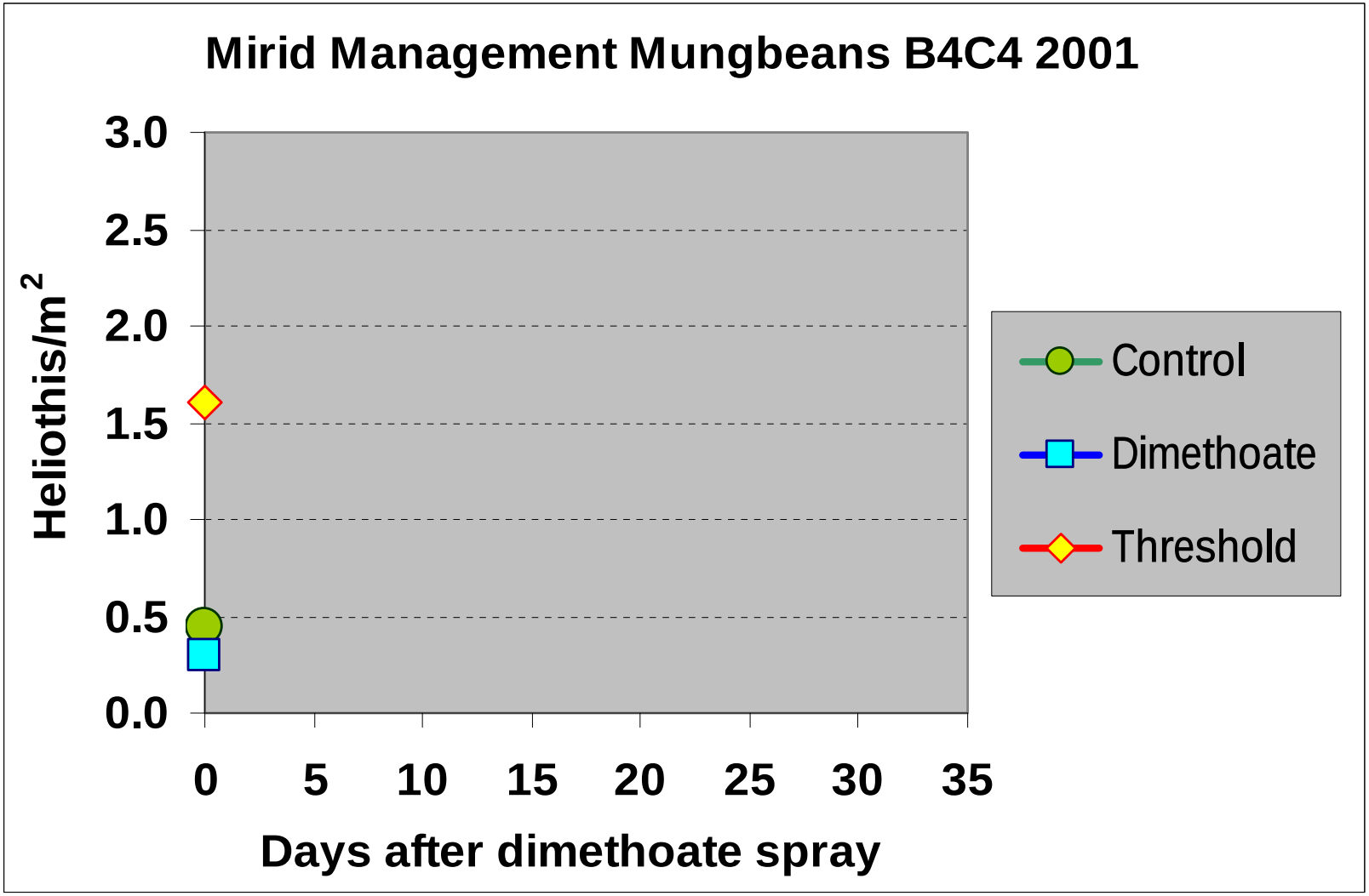
Low rate dimethoate (250mL/ha) has far less impact on most beneficials



Dimethoate @ 500mL/ha can increase the risk of subsequent helicoverpa attack



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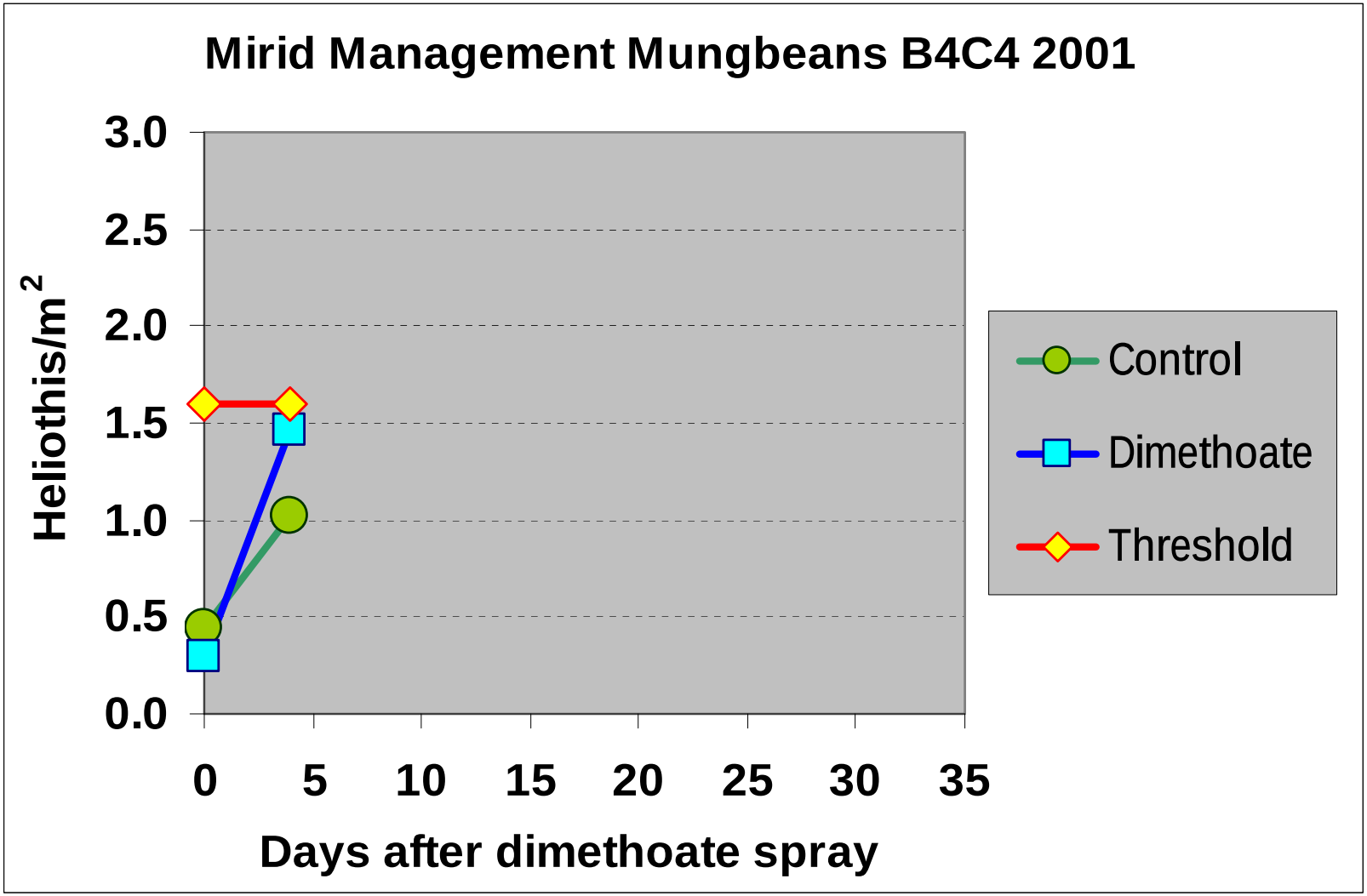

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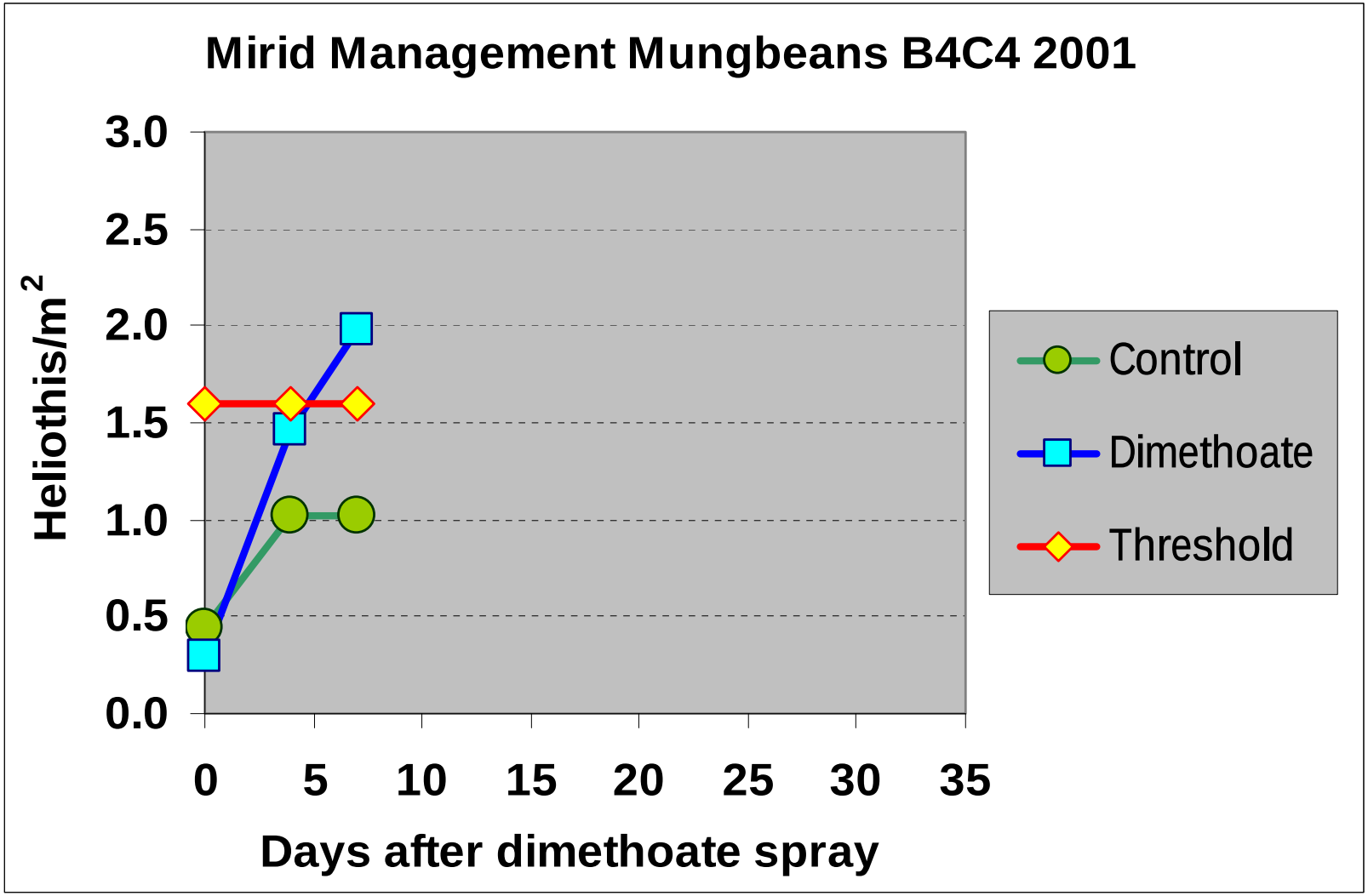

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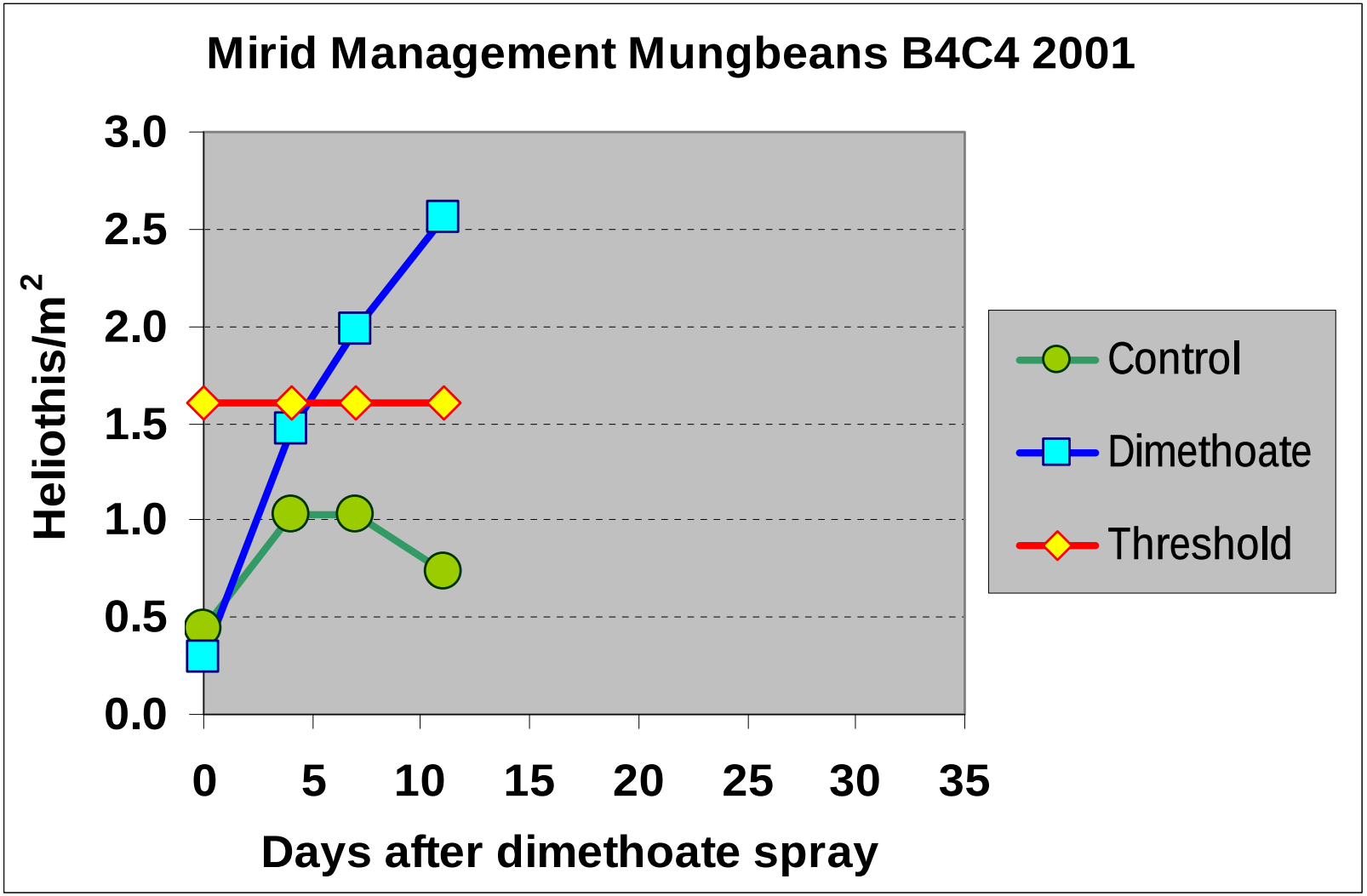

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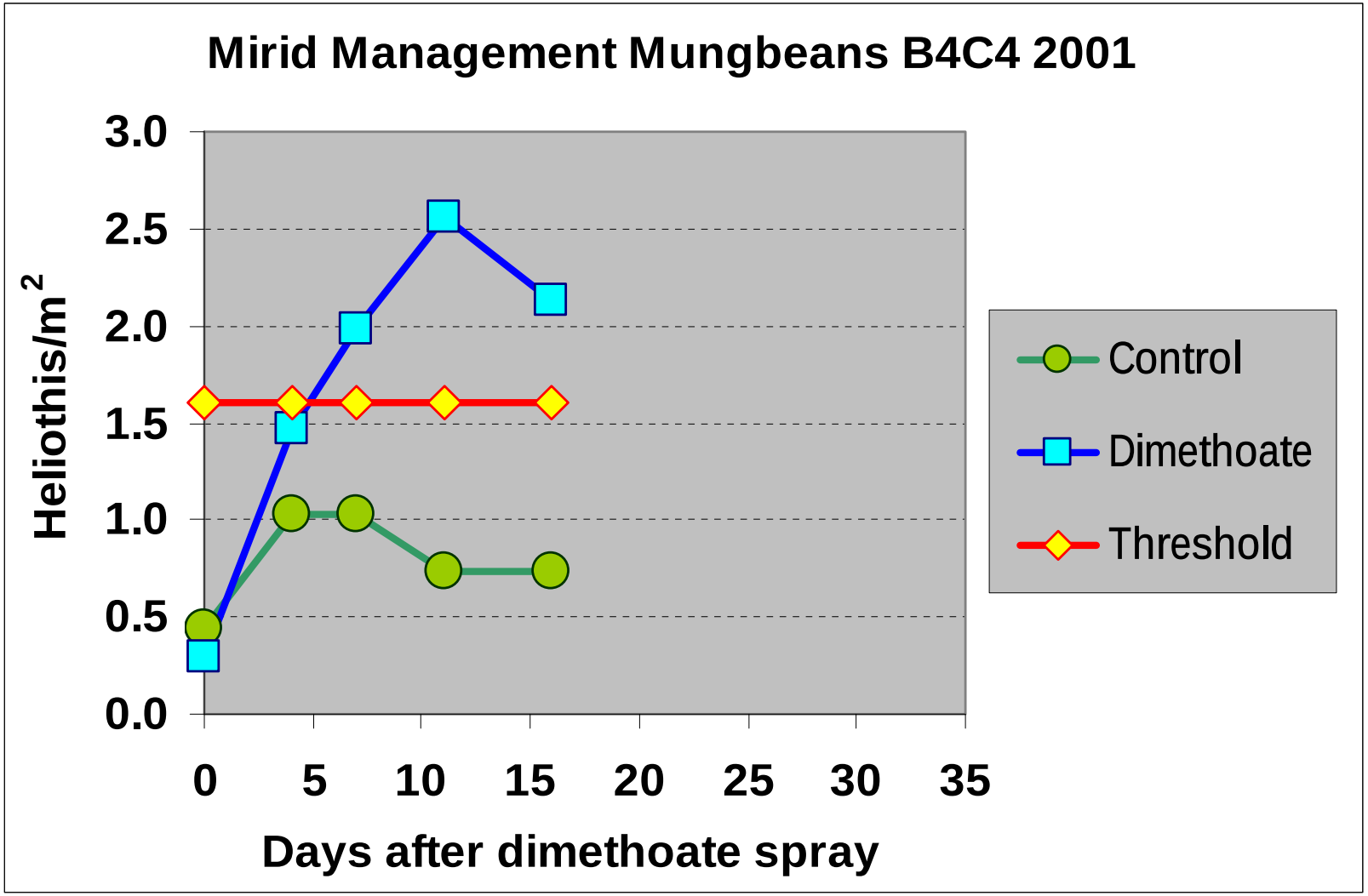

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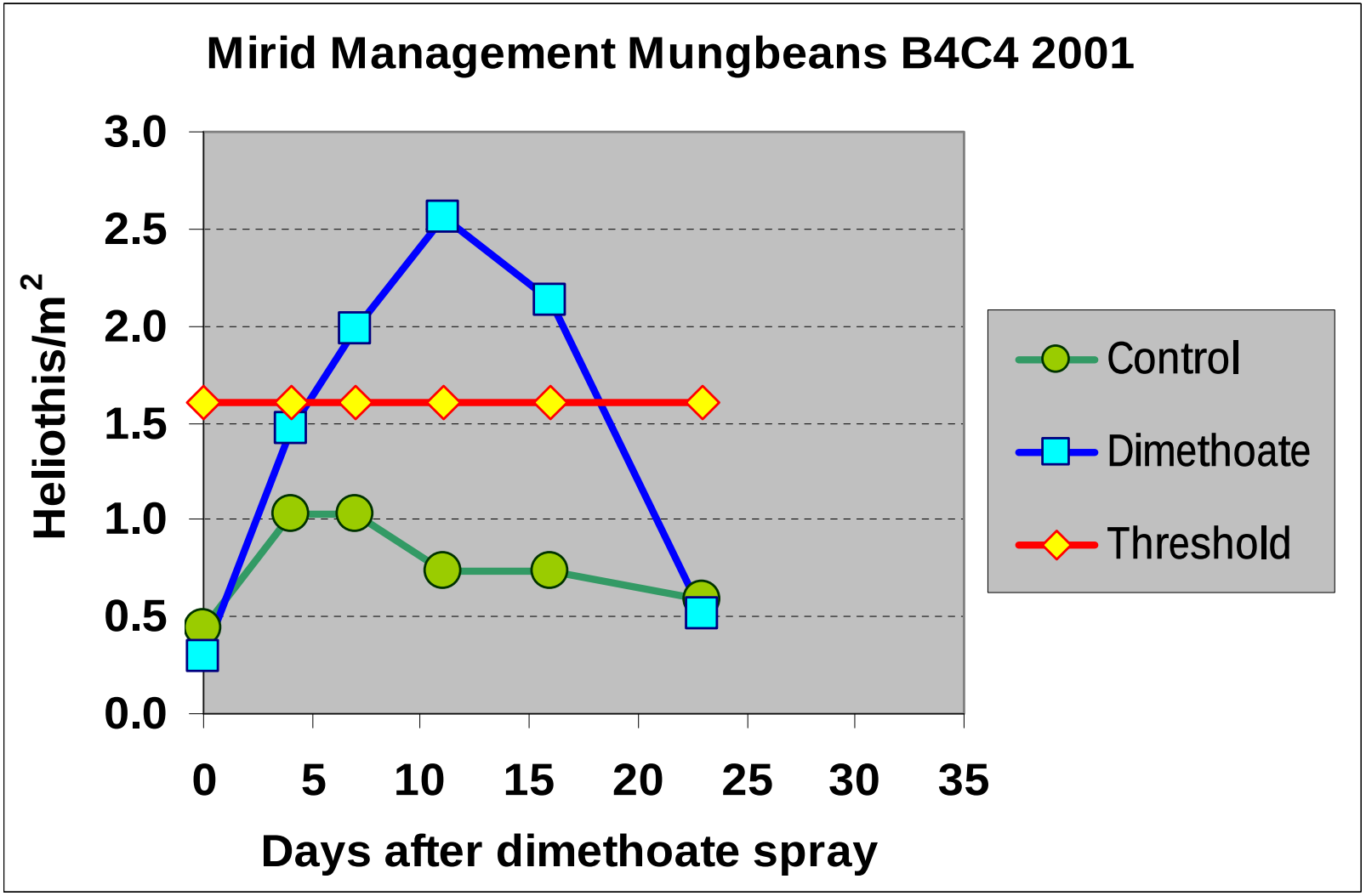

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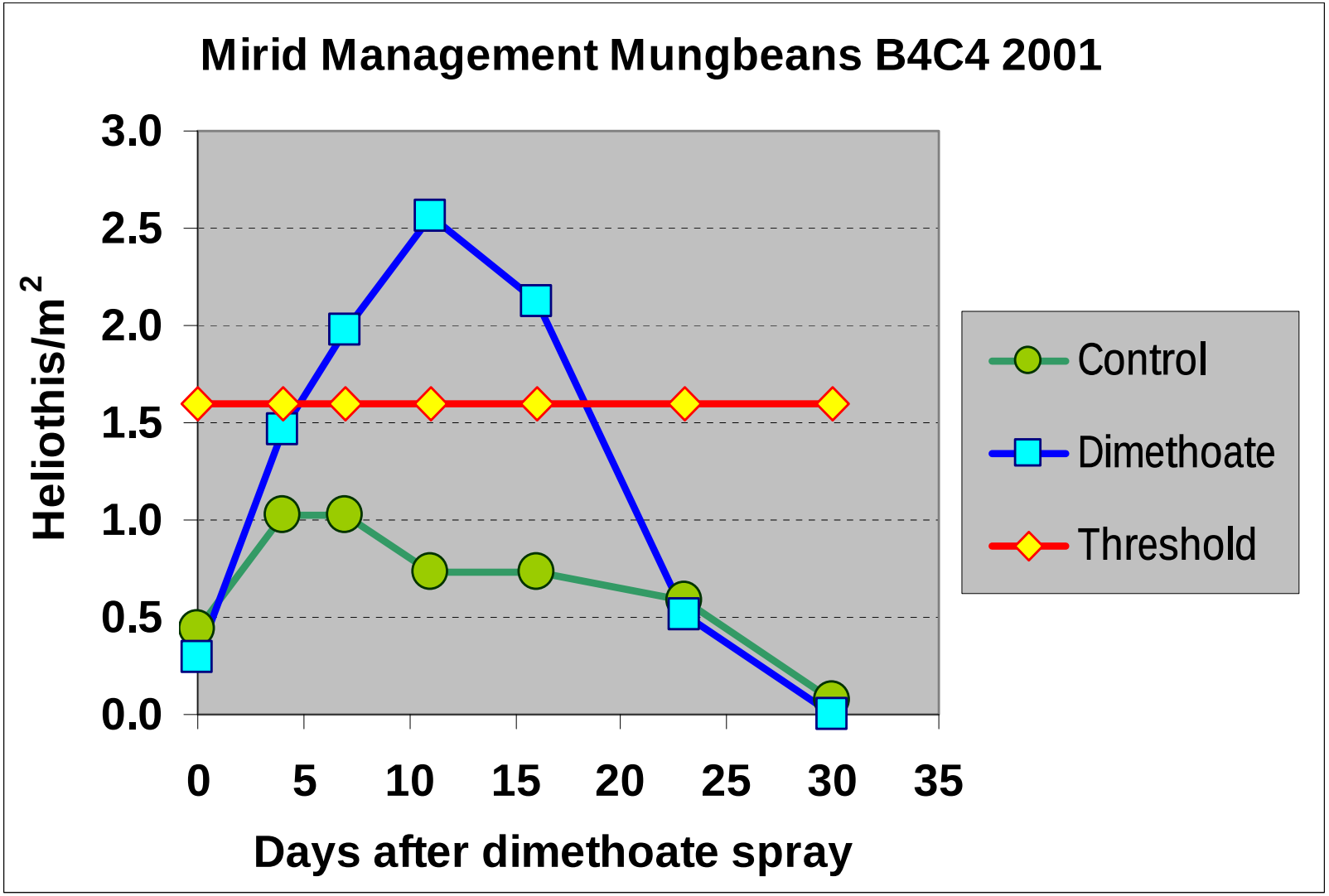

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Mirids in mungbeans
- Budding/flowering/podset

- Delaying a mirid spray !!***##
- This is heresy!
- Show us the data!

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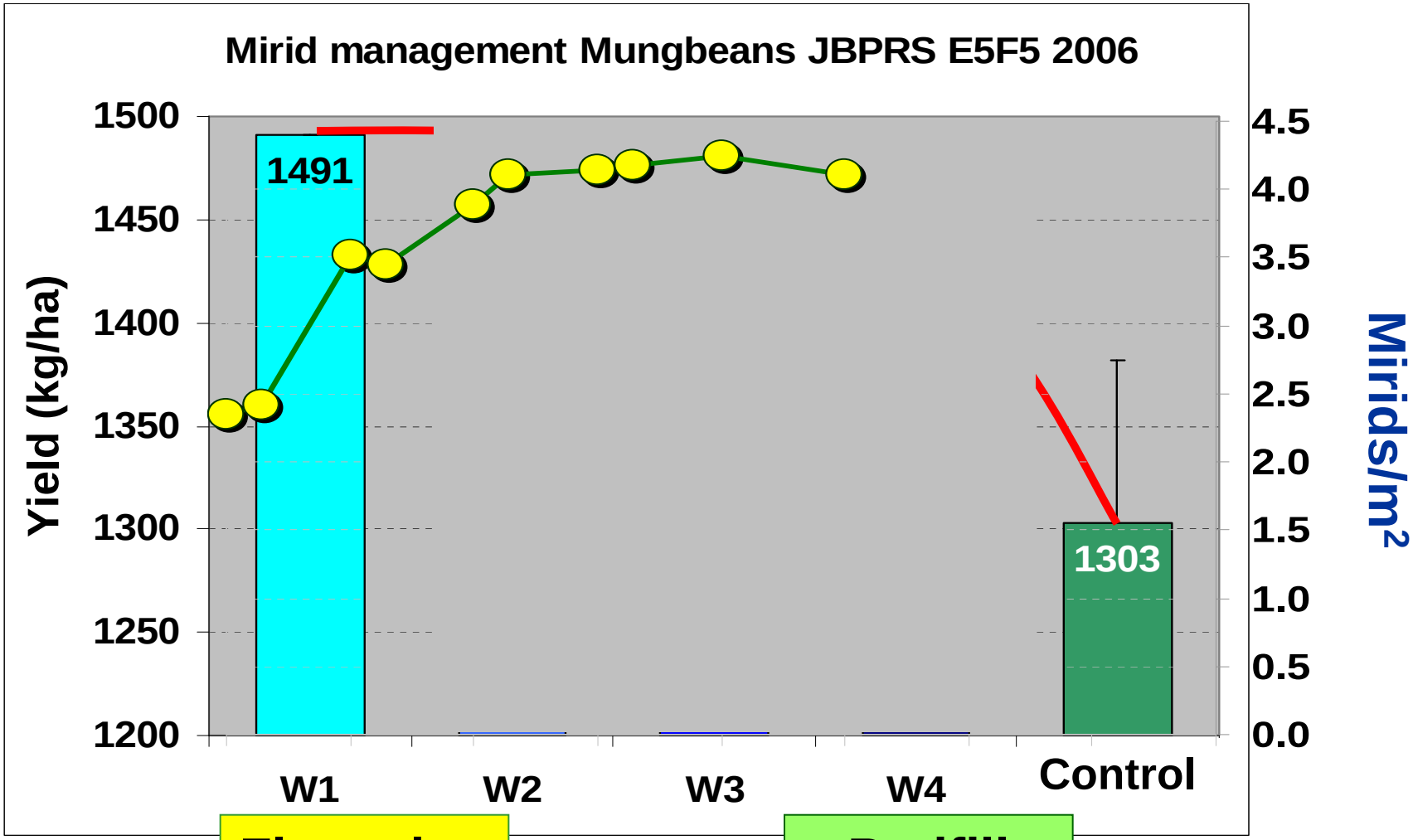
Mungbean yields where 1st mirid spray applied progressively later at weekly intervals from flowering (W1) onwards.

No yield loss despite starting population of 2.3 mirids/m²



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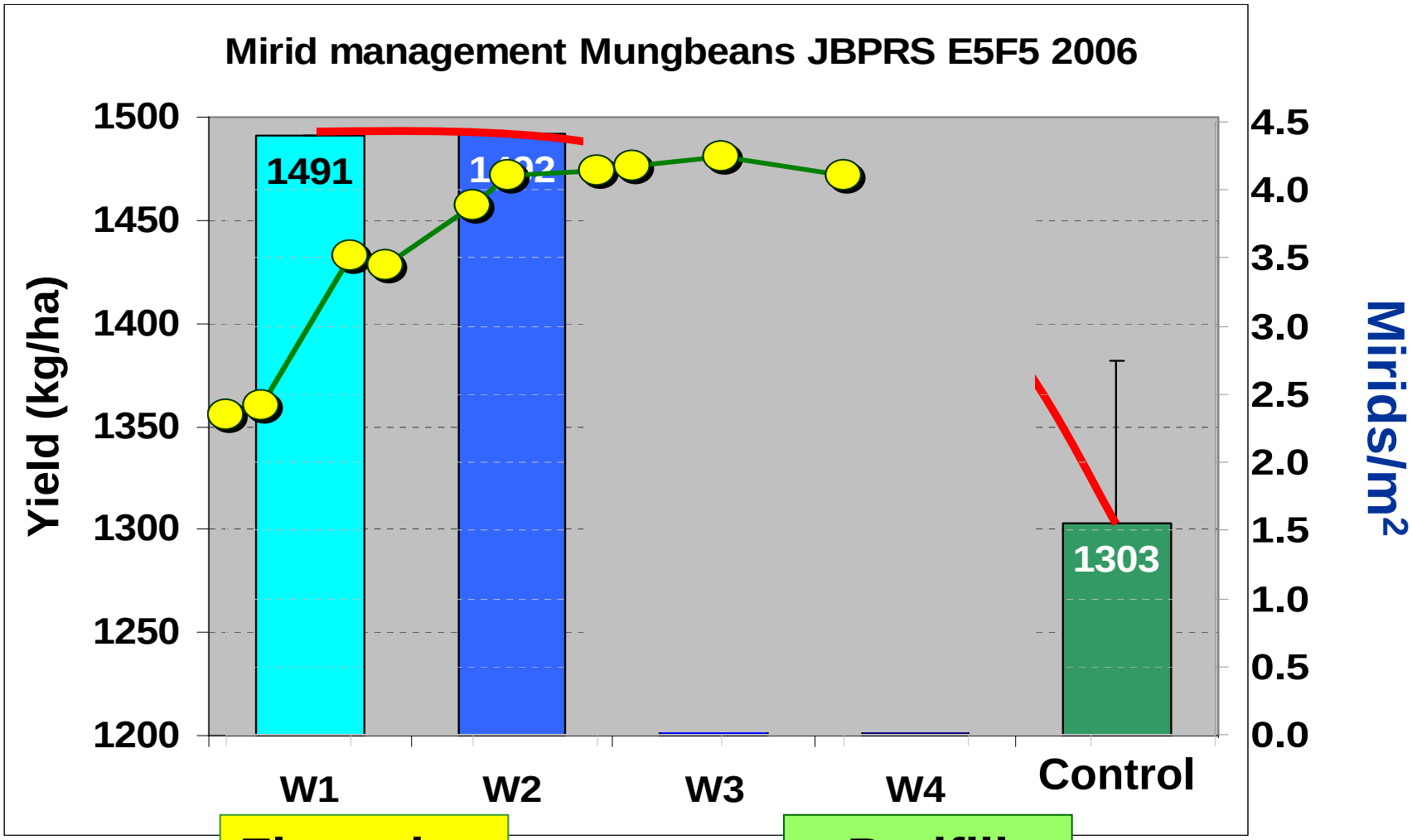

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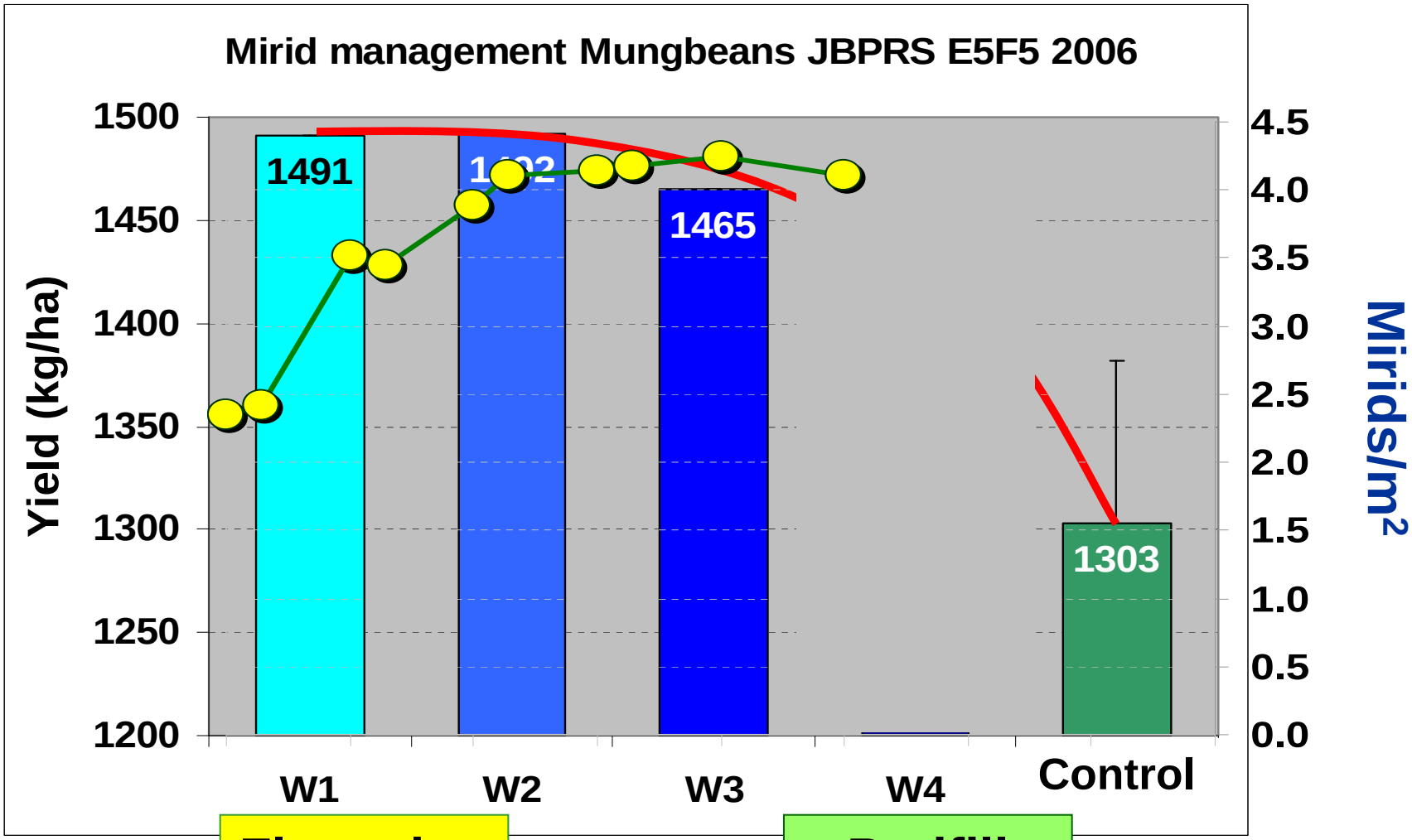

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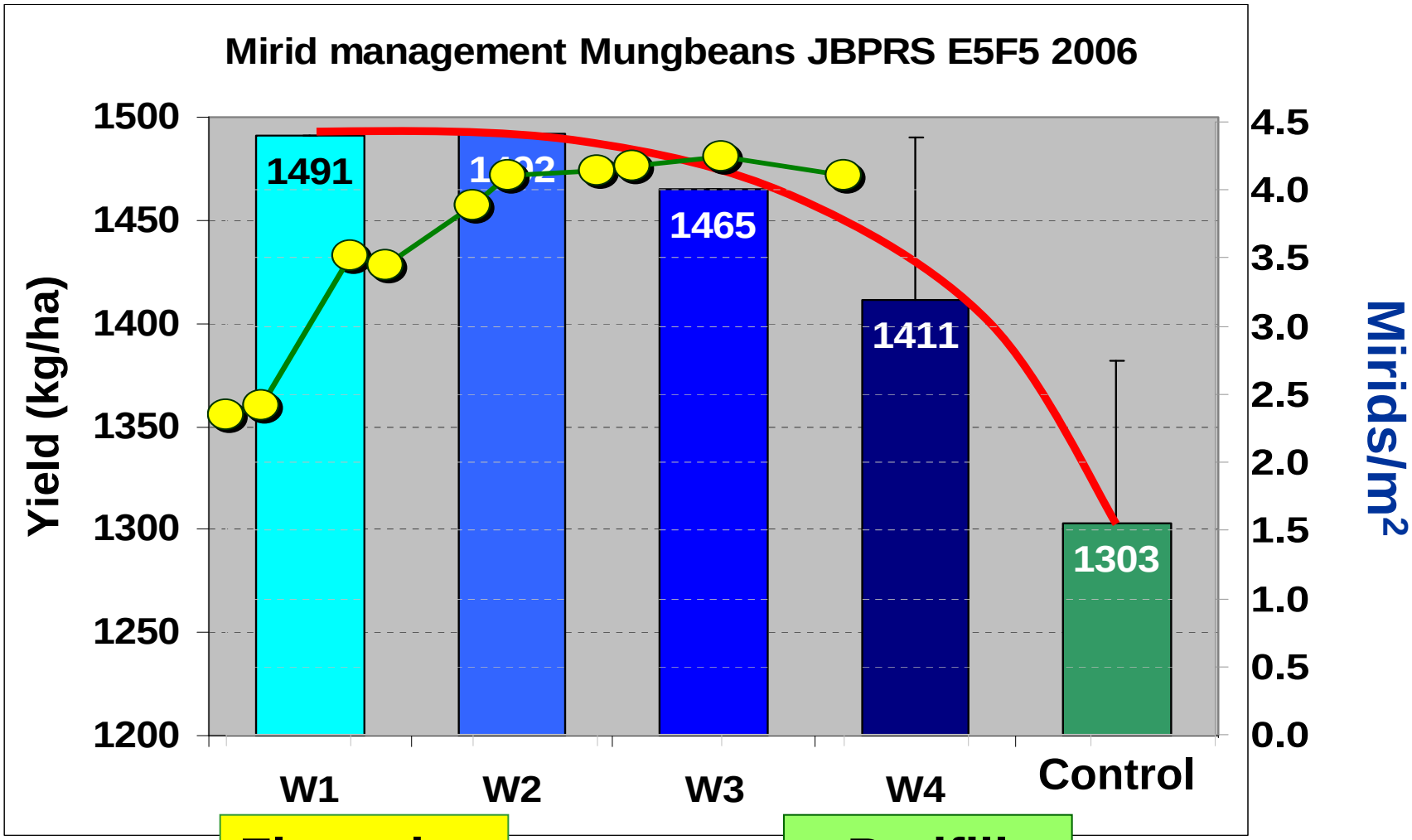
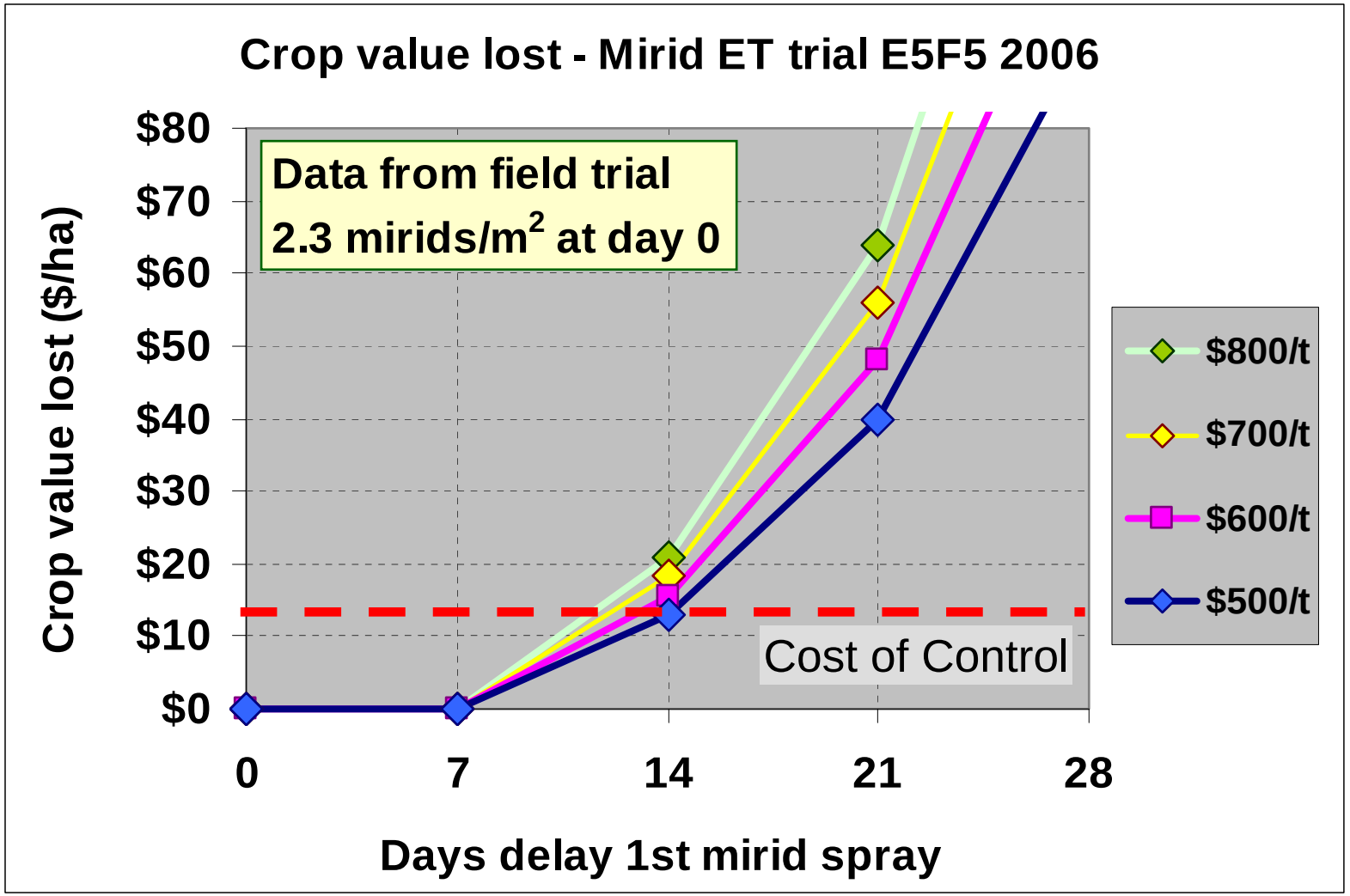


Mungbeans

Can delay 1st mirid spray slightly by up to 7 days with no $$ loss – if mirid ppn. not too high



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IPM best bets/opportunities
Budding/flowering/podset

Mirids in soybeans?

- **Far more tolerant than mungbeans**
- **Usually no need to spray as ET is 5/m^2**

IPM best bets/opportunities
Podfill/Pod ripening
Helicoverpa

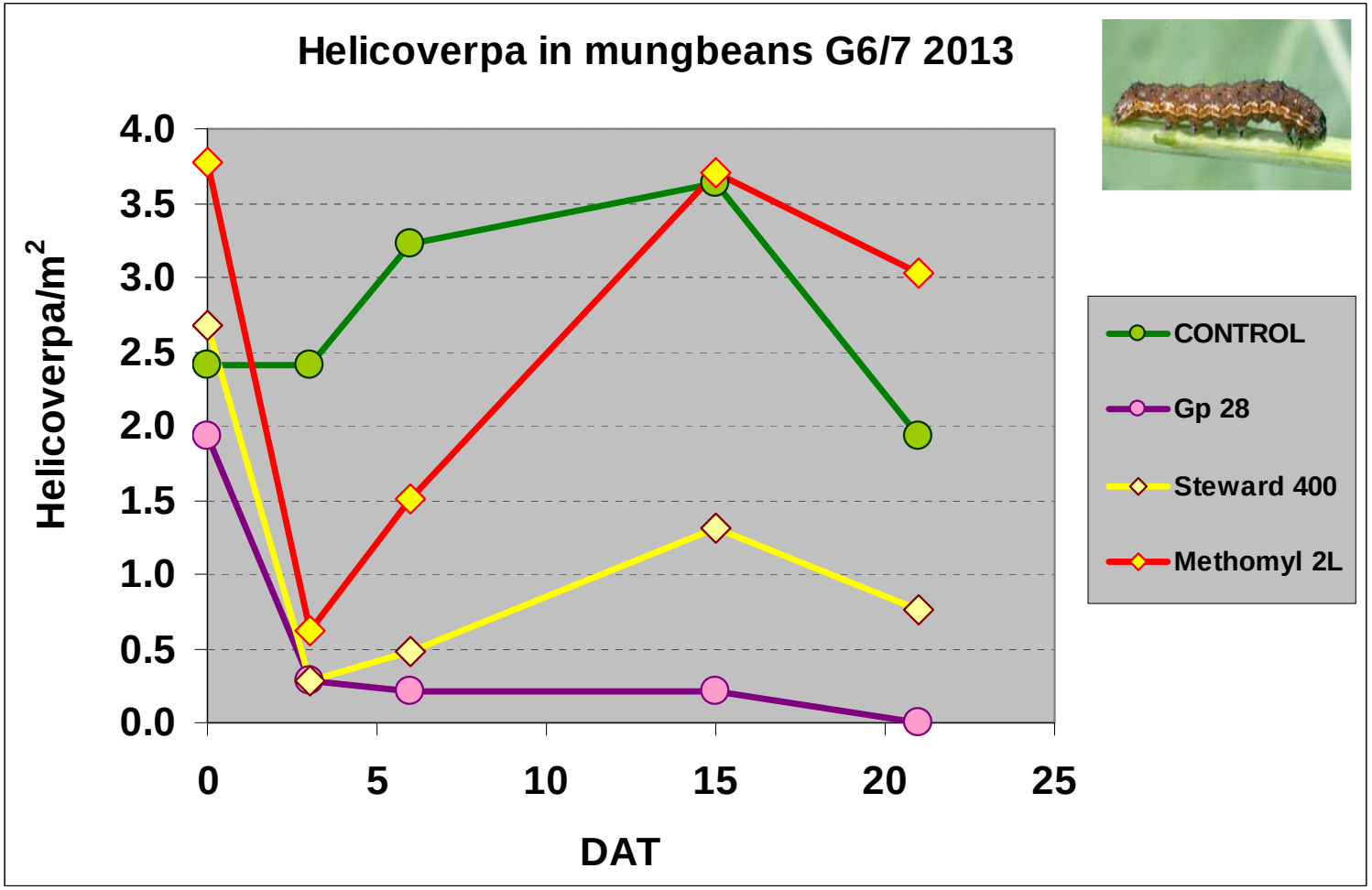
- **Indoxacarb preferred option**
- **Lower impact (softer) on parasitoids & bug predators than carbamates**
- **SP's ineffective against *H armigera***
- **Observe thresholds – see following tables**

Economic Threshold Table for Helicoverpa in Podding Mungbeans

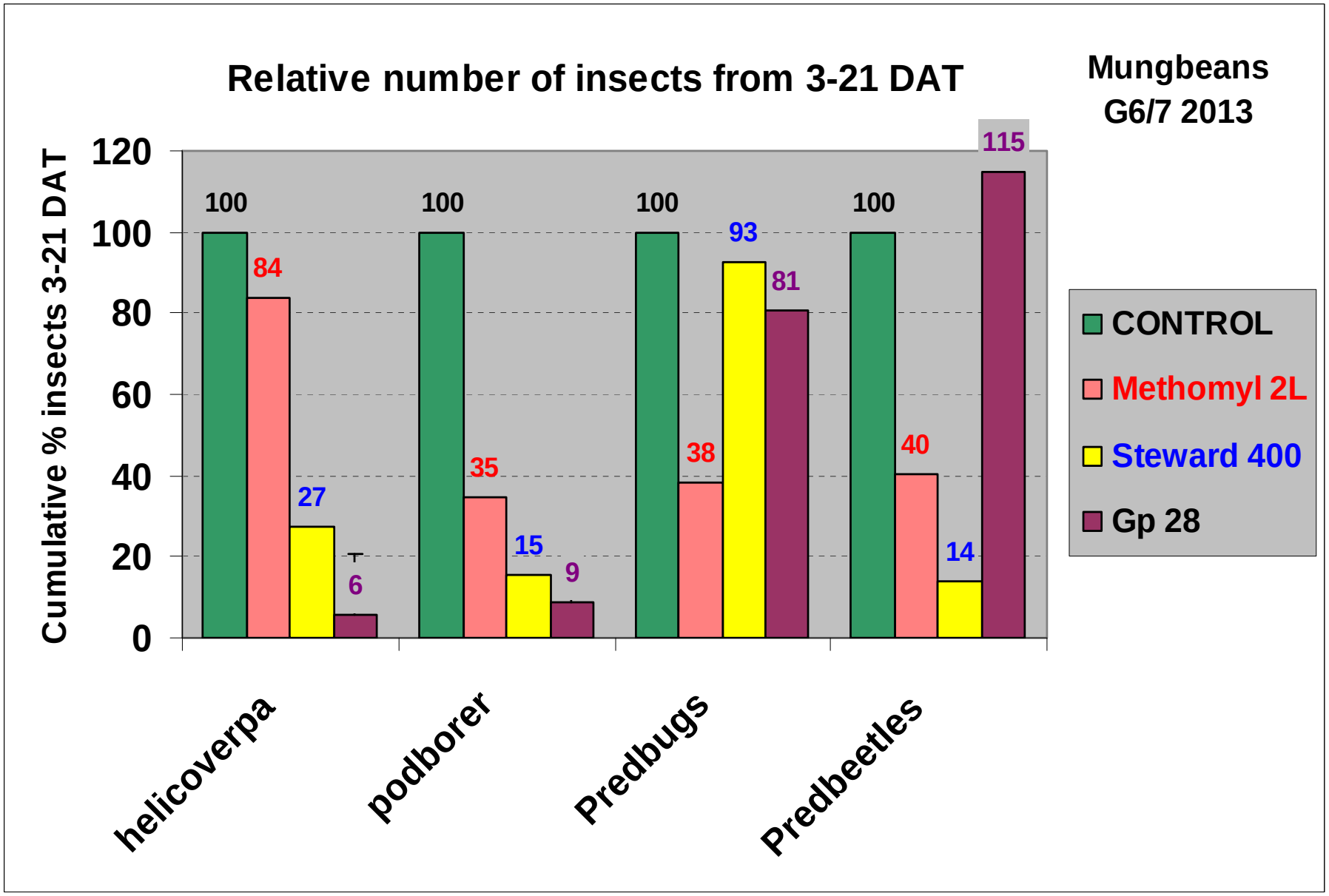
Control Cost $/ha	Threshold (larvae/m^2) at crop values listed below ($/t)						
	$ 400	$ 500	$ 600	$ 700	$ 800	$ 900	$ 1,000
$ 15	1.1	0.9	0.7	0.6	0.5	0.5	0.4
$ 20	1.4	1.1	1.0	0.8	0.7	0.6	0.6
$ 25	1.8	1.4	1.2	1.0	0.9	0.8	0.7
$ 30	2.1	1.7	1.4	1.2	1.1	1.0	0.9
$ 35	2.5	2.0	1.7	1.4	1.3	1.1	1.0
$ 40	2.9	2.3	1.9	**1.6**	1.4	1.3	1.1
$ 45	3.2	2.6	2.1	1.8	1.6	1.4	1.3
$ 50	3.6	2.9	2.4	2.0	1.8	1.6	1.4

- **Cross-reference cost of control vs crop value**
- **For Cost of Control = $40/ha & Crop Value = $700/t, ET = 1.6**

- Within 2 weeks, **methomyl** back at pre-spray levels
- **Steward®** best of registered products



Methomyl softer on caterpillars, harder on beneficials



Podfill/Pod ripening
Podsucking bugs


Green vegetable bug


Redbanded shield bug

- No effective soft options
- Deltamethrin ® (SP) - GVB
- Shield permit 12699 - GVB & redbanded (Sept 2014)
- Delay 1st spray till early podfill
- By then – lower risk of SLW or mites
- Need salt adjuvant for redbanded (Piezodorus)


Trichopoda

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Economic thresholds for podsucking bugs in mungbeans (and soybeans) are higher in high yielding crops.

Potential yield (t/ha)	0.25	0.5	1.0	1.5	2.0	2.5	3.0	3.5
GVBAEQ /m^2	0.1	0.2	0.3	0.5	0.7	0.9	1.1	1.4

Because thresholds are based on % seed damage & there are more seeds in higher yielding crops.

Mungbean thresholds based on GVBAEQ to give 2% seed damage

Unsure as to how good IPM is for your pest/crop??

- **Leave unsprayed strip/s** and monitor pests prior to and post spray till harvest
- **Assess** yield, time to harvest, and evenness of maturity

IPM Summary Mungs & Soys

- Sample regularly to detect the early stages of pest infestations and critical crop stages
- 'Go soft early' wherever possible
- Conserve beneficials by:-
- Only spraying above threshold pest ppns.
- And using selective pesticides where possible
- Delay hard pesticides as long as possible

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