



# Winter pulses





# Managing *Helicoverpa* in Chickpeas



*Helicoverpa punctigera*



*Helicoverpa armigera*



# Monitoring helicoverpa



## Early warning – moth activity

- Pheromone traps  
(*H. armigera* and *H. punctigera*)
- Emergence model for *H. armigera*  
(<http://cottassist.cottoncrc.org.au/DIET/about.aspx>)



## In-crop monitoring

- Sweep net
- Beatsheet

use the method appropriate to the threshold



# Pest Sampling

**Decision Making**  
for Integrated Pest Management  
in Grain Crops







A beat sheet is the recommended sampling method  
for chickpeas and other pulse crops



# *Helicoverpa* size classifications

## *Helicoverpa* larval size categories and actual sizes

Actual larval size	Larval length (mm)	Size category
	1-3	Very small
	4-7	Small
	8-13	Medium
	14-30 +	Large

# Implications of small larvae in the crop?

- Very small helis cause no economic damage
- Mortality of smalls is very high
- VS and S are difficult to count accurately
- They indicate recent egg lay & potential future damage
- If using biopesticides, **must** target larvae of this size



## Just count the larvae that WILL inflict significant damage

Very small larvae cannot be reliably assessed

a 30% of small larvae do not survive

Site: *Cameron*  
Date: *15/9/06*  
Row spacing: *75cm*

Sample (1 m row beat)	VS	S	M	L
1	8	5	1	0
2	1	1	1	0
3	3	3	0	1
4	3	2	1	0
5	2	6	0	0
Average		3.4	0.6	0.2
Adjust for 30% mortality (S*0.7)	$3.4 \times 0.7 = 2.4$			
Mean estimate of larval number (Adjusted S)+M+L	$2.4 + 0.6 + 0.2 = 3.2$			

Adjust for row spacing  
divide by row spacing (m)

$$\frac{3.2}{0.75}$$

4.2

Density Estimate  
per square metre

## Make sure your density estimates are right

- thresholds are expressed in numbers per square metre (m<sup>2</sup>)
- row spacing makes a difference



# Yield and quality thresholds

Threshold are calculated to protect:

## Yield

*Economic losses generally not incurred if threshold exceeded slightly*

## Quality

*Significant economic losses/discounts may apply if threshold is exceeded.*





# Economic thresholds

$$\text{Yield loss (\$/ha)} = \frac{\text{number heli coverpa larvae per m}^2 \times 2.0^* \times \text{chickpea price (\$/t)}}{100}$$

\* 2.0 g grain per larva

## Beatsheet ready reckoner

Chickpea price (\$/t)	Value of yield loss (\$/ha)				
	1 larva/m <sup>2</sup>	2 larva/m <sup>2</sup>	3 larva/m <sup>2</sup>	4 larva/m <sup>2</sup>	5 larva/m <sup>2</sup>
200	4	8	12	16	20
300	6	12	18	24	30
400	8	16	24	32	40
500	10	20	30	40	50
600	12	24	36	48	60

# Calculating dynamic thresholds



$$\text{Economic threshold (pests/sample unit)} = \frac{C}{V \times D}$$

Where

**C** = cost of control including application (\$/ha)

**V** = crop value (\$/tonne)

**D** = damage per pest  
(t/ha for every pest/sampling unit)

**D is what is determined by research**



# A ready reckoner

## ET for helioperpa in chickpeas

Cost of control (\$/ha)	Chickpea price (\$/t)							
	200	250	300	350	400	450	500	550
15	3.8	3.0	2.5	2.1	1.9	1.7	1.5	1.4
20	5.0	4.0	3.3	2.9	2.5	2.2	2.0	1.8
25	6.3	5.0	4.2	3.6	3.1	2.8	2.5	2.3
30	7.5	6.0	5.0	4.3	3.8	3.3	3.0	2.7
35	8.8	7.0	5.8	5.0	4.4	3.9	3.5	3.2
40	10.0	8.0	6.7	5.7	5.0	4.4	4.0	3.6

\* Based on beatsheet sample (# per m2)

# A calculator



## Helicoverpa in chickpea – threshold calculator

Helicoverpa is the only major insect pest of chickpea. Research has shown that the impact of one helicoverpa larvae (per square metre) completing development on the crop is a resultant loss of 2 grams of grain. This figure is used in estimating the potential yield loss and subsequently the economic threshold. The following calculator can be used to identify potential yield loss and provide an appropriate suggestion for action.

### *Helicoverpa threshold in chickpea*

Steps in determining if control is warranted:

1. Sample the crop and record the number of small (S), medium (M), and large (L) larvae in each sample (e.g. 5 beatsheet samples of metre row).
2. Average the number of each size of larvae and enter into the relevant box
3. Enter the crop's row spacing and click the calculate button from mean larval density
4. Add your estimate of the cost of control (including application) and expected crop value to calculate potential yield loss and break-even economic threshold. (If you have a preferred cost:benefit, enter it to get a revised economic threshold).
5. You can then request a suggestion for action based on crop stage and selected threshold.

Number of larvae	
Very small (1-3 mm) = 1 <sup>st</sup> instar	<input type="text" value="0"/> <i>Note: due to high mortality and low damage rates, very small larvae are not included when calculating larval densities</i>
Small (4-7 mm) = 2 <sup>nd</sup> instar	<input type="text" value="0"/> <i>Note: Final density assumes a 30% mortality rate of these larvae</i>
Medium (8-23 mm) = 3 <sup>rd</sup> or 4 <sup>th</sup> instar	<input type="text" value="0"/>
Large (24-30+ mm) = 5 <sup>th</sup> or 6 <sup>th</sup> instar	<input type="text" value="0"/>
Row spacing (m)	<input type="text" value="1"/>
<b>Mean larval density (per m<sup>2</sup>) after factoring in likely mortality:</b>	<input type="text" value="0.00"/>
	<input type="button" value="Calculate"/>

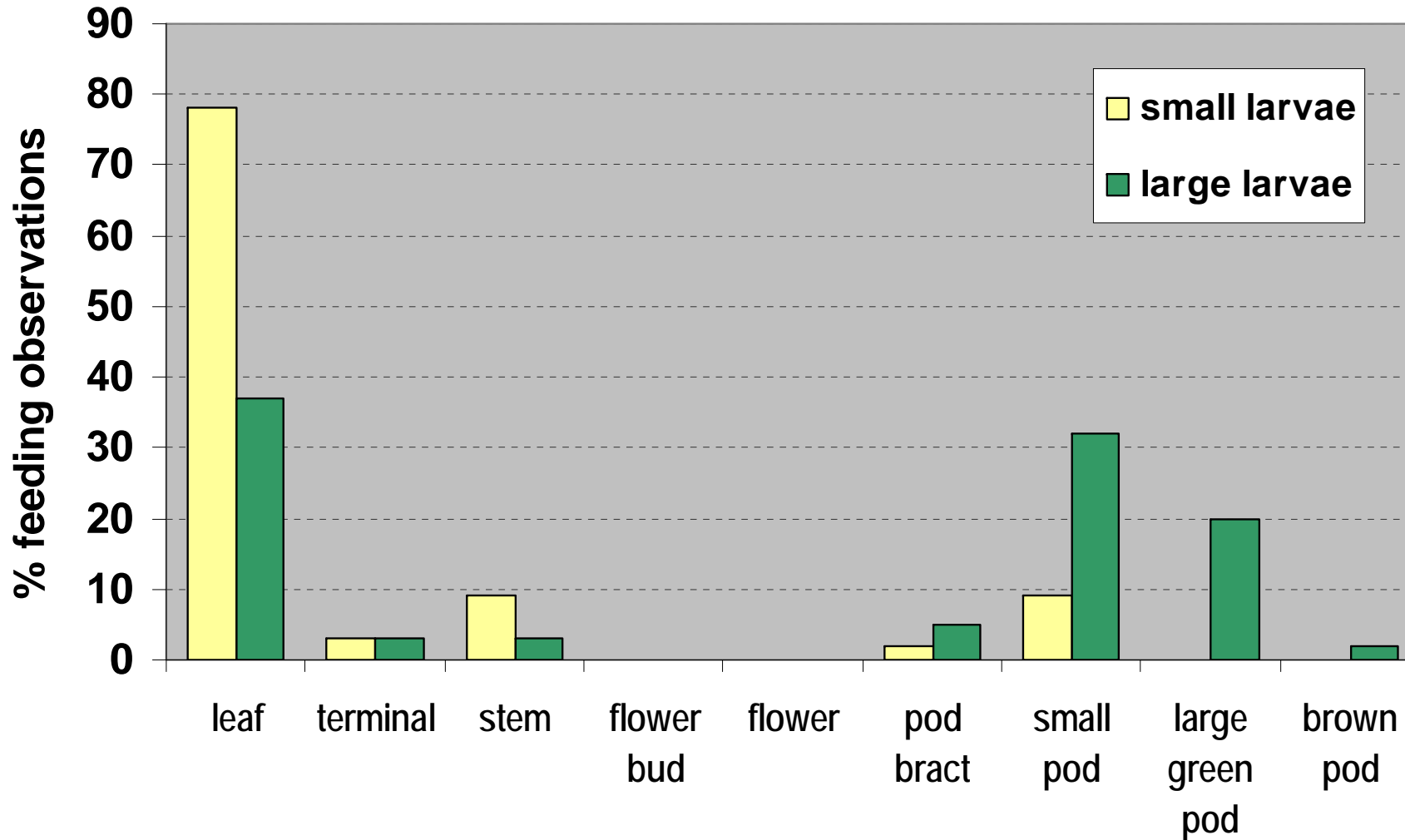


# Helicoverpa feeding preferences





# Determine the crop stage and susceptibility

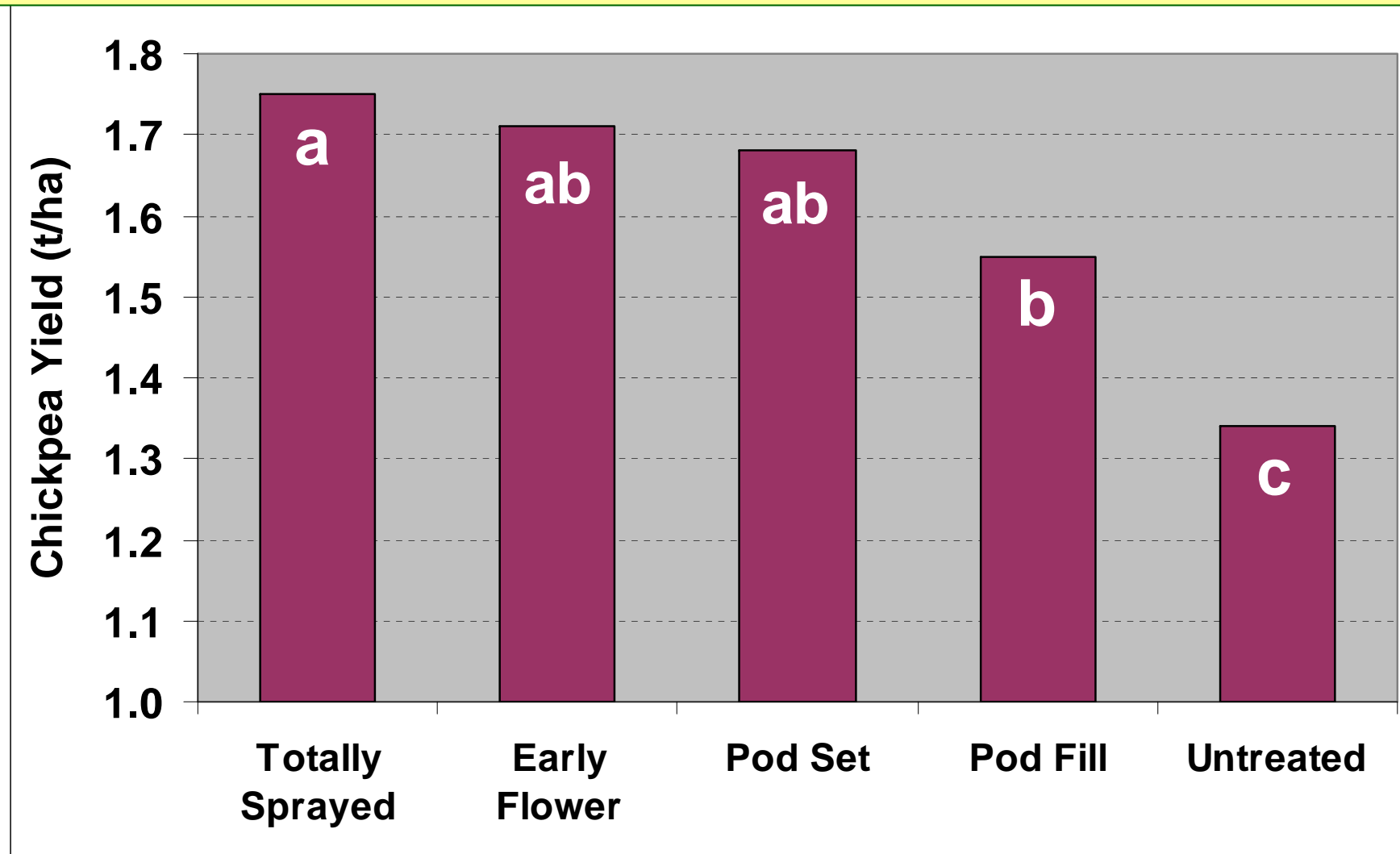


# Economic Thresholds

## Determine the crop stage and susceptibility



No significant yield loss by delaying spraying until podset







# Making a Spray Decision

Additional factors that may influence the decision, timing and product choice -

***Loss of yield and quality only occurs from pod set to maturity***

- Age structure of the larval population - in relation to time to desiccation or harvest
- Proportion of *H. armigera* and *H. punctigera*
- Spray conditions and drift risk
- Insecticide options, resistance levels for *Helicoverpa* and recent spray results in local area.
- Residual of the products

**Aim for one well timed spray**



# Making a Spray Decision

- Be aware of, and use, the voluntary farming systems Insecticide Resistance Management Strategy (Altacor 15 Oct Warm Areas)
- Avoid prolonged use and over-reliance on any one chemical group for *Helicoverpa* control.
- Rotate the main chemical groups wherever possible.
- Avoid use of pyrethroids on *H. armigera* populations
- Check compatibility of potential mixing partners before use  
Always read the label supplied with each product before use.
- Beware of withholding periods and factor this in to your decision-making about harvest date and/or insecticide use.

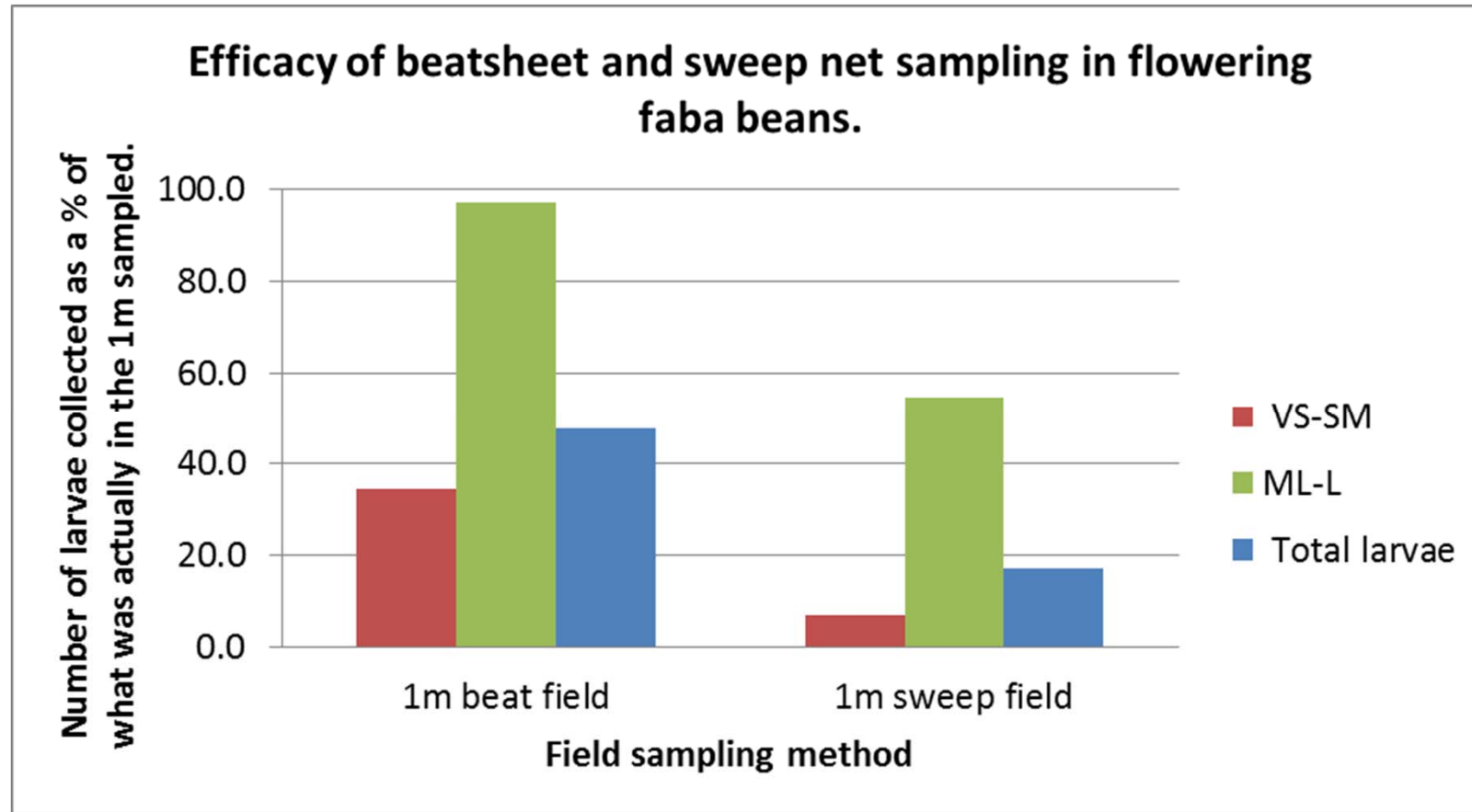


## Resistance management & product selection

- The threat of resistance development to new products will influence their future use patterns
- It is unlikely that season-long use of a single product will be allowed = label limits of 1-2 applications and/or cut off for use (e.g. Altacor in chickpea).



# Faba beans - sampling



45 cm row spacing  
Average plant height = approx 60 cm  
mean larval density 5-8 per metre row



### Location of helicoverpa larvae on flowering faba bean.

