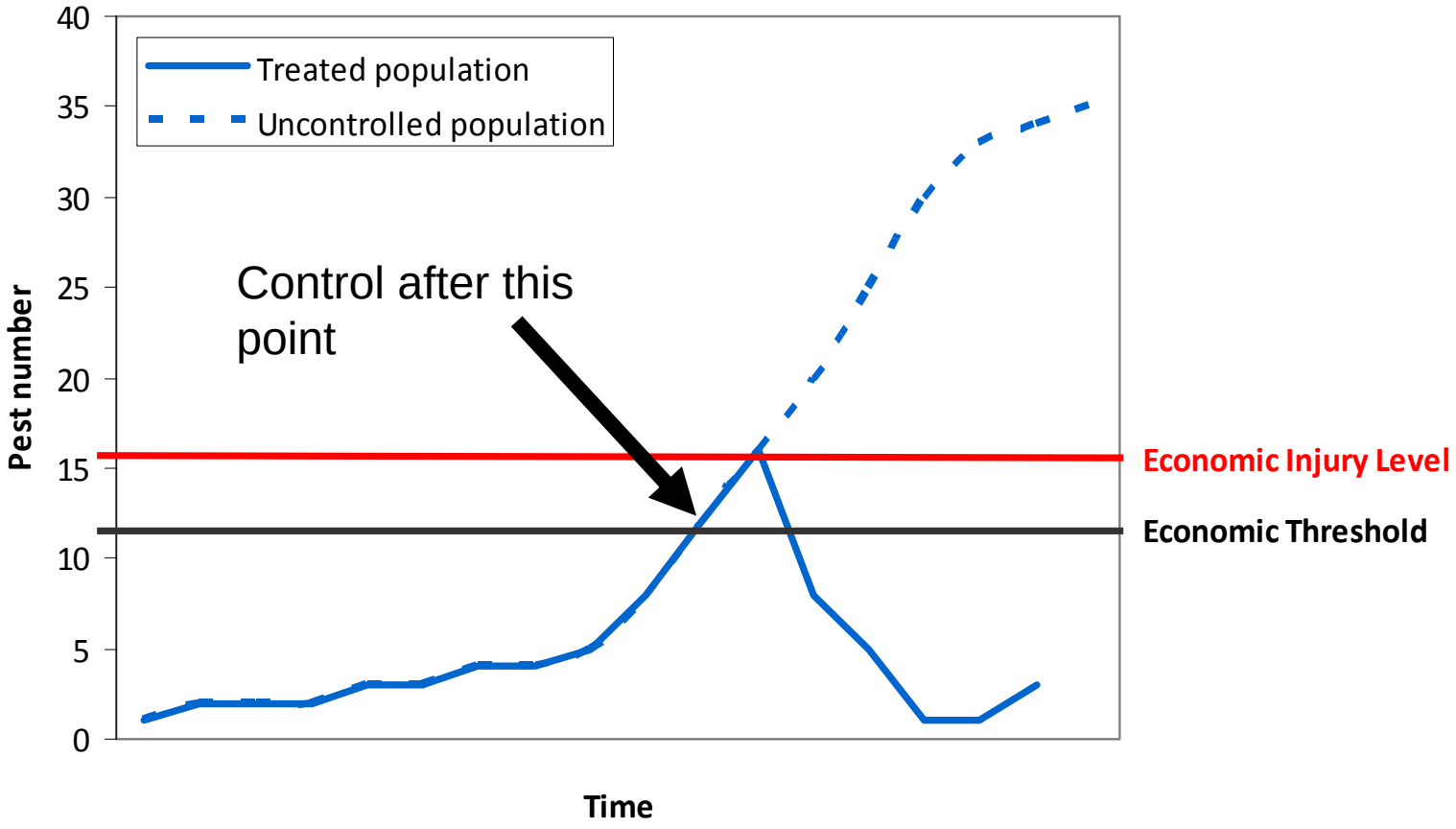
Thresholds

one of the cornerstones of IPM

Thresholds

The pest density that warrants control to prevent economic crop loss.



Thresholds are a cornerstone of IPM

Provide a basis for making decisions about control

Minimise the risk of:

- unnecessary and poorly timed sprays
- inducing outbreaks of pests
- selection for insecticide resistance

How thresholds are derived

Quantify the crop response to insect damage

- Characterise damage
- Replicated trials with specific pest densities and crop stages
- Assess impact on crop growth, yield, quality
- Done in conjunction with sampling and insecticide efficacy trials

Can take several years to get a result.




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.




Dynamic and fixed thresholds

There are relatively few dynamic thresholds

Most are fixed numbers

- Rate of pest damage (D) was probably used in calculating ET originally, but Cost and crop Value are likely to be out of date
- Best bets
- Experimentation, record keeping and experience will validate and/or refine

Economic thresholds expressed as:

- no. of pests per sample unit (e.g. #/m^2(beat sheet), #/10 sweeps)
- % leaf area removed
- % defective/damaged seed (by weight or count)

Using economic thresholds

Use the appropriate sampling technique for the threshold

Economic threshold

= economic breakeven point

Experience will inform use of fixed thresholds

Use calculators and ready reckoners where available

Calculating dynamic thresholds

Economic threshold (pests/sample unit) = C ÷ (V x 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 helicoverpa 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 m^2)

Predicted Helicoverpa yield loss in chickpeas

Chickpea price ($/t)	Value of yield loss ($/ha)				
	1 larva/ 10 sweeps	2 larva/ 10 sweeps	3 larva/ 10 sweeps	4 larva/ 10 sweeps	5 larva/ 10 sweeps
200	6	12	18	24	30
300	9	18	27	36	45
400	12	24	36	48	60
500	15	30	45	60	75
600	18	36	54	72	90

Based on sweep net sampling (10 sweeps)

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) = 1st instar	0	*Note: due to high mortality and low damage rates, very small larvae are not included when calculating larval densities*
Small (4-7 mm) = 2nd instar	0	*Note: Final density assumes a 30% mortality rate of these larvae*
Medium (8-23 mm) = 3rd or 4th instar	0	
Large (24-30+ mm) = 5th or 6th instar	0	
Row spacing (m)	1	
Mean larval density (per m^2) after factoring in likely mortality:	0.00	

Calculate