Grains Research
UPDATE
Research Information for Farm Advisers from the
Grains Research and Development Corporation (GRDC)
Northern Region

GRDC
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Development
Corporation

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New threshold for Helicoverpa in vegetative soybeans

According to QPI&F researchers Dr John Rogers and Hugh Brier, "a threshold of 7-8 larvae/m^2 for *Helicoverpa armigera* in vegetative soybeans is critical to avoid significant yield loss."

Dr Rogers said that "an average well grown irrigated or higher yield rain-fed crop, can tolerate 7-8 larvae/m^2 in the vegetative stage with no yield loss - but at higher larvae numbers, yield loss can be savage (Figure 1). In stressed crops or early vegetative crops a lower threshold would apply".

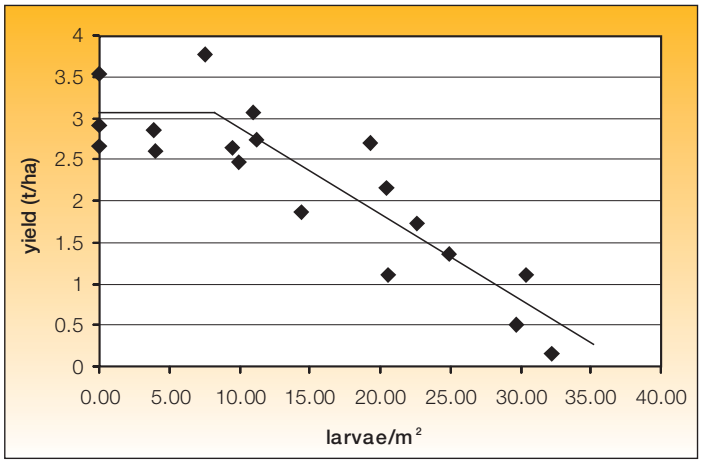

Figure 1: Yield loss (t/ha) from Helicoverpa armigera larvae in a non-water stressed soybean crop

"It is important to scout crops regularly and spray larvae when they are small. Bio-pesticides can be used in many crops – provided that a mortality of 60—70% is budgeted for and vegetative thresholds are kept below the critical level of 7-8 larvae/m^2.

In field trials 'at threshold' populations of 7-8 Helicoverpa larvae/m^2 inflicted less than 33% defoliation, i.e. less than the damage threshold currently used. The reason for the difference is that *Helicoverpa armigera* eat buds as well as leaves. Severe yield loss occurs when the Helicoverpa eat a critical percentage of the auxiliary buds which are the precursors to the floral buds.

"The 33% defoliation threshold will still hold for loopers which are predominantly foliar feeders, not bud feeders, said Mr Brier.

Further information:
Hugh Brier, 07 4160 0740, Hugh.Brier@deedi.qld.gov.au
John Rogers, 07 3720 9065, john.rogers@rcac.net.au

Potential for higher Helicoverpa thresholds in flowering mungbeans

According to QPI&F researcher Hugh Brier, mungbeans are much better able to compensate for Helicoverpa damage at flowering than previously thought.

"In recent mungbean trials, populations as high as 8.8 larvae/m^2 failed to reduce yields in well irrigated flowering crops (Figure 2). This was despite each larva eating 160 mungbean buds and flowers, and reducing the number of these structures per plant by over 80%. However, progressively fewer reproductive structures are eaten as the crops progress from budding/flowering to pod set to pod fill to harvest. Structures such as pods are more substantial, therefore each Helicoverpa needs to eat fewer of them to satisfy its hunger.

The high rate of damage to early reproductive structures (160 buds per larva) suggests small drought-stressed crops are at greater risk of yield loss due to damage at flowering. This is because in smaller/stressed crops, a given Helicoverpa population will eat a greater percentage of buds/flowers, as such crops set fewer of these structures.

There is an increased risk of Helicoverpa larvae eating more than a critical percentage of buds resulting in significant yield loss.

"We feel that we are likely to get a similar tipping point in smaller drought-stressed mungbean as found in vegetative soybeans – and further trials are planned to define the relationship between mungbean crop size and damage.

"However in well watered crops at flowering, the implications for Helicoverpa management are that (a) the current threshold (based on yield loss at pod fill) may be increased, (b) sprays may be delayed slightly to get away with one spray, and (c) biopesticides may have a fit in flowering crops. In order to give confidence to growers, more knowledge is needed on the relationship between crop size and susceptibility to Helicoverpa damage at flowering," said Mr Brier.

A discerning question raised by a top Queensland consultant is "Given mungbeans well publicised susceptibility to mirid damage at flowering, how come they are more tolerant of Helicoverpa damage?" The answer lies in differences in the pests' population dynamics. Because mirids typically are present in increasing numbers from early budding to pod fill, new buds set to replace mirid-aborted buds are continually attacked. In contrast where there is a single Helicoverpa generation (as often occurs), peak damage is confined to a limited period (5-7 days) and replacement buds are able to develop. However, where continued Helicoverpa pressure occurs, the potential for yield loss is obviously greater and new threshold models catering for such scenarios are needed in mungbeans, and all other grain crops attacked by this pest.

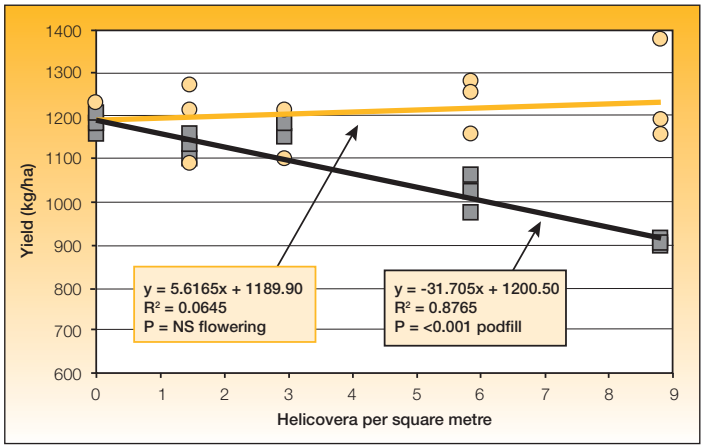

Figure 2: Relationship between Helicoverpa armigera density and yield loss in mungbeans infested at either flowering or late pod fill with early 4th instar larvae. Note the zero yield loss at flowering in this crop yielding 1.2 t/ha, despite up to 8.8 larvae/m², but a highly significant yield loss at late pod fill of 32 kg/ha per larva/m².

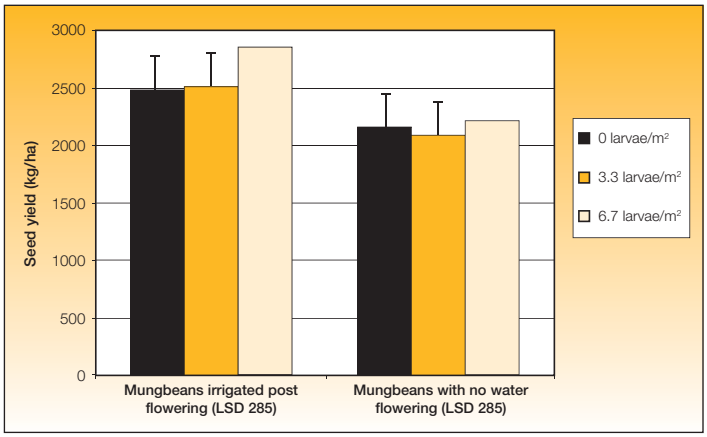

Figure 3: Yields for mungbean infested with up to 6.7 Helicoverpa armigera larvae/m at flowering/ early podding. All plots had a full moisture profile at flowering, but post flowering, plots either received continued irrigation, or no irrigation (i.e. suffered terminal drought). Post flowering temperatures ranged from 35-45°C. Note the significant impact of post flowering watering on yield, but the absence of yield loss due to Helicoverpa in either treatment, albeit in a high yielding crop.

Further information:

Hugh Brier, 07 4160 0740, Hugh.Brier@deedi.qld.gov.au

GRDC codes: DAQ00086 & DAQ00053

New mungbean management guide

If you have attended a Certified Mungbean Agronomy Course then you will have already received a hard copy of the new 'Mungbean Management Guide' in the mail.

For those of you that have not, then it can be found on the AMA website at http://www.mungbean.org.au/publications.html

Further information:

Gordon Cumming, 0408 923 474
pulse.gordon@bigpond.com

Beat sheet not showing all pod sucking bugs in soybeans

A preliminary trial conducted by Hugh Brier, Adam Quade and Joe Wessels from QPI&F (DEEDI) has shown large differences between beat sheet sample counts and the number of pod sucking bugs actually present (the absolute number) in soybeans.

The results from an 'average' late-season crop of Bunya soybeans were startling.

In 60 paired samples, the beat sheet detected less than 10% of green vegetable bug (GVB) small nymphs actually present and only 50% of GVB adults. However, the beat sheet detected 100% of the large GVB nymphs present in the crop.

As current GVB thresholds are based on data correlating the absolute number of GVB present with percentage seed damage, it is essential that beat sheet counts are adjusted for any sampling inefficiencies. "Based on US publications, it had been assumed that the beat sheet was capturing the majority of pod sucking bugs, said Mr Brier. However, the results from this trial suggest this is not necessarily the case.

"For summer pulses, pod-sucking bug thresholds are based on seed quality and are very low, typically at ~½ adult green vegetable bug equivalent (GVBAEQ) per square metre. The practical implications of this trial data are that if you are finding ~¼ of an adult per square metre using the beat sheet, this would equate to ~½ an adult in absolute terms.

And because ~¼ of a bug per square metre is such a very low population, in most crops, you'd make the decision based on the number of adults alone at the beginning of pod fill.

"As small nymphs usually suffer very high mortality and do not cause a lot of damage, the level of undercounting for these using the beat sheet is not as critical as for the adults.

"While this data is from only 1 trial, the results are highly significant (P <0.001). However, further trials are required to confirm these results in a range of summer pulses, from tall coastal soybeans to low-set dryland mungbean. The aim will be to determine the impact of crop size and crop type on beat sheet efficiency for GVB and other pod sucking bugs.

Mr Brier said that a key IPM tactic in summer pulses is to delay the application of pod sucking pesticides (currently only synthetic pyrethroids) until early pod fill, in order to reduce the risk of flaring whitefly, mites and Helicoverpa.

Further information:
Hugh Brier, 07 4160 0740, Hugh.Brier@deedi.qld.gov.au
GRDC code: DAQ00086-DAQ000153

High level resistance to phosphine – management critical for clean grain

A range of stored grain insects are becoming resistant to fumigation with phosphine. This has the potential to threaten exports, as live insects remain in grain after fumigation.

According to QPI&F (DEEDI) principal entomologist, Pat Collins, "during the 1990's and early 2000s, the frequency of resistance has steadily increased in all stored grain insect pest species as the grain industry came to rely more and more heavily on phosphine.

In 2007, high level phosphine resistance was detected in the flat grain beetle. "This resistance is at an extremely strong level – much higher than we have seen in other species - and we are concerned that it will threaten control with phosphine, said Dr Collins.

So the question is: can we control these insects on farm? Dr Collins said; "The application rate of aluminium phosphide (which produces phosphine gas) is the same for all silos: 1.5 tablets per cubic metre based on the total volume of the silo. Using this dose rate, our earlier research showed that fumigation in a sealed silo for 7-10 days easily controlled the resistance occurring in other species such as the lesser grain borer. However, this new resistance in the flat grain beetle is at a much higher level than we have seen before.

While we don't yet have a complete answer, early work suggests that it will take about 14 days at 400 ppm or about 25 days at 200 ppm at 25°C to completely control strongly resistant flat grain beetle. While these concentrations are easily achieved in well sealed silos at label rates of phosphine, maintaining the concentration for such a long time is difficult. The gas retention characteristics of sealed silos vary greatly. When fumigating wheat, some silos will maintain 400 ppm for only 10 days while others will hold that concentration for 20 days. This means that some fumigations, even in sealed silos, will control resistant insects while others may not. On the positive side, concentrations of at least 600 ppm and up to about 1000 ppm are typically reached in sealed silos and because phosphine toxicity is additive, this extra amount of phosphine will help to reduce the time required for a successful fumigation.

"If strongly resistant flat grain beetle becomes common on farms, it will mean that phosphine fumigations will be at least 16 days and growers may need to be measuring gas concentrations to ensure that effective concentrations are reached.

"Strongly resistant flat grain beetles have not yet been detected in on farm storages in the Northern Region and it is something we definitely don't want on farms.

Fumigating the same grain multiple times and under-dosing are the causes of resistance. To avoid resistance we need to minimise the number of times phosphine is used and avoid under-dosing. Correct dosing can only be achieved in a well sealed silo. My recommendation for the present is to fumigate only in a sealed silo and that way avoid under-dosing and the selection of these strongly insects, said Dr Collins.

Further information on managing high level phosphine resistant insects will be presented at all February/March GRDC Northern Region Updates. See back page for dates.

Pat is the leader of the Post Harvest Integrity Research Program of the CRC for National Plant Biosecurity.

Further information:
Pat Collins, 07 3896 9433, Pat.Collins@deedi.qld.gov.au

HatTrick® and other variety guides on line

Most by now will have heard about the new Desi Chickpea variety "PBA HatTrick®" which was recently launched with seed being available for the 2010 winter season.

If you have not yet seen a copy of the Variety Brochure, it can be found, along with information on other varieties at www.grdc.com.au/pba or on the Pulse Australia website by using the simple search function on the 'Publications, Crop and General' page.

Further information:

Gordon Cumming, 0408 923 474
pulse.gordon@bigpond.com

Visual quality charts for pulses on-line

Visual quality charts have been developed for lentil, faba bean and chickpea as a addendum to the Australian Pulse Trading Standards. These are a guide to be used in conjunction with the current 'Australian Pulse Trading Standards' to provide a pictorial reference for parameters as poor colour, insect damage, sprouting, bin burnt and heat damaged, mouldy and caked.

These charts can be viewed on the Pulse Australia Website at;

http://www.pulseaus.com.au/receival_and_trading_standards.aspx

Copies of the charts can also be ordered from Pulse Australia by completing the order form, found at the above link.

Further information:

Gordon Cumming, 0408 923 474
pulse.gordon@bigpond.com

Add your event details to GRDC diary dates on-line

If you are running a field day, workshop, seminar, farm walk or other event of interest to grain producers or advisers, log on to the GRDC's website and add your event details to GRDC Diary Dates on-line.

To add new events, go to: http://www.grdc.com.au/Adddiarydate

To see what's on, go to: http://www.grdc.com.au/diarydates

February 10	
16-17	**GRDC Adviser Update, Southern Region** - Wagga Wagga, NSW *Contact: Matt McCarthy, 03 5441 6176*
23-24	**GRDC Adviser Update, Southern Region** - Ballarat, Vic *Contact: Matt McCarthy, 03 5441 6176*
22	**GRDC Grower Update, Northern Region** - Wellington, NSW *
23	**GRDC Grower Update, Northern Region** - Nyngan, NSW*
24	**GRDC Adviser Update, Northern Region** - Dubbo, NSW *
25	**GRDC Grower Update, Northern Region** - Gunnedah, NSW *
28 Feb - 3 Mar	**Global Biosecurity 2010: safeguarding agriculture and the environment** Location: Brisbane Convention and Exhibition Centre, Qld *Further information: www.globalbiosecurity2010.com*
March 10	
1	**GRDC Grower Update, Northern Region** - Moonie, Qld *
2	**GRDC Grower Update, Northern Region** - Mungindi, NSW*
3-4	**GRDC Adviser Update, Northern Region** - Goondiwindi, Qld*
3-4	**GRDC Adviser Update, Southern Region** - Adelaide, SA *Contact: Matt McCarthy, 03 5441 6176*
15	**Integrated Weed Management (IWM) one-day workshop for growers** - Coonamble, NSW*
16	**Integrated Weed Management (IWM) one-day workshop for growers** - Gunnedah, NSW*
17	**Integrated Weed Management (IWM) one-day workshop for growers** - North Star, NSW*
18	**Integrated Weed Management (IWM) one-day workshop for growers** - Dalby, NSW*
22	**Integrated Weed Management (IWM) one-day workshop for growers** - Eugowra, NSW*
23	**Integrated Weed Management (IWM) one-day workshop for growers** - West Wyalong, NSW*
24	**Integrated Weed Management (IWM) one-day workshop for growers** - Griffith, NSW*
25	**Integrated Weed Management (IWM) one-day workshop for growers** - Deniliquin, NSW*
April 10	
13-15	**2010 Australasian Milling Conference** - Melbourne, Vic *Contact: Graeme Lukey, 03 9819 1433*
May 10	
1-4	**CICILS IPTIC International Pulse convention** - Brisbane Qld *Contact: Pulse Australia, http://www.pulseaus.com.au*
June 10	
21-24	**Australian Summer Grains Conference (ASGC)** - RACV Royal Pines, Gold Coast, Qld *Contact & Further Information: Kate: asgc10@yrd.com.au*

** Further information contact: John Cameron or Erica McKay, 02 9482 4930, updaten@tpg.com.au, http://www.icanrural.com.au*

(D) Varieties displaying this symbol beside them are protected under the Plant Breeders Rights Act 1994.

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Editor :
John Cameron Ph: (02) 9482 4930,
PO Box 718, HORNSBY NSW 1630
updaten@tpg.com.au http://www.icanrural.com.au

Research writer:
Erica McKay: (02) 9482 4930

Layout and design:
Lightning Designs Ph: (08) 8274 1648