FIELD PEAS
A POTENTIAL ALTERNATIVE TO CHICKPEAS FOR TRAP CROPPING IN CENTRAL QUEENSLAND

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Summary

Central Queensland currently enjoys an ascochyta blight free status, however the use of chickpeas as a winter trap crop has created a potential risk for the introduction of the disease. To address this problem we evaluated three winter active legumes (popani vetch, namoi vetch and field peas) for their suitability to be substituted for chickpeas as a spring trap crop in central Queensland. Field peas were found to be highly attractive to egg laying *Helicoverpa* spp. moths, carrying on average 50-70 eggs per metre row for most of September, the period for which a trap crop should be most attractive under CQ conditions. Egg survival on field peas was low with only 27 ± 3.5% of eggs surviving to hatch as opposed to 73 ± 2.9% egg survival on chickpea. The results suggest that field peas may be a viable trap crop alternative for chickpeas that would avert potential problems associated with ascochyta blight in this region.

Introduction

A strategic trap cropping program targeting *Helicoverpa* spp on cotton has been implemented in central Queensland since the beginning of winter in 1997. Growers typically plant 1% of their cropping area to a trap crop of chickpea in winter and pigeon pea in summer (Sequeira 2001).

Similar trap cropping strategies have been implemented in southern regions where chickpeas are utilised as a spring trap crop to capture *Helicoverpa armigera* populations that emerge from diapause at that time. However, a potential problem with the use of chickpeas is their susceptibility to ascochyta blight, a seed-borne fungal disease (Slatter & Lucy 2002).

At present CQ is free of ascochyta blight. However, members from the Pulse industry have expressed concern that the use of chickpea as a spring trap crop in CQ may inadvertently lead to the introduction of ascochyta. In response to these concerns we decided to evaluate a number of winter active legumes for their potential to be substituted as a winter trap crop under CQ conditions and thus alleviate any cross-industry conflict. The major focus for this study was to observe the number of eggs laid versus larvae numbers on each trap crop, as it was suspected that the high larvae numbers so often observed in chickpeas may be due to a lack of beneficial heliothis egg-eating insects, allowing a higher proportion of the total eggs laid to survive.

Materials and Methods

A replicated experiment was conducted on the Biloela Research Station, central Queensland (24°22'S, 150°06'E). The legumes Popani vetch, Namoi vetch, Field peas and Chickpeas were planted during the first week of July 2001 on 1 m rows in the centre of a 10 ha field of wheat. The treatments were arranged in a randomised block design with four replicates. Treatment plots were 400m^2 (20 rows x 20 m) with each plot being surrounded with 10 m of buffer sown to wheat on each side.

Helicoverpa spp. were abundant during the experiments. *H. armigera* (Hübner) was the dominant species, with only low numbers (<30%) of *H. punctigera* (Wallengren) observed. Counts of *Helicoverpa* spp. eggs were made on 4 randomly selected 1 m lengths of row of foliage in each treatment replicate. The foliage for each sample was destructively taken from the plots and searched thoroughly for *Helicoverpa* spp. eggs. *Helicoverpa* spp. larvae were also assessed during the experiment using a beat sheet method on 4 randomly selected 1 m lengths of row of foliage in each treatment replicate. The plots were sampled regularly for *Helicoverpa* spp. eggs and larvae throughout the experiment.

The fate of *Helicoverpa* spp. eggs laid on the chickpeas and field peas were also investigated during the experiment. This involved tagging 110 newly laid eggs in each treatment replicate and then re-visiting the eggs every day to determine if they had hatched or disappeared (presumed eaten or fallen off the plants).

Count data for *Helicoverpa* spp. eggs and larvae at each sampling date were analysed using a repeated measures ANOVA with the Genstat version 5.0 computer program (Payne *et al.* 1989). Differences between treatments ($P<0.05$) on each sampling date were determined with the least significant differences.

Results & Discussion

Chickpeas had significantly ($P<0.05$) more larvae from late August through until the end of September (Fig 1) which would suggest that chickpeas attracted significantly higher numbers of *Helicoverpa* spp than the other three species. However, the number of eggs found suggested a different response with field peas attracting far greater ($P<0.05$) egg-laying activity than chickpeas (Fig 2). The field peas carried on average 50-70 eggs per metre row for most of September, the period for which a trap crop needs to be most attractive for CQ conditions.

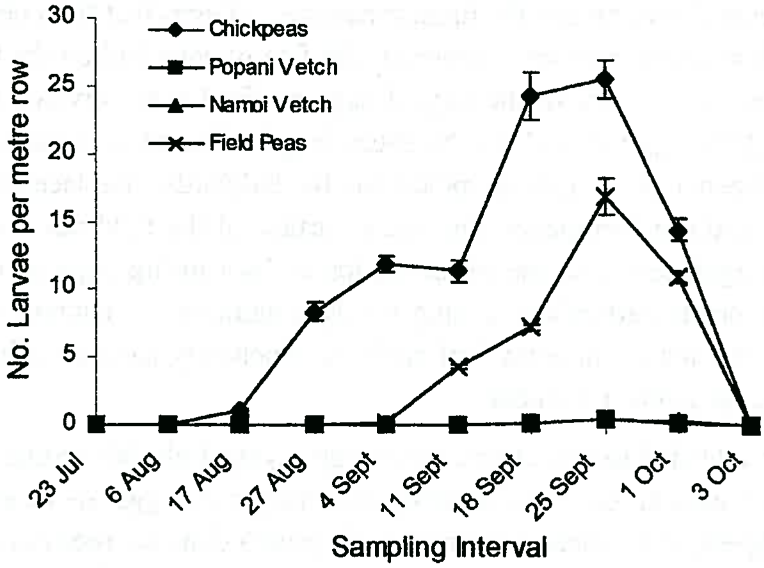

Figure 1. The number of *Helicoverpa* larvae found per metre row. The bars denote ± SE

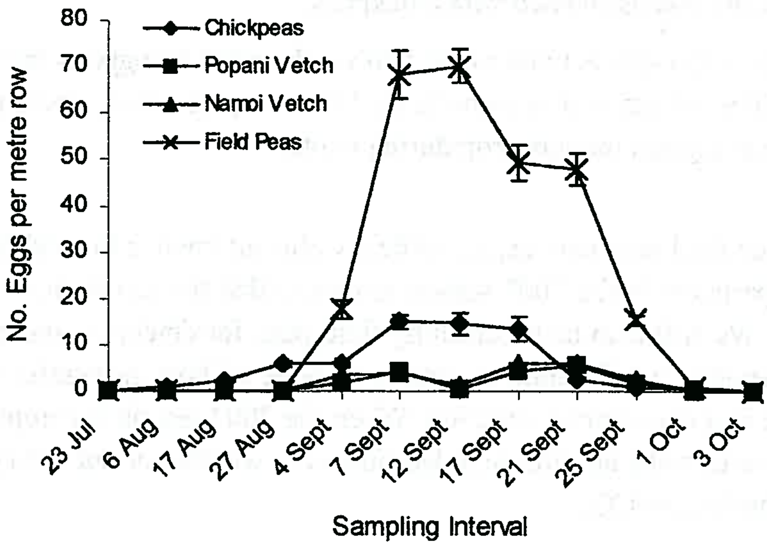

Figure 2. The number of *Helicoverpa* eggs laid per metre of crop row. The bars denote ± SE.

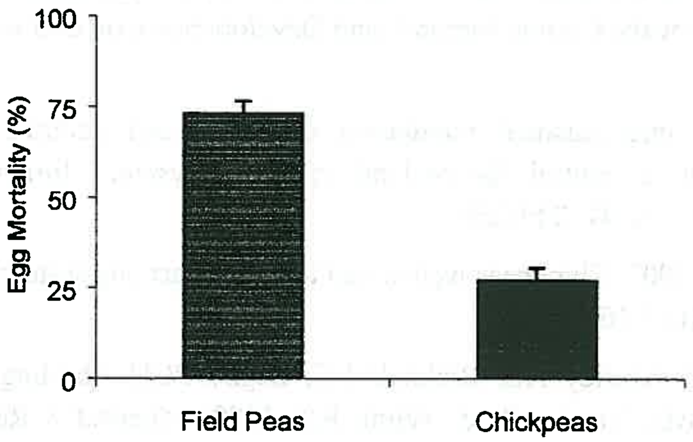

Figure 3. The percentage mortality of *Helicoverpa* eggs laid on field peas and chickpeas.

It could be expected that in having the highest densities of eggs that field peas would have also had the highest larvae numbers. However, the fate of eggs laid on the two trap crops suggested that only 27 ± 3.5% of the tagged eggs on field peas survived to hatching as opposed to 73 ± 2.9% egg survival on chickpeas (Fig 3). The losses observed in the field peas may have been due in part to predation by ladybirds and lacewings that were abundant in the field pea treatments. The waxy surface of the field pea leaves may have also contributed significantly to the observed losses by causing eggs or newly hatched larvae to fall off plants particularly during windy conditions. In contrast chickpeas had neither the beneficial insects or waxy leaf surfaces which may have contributed to greater egg survival to larvae in this treatment.

As a trap crop is intended to attract and divert egg laying Heliothis moths, the field peas outperformed chickpeas in this experiment by attracting more eggs. As an added bonus, in contrast to chickpeas, field peas supported high populations of predators such as lady beetles and lacewings. Robust under CQ conditions, the use of field peas would overcome the ascochyta disease risk associated with chickpeas.

The lack of *Helicoverpa* spp. activity in the two vetch varieties suggests that these are poor trap crop candidates, however it does bode well from a pest management perspective for this legume's use as a green manure crop during winter.

Conclusions

Whilst at this stage field peas may appear to be a viable alternative to chickpeas, we will be repeating the experiment in the 2002 season to ensure that the results are replicable under local conditions. We will also be substituting field peas for chickpeas on several growers' properties at Theodore and Emerald to gain a measure of how successful this alternative trap crop may be in a commercial situation. When the 2002 season is complete, we will be in a better position to make an informed decision as to whether or not field peas should be substituted for chickpea in CQ.

Acknowledgements

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