

Potential alternative to chickpeas for trap cropping

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Central Queensland (CQ) currently enjoys an ascochyta blight free status, but 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 have been evaluating alternative winter active legumes (popani vetch, namoi vetch, faba beans and field peas) for their suitability to be substituted for chickpeas as a spring trap crop in central Queensland.

Of the legumes tested, field peas have stood out from the rest and have been found to be highly attractive to egg laying heliothis moths. And the eggs laid on field pea suffer from very high mortality compared to chickpea — making it an excellent trap crop alternative. So far results are suggesting that field peas may be a viable trap crop alternative for chickpeas that would avert potential problems associated with ascochyta blight in the CQ region.

Background

A strategic trap cropping program targeting heliothis on cotton has been implemented in central Queensland since the beginning of winter in 1997. Growers typically plant one to two per cent of their cropping area to a trap crop of chickpea in winter and pigeon pea in summer.

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. But a potential problem with the use of chickpeas is their susceptibility to ascochyta blight, a seed-borne fungal disease.

At present CQ is free of ascochyta blight. But representatives 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.

So 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



Heliothis eggs marked on a field pea leaf.



Nicole Purvis-Smith destructive sampling for heliothis eggs.

FIGURE 1: Number of heliothis larvae recorded per

conflict. The major focus 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.

Comparisons Made

Replicated experiments over the past two seasons in CQ have aimed to compare chickpea with vetch, faba beans and field peas. On each occasion the experiments have been conducted in the centre of fields of wheat with replicated treatments arranged in a randomised design with each plot being surrounded by a buffer of wheat on each side.

Heliothis were abundant during the experiments. Counts of heliothis eggs were made on destructive samples taken from each treatment throughout the season.

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

Results

As we expected, chickpeas carried significantly more larvae than the other legume treatments. This suggests that chickpeas attract significantly higher numbers of heliothis than the other legume species.

But the number of eggs recorded suggest otherwise, with field peas attracting far more egg-laying activity than chickpeas over the past two seasons. The field peas carried on average 50–70 and 30–50 eggs per metre of row for most of September in 2001 and 2002 respectively. The month of September is the period for which a trap crop needs to be most attractive for CQ conditions.

The interesting phenomena was the fate of the eggs laid on field peas. It could be expected that the highest egg densities in field peas would have also produced the highest larvae numbers.

But only a third of the eggs laid on field peas were observed to survive as opposed to over two thirds survival on chickpeas (Figure 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

metre row in each of the legume trap crop treatments during August and September

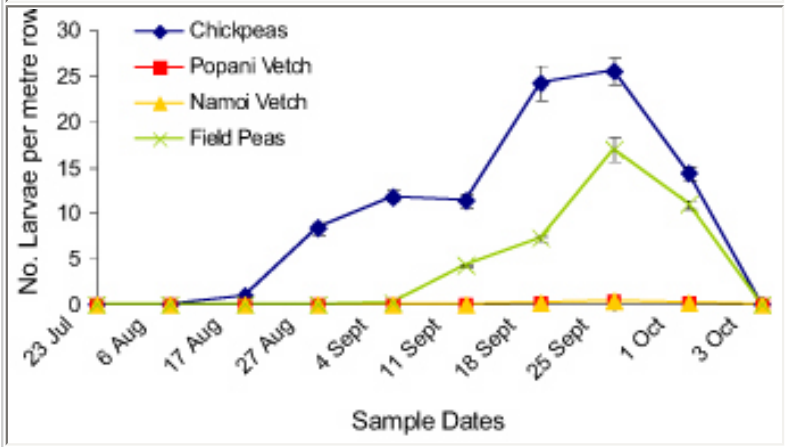


FIGURE 2: Number of heliothis eggs recorded per metre row in each of the legume trap crop treatments during August and September

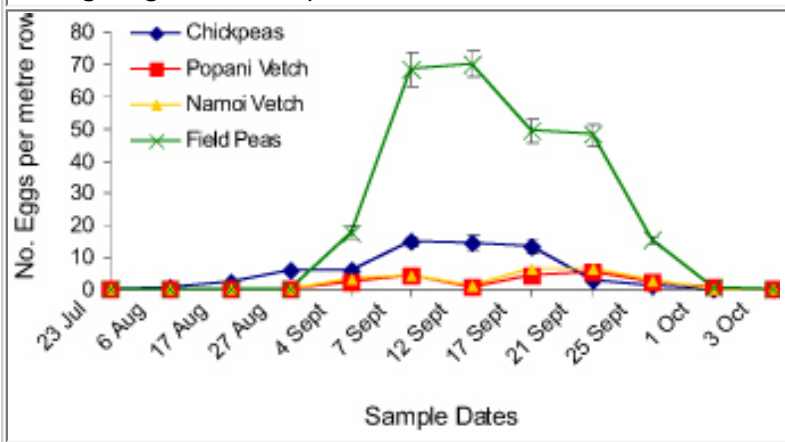
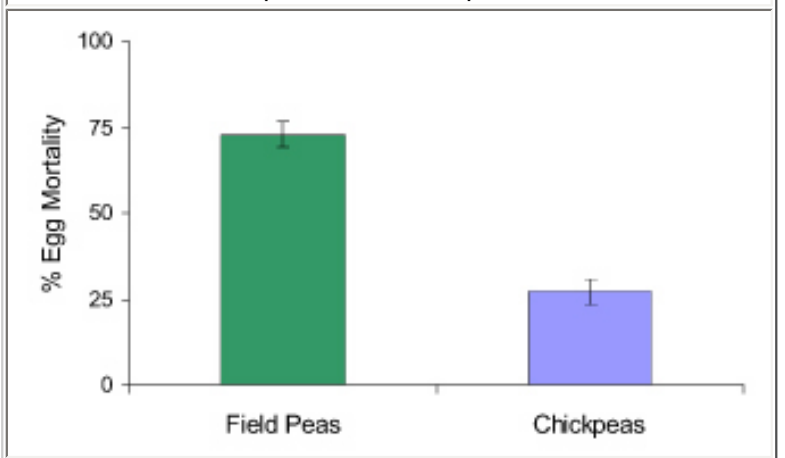


FIGURE 3: Comparison of egg mortality between those laid on field peas and chickpeas



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 these experiments by attracting more eggs. As an added bonus, in contrast to chickpeas, field peas support 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.

Conclusions

While at this stage field peas may appear to be a viable alternative to chickpeas, we will be first 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. By the end of spring this year 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.

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Field peas show great promise as a trap crop.