

## ORGANIC COTTON ON THE DARLING DOWNS: A PEST MANAGER'S NIGHTMARE

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There are both anecdotal and well documented reports indicating that unsprayed cotton can be profitable. However, the frequency of growing a profitable crop in this way has not been established and the pathway to success is not well worn. On the other side of the coin, the use of insecticides increases the probability of profitable returns, but this approach to pest management is not without its problems.

### **The task**

Consumer demand for organic products has sparked an interest in organic cotton, but the question must be asked - is organic cotton production in Australia a realistic expectation? Until the 1993/94 season I was confident that unsprayed raingrown cotton crops could yield satisfactorily e.g. 1.2 to 2.5 bales/ha, depending on the season. With the option of using some organically approved products for pest management, it seemed producing a worthwhile yield would be a breeze.

From the pest management perspective, taking the step from an unsprayed crop to an approved organic crop should not have required a quantum leap. The spectrum of pests was known, and apart from heliothis, the main threats were mirids and aphids. The only other requirement was that products applied to cotton were approved 'organically' and registered for use on cotton.

### **The tactics**

Insecticide-treated seed could not be used. Delaying planting until conditions warmed up in November lessened the threat from seedling pests - false wireworm larvae and thrips. In general, false wireworm larvae have pupated by late November, and warmer conditions allowed seedlings to grow away from thrips.

What were the options for mirids? The first was to do nothing! If not controlled, loss of early fruit would probably delay harvest. There was also the risk that unless some early fruit were retained, rank plant growth could lead to problems later. Chemicals could not be used to manage plant growth, and spray application to large vegetative plants could be less than desirable. Two other options were suggested - trap crops and garlic sprays. Neither were established remedies.

Aphids are a problem only if there is a risk that honeydew will contaminate the lint of open bolls. Therefore aphids are a major concern late in the season. As honeydew is readily soluble in water, light rainfall washes off honeydew deposited earlier in the crop cycle. Predators, particularly ladybird beetles and hover flies, effectively control aphids, but often aphid populations reach high densities before control is achieved. Soap sprays have been used in other crops.

In most seasons there will be two or three waves of heliothis activity. The intensity of activity is governed by factors over which we have little direct control - it's a case of taking what comes along. When present at reasonable densities (near-threshold levels), natural enemies are capable of managing heliothis. In this situation the first option was to give the beneficials a chance. Natural enemy populations could be supplemented by the release of green lacewings and/or egg parasitoids (*Trichogramma*), but their efficacy in cotton was not proven. The fallback position was to use *Bacillus thuringiensis* (Bt). If that failed, the options were very limited. Natural pyrethrums could be used, but they were considered harsh on beneficials, and there was also the underlying resistance problem with *Helicoverpa armigera*.

The tactics for managing insect pests of organic cotton did not offer a lot of scope, but based on previous experience, this was not a serious concern.

#### **The 1993/94 organic experience**

The organic experience on the Darling Downs was not a pleasant one. Pests other than heliothis paled in significance as heliothis repeatedly chewed through crops. The first wave hit in December. This was followed by a second wave in late January and the *coup de grace* in March.

Managing these waves of heliothis in conventional cotton with a full arsenal of chemicals was a difficult task. Thus it was not surprising that the organic approach failed to produce a crop (Figure 1). The large bushy plants reduced the effectiveness of spray applications, and this may have been a factor contributing to the poor performance of Bt. To make matters worse, predator numbers were lower than expected from previous experience. The factors responsible for low predator activity are not known, but the continuing drought could have been a factor.

### **Main points**

Some of the main points to come out of my first organic adventure were:-

- . Bt was not effective against high densities of heliothis.
- . There was no effective organic salvage treatment for heliothis.
- . Organic remedies need to be properly evaluated in cotton.
- . Mirids are a problem, as in IPM programs.
- . Egg parasitoid releases had minor impact on parasitism of heliothis eggs.
- . Predator ecology and dynamics are poorly understood.
- . Large organic plots offer wonderful opportunities to study beneficials.

The past season has been a lesson in humility. There are motivated producers who want to make organic cotton a success, and their success will ultimately benefit the industry. The problems facing organic growers now could be the problems facing the Industry in the future. The CRDC is to be applauded for its foresight and support of the organic trials.

### **Acknowledgments**

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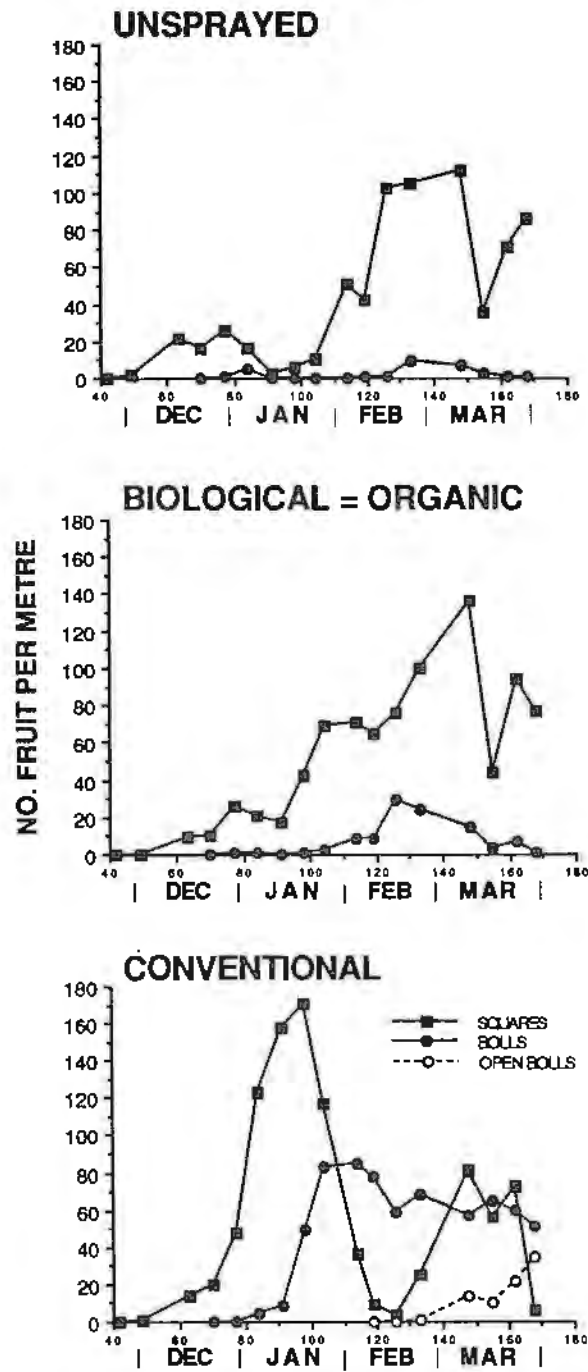


Figure 1. Comparison of fruit production on unsprayed, biological and conventional treatments at Warra, 1993/94.