

The role of refuges in the resistance management of *Helicoverpa* moths and the implications of this to IPM in cotton

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Bt cotton has transformed cotton growing in Australia by drastically reducing the amount of insecticides used on cotton crops. Nevertheless it could lose its efficacy if the target pest, *Helicoverpa* spp, developed resistance to Bt toxins. In order to delay resistance, growers are required to plant refuges to ensure a supply of moths not subjected to Bt selection pressure. The rationale is that moths emerging from refuges will mate with any resistant moths emerging from Bt cotton, thereby diluting their resistant genes. Currently, growers must ensure that 10% of the area planted in Bt cotton is planted as a conventional cotton refuge. However, if they use pigeon pea as the refuge crop they need only plant 5% of the area to refuge. This is because pigeon pea is thought to be twice as affective at producing moths as cotton. In this study the efficacy of different types of refuges over the last two seasons was compared. The results suggest that while pigeon pea can attract high egg lays, its attractiveness is very variable and high egg lays do not necessarily result in a high number of moths. In addition, changes in the survivorship of larvae over the season modified the productivity of refuges. The results are discussed in respect to the efficacy of refuges and the implication of this to Integrated Pest Management in cotton.

