Better management of cotton refuges within the best management practices framework

Dominic Cross [*1], Sarah Mansfield [1], Mary Whitehouse [2], Sharon Downes [2]

[1] University of Sydney, PO Box 692, Narrabri, NSW 2390, Australia
[2] CSIRO (Ecosystem Sciences), Locked bag 59, Narrabri, 2390, NSW, Australia

The implementation of genetically modified Bacillus thuringiensis (Bt) cotton has reduced the use of chemicals by suppressing Helicoverpa armigera and H. punctigera pest populations. This results in selection for resistance to Bt since pests tolerant to Bt survive and convey their resistant genes to the next generation. To maintain susceptibility to Bt in pest populations, refuges of unsprayed non-Bt cotton are planted with Bt cotton so that susceptible populations dilute any acquired resistance, preventing Bt cotton from becoming ineffective at controlling pest populations.Planting an unsprayed crop carrying high numbers of invertebrates and with a low yield potential can appear counterintuitive to growers. Therefore, quantifying and improving the efficacy of refuges is necessary to maintain industry support. Disease, predator and parasitoid populations increase with increasing densities of Helicoverpa larvae and could cause excessive mortality as larvae numbers increase. Consequently larger numbers of larvae may result in fewer moths. Part of the research will identify if there is a point at which the density of Helicoverpa in the crop causes the population to crash, and whether this point varies between refuge types.Though still in its infancy, the project will determine the best management strategy for refuges in cotton to ensure maximal output of Bt susceptible moths. From the practical perspective, the information gained will enable growers to be confident that they are getting the best biological benefit from their refuges via the most cost-effective means. From a biological perspective, the project will examine the interguild effects of high herbivore numbers.