

The role of varietal control in the protection of intensive cropping systems

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The selection and breeding of crops resistant to pests and disease (varietal control) offers the only practical cost-effective long-term approach to crop protection in many instances. This statement is especially pertinent in cases of crops of low capital/area value, e.g., pastures and crops exhibiting refractory problems with respect to protection practices, e.g., cotton.

The problems associated with this approach relate specifically to the long-term nature of breeding and evaluation programmes and the consequent disinclination of those agencies capable of mounting large-scale breeding programmes to proceed in long-term ventures without guarantees of eventual success. Another problem relates to the lack of protection afforded commercial breeders by Australian laws on "breeder's rights" with respect to non-hybrid varieties.

The University of Queensland has been conducting evaluative trials of cotton and soybean cultivars that possess characters potentially useful in pest management programmes. In cotton, characters investigated include 'frego-bract', 'nectariless', 'red colour', 'okra-leaf' and 'glabrousness'. In addition, research initiated on short-season varieties is proceeding and preliminary observations reveal that the short-season advantage may be lost if grown in less-than-efficient pest management regimes. Work has also commenced on "glandless", i.e., gossypol-free cotton to determine whether it can be grown successfully if protected by a comprehensive pest management programme.

The results to date confirm the superiority of some of the mutant cotton characters mentioned above. 'Frego-bract' permits higher levels of biocontrol, 'okra-leaf' allows far greater penetration of air, radiation and crop protection materials. This has implications for disease and pest control and for photosynthetic efficiency. 'Nectariless' dramatically reduces density levels of all arthropods but the overall result is advantageous in that *Heliothis* levels are economically reduced (50%). The character also confers earliness and greater fruiting point retention.

Preliminary work on soybeans indicate that the lucerne crown borer *Zygrita diva* and *Heliothis* spp. greatly prefer the commercial variety 'Davis' to imported cultivars PI-339358, PI-337687 and P1-171451. There are 8 lines currently showing much promise at the Edisto Experiment Station of Clemson University. These lines will be imported and evaluated for varietal control to a series of soybean pests in different soybean growing environments.

Given that there are varying levels of determinacy in cotton and soybean cultivars and given that biocontrol complexes exist in both systems, it now may be accepted that marginal increases in varietal control may result in complete or significant reductions in pesticide usage.