DAN93C Executive Summary

Project Title :	Insecticide resistance in cotton aphid
Project Number:	DAN 93C
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SUMMARISED REPORT

Cotton aphid is a global pest of cotton. It is the major aphid pest of cotton in many countries but as yet has not caused widespread problems in Australia. Recently, Australian cotton aphid proved difficult to control with some field control failures being reported. There have also been reports received that cotton aphid caused problems at seasons end in some plots of Bt-cotton, requiring several insecticide sprays. However, at the moment it is not possible to determine if those field control failures are due to resistance, because base-line data for resistance monitoring are not available.

To address that problem the aims of this study were to: obtain base-line data against 12 pesticides and to conduct an initial evaluation of the current resistance status of field-collected cotton aphid strains. To that end laboratory studies were required to establish base-line data for Australian cotton aphid. Susceptible strains of cotton aphid were established and breed in purpose built cages. When sufficient numbers of aphids were available they were assayed against a range of established and potential pesticides to establish base line-data. Once generated, the base-line data was used to screen a number of field-collected strains for resistance.

A total of 24 registered or potential pesticides were evaluated, twice the number initially envisaged. Base-line data was generated to 21 of the pesticides, with three chemicals abandoned due to lack of efficacy. The base-line data was used to detect resistance in three field populations of cotton aphid. Resistance was detected to endosulfan and pyrethroid pesticides but not to carbamates or organophosphates. Two of the three chemicals proved to have modes of action incompatible with the testing procedure. Those chemicals will require further evaluation at a later date requiring intricate and time consuming methods development. Such methods development is beyond the scope of the present study.

A new project should monitor a large number of field-collected strains of cotton aphid to determine the variability in response to key chemicals. Methods to test novel pesticides require development and further work is needed to refine each discriminating-dose to avoid false positive results. Finally, resistance management of cotton aphid needs to be considered under the specific insecticide use requirements of transgenic cotton.

Addendum to summarised report: abstract- Two strains of cotton aphid (*Aphis gossypii* Glover) were collected from an unsprayed source and tested against 24 registered or experimental pesticides by laboratory bioassay. Full log-dosage probit regressions were completed for 21 chemicals and LC99.9s calculated for the least tolerant strain which was used as a discriminating-dose. The discriminating dose was used to monitor and detect resistance in three field populations of cotton aphid. In contrast to overseas studies, discriminating-dose evaluation of the three field strains suggested resistance in Australian cotton aphid was present to endosulfan and pyrethroids but not to carbamates or organophosphates.