The distribution and parasitism of biotypes of the whitefly *Bemisia tabaci* in cotton areas of Queensland

B. A. Franzmann[1], D. R. Lea[1] and P.J. De Barro[2]

[1]Farming Systems Institute, QDPI, P.O. Box 102, Toowoomba Qld 4350.

[2]CSIRO Entomology, GPO Box 1700, Canberra ACT 2601.

Introduction

The silverleaf whitefly (SLW), *Bemisia tabaci* B-biotype, was first discovered in Australia in 1994 (Gunning *et al.* 1995). SLW is a major pest of cotton and other crops in many overseas countries and poses a considerable threat to cotton in Australia. SLW is the second biotype of *B. tabaci* to be found in Australia. A closely related indigenous biotype (IBW) was first recorded from Australia in 1959 (Carver and Reid 1996). Molecular phylogenetic studies (De Barro unpublished data) indicate that IBW is unique to Australia and some near Pacific Island countries. IBW is an efficient vector of tomato geminiviruses that were extremely damaging to the Northern Territory tomato industry, but unlike SLW does not cause feeding related damage.

Since its detection, SLW has spread widely in New South Wales and Queensland. However, its spread into the cotton growing regions of both states has been slower than in the areas dominated by vegetable horticulture. Given the threat posed by SLW to cotton in Queensland a monitoring system using surveys was established and has been run over the past two years to:

- Monitor the distribution and abundance of the whitefly,
- Record its hosts, and
- Assess the degree of natural biological control provided by indigenous parasitoids.

This paper reports some of the results of the sampling.

Sampling plan

All major Queensland cotton growing areas have been sampled since the winter of 1996. The Central Highlands, Dawson/Callide, St. George and Goondiwindi were sampled four

times per year (once per season), whereas the Darling Downs was sampled approximately once each month.

Sampling focussed on the towns of Emerald, Biloela, St. George and Goondiwindi as SLW had previously been found in plant nurseries in these towns in 1995. On the Darling Downs sampling was centred on the towns of Oakey, Dalby and Warra.

At least one hour was spent searching for *B. tabaci* on host plants in and around each town. In addition, nearby rural areas were also sampled. Where whiteflies were found, adults and 'pupae' were collected. Pupae were held in vials at 25°C to allow parasitoids to emergence.

During the 96/97 cotton season, unsprayed areas of cotton were regularly sampled at Dalby and Warra. Adult *B. tabaci* were counted on 100 terminals and pupae were collected.

In the 97/98 cotton season, commercial cotton fields were sampled. Cotton leaves from around the fifth node were taken from various farms in the Emerald (400 leaves), Biloela (200 leaves), St. George (200 leaves) and Darling Downs (1800 leaves) areas.

B. tabaci were identified as SLW or IBW using RAPD PCR (De Barro and Driver 1997).

Results

SLW was first found at:

- Biloela in July 96 on ornamental plants and weeds, breeding throughout the year,
- St. George in January 98 on wild sunflower,
- Goondiwindi in January 98 on cobblers peg and sowthistle,
- Warra in January 98 on sowthistle,
- Emerald in May 98 on weeds and ornamental plants,
- Comet in May 98 on roadside volunteer cotton,
- St. George irrigation area in April 98 on wild gooseberry.

IBW was found readily in all areas throughout the two years and to date only IBW has been recovered from commercial cotton.

Rates of parasitism were variable and in the different areas averaged: Central Highlands 43%, Dawson/Callide 36%, St. George 67%, Goondiwindi 45%, Darling Downs weeds 45%, cotton 72%. The parasitoids belonged to several species of *Encarsia* and *Eretmocerus* spp. and were common in all cotton growing regions.

Discussion

Soon after the detection of SLW in Australia, it was found in nurseries in several major towns across the Queensland cotton growing regions. At the same time it was also found in towns throughout the major horticultural areas. In that time, it has quickly spread to weeds and crops throughout much of Queensland horticultural areas, but has been much slower to colonise weeds in the cotton growing regions and to date has not been detected in cotton fields.

However, the results from the past two years show an incremental increase in distribution and abundance of SLW across the cotton growing regions. It would appear that SLW has gained a foothold on weeds in all cotton growing districts. Whether populations build up from here to threaten cotton is unknown.

The relatively slow spread of detectable populations of the SLW in the cotton areas of Queensland may be attributed, at least in part, to the activities of its parasitoids. Recent research (De Barro unpublished) has shown that large numbers of IBW may interfere with the rate of establishment of SLW and the combination of this with parasitoid activity may explain the differences between the cotton and horticultural regions. Work on the biology of several of these parasitoids indicate that two species of *Eretmocerus* give levels of parasitism equivalent to those being introduced into the USA from Pakistan and the United Arab Emirates. One of these is particularly common in the cotton growing regions. This together with the high rates of parasitism already being observed on weeds suggest that biological control could be a significant factor in future IPM programs for this pest in cotton in Australia.

References

Carver, M. and Reid, I.A. (1996) Aleyrodidae (Hemiptera: Sternorrhyncha) of Australia – systematic catalogue, host plant spectra, distribution, natural enemies and biological control. CSIRO Division of Entomology Technical Paper No. 37.

De Barro, P.J. and Driver, F. (1997) Use of RAPD PCR to distinguish the B biotype from other biotypes of *Bemisia tabaci* (Gennadius) (Hemiptera: Aleyrodidae) Australian Journal of Entomology. 36:149-152.

Gunning, R.V., Byrne, F.J., Conde, B.D., Connelly, M.I., Hergstrom, K, and Devonshire, A.L. (1995) First report of B-Biotype *Bemisia tabaci* (Hemiptera: Aleyrodidae) in Australia. J. Aust. ent. Soc. 34: 116.