

**Resistance of Australian native cottons to *Helicoverpa* spp.**Chris G. Benson<sup>1</sup>, Gary P. Fitt<sup>2</sup>, David N. Leach<sup>1</sup> and Cheryl L. Mares<sup>2</sup>

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**Introduction**

The distinctive dark glands covering most of the aerial parts of the cotton plant are well known to growers. These glands contain an oil rich in insecticidal terpenoid compounds and as a consequence are associated with host plant resistance. The glands are a general characteristic of the tribe Gossypiae which, in addition to the cultivated species, includes many wild cottons of no commercial importance. Approximately sixteen wild cottons occur in Australia, probably the best known being Sturt's Desert Rose (*Gossypium sturtianum*), the floral emblem of the Northern Territory. Whilst this species has been studied in some detail, in particular with respect to its potentially useful glanded plant/glandless seed trait, detailed studies of the chemistry of Australian wild cottons generally, have not been reported. Anecdotal evidence suggests that many of the native species are relatively free of insect infestation in the wild. In association with other work assessing the pest resistance of *G. hirsutum* varieties, a small plot of wild cottons was grown at Narrabri over the 1993/94 season. The plot was unsprayed and plants were used in bioassays which measured the growth and survival of *Helicoverpa* larvae throughout the season. Preliminary results of these bioassays are presented here.

### **Genotypes studied**

Five species of wild cottons were planted in the 1993/94 season. These were *Gossypium sturtianum*, *G. robinsonii*, *G. australe*, *G. bickii* and *G. nelsonii*. These occur in varied habitats throughout Australia, mainly in central and northern arid regions. A number of accessions were grown, selected from various locations over the geographical range of each species, in order to identify any variation which might be useful for host plant resistance. The glandless *G. hirsutum* genotype DP16 was chosen as the susceptible control, and in addition Siokra 1-4 was included in bioassays for comparison of the native species with a normally glanded cultivar.

### **Bioassays of Larval Growth and Survival**

Neonate larvae of both *H. armigera* and *H. punctigera* were placed on fresh leaves (node 3 from the top of the plant) collected from unsprayed field grown plants. Weights of larvae and the numbers surviving were recorded after 8 days of feeding. Figure 1(a,b) shows the mean weight and survival relative to that on the glandless variety (set at 100%). Four bioassays were conducted over the 1993/94 season, with similar results observed each time. For simplicity only data for late February are presented here.

As expected, growth was always best on glandless cotton, and the much slower growth rates on Siokra show the effectiveness of the glanded trait. With the possible exception of *G. robinsonii*, the native cottons were even more effective in inhibiting growth rates when compared to Siokra, dramatically so in the case of

*G. nelsonii*. Survival rates were also significantly reduced on this species, which shows the greatest promise among those screened to date. In choice tests larvae consistently rejected it, in favor even of high gossypol lines.

### **Future work**

In conjunction with the bioassays we sampled tissues of all species for chemical analyses, which are being undertaken currently in order to establish whether the observed resistance is due primarily to biochemical or other factors. More comprehensive screening is planned for the 1994/95 season, and it is hoped will include some of the newly described "Kimberley cottons" (section *Grandicalyx*) (Fryxell *et. al.*, 1992). These early results are encouraging and illustrate the potential that Australian native cottons may have in future breeding programs to enhance pest resistance in commercial cotton varieties.

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### **References**

Fryxell, P. A., Craven L. A. and Stewart J. McD. (1992) A revision of *Gossypium* sect. *Grandicalyx* (Malvaceae), including the description of six new species. *Systematic Botany* 17:91-114

**Figure 1 A. Growth and B. Survival of *Helicoverpa* larvae reared on leaves of Siokra 1-4 and four native *Gossypium* species, relative to growth and survival on glandless *G. hirsutum*, late February 1994**

