Breeding locally adapted Pima cotton

Greg Constable,

CRC for Sustainable Cotton Production, CSIRO Cotton Research Unit, Narrabri

CSIRO has had a successful cotton breeding program for over 20 years. In 1996, more than 90% of Australia's cotton was sown to varieties derived from the CSIRO breeding program. In the Cotton CRC, the aim is to complement and enhance the previous work in all areas of traditional breeding, genetic engineering and fibre quality.

Until recently only *G. hirsutum* (Upland) varieties were grown in Australia but now some Extra Long Staple Pima cotton of the *G. barbadense* species is being grown at Bourke and Lake Tandou in far inland growing areas of New South Wales. Commercial results are very good with high yields being obtained. However, the American-bred *barbadense* varieties are very sensitive to bacterial blight and this disease could threaten commercial production. CSIRO has successfully combated the bacterial blight threat in the Upland industry by breeding varieties that are nearly immune to the disease. The 1997/98 season saw an epidemic of bacterial blight which substantially reduced yield of Pima cotton.

We aim to develop better adapted *barbadense* cottons to Australian conditions by developing bacterial blight resistant varieties. Yield and quality will be improved by selection of the breeding material under Australian growing conditions. A secondary benefit may be the addition of useful *G. barbadense* characters such as Verticillium wilt tolerance, growth habit and improved fibre quality, into the Upland breeding pool. The crossing of these two cotton species is common overseas, but has not been attempted in Australia before.

Progress

This project has achieved our original objective: a number of *barbadense* lines with blight resistance have been generated from the original eight crosses (Figure 1). These lines have fibre length and strength typical of *G. barbadense*: (greater than 1.4 inches fibre length and greater than 40 g/tex fibre strength).

This project is also importing *barbadense* genotypes from other countries for evaluation under Australian conditions, particularly to determine if these lines could be used as parents in a crossing program.

Breeding lines

The following table shows yield and some fibre properties of bacterial blight resistant *barbadense* lines from this program when grown at ACRI in 1996/97. Although these lines require further selection for agronomic type, the data shows promising yield and fibre results. Further testing of these lines and other new lines are continuing.

Line	Yield (kg lint /ha)	Fibre length (inch)	Fibre strength (g/tex)
Pima S6	960	1.32	36.9
Pima S7	821	1.35	38.3
93242-133	997	1.42	40.0
93242-49	819	1.35	39.1
93246-124	814	1.35	34.1

Figure 1. Incidence of bacterial blight on commercial *G barbadense* cotton (Pima S7) and a breeding line from this project (Sipima 2000). Disease lesions are evident on fruit and leaves of Pima S7, with none on the resistant line.