SHORT SEASON COTTON BREEDING

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At Narrabri we are continuing our breeding program to develop locally adapted early maturing varieties. At present there are no early varieties available commercially in Australia but we feel that they could play an important role in the following situations:

(1) In the shorter growing season regions e.g. parts of the Darling Downs and the southernmost N.S.W. areas.
(2) For late plantings, particularly in southern growing areas. Late planting is often necessary because of poor initial establishment or delayed land preparation through wet weather.
(3) To enable earlier harvesting. A proportion of early cotton on a farm would spread the risk of encounting weather problems and lessen the pressure on labour and machinery at harvest.
(4) To offer some escape from insects, particularly a late build up of Heliothis armigera.

Background

Mr. A. Low of CSIRO commenced breeding short-season cotton in the mid 1960's at Griffith in the M.I.A. The region has a short growing season for cotton and varieties of normal maturity were often adversely affected by low temperatures at the beginning and end of the season. Good progress was made in breeding cultivars adapted to the M.I.A. environment but, with the decline of the M.I.A. industry in the early 1970's, CSIRO's short-season breeding program was transferred to Narrabri in the Namoi Valley. Dr. Fred Gillham conducted the program until 1979 when I assumed responsibility for it.

Lines developed at Griffith were tested extensively at Narrabri, and initially further selected. In the longer season environment the M.I.A. material was generally far inferior in yield and staple length to full season cultivars. Most M.I.A. lines also proved to be very susceptible to

Verticillium Wilt and Bacterial Blight.

For the breeding program developed at Narrabri our aims are to produce cultivars which mature about two weeks earlier than the main commercial cultivar Deltapine 61, are competitive in yield, have good fibre quality and are disease resistant. Historically, a major difficulty in breeding for early maturity has been the link between earliness and short staple length and achieving a commercially acceptable staple length of minimally 1 and 1/16 inches is a major consideration.

Progress

We have made considerable progress with the yield, staple length and disease resistance of our short season lines since the early years of the program. Our best lines are much more competitive with full season types and have outyielded U.S.A. varieties of similar maturity. The best yield performances of the early lines have been in late planted trials at Narrabri and in trials conducted on the Darling Downs by the Department of Primary Industries. Over four seasons of mid-November plantings at Narrabri the average yield of 75007-3 (one of our advanced early lines) was 10% greater than Deltapine 61 while in four seasons on the Downs, 75007-3 has averaged 12% better than Deltapine. As expected, under longer growing season conditions Deltapine 61 is superior to our best early lines e.g. at Narrabri in four years of normal planting dates (October) Deltapine has out-yielded 75007-3 by 8%.

When considering other characteristics apart from yield 75007-3 has a number of good features. It is 10 to 14 days earlier to mature than Deltapine, has much better fibre strenght and is resistant to Bacterial Blight. Staple length is shorter than Deltapine but it will usually achieve 1 1/16 inches. The main deficiencies of 75007-3 are a low ginning out-turn and hairy leaves which produce lower grades. Newer lines which out performed 75007-3 by up to 8% in three trials last season have smoother leaves and higher out-turns. A greatly expanded selection program is under way with almost 200 promising new selections being tested in replicated trials at Narrabri this season. Our range of sites for testing our early maturity lines has also been expanded to include a site in the Breeza district. This site should prove valuable in selecting varieties suitable for the new marginal cotton areas. Another facet of our work will be an evaluation of some early lines in dryland trials. Although early

varieties have not done well in these trials to date some people feel that they would enable a more stable production system based on low inputs.

Conclusions

While we still have some improvements to make in our early lines in such things as lint percentages, smoother leaves, longer staple and of course greater yields, we are making good progress. We are hopeful that our expanded selection effort will produce even more substantial advances. There is certainly a wide scope for utilization of early maturity in the situations already mentioned and the demand for an early variety could certainly increase substantially if expansion continues in the cooler N.S.W. areas.