

COTTON RESEARCH AND DEVELOPMENT CORPORATION**FINAL REPORT**

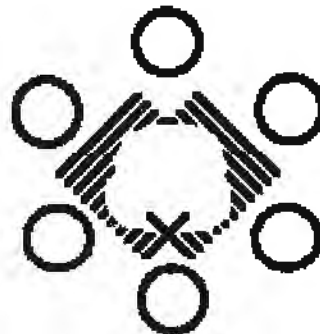
PROJECT TITLE: Improving water use efficiency of cotton.

PROJECT CODE: CSP55C (CRC Project CS 3.1.2)

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Plain English summary

The increasing area of dryland and partially irrigated cotton prompted research into identifying characteristics of varieties that made them better suited to water stressed conditions.

Water use efficiency (WUE) was measured in a number of ways with a view to identifying a simple method for screening breeding lines. Agronomic WUE was determined using neutron probe measurements. Physiological WUE was determined using gas exchange and isotope discrimination techniques.

The okra leaf trait combined with high adaptation and yield potential conferred good performance under raingrown conditions. This result is consistent with physiological measurements. If morphological characters such as okra leaf type provide improved performance under raingrown conditions, there may be potential for placing selection pressure on other physiological characters such as photosynthesis, transpiration efficiency and carbon isotope discrimination.

Full season types were superior for raingrown yield; earliness was generally associated with lower yield under conditions of water stress. These experiments were for normal sowing dates, late sowings may require early maturing cultivars.

Small scale experiments were able to identify better raingrown genotypes so long as disease incidence was known at each site. CSIRO are evaluating the possibility of increasing the number of dryland sites for evaluation of breeding lines.

Overall, the project has demonstrated the following highlights:

- The okra leaf trait was associated with superior field yield under raingrown conditions. That result is consistent with some leaf physiological water use efficiency measurements.
- Full season types were superior for raingrown yield. Rooting depth was one factor associated with that result.
- Some physiological water use efficiency traits have significant genetic differences and may be of value for use in choosing parents and/or screening segregating populations.