1999

CSIRO Plant Industry
Cotton Research Unit
Narrabri

FINAL REPORT

Project Title: **Expansion of drying facilities at ACRI**

Project code: **CSP 101C**

Research organisations: **CSIRO Plant Industry / NSW Agriculture**

Research staff: **All ACRI researchers who conduct regular sampling of field experiments and cotton breeders.**

Project Supervisors: **Dr Ian Rochester / Dr Philip Wright**
CSIRO Plant Industry / NSW Agriculture

A final report prepared for the Cotton Research and Development Corporation

Project CSP 101C Expansion of drying facilities at ACRI

SUMMARY

An industrial shed (9 x 12m) with concrete flooring and roller door access was constructed at ACRI in November 1998. The shed was sited in close proximity to other sample processing buildings. A drying room was constructed within the shed using insulation panelling with single door access. This room was then fitted with shelving and a mobile dehumidification unit installed. This unit efficiently removes water vapour from the atmosphere within the room using refrigeration technology. The unit can remove in excess of 40 L of condensed water vapour each day. This is sufficient to dry plant material on fully laden shelves within 2-3 days. The drying period is similar to the existing dehydrators, but the new facility uses a fraction of the electricity consumed by the older dehydrators. The unit operates at about 50°C compared with the older units which operate at 80 °C. The unit was operating by mid-January 1999, prior to the busiest part of the cotton season. It was in constant use until mid-winter 1999.

Objectives:

- To alleviate the mounting demand for dehydrator space and allow for drying of greater numbers of samples of cotton plant material, soil and delinted cotton seed.
- To expand the dehydration facility which will dry samples effectively and quickly at near ambient temperatures.

Research project summary:

The capacity of the drying facility at ACRI has not kept pace with the increase in staff over the past two decades. The new installation would increase the current capacity by 50%, which would ease the current situation. A further unit may be required with further increased demand. The efficiency of drying depends on the amount of material loaded. Engineers suggest that the proposed installation would be at least comparable to the existing units.

The initial cost of the new installation would be much less than the units currently operating at ACRI. The new unit would be house in a shed to be erected adjacent to the current facility which would have capacity to house two dehumidiificatoin units. Because it operates by dehumidifying air, rather than heating it, the new unit would be cheaper to operate and samples would not be subjected to high temperatures which could affect their chemical composition.

Purchase of a unit similar to those operating at present would cost $45,000. Vacuum drying equipment, although much quicker, would cost in excess of $100,000.

Scientific importance:

The current facility for drying samples at ACRI relies on two electrically heated forced air dehydrators which were installed some 20 years ago. At that time, the facility was adequate for the few researchers stationed at ACRI. At the current time, staff at ACRI has increased 5

fold, without a commensurate increase in the capacity for sample drying. The current units consume a large amount of electrical power. They are in constant use throughout the cotton season and are used regularly throughout the winter months.

Researchers have out-grown this facility and have been forced to reduce the number, size and frequency of the samples they collect and process. A dehydrator at I A Watson Wheat Breeding Institute has been used on many occasions through summers for the past 10 years. The lack of capacity of the existing facility has now become a serious limitation to the field work conducted at ACRI.

Links with other CRDC and CRC projects:
Researchers using the current facility

CSIRO	NSW Agriculture	CRC staff
Ian Rochester	Phil Wright	Catherine Hare
Michael Bange	Grant Roberts	Chris Dorahy
Stephen Milroy	Nilantha Hulugalle	other PhD students
Lewis Wilson	David Nehl	
Greg Constable	Jonathon Holloway	
Peter Reid	Graham Charles	
Tom Lei		
Stephen Allen		

Results:
About half of the researchers listed above have used the new facility over the past cotton season. As the older dehydrators are usually fully utilised, researchers needing drying space have utilised the new facility, which operated at full capacity from February to May in 1999. The new facility has been used regularly during the winter months for the drying of plant and soil samples when the older dehydrators have been full.

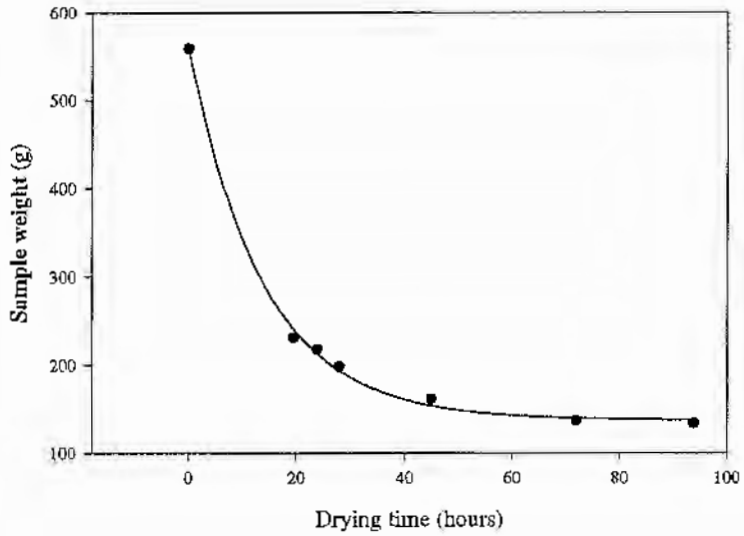

Figure 1. Drying curve for plant material placed in the new dehumidification room for 4 days. Very little moisture was left in the plant material after 3 days of drying.

REQUESTED BUDGET

	1998/1999		1999/2000		2000/2001	
Item	**Original estimate $**	**Now requested $**	**Original estimate $**	**Now requested $**	**Original estimate $**	**Now requested $**
A STAFFING						
TOTAL STAFFING						
B TRAVEL						
TOTAL TRAVEL						
C OPERATING						
Installation [1]	2,000					
Heater and fans [2]	2,000					
Shelving [3]	2,000					
Drying trays [4]	2,000					
TOTAL OPERATING	**8,000**					
D CAPITAL						
Cabinet [5]	5,000					
Dehumidifier [6]	8,700					

Shed to house unit [7]	10,000					
TOTAL CAPITAL	**23,700**					
TOTAL REQUESTED	**31,700**					