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Project Review

ANNUAL RESEARCH REPORT 2002/03

Cotton CRC Project Number: 46C

Project Title: Cotton gin trash and agroforestry for sustainable soil management

AIMS:

- Use composted cotton gin trash and pelletised cotton gin trash to monitor soil response and soil nutrition benefits
- Establish experimental woodlots of salt/waterlogging tolerant eucalypts with pelletised cotton trash to manage groundwater recharge, and prevent salinisation, and improve soil carbon stores.
- Monitor the impact of the woodlot and cotton waste material on soil quality, salinity and groundwater levels

Milestones for 2002-03

- Prepare site for establishment of trial at "Hudson", near Willow Tree, NSW
- Conduct GPS and EM-38 surveys to identify site variability and layout field plots
- Sample soils for baseline soil characterisation in winter 2002, followed by second sampling in Autumn 2003. Complete soil analyses.
- Plant Saltgrow Eucalypts in Spring 2002

STAFF:

Dr. N. Hulugalle, Senior Research Scientist, NSW Agriculture

Dr. G. Dale, Research Director, SaltGrow Pty. Ltd., Qld.

Mr. L. Finlay, Technical assistant, NSW Agriculture

PROGRESS AGAINST AGREED MILESTONES:

- GPS survey of the field site was completed by August 2002. This was complemented with an EM38 survey conducted by Dr John Triantafilis and his staff from Sydney University. The site is located on a saline, sodic black earth (black Vertosol; very fine) with a shallow water table at "Hudson", near Willow Tree, NSW. Following the survey, experimental plots were laid out as per previously agreed experimental design.
- All soil sampling for 2002 was completed on schedule by September. Due to a shallow water table and high salinity in lower part of the field, soil sampling was limited to the first 5 replications. Soil physical and chemical analyses have been completed by December 2002 (Tables 1 and 2). They show that the site is very saline and sodic. It also has low Ca: Mg ratios. Potentially this site may be prone to poor soil structure due to low Ca: Mg, and high exchangeable Na and ESP values. However, due to high carbonate content and ionic strength caused by high EC values, structure may be maintained. This is supported by the relatively high $EC_{1.5/exch}$. Na ratios in the surface 30 cm. Initial results indicated that soil salinity in the beds and in the site was very high. Due to the drought and high salinity within beds, planting of trees was deferred until the autumn. A second sampling was conducted in April 2003 to evaluate salinity. Surface salinity had decreased by about 45%, but that in the subsoil had not changed or had increased, probably due to salt leaching from the surface horizon.

Table 1. Soil chemical properties at experimental site, "Hudson", Willow Tree, NSW

Depth cm	pH (0.01M CaCl ₂)	EC _{1:5} dS/m	ECe, dS/m	CaCO ₃ equivalent, %	Org. C, %	cmol/kg				CEC	Ca:Mg	ESP	EC _{1:5} / Exch. Na
						Exch. Ca	Exch. Mg	Exch. Na	Exch. K				
0-10	7.5	2.5	14.7	15.5	1.59	18.27	38.00	9.09	1.07	66.4	0.6	13.6	0.29
10-30	7.6	2.2	12.4	17.3	1.52	17.38	38.10	8.95	1.05	65.5	0.5	13.7	0.24
30-60	7.8	1.1	6.4	22.6	1.48	15.25	39.14	9.18	1.04	64.6	0.4	14.3	0.13
60-120	7.8	0.9	5.3	23.2	1.20	11.53	39.53	9.72	0.85	61.6	0.3	15.8	0.10
120-180	7.8	0.7	3.9	22.6	1.13	10.46	38.90	10.42	0.76	60.5	0.3	17.3	0.07

Table 2. Soil physical properties at experimental site, "Hudson", Willow Tree, NSW

Depth, cm	Clay	Silt	Sand	Dispersion index
	%	%	%	g/100g
0-10	64	13	23	16.8
10-30	68	9	23	20.7
30-60	69	6	25	4.0
60-120	68	6	26	12.6
120-180	54	20	26	5.6

- Decomposition and nutrient release laboratory studies using gin compost-enriched soil from "Hudson" were conducted during January and February. Soil analyses are incomplete as yet.
- Due to the possibility of contamination with pesticides through gin trash application, the Environmental Protection Agency of NSW expressed concerns on its potential use as a soil ameliorant. Application of the gin trash was, therefore, deferred until a pesticide residue analysis could be performed on it. Drs. Ivan Kennedy and Angus Crossant of Sydney University conducted a pesticide residue analysis of the composted trash. Small amounts of residues were detected, mainly DDE a degradation product of DDT. This is likely to have come from soil, not cotton trash. Pesticide residues in cotton trash alone were negligible. A subsequent meeting between CRDC (represented by Guy Roth) and the EPA failed to resolve the issue. Consequently the project was terminated as a result of the impasse with the EPA and reduced funding from CRDC. However, Saltgrow is exploring the possibility of continuing the project independently using an alternative source of composted recycled green-waste.

PUBLICATIONS: None

PRESENTATIONS AND PUBLIC RELATIONS: None

AWARDS: None

PLAIN ENGLISH SUMMARY:

The aims of the project were: (1) Use composted cotton gin trash and pelletised cotton gin trash to monitor soil response and soil nutrition benefits; (2) Establish experimental woodlots of salt/waterlogging tolerant eucalypts with pelletised cotton trash to manage groundwater recharge, and prevent salinisation, and improve soil carbon stores; and (3) Monitor the impact of the woodlot and cotton waste material on soil quality, salinity and groundwater levels.

Baseline soil sampling and field mapping of the experimental site were completed by July and experimental plots laid out by August. The soil analyses showed that the site was very saline and sodic. Because of drought and extreme salinity, planting of trees and application of composted gin

trash was deferred until autumn 2003. Following this, because of possible contamination with pesticides through composted gin trash application, the Environmental Protection Agency of NSW expressed concerns on its use as a soil ameliorant. Pesticide residue analyses showed that very small amounts of DDE, a degradation product of DDT was present. This is likely to have come from soil, not cotton gin trash, as it was absent in the latter. A subsequent meeting between CRDC (represented by Guy Roth) and the EPA failed to resolve the issue. Consequently the project was aborted as a result of the impasse with the EPA and reduced funding from CRDC. However Saltgrow is looking into continuing the project independently using an alternative source of composted recycled green-waste.