Australian Government
Cotton Research and Development Corporation

FINAL REPORT 2016

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Part 1 - Summary Details

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CRDC Project Number:CLW1401

Project Title:Monitoring greenhouse gas emissions from irrigated cropping systems

Project Commencement Date:1/7/2013**Project Completion Date:**31/5/2017
CRDC Research Program:1 Farmers

Part 2 – Contact Details

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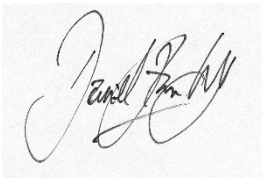

Signature of Research Provider Representative:_____

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Date Submitted:____**1 August 2017**_____

4 – Final Report Executive Summary

In furrow irrigated cotton production systems the application of nitrogen fertiliser is required for high yielding crops. If excessive nitrogen fertiliser is added then nitrous oxide is produced. The results show that chambers must be deployed in the hill and skip and irrigation furrows to quantify the greenhouse gas emissions. Further the measured soil temperature and volumetric moisture content and atmospheric temperature, vapour pressure deficit and CO2 concentration inside chambers were periodically different to the field. These differences may result in increased nitrogen and carbon cycling in the chambers relative to the field. In terms of modelling the emissions generated in the chamber will potentially not equate to field conditions and a correction factor will need to be applied.

The field average emission of N2O from an application 240 kg N ha-1 produced 4.17±0.56 kg N2O-N ha-1 during the season. The largest fluxes occurring during the first 3 months after planting of the cotton crop. This indicates that excessive N was present in the soil and was converted to N2O during nitrification and denitrification. The emissions from the hill and the skip and irrigation furrows were different. The hill had the greatest N2O emission and the skip and hill furrows had emissions significantly great than the background. The emissions from the furrows were caused by the deposition of N in the irrigation water or by leaching of N from the hill.

Methane was a small component of the greenhouse gas inventory and approximately 1 kg CH4 ha-1 was consumed by the soil over the 2 year rotation. The CO2 emissions significant differed between the hill and the irrigation furrow during each season. The wheat and cotton NEE was positive from the hill due to the presence of the plants, whereas the furrows were strongly respiring. The overall carbon balance (NBE) indicates that the cotton wheat fallow rotation lost 5 t C ha-1 soil carbon during the 2015-2016 crop rotation. To improve the carbon balance in these cropping systems the bare fallow needs to be eliminated and the use of mulches, plants or polymers in the furrows should be considered.