

SRDC Research Project Final Report

Cover Page:

Title of the Project: **Irrigation Runoff Event Monitoring**

Project Reference Number: **MAF 001**

Name(s) of the Research Organisation(s): **Mulgrave Area Farm Integrated Action (MAFIA) & Canegrowers Burdekin Limited (CBL).**

Principal Investigator's name(s), contact phone number, address and Email address:

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Project funded by : **Sugar Research and Development Corporation.**

A statement of confidentiality:

The disclaimer should be included in the acknowledgement section along with the SRDC logo. An example of a suitable acknowledgement and disclaimer is shown below. You may use the image and text shown below without the border showing.



Australian Government

**Sugar Research and
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Executive Summary:

(Maximum 800 words. This should provide a non-technical overview of the project which could be used to communicate project outcomes in media such as the SRDC website. It should cover the following:

- *Issue: What was the industry and/or community issue, what was its relevance, and how did the project address the issue?*
- *R&D Methodology: Succinctly explain the methodology, and indicate the extent of collaboration and/or partnerships, especially with end users.*
- *The project deliverables ie outputs (knowledge, skills, processes, practices, products and technology) and outcomes (impacts that benefit the industry and community);*
- *The impact of the project findings on the sugar industry and the Australian community. Indicate actual/expected net benefits in terms of social, environmental and economic impact, and actual/expected adoption of outputs.)*

A major concern of the Burdekin irrigated sugarcane growing industry is the impact of nutrient runoff on the waterways and the surrounding environment. In line with the current Commonwealth and State Government's Reef Water Quality Plan and the NRM regional plans, growers expressed the desire to evaluate the current situation to be able to address these concerns. This project was designed to enable growers to monitor runoff from their paddocks when irrigating and to assess the resulting. A trailer was designed and fitted with a solar power ISCO Avalanche refrigerated pumping sampler. It was designed to be a mobile unit that could easily be moved to any site within the MAFIA grower group area. The intention has been to make this unit available to any other grower group within the Burdekin area.

During this project a number of training days were held and information disseminated to other grower groups through presentations at regional field days and workshops. Event sampling was carried out by growers in the MAFIA group which they then paid to have tested for nitrate concentrations. This information allowed growers to assess nitrate concentrations in runoff from irrigation of plant cane and discussions about the results were carried out with the members. Although a good wet season this year has limited the number of irrigation events available to monitoring. Great interest was expressed in further use of the sampling trailer to compare different fertiliser application methods and bedding practices to evaluate best management practices. The fact that the MAFIA group paid to have a consultant test the water samples shows their commitment to the success of the project and ongoing use of the water sampling trailer.

A baseline survey was carried out at the start of the project and a follow up survey was done at the end of the project. Even with the weather constraints this year there has been an indication from these surveys that over 50% of growers in the group have made recent changes to their irrigation practices as a result of this project. It has provided the MAFIA members with degree of ownership of their runoff issues. This has highlight to an already aware group the extent of runoff and possible future investigations in improvement of irrigation practices. There has been a perceivable increase in the confidence of growers in the group about the validity of the sample data collated as it directly relevant to them.



Background:

(Including technical information and existing knowledge concerning the problem or research need addressed by the project)

Nutrient and pesticide in runoff from irrigated sugarcane farms in the Burdekin area are a major concern, both to the industry and to the NRM groups in the region. The MAFIA grower group wanted to take a proactive approach to the problem and identified that a lack of understanding of the current situation was a barrier to addressing such issues. Having the available tools to assess the situation gives the growers ownership and knowledge to promote best management practice adoption. Although the growers in this area have been previously involved in water quality monitoring they are keen to gain a better understanding of their current irrigation practices and how they can be improved. The water sampling trailer was considered to be an invaluable tool in trying to achieving a better understanding of these issues and assisting in more sustainable decision making process.

Objectives:

(As stated in the original proposal, and a statement of the extent to which the project has achieved them)

The trailer mounted solar powered refrigerated water sampler has made it possible to obtain quality water samples from irrigation run off events. This has facilitated a better understanding of the current situation which has promoted an attitude that should result in a adoption of best management practices. It is expected that this will lead to a more informed decision making, resulting in a more sustainable approach toward irrigation, fertiliser application and pesticide use.

Training of growers in the MAFIA grower group and other Burdekin grower groups in the use and maintenance of the equipment to collect water samples was considered to be a positive step in achieving best management practices in this regard. The analysis of the samples is also a integral part of gaining a better understanding. Of the 20 MAFIA grower group members, 15 participated in training sessions. This 75% participation rate is considered to be commendable and show their commitment to taking ownership of the issue and an active interest in addressing them. It has been unfortunate that due to the unusually high frequency of rainfall events during the first six months of this year there has been less opportunity to put the sampling trailer to use than was anticipated. However the preliminary results from the data collected have sparked an interest in further investigations.



Methodology:

(Include activities and project management to deliver outputs and outcomes. Where detailed methodology has been published elsewhere, it should be summarised here and the publications should be included as Appendices to the report.

- *Clearly enunciate the project process and its links to the outputs. Include where appropriate details of stakeholder participation, systems integration, implementation/adoption strategies and enhancement of human capacity.*

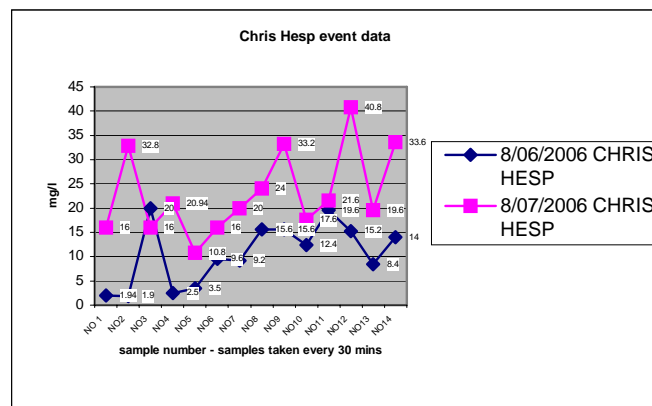
The components of the water quality trailer were purchased and assembled by the growers in the group. After testing and instruction leaflets compiled a number of training sessions were held to allow the grower and R&D personnel to become proficient at event sampling and analysis as well as data interpretation. The trailer was then used by the group, consultants and others involved in the industry to monitor their irrigation water runoff with a view to change management to minimise loss of nutrient from irrigation runoff.

- *Specify method(s) used to evaluate success in delivery of outputs and outcomes. In particular, clearly enunciate the method(s) of evaluation used within the project to assess:*
 - *the impact of the project,*
 - *the learning experiences/capacity building achieved from the project, and*
 - *the implications of the project in guiding future R&D.)*

As one of the main objectives of this project was to raise awareness of the MAFIA grower group members of nutrient runoff occurring during irrigation events and help them take ownership of the management of this issue, a baseline survey was carried to assess the level of understanding held prior to the project. The initial survey indicated that growers felt they already had a good understanding of water quality issues in their area. The vast majority of those surveyed in the first instance indicated that there would be nil to little affect of runoff on the watercourses and coastal water bodies. It was also evident from the responses that they felt their current practices had little effect on the quality of ground water in the Mulgrave area. The survey also indicated an understanding that farming practices would influence the quality of runoff from their farms.

Another brief survey was carried out at the end of the project to try and assess any changes in attitudes and knowledge base. As the growers already showed an understanding of the links between farming practices and water quality it is difficult to assess over such a short period of time how much their understanding has changed. It should however be noted that all growers surveyed after the project indicated that water quality was a very important issue and that on farm practices were of significant importance in management of these issues. The majority also indicated that there were opportunities to change management practices to improve water use and quality. Just over half of those surveyed indicated that they have made changes to their practices recently.

The main research participant to date has been Chris Hesp who now feels confident enough about using the water quality trailer to instruct others in its use. This has relieved to some extent the need for an extension officer to be present at the initial stage of collecting the water samples. Initially, a lack of confidence and time constraints led the MAFIA group to employ an extension officer for a period of 6-10 weeks to assist in the use of the trailer and analysis of the samples, an investment of \$5000 of their own money. This showed their commitment to the success of the project and a desire to gain understanding through whatever means necessary. Time constraints make it difficult to facilitate use of the trailer on a consistent and ongoing basis due to the need to carry out analysis of the samples. Indications are that water analysis processes that have been trialled to date are too complex and time consuming, making them impractical for growers to carry out themselves without some form of ongoing assistance.



Outputs:

(Including knowledge, skills, processes, practices, products and technology developed)

Participation in training to learn how to use the trailer was high, with 75 % of the MAFIA group participating in training session on how to use the trailer. An unusually long wet season this year prevented planting at the usual times, which has limited the opportunities for use of the water quality trailer. Results from samples taken give preliminary indications of nitrate concentration similar to those found in other cane growing areas. Growers have expressed a strong interest in co-ordinating a project to assess the affect on runoff of different fertiliser application methods, irrigation flow rates and bedding design. This would assist the growers in implementation of best management practices in irrigation and run off related issues. The water quality testing trailer will be a valuable tool for ongoing assessment of farming practices and it is envisaged that it use will become widespread with some support required initially in building confidence in the use of the equipment and ongoing support for the analysis of water samples. Discussions

between the growers at meetings raised a past distrust in data relevance and other parties having hidden agendas for grower data. Personal ownership and control of this data has provided a high degree of confidence in the results.

Other industry representatives and other grower groups have attended workshops and training days making knowledge of the water testing trailer available to the wider community. The MAFIA group are more than happy to provide the trailer to other members of the cane growing community and provide training. A power point presentation was given by Chris Hesp on 18/2/06, at the GIVE (Grower Innovation Virtual Expo) Day at the Burdekin Agricultural College, which was attended by 300 people and the trailer was on display. The power point presentation is displayed on the Giveday.org.au website making information about the trailer available to the wider cane growing community. A further presentation was given a regional SRDC workshop on the 6/3/06, in Ayr which was attended by a 100 people



Intellectual Property:

(Detail any commercial considerations or discoveries made, and means of protection (eg patents) undertaken or planned)

The MAFIA growers do not want to restrict access to the water monitoring trailer. Consideration has been given to the possible need to charge a small fee to other users of the equipment to cover ongoing and maintenance costs, such as trailer registration and general maintenance issues. Ownership and use of data collected as a result of using the trailer has been a concern discussed at length by the MAFIA group. They feel that any data collected should remain the property of the particular grower whose farm it was taken from, however the outcomes derived from the data should be made freely available to other grower groups and other cane growing areas to assist in a more co-ordinated and supportive approach to water management in the Burdekin and in other cane growing areas.

Environmental and Social Impacts:

(Including any expected or actual adverse or beneficial environmental or social impacts of conducting the project and/or implementing its findings)

The water monitoring trailer should prove to be a useful tool in assessing and driving change in irrigation, fertiliser and pesticide use. Ongoing testing will provide knowledge enabling informed decisions in these areas. Thus minimising the impact of cane growing on the environment and assist in adoption of best management practices.

Ongoing R & D and assessment of practices will further strengthen the grower's ownership of issues relating to water quality. Through the sharing the equipment and the knowledge gained, social networks should be strengthened and widened providing a basis for a more integrated approach to problems such as rising ground water and water quality related issues.

Expected Outcomes:

(Including assessment of the likely impact for the sugar industry in Australia and elsewhere and where possible the cost and potential benefit to the Australian sugar industry and/or the community. Qualitative and/or quantitative baseline data collected in the early stages of the project and compared with data collected towards the end of the project should be analysed and presented to demonstrate impact, learnings and additional outcomes of the project.)

- Provide the growers an opportunity to take more meaningful water samples form chemical analysis;
- Improve farmer skills regarding the processes of solute transport in irrigation runoff;

- Engage farmer in water quality monitoring program

The water quality trailer has provided an opportunity for growers to take irrigation runoff event samples at specific intervals over the irrigation event. The samples have been tested for nitrate concentrations to provide a picture of how much nitrate is lost during irrigation. Although a good wet season this year has limited the number of irrigation events available to provide samples, preliminary results seem to suggest a pattern in nitrate runoff concentrations. This has been discussed by the members of the MAFIA group are wanting to make some comparative tests to identify BMP for their irrigation and fertiliser application.

Involvement in this project has raised awareness of irrigation related issues in the MAFIA grower group. Animated discussions about how the trailer could be used have occurred at group meetings. The interest in use of the water monitoring trailer appears to minimal at the moment, however it is envisaged that further sample results will encourage further use.

Future Research Needs:

Discussions between growers of the MAFIA group have indicated that they would be interested in a comparative study of different fertiliser application methods and rate, irrigation regimes, bedding width to look at improving current practices. It has also been identified that ongoing extension support in necessary to bridge the technological barriers to use of the trailer and water sample testing.

Recommendations:

(Including activities or other steps to further develop, disseminate or exploit the Project Outputs, and/or to achieve benefits)

Ongoing use of the water quality trailer to better inform growers of irrigation practice implications appear to be a focus of the group. Time constraints seem to be one of the major barriers to the use of this equipment, combined with an uncertainty about the use of the technology. Due to this it is envisaged that ongoing confidence building is required until the group feel confident to use the equipment without assistance. Members of the MAFIA group would like to make some comparative tests to identify BMP for their irrigation and fertiliser application. They would require assistance to set this up in a robust manner so that the results of any such R & D would be able to be discussed and informed decisions made with a high degree of certainty.

List of Publications:

(Copies of substantive publications from the project should be included as Appendices. Where the project involves a student and the thesis is relevant to the project this should be referred to in the report and an electronic copy of the thesis sent with the report or as soon as it is available.)

