Introduction

We invite you to take part in this survey, which aims to understand the current adoption of precision agriculture, the potential for future adoption, and to inform future strategies for precision agriculture research, development, extension and communication by the research team. The research team conducting this survey includes CSIRO (Commonwealth Scientific and Industrial Research Organisation), SRA (Sugar Research Australia) and NCEA / USQ (National Centre for Engineering in Agriculture / University of Southern Queensland).

The survey is made up of 11 multiple choice questions and should take less than 10 minutes to complete. Individual survey answers are not identifiable; the research team only receives collated results. All survey results provided to the research team will be securely stored electronically and only made available to the research team. Participation in the survey is entirely voluntary, and you may withdraw at any time. Due to answers not being individually identifiable, once the survey is submitted data cannot be withdrawn. By participating in the survey you can help shape future research, development and extension activities aimed at increasing the adoption of precision agriculture in the Australian sugarcane industry.

This survey has been sent to sugarcane industry participants via the SRA e-newsletter contacts, and you are welcome to forward it to others in the sugarcane industry. However, please do not respond to it more than once. We would also prefer to only receive one response per farming unit, so do not send it to a partner unless you intend for them to complete the survey instead of you. The survey is also available on the SRA website. Collated survey results will be published in the SRA e-newsletter, as well as in a project report to SRA by the project team CSE022: A collaborative approach to Precision Agriculture Research Development and Extension for the Australian Sugar Industry.

This survey has been approved in accordance with the human ethics review processes of CSIRO within the guidelines of the National Statement on Ethical Conduct in Human Research. This survey should pose no risks to participants, however if you find any question invasive or offensive, you are free to omit answering that question. If you have any questions or issues concerning participation, please contact any of the research team, or concerns and complaints can be raised with the CSIRO Social Science Human Research Ethics Committee by email at csshrec@csiro.au.

Thank you for participating in the Sugarcane Precision Agriculture survey. Click the "next" button to start the survey.

Kind regards

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Self description

Choose an answer for each question that best describes yourself.

1. What is the nature of your primary involvement in the sugarcane industry?

- ◯ Grower
- ◯ Miller
- ◯ Extension
- ◯ Research
- ◯ Harvesting
- ◯ Consultant
- ◯ Agribusiness

Other (please specify)

2. Which sugar milling region are you from or primarily work in?

- ◯ Wet Tropics
- ◯ Tablelands
- ◯ Herbert
- ◯ Burdekin
- ◯ Central
- ◯ Southern
- ◯ New South Wales

3. If you grow sugarcane, what area of cane do you grow?

- ◯ Less than 20 ha
- ◯ 20 to 50 ha
- ◯ 50 to 100 ha
- ◯ 100 to 150 ha
- ◯ 150 to 200 ha
- ◯ Greater than 200 ha
- ◯ N/A

Technology use

Choose the answer for each technology that best describes how often you use that technology.

4. How often do you use the following technologies in the running of your business?

	Never	Less than once a month	At least once a month	At least once a week	At least once a day
Computer	◯	◯	◯	◯	◯
Internet	◯	◯	◯	◯	◯
Smartphone (functions other than making phone calls)	◯	◯	◯	◯	◯
Farm management software	◯	◯	◯	◯	◯
Accounting software	◯	◯	◯	◯	◯
GIS/mapping software	◯	◯	◯	◯	◯

Awareness and Experience with Precision Agriculture

5. What is your understanding of precision agriculture?

- ◯ I have never heard of precision agriculture
- ◯ I have heard about precision agriculture, but I don't really understand what precision agriculture is
- ◯ I have heard about precision agriculture, and I have some understanding of it
- ◯ I have a good understanding of precision agriculture
- ◯ I have an expert understanding of precision agriculture

6. If you have an awareness, where do you source your information on precision agriculture from? (multiple choices are allowed)

- ☐ Neighbours / other farmers
- ☐ Industry association
- ☐ Industry magazines
- ☐ Internet
- ☐ You Tube
- ☐ Farmer / technical meetings
- ☐ ASSCT
- ☐ SRA
- ☐ Government extension agents
- ☐ Agribusiness
- ☐ Productivity services
- ☐ Consultant
- ☐ Researchers

Other (please specify)

7. What is your awareness and experience with the following precision agriculture technologies

	I have no awareness about this technology	I am aware of this technology, but don't own or have access to this technology	I own or have access to this technology, but don't really use it	I use this technology in my business
GPS / guidance systems for harvesters and / or haulouts	◯	◯	◯	◯
GPS / guidance systems for other equipment (eg planting, fertiliser, sprays, lime, gypsum)	◯	◯	◯	◯
Yield monitoring equipment	◯	◯	◯	◯
Yield maps	◯	◯	◯	◯
Remote sensing, such as satellite or airborne	◯	◯	◯	◯
Proximal sensing, such as Greenseeker	◯	◯	◯	◯
High resolution soil survey, such as EM	◯	◯	◯	◯
Variable rate application (multiple rates of fertiliser, sprays, lime or gypsum within a single block)	◯	◯	◯	◯

Benefits and limitations of Precision Agriculture

8. Assuming there are no impediments, in your opinion what are the commercial benefits of the following technologies for the Australian sugarcane industry

	No obvious benefit	Some benefit, but unlikely to be commercial	Likely to deliver a commercial benefit	Already delivering a commercial benefit to my business	I don't know
GPS / guidance systems for harvesters and / or haulouts	◯	◯	◯	◯	◯
GPS / guidance systems for other equipment (eg planting, fertiliser, sprays, lime, gypsum)	◯	◯	◯	◯	◯
Yield monitoring equipment	◯	◯	◯	◯	◯
Yield maps	◯	◯	◯	◯	◯
Remote sensing, such as satellite or airborne	◯	◯	◯	◯	◯
Proximal sensing, such as Greenseeker	◯	◯	◯	◯	◯
High resolution soil survey, such as EM	◯	◯	◯	◯	◯
Variable rate application (multiple rates of fertiliser, sprays, lime or gypsum within a single block)	◯	◯	◯	◯	◯

9. What do you think are the main limitations to the adoption of the following technologies (multiple answers allowed)

	There are not any major limitations to its use	Not enough commercial benefit to warrant its use	I do not know how to use the technology	It is an unproven technology	Too difficult to use	Too costly to setup	Too time consuming to use	Not enough technical support to use	It is not compatible with my existing systems
GPS / guidance systems for harvesters and / or haulouts	☐	☐	☐	☐	☐	☐	☐	☐	☐
GPS / guidance systems for other equipment (eg planting, fertiliser, sprays, lime, gypsum)	☐	☐	☐	☐	☐	☐	☐	☐	☐
Yield monitoring equipment	☐	☐	☐	☐	☐	☐	☐	☐	☐
Yield maps	☐	☐	☐	☐	☐	☐	☐	☐	☐
Remote sensing, such as satellite or airborne	☐	☐	☐	☐	☐	☐	☐	☐	☐
Proximal sensing, such as Greenseeker	☐	☐	☐	☐	☐	☐	☐	☐	☐
High resolution soil survey, such as EM	☐	☐	☐	☐	☐	☐	☐	☐	☐
Variable rate application (multiple rates of fertiliser, sprays, lime or gypsum within a single block)	☐	☐	☐	☐	☐	☐	☐	☐	☐

Other limitations not specified

Future use of Precision Agriculture

Choose the answer that best describes your current intentions for the following five years.

10. Do you plan on using the following technologies within the next 5 years

	I have no plan of using the technology in the next 5 years	I plan to use the technology in the next 5 years	I already use the technology and will continue to do so
GPS / guidance systems for harvesters and / or haulouts	◯	◯	◯
GPS / guidance systems for other equipment (eg planting, fertiliser, sprays, lime, gypsum)	◯	◯	◯
Yield monitoring equipment	◯	◯	◯
Yield maps	◯	◯	◯
Remote sensing, such as satellite or airborne	◯	◯	◯
Proximal sensing, such as Greenseeker	◯	◯	◯
High resolution soil survey, such as EM	◯	◯	◯
Variable rate application (multiple rates of fertiliser, sprays, lime or gypsum within a single block)	◯	◯	◯

Research required for Precision Agriculture

11. How much more research and development would you like to see in the Australian sugarcane industry for each of the following aspects of precision agriculture?

	No further research and development	A small research and development investment	A moderate research and development investment	A large research and development investment
GPS / guidance systems for harvesters and / or haulouts	◯	◯	◯	◯
GPS / guidance systems for other equipment (eg planting, fertiliser, sprays, lime, gypsum)	◯	◯	◯	◯
Yield monitoring equipment	◯	◯	◯	◯
Yield maps	◯	◯	◯	◯
Remote sensing, such as satellite or airborne	◯	◯	◯	◯
Proximal sensing, such as Greenseeker	◯	◯	◯	◯
High resolution soil survey, such as EM	◯	◯	◯	◯
Variable rate application (multiple rates of fertiliser, sprays, lime or gypsum within a single block)	◯	◯	◯	◯
Harvester mounted quality sensors (such as C.C.S)	◯	◯	◯	◯
Selective harvesting	◯	◯	◯	◯
Economic benefits of precision agriculture	◯	◯	◯	◯
Environmental benefits of precision agriculture	◯	◯	◯	◯

Any other areas of research in Precision Agriculture you would like to see

Further comments

12. Any further comments you would like to make about any aspect of precision agriculture as it pertains to the sugarcane industry

Survey complete

Thank you very much for completing this survey into Precision Agriculture in the Australian sugarcane industry. Please feel free to forward the survey link to other sugarcane industry members.