



RESEARCH SUMMARY

USA219T

FAST FACTS

PROBLEM

Developing a successful stored grain ecosystem model requires input and interaction by engineers and scientists specialising in the subject.

PROJECT

The American Society of Agricultural and Biological Engineers 2019 Conference (ASABE 2019) provided an ideal opportunity to engage with global experts

PARTICIPANTS

University of South Australia:
Shubham Subrot Panigrahi

DATES

Start: 1 April 2019
Finish: 30 June 2020

STRATEGIES TO ENHANCE THE VALUE OF ON-FARM GRAIN STORAGE IN SOUTH AUSTRALIA

Shubham Panigrahi is developing a model for stored grain aeration in on-farm silos as part of his PhD research at the University of South Australia. Having published data from his studies of conditions inside silos at Balaklava, he travelled to the American Society of Agricultural and Biological Engineers Annual International Meeting 2019 (ASABE AIM 2019) in Boston to meet with expert grain storage engineers and scientists.

Their insights will help translate the data into a stored grain ecosystem model that South Australian growers can use to balance the costs of aeration and cooling against the value of their stored grain.

BACKGROUND

Mr Panigrahi has studied conditions inside steel on-farm grain silos under South Australian conditions to develop a modelling system that can accurately predict thermo-physical and biological phenomena occurring within the stored grain ecosystem, and model the impact of factors such as aeration, solar radiation and wind on the silo wall.

Aeration studies of both galvanised and white-painted steel silos were conducted with GRDC support at Balaklava, South Australia during the 2017-18 and 2018-19 seasons. The resulting data formed the benchmark for developing the model and predicting the number of required fan hours to cool and condition the stored grain.

Accurate modelling will help optimise the use of aeration in silos to give the greatest cost/benefit outcomes for growers under SA's hot, dry conditions.

RESEARCH AIMS:

The core objectives of the project were to:

- Personally present scientific results of stored grain aeration experiments and resulting proposals for improving on-farm grain storage modelling.
- Exchange insights and develop international contacts to further develop and improve a stored grain ecosystem model specific to the South Australian climate.

IN THE FIELD:

ASABE AIM 2019 was held in Boston, USA from 7 to 20 July 2019. The meeting comprised events in nine major Technical Communities:

- Applied Science and Engineering
- Education, Outreach and Professional Development
- Energy Systems
- Ergonomics, Safety and Health



- Information Technology, Sensors and Control Systems
- Machinery Systems
- Natural Resources and Environmental Systems
- Plant, Animal and Faculty Systems
- Processing Systems

Sessions within these fields of research were progressed with both oral and poster presentations. There were also Young Professional Communities for graduate students considering their future careers. Total attendance was 1,808 industry professionals from 48 US states and 36 countries.

RESULTS:

While attending AIM 2019, Mr Panigrahi met engineers from the United States Department of Agriculture (USDA) and professors from various universities with extensive experience in the stored grains research area – including

- Dr Mark Casada, USDA Research Agricultural Engineer
- Dr Michael Montross, Professor, University of Kentucky
- Dr Johnselvakumar Lawrence, Lead Researcher, AGI SureTrack
- Dr RP Kingsly Ambrose, Associate Professor, Purdue University
- Dr Shahabaddine Sokhansanj, Adjunct Professor, University of British Columbia
- Dr Griffiths G Atungulu, Associate Professor, University of Arkansas

He took part in three panel discussions on improving current on-farm grain storage technology and co-authored the paper Effect of Mediterranean climatic conditions during aeration and silo wall coating in on-farm grain storage in South Australia Panigrahi, S.S., Singh, C.B. & Fielke, J.M. (2019, July) published in 2019 ASABE Annual International Meeting (p.1), American Society of Agricultural and Biological Engineers.

VALUE FOR GROWERS:

Through interactions, discussions, presentations and developing contacts with leading agricultural engineers from around the world, Mr Panigrahi will be able to advance grain storage ecosystem modelling specifically for South Australian climatic conditions.

His computational work following ASABE AIM 2019 is being supported by SAGCO (USA119) and will help enable the ongoing improvement of on-farm grain silo storage practices in South Australia.



Shubham inside a 1,000 t silo taking airflow measurements for model validation.

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