



83rd IFA ANNUAL CONFERENCE
MAY 25-27 2015
ISTANBUL CITY OF SENSES

83rd IFA ANNUAL CONFERENCE CITY OF ALL SENSES Istanbul

Developing more effective fertilizers

M.J. McLaughlin
University of Adelaide and CSIRO Land and Water Flagship
Adelaide, Australia



Outline

- Why fertilizer efficiency is important
- Improving fertilizer efficiency
- Linking science to engineering
- The future

Fertilizer efficiency = farmer viability/profitability



83rd IFA Annual Conference

Fertilizer efficiency = less environmental impact

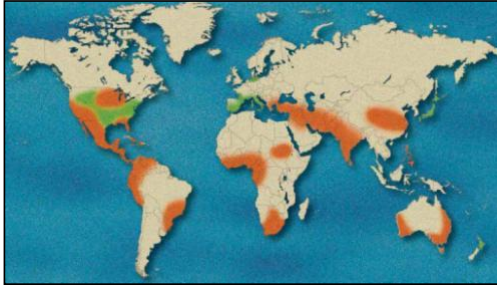
- Off-site movement of nutrients into waterways



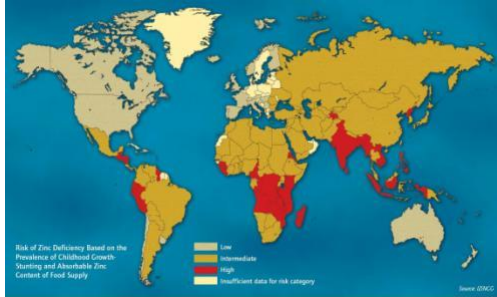
- Emission of greenhouse gases to the atmosphere

83rd IFA Annual Conference

Fertilizer efficiency = improved human health



Soil Zn deficiency



Human Zn deficiency

83rd IFA Annual Conference

Phosphorus



83rd IFA Annual Conference

Better P fertilizers for calcareous soils

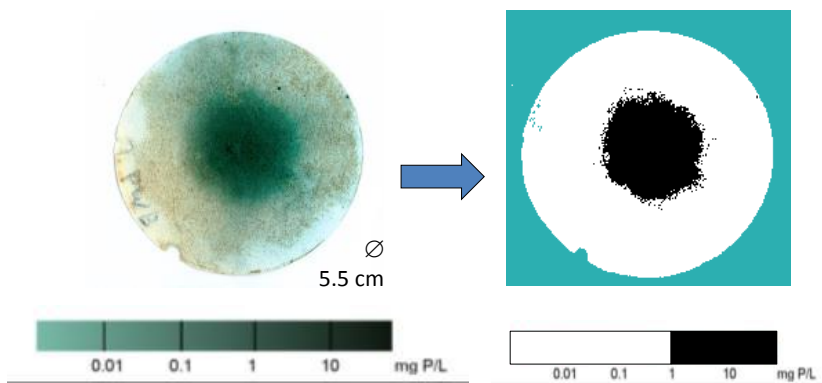
- In calcareous soils P use efficiency is low due to strong P reaction with soil



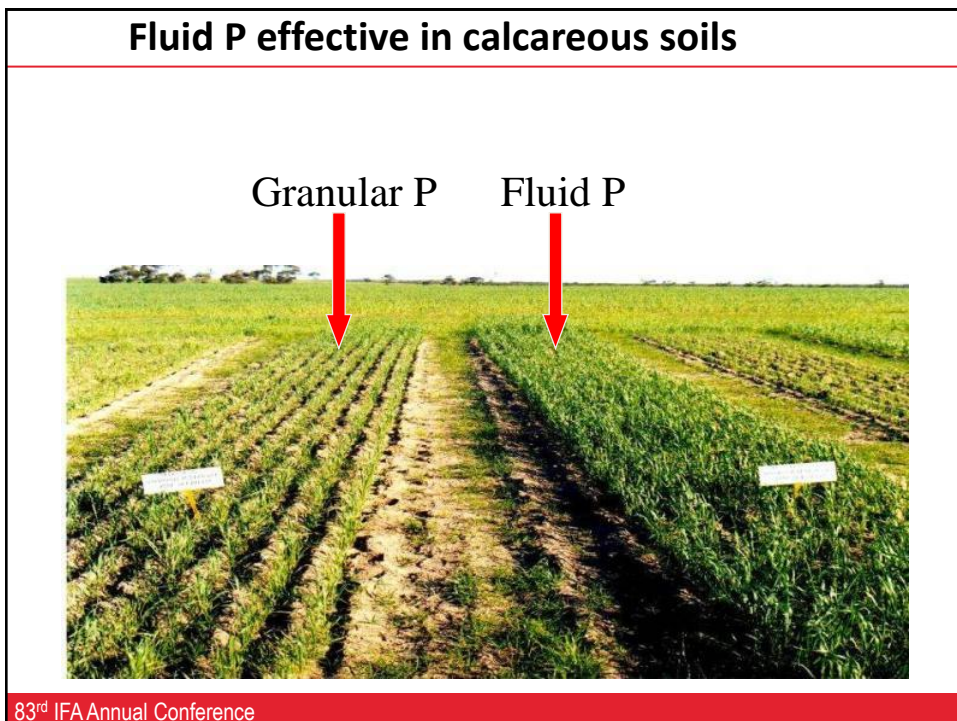
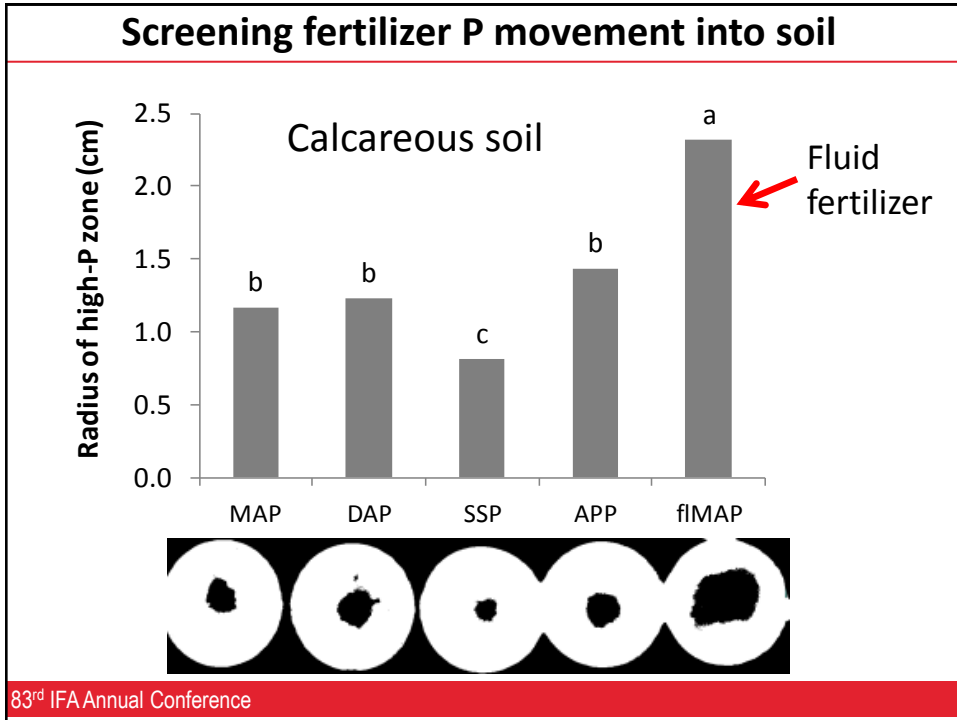
Microphotograph of P fertilizer granule incubated for 4 wks in a calcareous soil

83rd IFA Annual Conference

Screening fertilizer P movement into soil



83rd IFA Annual Conference

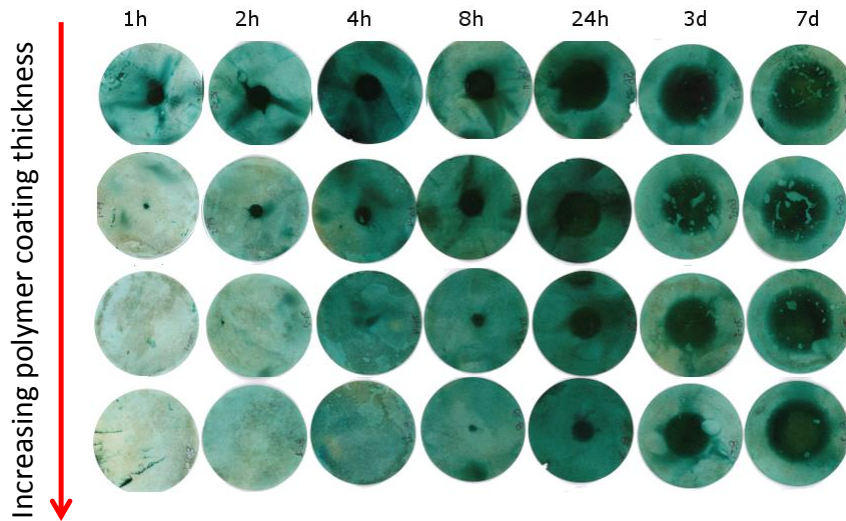


Stopping P losses to waterways



83rd IFA Annual Conference

Evaluating controlled release P products

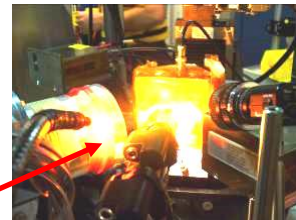


83rd IFA Annual Conference

Zinc

83rd IFA Annual Conference

Zinc fertilizers under the microscope

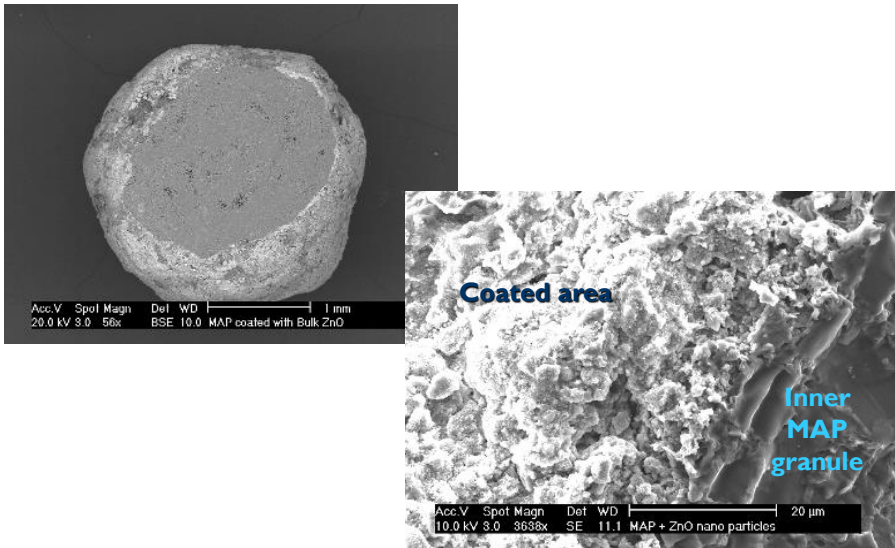


Advanced Photon Source,
Argonne National Laboratory,
Chicago

- Zinc mapped in fertilizer granules, and form of zinc determined
- Movement of zinc out of granules mapped and forms of zinc in soil determined

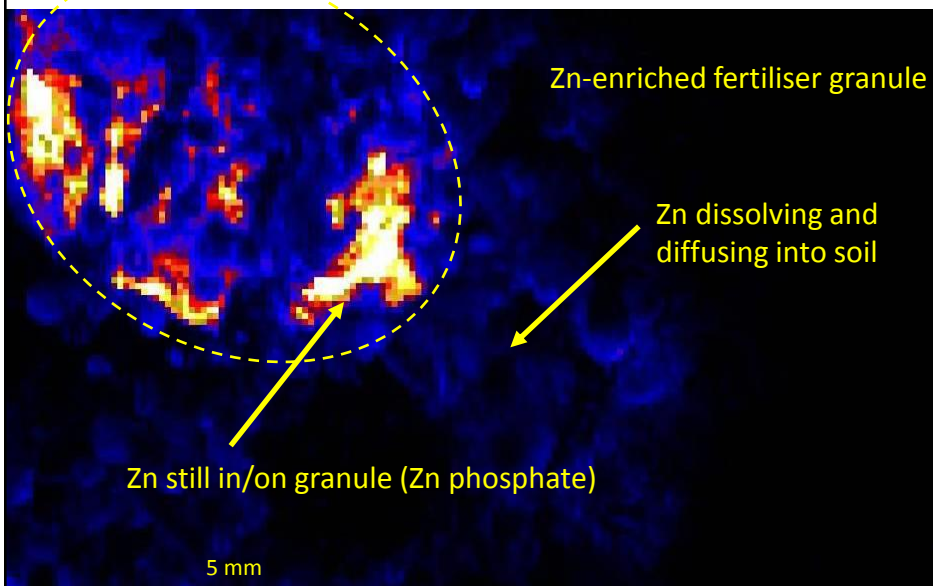
83rd IFA Annual Conference

Zinc fertilizers under the microscope



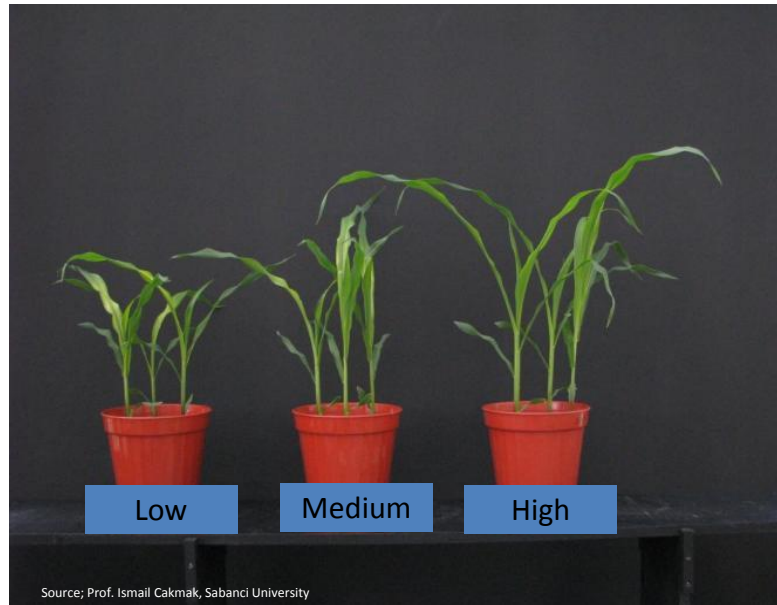
83rd IFA Annual Conference

Reactions of fertilizer Zn in soil



83rd IFA Annual Conference

Water solubility of Zn important



83rd IFA Annual Conference

Improving zinc fertilizers

Physical barriers to reduce phosphate precipitation of zinc and to increase water solubility

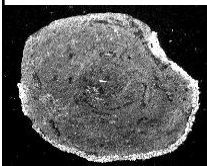
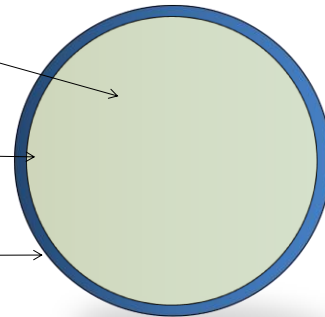
Ammonium phosphate



Barrier Coating



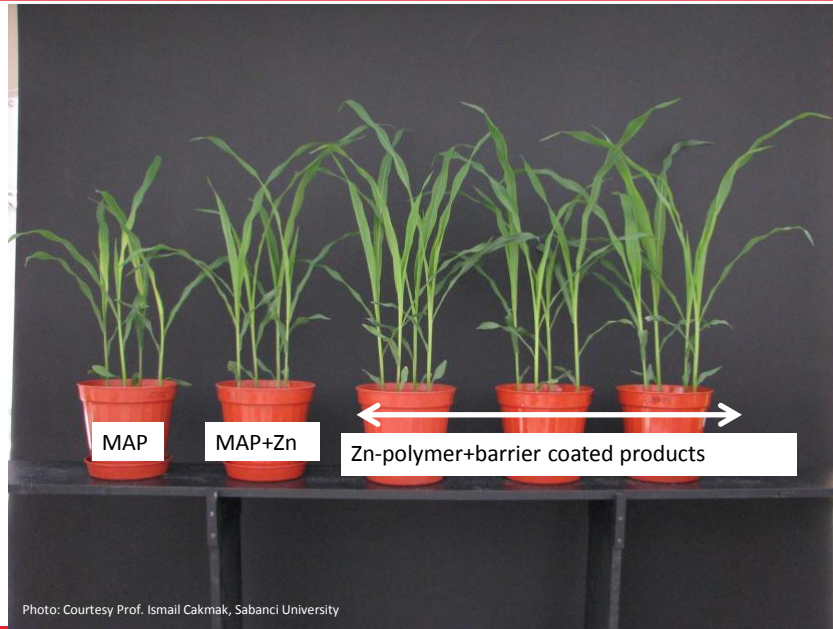
Trace element



Peacock A, Stacey SP and McLaughlin MJ. 2010. United States Patent and Trademark Office Application No 61/309,894. Fertilizer Composition Containing Micronutrients and Methods of Making Same.

83rd IFA Annual Conference

Improving zinc fertilizers

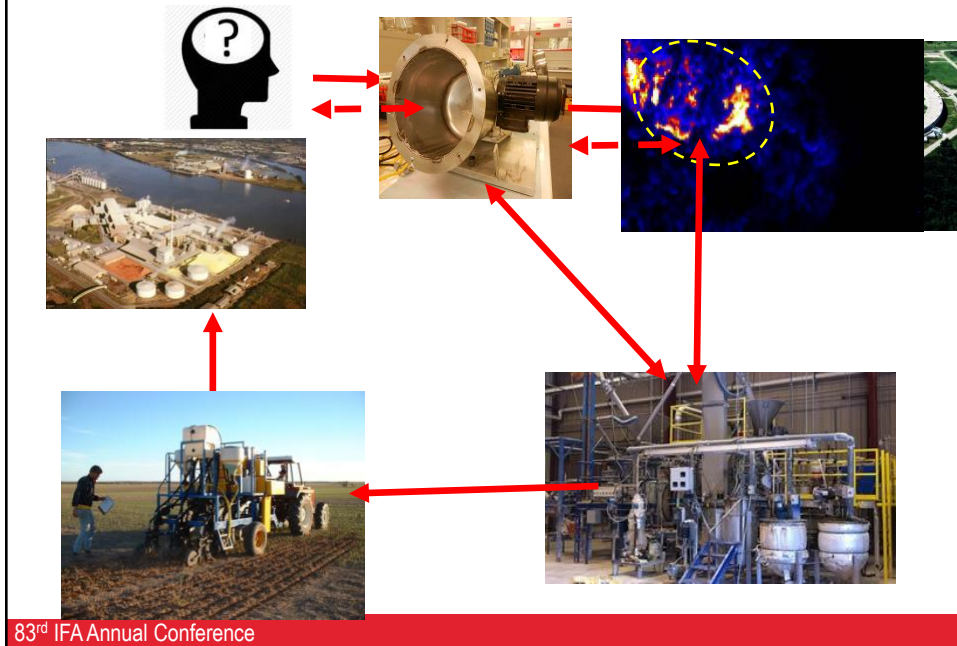


83rd IFA Annual Conference

Effective innovation

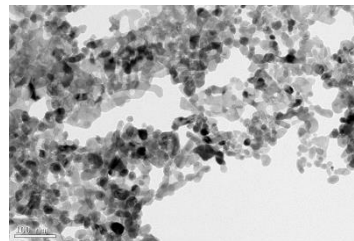
83rd IFA Annual Conference

Developing effective fertilizers



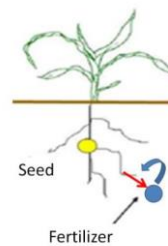
Fertilizer efficiency - the future

- Nanofertilizers and nanocomposite fertilizers



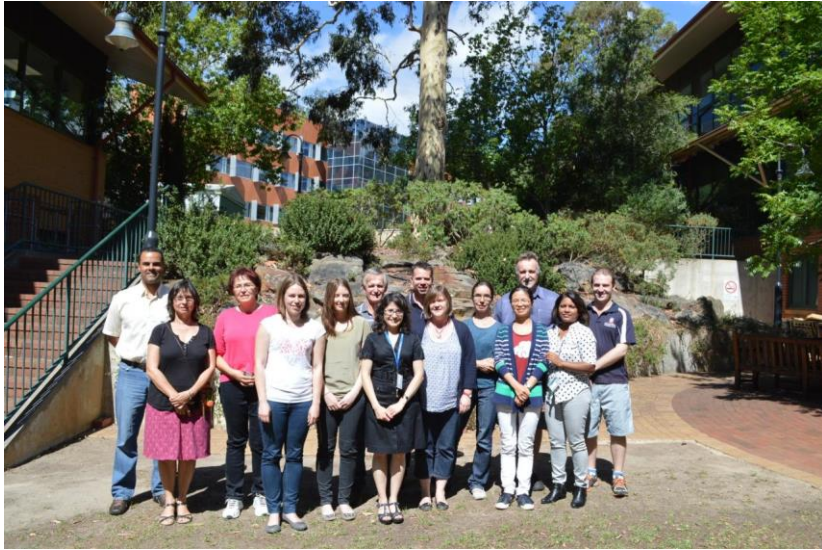
(Nanostructure & Amorphous Material Inc., USA)

- Signalling fertilizers & biostimulants



83rd IFA Annual Conference

Acknowledgements



83rd IFA Annual Conference

Acknowledgements




83rd IFA Annual Conference

Further information

www.adelaide.edu.au/fertiliser/

Further information

www.adelaide.edu.au/fertiliser/



FTRC Home



FTRC Home

About the FTRC

Research

People

Partners

Publications

News

Events

Contact



People

Find out more >

Welcome to the Fertiliser Technology Research Centre

The Fertiliser Technology Research Centre (FTRC) is a University of Adelaide Research Centre located within the School of Agriculture, Food and Wine. The FTRC focuses on the understanding of fundamental processes controlling fertiliser efficiency in a wide range of soils globally, using a combination of spectroscopic, speciation and radio-isotopic techniques. The Centre manages and conducts experimental work under laboratory, glasshouse and field conditions to develop more effective fertiliser formulations to optimise their efficiency.

Research



People



Quicklinks

- > Soil Science - AFW
- > School of Agriculture, Food & Wine (AFW)
- > The Waste Research Institute (WRI)

News

Prof. McLaughlin is the laureate of 2015 IFA Norman Borlaug Award
 The International Fertilizer Industry Association (IFA) announced Prof. Mike McLaughlin as the 2015 IFA Norman Borlaug Award laureate.

Courtney Peirce received the KP Barley Prize
 Courtney Peirce received the KP Barley Prize from the Faculty of Sciences - The University of Adelaide for outstanding

83rd IFA Annual Conference

13