

International Conference on Enhanced-Efficiency Fertilizers

An IFA-New Ag International Event

23-24 March 2010

Hotel Hyatt Regency, Miami, FL, USA

**BIOSTIMULANT COATED FERTILIZERS PROVE
ECONOMICALLY SIGNIFICANT INCREASES IN NITROGEN USE
EFFICIENCY AND SUBSEQUENT CROP PRODUCTIVITY**

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Biostimulant coated fertilizers prove economically significant increases in nitrogen use efficiency and subsequent crop productivity

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CEO
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Context

- ▶ Fertiliser use critical to food security and responsible resource management
- ▶ Ironically – 1 t GHG per 1 t fertiliser production
- ▶ Enhanced Efficiency Fertilizers are win/win solution

Organic Connection

- ▶ Soils of low biological fertility have greater loss pathways
- ▶ Improve biological fertility at fertilizer granules micro site in the soil
- ▶ Mimic nature

A solution is born

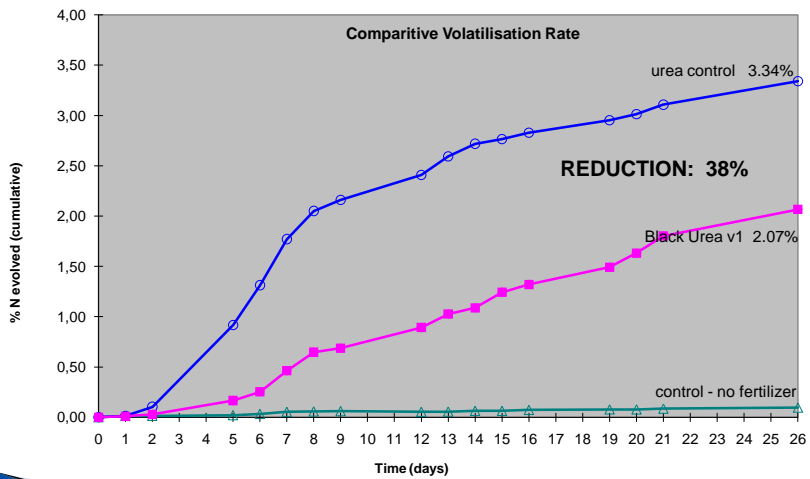
- ▶ Goal: agronomic and economic value to whole production chain (consumer to raw materials)
- ▶ LAUNCH™ – coating of unique combination of biostimulants and nutrient biocatalysts
- ▶ from humate derived organic acids, plant hormones, vitamins and minerals
- ▶ Stabilise nutrients by ionic exchange capacity and biological sequestration

Animation

An overly simplified view of the process follows

[Link to animation](#)

Ion Exchange Capacity



Bio warehousing

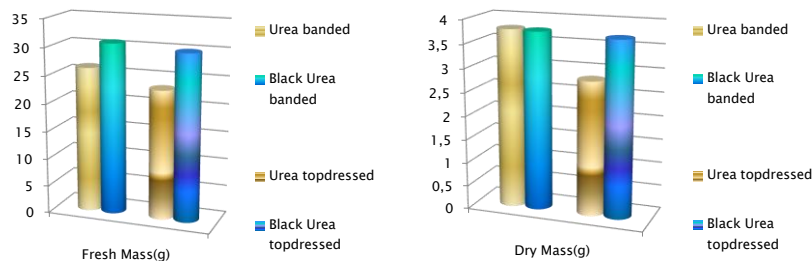
- ▶ Feed heterotrophs to outcompete chemoautotrophs and store nutrients in a stable “biological warehouse”
- ▶ Plant influences release rate, root exudates, usual N cycle



Dr James Harkryder, Cypress College Biology Dept.
 Test of biostimulants in Launch.
 Heterotrophic plate count,
 left petri with 2 drops of 100% bio-stimulant,
 right petri 2 drops of 10% diluted bio-stimulant.

Greenhouse

- ▶ Greenhouse experiments inconsistent
- ▶ Lack of microbial diversity and/or consistency probable cause
- ▶ Van Vuuren gets results



Inconsistent

- ▶ Laboratory results are not necessarily true to life
- ▶ Lack of microbial diversity and/or consistency probable cause but due to sample soil preparation
- ▶ Commercial scale field research the answer

Field Research

Ferguson, J. NITROGEN RETENTION in SOIL (% Total N)					
Low Moisture					
	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks
Coated Urea	95%	84%	75%	70%	62%
Uncoated Urea	55%	30%	15%	3%	1%
Low - Medium Moisture					
	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks
Coated Urea	93%	85%	70%	63%	52%
Uncoated Urea	66%	45%	28%	10%	4%
Optimum Moisture					
	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks
Coated Urea	90%	80%	65%	52%	46%
Uncoated Urea	75%	42%	26%	8%	5%
Moderately High Moisture					
	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks
Coated Urea	90%	76%	65%	50%	45%
Uncoated Urea	68%	40%	15%	4%	3%
Very High Moisture					
	2 weeks	4 weeks	6 weeks	8 weeks	10 weeks
Coated Urea	85%	70%	60%	52%	48%
Uncoated Urea	60%	35%	10%	2%	1%

Return on Investment



- ▶ EEF are value added inputs
- ▶ Seek minimum 2:1 Return On *additional* Investment

\$538/ha

Crop and Location: Irrigated Cotton - "Tundunna", Mungindi

Application: Ground rig, September 2005, 390kgs/ha

Trial Conditions: Replicated 2.4ha plots over three fields.

Black Urea applied at only 5% less (390kgs/ha) than normal practice (410kg/ha) giving an increased application cost for Black Urea of \$22/ha.

Heavy cracking clay with a 8.1 pH and a CEC of 40. Average rainfall 550mm.

Result: Granular Urea: averaged 12.67 bales/ha

Black Urea : averaged 13.79 bales/ha

The additional 1.12 bales (@ A\$500/bale) less the increased application costs (-A\$22/ha) provides a **net profit increase to the grower of \$538/ha**

\$165/ha

Crop and Location: Dryland Wheat – “Mayfield”, Quirindi

Application: Applied by air in crop, July 2004, 50kgs/ha.

Trial Conditions: Urea is usually applied at 80kgs/ha in crop but is difficult to maintain to be economically viable. Black Urea™ is tried at 50kgs/ha to determine if overall economics improve over an area of 200ha.

A black basalt soil with a 6.5 pH and a CEC of 28. Two good rain events through the season with a wetter than normal harvest.

Result: Urea average yield: 4.23 t/ha

nutrition cost of \$28/ha = 151kgs yield per \$1.00 spent.

Black Urea av. Yield: 4.89 t/ha,

nutrition cost of \$23/ha = 212kgs yield per \$1.00 spent.

Black Urea™ delivered an increase in the overall yield economics of over 40%. A yield increase of 0.66t/ha and reduced input cost **increase net margin by \$165/ha.**

\$284/ha

Crop and Location: Irrigated Corn – “Goodgerwirri”, Caroona

Application: Side dress, December 2004, 160kgs/ha

Trial Conditions: In order to evaluate any economic benefit of Black Urea on Corn compared to granular urea. Black Urea was applied to 90ha at 20% less the historical rate of granular urea (200kgs/ha)

Black self mulching clay–Vertosol with an 8.5 pH and a CEC of 64. High rainfall in December and January with a dry harvest.

Result: Granular Urea av. yield: 11.5 t/ha @ 142kgs per \$1.00

Black Urea™ av. yield: 12.3 t/ha @ 149kgs per \$1.00

The additional 0.8t/ha netted the grower an **increase of \$284/ha**

\$36/ha

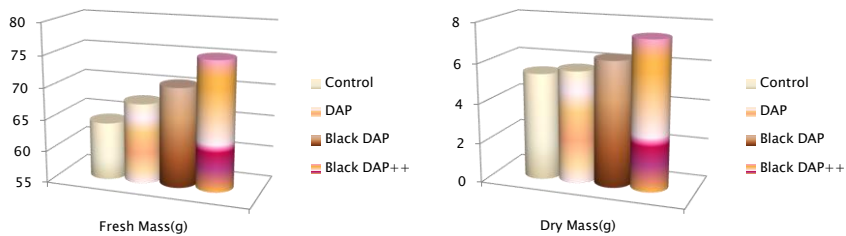
Crop and Location: Dry Land Pasture – “JNardi”, Eureka
 Application: Ground spread, September 2005, 80kgs/ha
 Trial Conditions: In order to evaluate any economic benefit of Black Urea on rye grass pasture directly compared to granular urea on an intensely grazed dairy farm. Red volcanic soils with a 5.0 pH and a CEC of 18. High summer rainfall.
 Result: Granular Urea: after 21 days approx. 8t of DM/ha
 Black Urea : after 21 days approx. 10t of DM/ha.
 The additional 2t/ha dry matter netted an additional 5 days grazing giving the grower a calculated **nett increase of \$36/ha**

\$294/ha

Crop and Location: 3rd Ratoon Sugar Cane – Home Hill
 Application: Applied by stool splitter, July 2009, 160kgs/ha.
 Trial Conditions: Replicated plots of varying sizes from 0.33ha – 9.75ha over six fields. Black Urea applied at only 73% less (160kgs/ha) than normal practice (220kg/ha) giving a decreased application cost for Black Urea of \$44.90/ha. Soil light sandy loam with a 6 pH and a CEC of 5. Average rainfall 1100mm.
 Result: Granular Urea: averaged 1342.04 production units per ha
 Black Urea : averaged 1404.47 production units per ha
 The additional income per ha of \$4/unit less the increased application costs (A\$44.90/ha) provides a **net profit increase to the grower of \$294/ha**

Future Innovations

- ▶ Continuous improvement
- ▶ van Vuuren adds lime and microbes with promising results



Environmental Impact

- ▶ 20–30% reduced fertiliser application is a 20–30% reduction in environmental cost.
- ▶ Possible reduced nitrification and N_2O production

Wrapping up

- ▶ EEFs have a niche applications.
- ▶ Ours is low biologically fertile soils
- ▶ More research
- ▶ Priority One – economically and environmentally sustainable outcomes

Thank you

Further information:

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- ▶ www.blackurea.com

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