



Project UA 00023



## Farmer profile >

Andrew and Simon Longmire Salmon Gums Western Australia

Brothers Andrew and Simon Longmire sing the praises of fluid fertilisers on their property, near Salmon Gums in Western Australia.

The brothers switched to fluid fertilisers on their property after trials were conducted and the results were “pretty good.”

“(Fluid Fertilisers) are much easier and better for us to use. We will continue with them because it is easier to handle and better for our soil types (red sandy loam and clay loam) which tie up the phosphorus and zinc,” Andrew said.

This year Andrew has switched to Liqui-NP™ - a new product by CSBP – after using Flexi-N™ a nitrogen based fluid fertiliser instead of urea.

“There were trials done here with it and it did pretty well. About four years ago we first used phosphoric acid and we got up to a 30% increase in yield,” Andrew said.

Adding zinc, to their zinc deficient and highly alkaline soils, using a doseatron to measure the exact amount of zinc per hectare, has also increased their yield.

Andrew and Simon were inspired by Bob Holloway’s recent South Australian trial results, with the Eyre Peninsula researchers obtaining results recently indicating a better residual response to fluid phosphorus than granular.

Their use of fluid fertilisers has also translated to the bottom line with an increased yield.

“We have experienced an increased yield on certain soil types. We think we get better use of phosphorus and nitrogen in many years, with fluid fertilisers resulting in better plant nutrient availability,” Andrew said.

Unlike SA growers, the Longmires have had no problem with gaining access to fluid fertiliser supplies at their property or with equipment.

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## From the editor

We are looking forward to September and the inaugural Fluid Fertiliser workshop to be held here in Australia.

With the increasing interest in fluid forms of nitrogen, phosphorus and trace element fertilisers in this country, this meeting will present the latest in agronomic and technical information.

We are calling on researchers, growers and advisers to attend and share current knowledge and discuss the future direction of fluid fertilisers in the national grain industry. The workshop will be an excellent venue for an international exchange of information.

Dr Larry Murphy (from the USA Fluid Fertilizer Foundation) will join a range of Australian and international experts, speaking on the potential benefits, chemistry and application of fluid N and P fertilisers.

For further information see Page 8 for further information and registration details.

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from page 1.

“We have had to modify our equipment to meet our needs. When we first started using fluid fertilisers there wasn’t anything to suit our farm, now there is,” Andrew said.

LiquiNP™ is very easy to handle according to Andrew, and there are no major OH&S problems. It is a new product from CSBP, with Andrew only receiving supplies in April.

He has also had no difficulties with supply of Flexi-N™ – although he admits this could be due to the manufacturing plant being located in Esperance.

Andrew does have storage facilities on his properties and recommends other farmers do the same. He says it only involves a little bit of work – with some agitation in the tank, especially when mixing in trace elements and fungicides.

Andrew has however experienced some issues with mixing Flexi-N™ and trace elements. He called for more research in this area for compatibility.

Overall, the Longmire brothers’ experience with fluid fertilisers has been successful.

“Fluid fertilisers are great they are the way to go,” he said.

“The nitrogen based fluid fertilisers are more expensive, while the Phosphorus is comparable to granular in Western Australia.”

Andrew estimates he has spent close to \$70,000 in modifying equipment, purchasing a liquid cart, which includes a separate container for zinc and constructing three 45,000L storage tanks on site.

“It cost more than we initially thought,” he said.

Andrew is hoping this year, after much trial and error he will finally have the application and mixing of trace elements right for his crops and soils.

“It’s taken a while and a bit of money but we are not looking back,” he said.



## In Brief

Rainfall 325mm per annum

Soils mainly red sandy loam, with some red clay loam

Crop 2900 ha – wheat, barley, peas, lupins and some oats

Mainly minimum tillage and direct drilling

Application Rate for Liqui NPÔ is 80l/ha.

Equipment – Morris Air Seeder Bar and fitted with Pressure wheels, Valley liquid cart

## Pot Trial

Early results from pot trials on 30 soils from SA, VIC and WA have indicated positive responses to fluid fertilisers rather than granular.

University of Adelaide PhD student Therese McBeath, who worked with Enzo Lombi, Mike McLaughlin and Roger Armstrong on the trials, said the trials indicated plants find it easier to access P from fluid fertilisers than granular.

“This is a significant discovery, it means less work for plants. We showed that calcium carbonate (Calcareous soils) was very important,” she said.

The P fertilisers tested were triple superphosphate (TSP), phosphoric acid ( $H_3PO_4$ ), ammonium polyphosphate (APP) and a control of no P fertiliser. The amount of P applied to each pot was the equivalent of 12 kg P per hectare.

Wheat dry matter was enhanced by phosphorus application in 86% of the soils tested. In 62% of these phosphorus responsive soils, wheat dry matter was significantly greater when fluid P fertilisers were used as compared to the granular form.

These responses were in calcareous soils, acidic soils and some alkaline non-calcareous soils. The neutral pH soils did not show a greater response to fluids as compared to granular, but rather an equivalent response. Neutral pH soils do not fix phosphorus as strongly as alkaline and acidic soils. In all cases response to fluid fertiliser was equal to or greater than the granular fertiliser.

“We found that the increase in dry matter for fluid fertiliser responsive soils was due to increased efficiency of phosphorus uptake in these plants,” Ms McBeath said

“In some calcareous soils supplied with granular triple superphosphate, the amount of tissue phosphorus in the plant was not enough to be above the critical deficiency limit.

“We tried to determine which soil properties would make plants growing on that soil respond favourably to fluid fertilisers.

“Among the soil properties, soil pH and calcium carbonate content were the key soil characteristics that controlled crop response to fluid P fertilisers. Other soil characteristics like Colwell P which is routinely used to determine the levels of P that a farmer needs to apply were not well correlated with crop response to fluid P fertilisers.”

Ms McBeath said the results were only preliminary but they do suggest that the yield benefits may not just apply to calcareous soils and it is worth investigating other soil types.

## Local research

### Therese McBeath

Therese McBeath is just one of the hard working team of researchers based across Australia studying fluid fertilisers and reactions in soils



From Minnipa originally, Therese was based in Horsham for some years. She is now in the second year of her PhD based at Adelaide University.

She is studying the reaction of ammonium polyphosphate fertilisers in soils and solutions: biological and chemical effects and is supported by Agrichem Pty Ltd.

“I am working with Ammonium Polyphosphate (APP) because it has quite different chemistry to other phosphate fertilisers,” she said.

“Normal fertiliser is just one orthophosphate, whereas APP is made up of a multiple of phosphate groups such as pyrophosphate.

Therese decided to focus her PhD on APP because the chemistry was so different (she) had to see the effect on calcareous soils.

“There’s evidence to suggest it may mobilise native phosphate on soils,” she said.

“We’re trying to develop methods in labs to prove whether or not this happens.”

Another aim is to be able to go back to farmers with the best way to use APP and the best products to mix in.

“We want to be sure that this is not affecting the integrity of the fertiliser.

“Farmers quite often develop their own blends, that’s why they like to use fluids because they are more flexible.

“Some people acidify it to introduce other nutrients,” she said.

Therese will concentrate first on fluid fertilisers chemistry, before looking at interactions with soils.

“And then the most important thing is to determine why phosphate is more available as a fluid fertiliser.”

## International News Briefs

Fluid Fertilizer Foundation 2004 Fluid Forum Conference Proceedings.

### Phosphorus Fertiliser effects on forage, beef and grain production from winter wheat

D.L. Robinson et al  
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Phosphorus Fertiliser was surface applied or injected in a NPS solution and compared to a surface-applied NS solution to determine if fall forage production could be increased by P applications and to determine if the additional forage could be captured through beef production to make the P applications profitable. Although both forage and beef production were increased by one third and increased income sufficiently to exceed the cost of added P, the profit margin was very narrow in the graze-plus grain system and negative in the graze out system. The study confirmed our belief that grain production is still extremely important in Rollin Plains wheat sticker cattle production programs.

### Banded P Placement for Sugarbeets in Calcareous Soils

B. Hopkins and J. Ellsworth

University of Idaho; Plant, Soils and Entomological Sciences Department  
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Phosphorus is an essential element for sugarbeet nutrition. Soils in the Western US tend to be calcareous and alkaline, resulting in low P solubility. Sugarbeets have difficulty in exploiting soluble P in surface soil. This project evaluated the effectiveness of two starter fertilisers (APP and UAN) at three depths at two Idaho locations. The banded application of APP at the 6 in below the soil surface depth resulted in increased sugar production due to a combined increase in sugar percentage and total yield at one location. In contrast, the banded APP at the surface did not result in increased sugar percentage or yield and in fact significantly reduced sugar yield at one location.



### Residual effects of MAP and APP on Calcareous Soils

R.E. Holloway et al  
Minnipa Research Centre, SARDI  
M.J. McLaughlin and E. Lombi, CSIRO Land and Water, Adelaide SA  
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A P Rate response trial was established in 2002 at White Well in South Australia on a grey highly calcareous soil containing 60% calcium carbonate. In 2002, triticale produced 14% more dry weight shoots at a commercial application rate of 8kg p/ha with the APP-based fluid than the granular fertiliser; the rate of response to increasing P applications was also greater with APP.

### Dissolution of Granular Fertilisers and Diffusion Liability of P from Fluid and Granular Fertilisers in Alkaline and Calcareous soils of Southern Australia

E. Lombi et al  
CSIRO Land and Water  
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Unlike many soils in Europe and North America, many Australian soils are still responsive to additions of P fertiliser, especially alkaline and/or calcareous soils that dominate the low rainfall zone of southern Australia. Poor responses to granular fertilisers in the area have recently stimulated a swing by grain growers towards the use of fluid formulations, often resulting in significant yield responses. Lab experiments examining P diffusion were undertaken to investigate the reasons for the poor efficiency of granular formulations such as TSP, MAP and DAP, and the greater efficiency of the fluid products; TGMAP, PA and APP in alkaline soils.

For further information on the papers, see the Fluid Fertilizer Foundation's website at [www.fluidfertilizer.com](http://www.fluidfertilizer.com)

# CSBP article

## Products

With more than 70 years in the fertiliser industry, CSBP is the market leader in fertilisers in Western Australia (WA).

It started its own in house trials (one of the perks of being a former monopoly in the industry is having your own research team), into fluid fertilisers, developing Flexi-N™ in 1987 and building considerable expertise in the field since.

CSBP's Manager Field Research, Dr Stephen Loss, said fluid fertilisers were just a small part of their business at this stage, but the company recognises the potential to expand.

Flexi-N™, the flagship product, is a premium clear liquid fertiliser containing nitrogen. Nitrogen is in the nitrate, ammonium and urea forms. Nitrate is immediately available to plants while ammonium and urea become available more slowly.

### Advantages:

- Economical to store
- Remains stable in storage from year to year
- Easy handling through hoses and pumps
- Can use existing spray equipment
- Application by boom sprayer is very uniform compared to top dressing solid fertilisers
- Many herbicides, insecticides and fungicides may be applied at the same time
- Limited concentration of trace elements may be applied with the solution
- Less potential for loss to the atmosphere compared to urea
- Safer to band than urea



Flexi-N™ is suitable for crop application through both boom sprayer and liquid seeder system. Although Flexi-N™ is less toxic than urea, separation from the seed 2-3 centimetres is recommended when banding. As part of a balanced fertiliser program for cereals and canola, Flexi-N™ may be applied before, at or after sowing, with solid fertilisers such as Agstar or K-Till used at seeding.

Dr Loss said spraying Flexi-N™ with a boom spray could ensure even spraying, while urea can often result in “waves” – “last season this uneven application would have cost farmers money.”

Flexi-NS™ is a premium clear liquid fertiliser containing nitrogen and sulfur. Nitrogen is in the nitrate, ammonium and urea forms and sulfur is in the thiosulfate form. Nitrate is available immediately to plants while ammonium, urea and thiosulfate becomes available more slowly.

Flexi-NK™ contains nitrogen and potassium. Nitrogen is in the urea form and potassium is in the muriate (chloride) form. Potassium chloride is available to plants immediately while urea becomes available more slowly.

Flexi NP™ is a premium clear, liquid fertiliser containing nitrogen and phosphorus. Nitrogen is in the nitrate, ammonium and urea forms and phosphorus in the polyphosphate form. Nitrate is available immediately to plants while ammonium, urea and polyphosphate becomes available more slowly.

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All products in the premium Flexi range have similar advantages and applications.

Liqui-NS™ and Liqui-NP™ are economy liquid fertilisers. NS contains nitrogen and sulfur, while NP contains nitrogen and potassium. Nitrogen is in the ammonium form, sulfur is in the sulfate form and phosphorus is in the sulfate form. Sulfate and Phosphate are available immediately to plants, while ammonium becomes available more slowly.

Advantages:

- Easy to store, with occasional agitation
- Remains stable in storage
- Easy handling through hoses and pumps
- Can use existing spray equipment
- Application by boom sprayer is very uniform compared with top dressing solid fertilisers
- Selected herbicides, insecticides and fungicides can be applied at the same time
- Limited range and concentration of certain trace elements can be applied with the solution
- Less potential for loss to the atmosphere compared to urea
- Safe to band, less prone to blockages than solid fertilisers

Both Liqui-NS™ and Liqui-NP™ are suitable for application through a boom sprayer or liquids cart. Although both are less toxic than urea, separation from the seed 2-3 cm is recommended when banding.

CSBP conducts about 70-80 trials a year – with 50% focussing on fluid fertilisers.

## Product specifications

Product	N	P	K	S	Price*
FLEXI-N™	32	0	0	0	\$315
FLEXI-NS™	28	5	0	0	\$318
FLEXI-NK™	15	0	8	0	\$440
FLEXI-NP™	21.6	7.1	0	0	\$220
FLEXI-NPK™	12.6	8.2	5.2	0	\$393
Liqui-NS™	21.5	0	0	5.5	\$217
Liqui-NP™	8.9	11.8	0	0	\$380

\* Prices quoted per tonne

This year, Dr Loss said some of their trials will focus on:

- Storage on site and agitation
- Boom spray application of fluid fertilisers
- In furrow fungicides
- Adding trace elements

Dr Loss said one of the biggest advantages to farmers using fluid fertiliser was the convenience of storage and application.

“There is no waste and it can be kept from season to season,” he said.

CSBP encourages growers to store fertiliser on site. When Flexi –N™ was first trialled with 12 WA farmers in 1999, CSBP provided the correct storage tanks. Now CSBP has two manufacturers supplying the market with tanks specifically designed to store its products.

“We actively encourage farmers to store fluid fertilisers on site, we have limited storage at CSBP facilities and therefore we cannot guarantee a supply come seeding time with the great demand,” Dr Loss said.

“We encourage farmers to have 80% of their seeding requirements stored on site – we also offer a discount to farmers to encourage them to establish storage tanks on their property.

In the last few years, CSBP has watched Flexi-N™ take a bigger share of the Western Australian market.

“CSBP made a prediction that (Flexi-N™) would be 30% of the market in five years time, and we are well on track to achieving that,” Dr Loss said.

“It’s a great product and with hundreds of growers using it, only two or three have said it is not for them.”



# Fluid Fertiliser Adaptation Trailer

The Minnipa Agricultural Centre is currently completing construction of a fluid fertiliser adaptation/demonstration trailer.

The trailer is an initiative of the EP Farming Systems (EPFS) Project and funded through GRDC and the National Heritage Trust - Western Eyre Community Landcare. Although, this brilliant concept originally came from Neville Trezona of Streaky Bay.

These funds have purchased a 6x4 trailer, 2 x 200 L tanks, a transfer pump and liquid distribution lines and nozzles. Liquid Systems SA, through the Minnipa Research Foundation, have provided an Auto Rate Injection System with electronic controller, free of charge for two years.

The trailer is designed to be connected to the rear of any farm seeding equipment in a very short time (to minimise disruption) during seeding. Distribution manifolds can be hung on the farm seeders' frame and lines placed behind each line with a nozzle on the end and held in place temporarily with cable ties.

The fluid pump is normally driven by tractor hydraulics, but for simplicity, the trailer will be driven by petrol motor or hydraulic power pack from within the trailer. An electronic controller will control the output rate and allow simple rate adjustment. All sensors and valves are contained within the trailer.

"Farmers will be able to utilise the trailer to test fluid fertilisers on their property, with their machine, under their farming system," SARDI researcher Brendan Frischke said.

"It is anticipated that demonstrations will include the farmer's usual practice - what he is doing when we get there - and two or three fluid brews in machine width strips."

"We envisage set up will take 2- 3 hours, application 1 hour and dismantling 1 hour with the whole process taking no more than 5 hours. As soon as we have the farmer's seeder back on the job, preparations can begin for the next demonstration."

Mr Frischke said only six demonstrations will be targeted across Eyre Peninsula. During this set up period, researchers will ensure they will "get it right and have time to iron out any bumps encountered in the teething process. The six sites will be chosen by the EPFS Reference Groups after group meetings in March this year.

"We expect there will be a very long list of volunteers after the group meetings, so the Reference Groups will have a tough job of weaning this list down to 6 sites for the 2004 season," Mr Frischke said.

"Assistance to establish and manage the demonstrations will come from Fish Cordon and Ben Ward (EPFS)."

Our thanks go to Brendan Frischke (Fluid Fertiliser Research project @ MAC) for negotiating the Liquid Systems SA deal and supervising the design and construction of the trailer. We also appreciate the construction efforts of Ben Ward and Wade Sheppard (EPFS project).



Figure 1: The fluid adaptation trailer during assembly at Minnipa Agricultural Centre (L-R Wade Sheppard, Brendan Frischke, Ben Ward).



Figure 2: Auto Rate Injection system provided by Liquid Systems SA which will be fitted on the trailer.

## Inaugural Fluid Fertiliser Workshop

The Inaugural Australian Fluid Fertiliser Workshop will be held in Adelaide from 21-22 September 2004.

There is increasing interest in fluid forms of nitrogen, phosphorus and trace element fertilisers in Australian broadacre agriculture and the workshop aims to review the current agronomic and technical information with regard to this technology.

It will bring together researchers, farmers and industry to share information and discuss the potential, the limitations and the possible future directions of fluid fertilisers in the Australian grain industry.

It will also provide a venue for international exchange of information between Australian researchers, farmers and industry and their counterparts in other countries, where fluid fertilisers are in use – especially North America.

### Program

The workshop program will include scientific presentations on the agronomic performance of fluid fertilisers, their reactions in soils, their placement and distribution.

Part of the workshop will also focus on the experience of farmers and the perspectives of fertiliser and equipment industries.

### Invited international speakers

Dr Larry Murphy	Fluid Fertilizer Foundation (USA)
Dr Nyle Wollenhaupt	SoilTeq (USA)
Dr Cindy Grant	Canada
Dr John Mordvedt	USA
Mr Jim May	Jim May Equipment (USA)
Dr Annie McNeill	(AUS)
Dr Mark Alley	(USA)
Prof Derek Oosterhuis	(USA)

Growers from South Australia and Western Australia will provide an overview of on-farm experiences with fluid N and P fertilisers.

The draft workshop program and details for registration and preparation of abstracts/contributed posters can be found at <http://www-test1.clw.csiro.au/conferences/fluidworkshop/>

### Commercial Displays

Space will be available for companies to display their

products, equipment and services related to fluid fertilisers. Contact the organising committee for further information.

### Post Workshop Field Trip

Following the workshop, delegates are invited to attend the SARDI field demonstration days at Minnipa, Eyre Peninsula.

The necessary travel and accommodation arrangements will be made for those delegates indicating their interest in this option on the workshop registration form.

### Dates:

#### September 21-22

1<sup>st</sup> Australian Fluid Fertiliser Workshop  
Adelaide, South Australia

#### September 23-24

Post Workshop Field Trip  
Minnipa, Eyre Peninsula, South Australia

**For Further Information**, please contact the Workshop Secretary at:

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