



Newsletter

KIMBA

JUNE 2018

A game changer in the fight against prostate cancer

When, Fairfax media outlets including The Age, The Sydney Morning Herald and the Financial Review, have published a story on an experimental treatment, made possible by a radiopharmaceutical known as lutetium-177

(Lu-177), which is made at ANSTO's Lucas Heights campus. With respect to the story, Mark Moore, the General Manager of ANSTO Health, can be quoted on the following:

"ANSTO is the only manufacturer of Lutetium-177 (Lu-177) in Australia, which is produced in the OPAL multipurpose reactor, and is involved in the trial," Mr Moore said.

Charlie Milton, 63, from Kimba, said he had a prostate cancer diagnosis using nuclear medicine, and he likes the prospect of a new nuclear medicine treatment.

"Nuclear medicine scans were used to diagnose my prostate cancer, and biopsies were used to confirm the diagnosis from about November last year," Charlie said.

In 2017, The Eyre Peninsula Tribune reported "men living in the Franklin Harbour, Kimba and Cleve district councils had a 69% higher chance of being diagnosed with prostate cancer than the national average".

"I was one of the lucky ones where it was caught early and wholly related to the prostate. In February I got the whole prostate out, and now the scans and tests are coming back negative, which is a big relief.



Charlie and Margaret Milton

"It was nuclear medicine that found my problems initially, and I think it's great we are researching new treatments that might give other people some new hope as well. We have had three friends in Kimba who have had to have radiation therapy and other treatments, and I am sure that everyone would be happy that new medicines might one day be available," he said.

Agriculture roundtable meeting

The Minister's Agriculture Roundtable Meeting was held on Tuesday 12 June. Representatives from major Agricultural Associations attended including Livestock SA, Grain Producers SA and Grain Trade Australia along with representatives from ARPANSA, the Department of the Environment and Energy, the Department of Agriculture and Water Resources, Food Standards Australia and New Zealand, ANSTO, Prime Minister and Cabinet and the Radioactive Waste Taskforce. This provided an opportunity for the Agricultural Associations to ask the Minister any questions concerning the co-existence of agriculture alongside Facility. Food Standards Australia and New Zealand and The Department of Agriculture and Water Resources were able to confirm that the Facility poses no risk to human health, the environment or agricultural produce due to the strict licensing requirements put in place by ARPANSA. The discussion was very positive focussing on the strength of the regulatory frameworks and the environmental monitoring regime at and around the facility which gives complete confidence that there is no radiological or other contaminants in crops or the environment. Participants heard that there has never been any domestic or export market concerns involving radiation for Australian farmers even with current radioactive waste facilities operating across Australia, including South Australia for the past 60 years.

Economic Working Group update

In May, the group presented to the Kimba Consultative Committee a list of priority proposals the community would like the government to support should the facility be located in the district.

The group also heard from Chief Nuclear Officer of ANSTO, Hefin Griffiths who gave an overview of the Waste Acceptance Criteria and the jobs associated with the Facility.

Principle Project Manager, Alex Sawyer from AECOM, gave an overview of the potential opportunities for local businesses to participate during construction.

Business construction workshop

Take this opportunity to hear from experts on how small businesses can prepare and benefit from the construction of a large scale facility.

Learn about how the construction sector works and how local businesses can link with business engagement specialists.

Find out how to re-skill, up-skill and what the required competencies will be needed from a Vocational Education and Training Provider.

Find out how small to medium businesses can comply for large projects or sub-contract in regards to insurances and work health and safety.

Tuesday 17th July 2018

7:00 pm to 9:00pm

Kimba Gateway Hotel

40 High Street, Kimba

RSVP to

maree.barford@industry.gov.au or 0424 745 176

Light refreshments will be provided

All welcome!

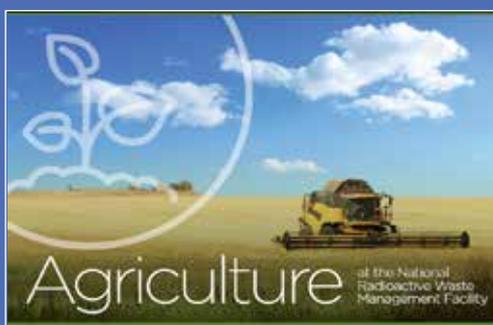
New factsheets available

The following factsheets have been released:

- Agriculture
- Safely managing radioactive waste
- Why we need a NRWMF
- New framework

You can find these factsheets on our website:

www.radioactivewaste.gov.au



Nuclear techniques helpful in study of zinc fertiliser applied to the leaves of broadacre crops



Dr Tom Cressell, Dr Casey Doolette and Thea Lund Read

Researchers from the Future Industries Institute at the University of South Australia are collaborating with a group of scientists at ANSTO to investigate a new class of micro and nano-scale zinc fertilisers for broadacre crops, such as wheat.

Zinc is an essential micronutrient required for the growth of wheat with crucial roles throughout the plant. Australian agricultural soils are known to be deficient in zinc and other micronutrients.

Dr Casey Doolette (pictured above centre) and PhD candidate Thea Lund Read (pictured above right) from Professor Enzo Lombi's lab are assessing if nano and micro zinc particles applied to leaves (known as foliar fertilisers) provide a more sustained supply of zinc to crops than dissolved forms of the metal. They are also evaluating two commonly used agricultural formulations, soluble zinc and chelated zinc (Zn-EDTA). In order to make this evaluation, they needed to use a combination of tools to understand zinc transport and bioaccumulation. One technique, based on the use of radiotracers to track the distribution of elements, was of particular interest and available at ANSTO.

ANSTO Environmental Research scientist Dr Tom Cresswell (pictured above left) has expertise in the use of radioactive

isotopes as tracers in marine organisms to study the bioaccumulation of specific elements.

"It is slightly different working with plants but the concept is essentially the same. By using zinc-65 as a radiotracer, it is possible to detect exactly where the zinc goes after it has been absorbed by the plant," said Cresswell.

ANSTO Biologist Nicholas Howell has captured a series of autoradiographic images of the plants that show the change in distribution of radioactive zinc, in live leaves, over time.

"Conventional analysis and imaging of zinc is limited because the naturally-occurring zinc in the leaves makes it difficult to identify newly-accumulated zinc," said Doolette.

The purpose of the study is to determine what form of zinc is the most efficient for supplying the nutrient to broadacre crops following its application to the leaves.

Doolette explained that although zinc can also be delivered directly to the soil, there are some limitations due to soil conditions that affect its ability to address zinc deficiency in plants.

"When you deliver zinc to Australian agricultural soils, the zinc tends to get locked up, particularly in alkaline soils, and is not readily available to the plants," said Doolette.

Continued from page 3.

This occurs because zinc is largely immobile in soil and only moves short distances from the point of placement. Leaf applications of zinc are used by crop farmers to supplement soil applications. Doolette explained that applying zinc in a soluble formulation has a tendency to damage the leaves.

“However, if the zinc can be released slowly into the leaf, such as the case when it is applied in nano form, there is likely to be less leaf scorch” said Doolette.

The investigators are not focused on how the zinc, in the form of soluble zinc, is taken up but rather how much zinc is bioaccumulated. They are measuring zinc concentrations, as well as identifying where the zinc is transported in the plant, whether it be the new shoots, stems or grains.

“Ideally we would hope to have the applied zinc accumulate in the grains of the plant, where it has the most nutritional benefit as food, which is known as biofortification,” said Doolette.

“We hope to find out if using zinc nanoparticles is a viable way of administering it as a nutrient.”

Doolette and Read transported 140 wheat plants by air to ANSTO, where they were housed in a greenhouse on-site fully licenced for conducting radiotracing studies. Plants were harvested, or imaged, after one day, 14 days and at maturity (i.e. the production of grains) to evaluate the translocation and biodistribution of zinc. The imaging technique developed by the team has allowed for single plants to be measured at multiple time points without the need to harvest, producing a true, and unique, longitudinal data set. The concentration of zinc is quantified using gamma spectroscopy. The zinc particles for the experiments were made industry partner Sonic Essentials and were made radioactive using the OPAL research reactor.

“By determining the most efficient form of zinc for direct foliar application, crop management strategies can be optimised to increase crop yield and quality,” said Doolette.

Zinc is used by the plant for protein metabolism, synthesis of hormones and in the production of essential enzymes.

“We would also be interested in knowing how much zinc is not taken up by the plant, as this zinc would be released into the environment with rainfall,” said Cresswell.

“From the perspective of an ecotoxicologist, it is important to know if the zinc is affecting freshwater runoff.”

Food security, plant nutrition and soil fertility at the Future Industries Institute also collaborates with the School of Agriculture and Food Science at the University of Queensland.



Contact us:

Call 13 28 46

Email radioactivewaste@industry.gov.au

Facebook [@radioactivewasteproject](https://www.facebook.com/radioactivewasteproject)

Kimba Project Office: 49 High Street Kimba