

## Enzymes boost nutrient uptake

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Australian mainstream agriculture and horticulture will soon benefit from a new category of biologically based crop-improvement products, including enzymes that enhance plants' ability to use nutrients from applied fertilisers and soil organic matter.

Developed in the US by life-sciences company Elemental Enzymes, the products have been successfully trialled in Australian conditions from North Queensland to WA.

Partnerships have already been formed with major agricultural distributors and retailers to bring these simple, effective breakthrough products to Australian horticulture and broadacre crop growers.

Australian national sales and marketing manager Chris Ramsey said the biological products developed by the company had much greater potential for broad efficacy across agriculture, compared with the application of microbial products.

"Elemental Enzymes has focused on using the plant's own 'machinery' at the molecular level to solve big problems in nutrient availability and plant defences," he said. "Fine-tuning at this level has the potential to boost growth and yield from existing inputs."

Mr Ramsey said this revolutionary approach, using natural biochemistry, represented a step-change and new era for agriculture.

"For example, all our soil enzyme products replicate enzymes that are naturally secreted by plants and/or microbes to do the tasks we want them to do, such as degrading complex soil-borne molecules into smaller, more absorbable molecules.

"We just supply the enzymes to the soil in a higher concentration, distributed more widely throughout the rhizosphere."

### Lumen a great example

Mr Ramsey said one of the first products to be available in Australia, the liquid enzyme solution Lumen was a great example, improving the efficacy of applied nutrients and those existing in soil organic matter.

"Lumen improves nutrient availability and absorption by providing the right amount of enzyme, right where and when it's needed – for plants to have greater access to soil nutrients and to provide roots with a better opportunity to absorb those nutrients, leading to higher yields and better-quality produce.

"Used with liquid or granular fertilisers, Lumen enhances the uptake of nutrients by plant roots, improving soil and plant health, growth and yield."

Mr Ramsey said plant roots amazingly exerted a pressure of around 690kPa (100psi) as they powered through the soil to access soil-bound nutrients, enabled by a slippery mucilage layer on the surface of root tips. This layer is equipped with enzymes that work with soil microbes to convert inaccessible nutrients into absorbable nutrients.

"For the best start for the crop we can prime the soil and native soil microbes to provide more nutrients, increase their accessibility to those nutrients, and reduce the workload on the root.

"By putting enzymes into the soil, we are not depending on their natural presence to enable plant roots and microbes to do their job. It's another important part of the jigsaw puzzle that leads to maximum crop growth in a variety of field conditions."

Mr Ramsey said Lumen contained a blend of two enzymes in a concentrated liquid formulation to do this work.



Lumen enzyme trials in wheat at Katanning, WA.

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"The enzyme lipase converts lipids in soil organic matter, allowing release of bio-available nutrients for the plant, and stimulating native microbial soil activity.

"The mannanase enzyme breaks down exudates around the outer layers of the root tip, making it easier for the slippery mucilage layer of roots to absorb extra nutrient, and creating soil conditions ideal for plant-root growth."

Mr Ramsey said Lumen is suitable for a wide range of crops, dryland or irrigated.

### Res+ speed crop residue breakdown

Elemental Enzymes is introducing another new product called Res+ in Australia in 2022.

"Application of Res+ accelerates residue breakdown and kick-starts soil microbial activity, leading to potential yield increases in the subsequent planted crop," Mr Ramsey said.

"This liquid product contains a residuedegrading enzyme, chelated nutrients and 5% nitrogen to provide soluble nutrients to fungi and microbes for optimal stubble degradation, plus a humectant to lock in moisture and speed up natural degradation.

"The residue-degrading enzymes expose the lignin and cellulose, for more rapid degradation of stubble by microbes.

"After harvest, Res+ may be sprayed onto stubble from four weeks before, up to sowing the next crop. Res+ can be mixed with pre-plant knockdown and pre-emergent herbicides for a simple one-pass operation.

"On application, Res+ starts stubble breakdown and triggers nutrient release, providing nutrient-rich soil prior to planting and during growth, for improved crop or pasture establishment and production."

Mr Ramsey said the co-founders of Elemental Enzymes were working at the forefront of agricultural biotech, and their unique and patented technologies were now about to be applied to Australian farming.

He said Elemental Enzymes and their established business partners in the USA and globally had quickly recognised the amazing potential for using soil enzymes in conjunction with fertilisers in agriculture, to maximise soil health, plant growth and yield.

"Our unique and patented soil enzyme products are now set to be a great boost and turning point for crop nutrition programs locally in Australia," Mr Ramsey said.



Elemental Enzymes crop nutrition replicated trial site, Eyre Peninsula.