

## RLF SPECIALTY FERTILISER PRODUCTS DELIVER ADDED BENEFIT

### Through the use of liquid fertiliser in overhead irrigation

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A recent Technical Bulletin written by RLF's Head of Technical Dr Hooshang Nassery provided a comprehensive understanding as to why the application of liquid fertiliser is beneficial for plants. It also described how the use of overhead irrigation systems renders an ideal opportunity to keep pace with the high level nutrient needs of the plants.

Fertiliser application to soil is generally achieved by spreading or banding granular fertilisers. Plant nutrient demand is also assisted with foliar fertilisers applied by boom spray or aerial spray. As many growers already use overhead irrigation systems – such as Centre Pivot Irrigation – injecting nutrients in overhead irrigation adds another option for keeping up with high plant nutrient demand under irrigation.



### Nourishing Plants by Overhead Irrigation

Dr Nassery cited that foliar tests have been simulated at the rate of 20,000 litres, or 1mm of irrigation per hectare. At this rate, when leaf surface is dry, leaf coverage to near drip point is achieved with little ground-hit when canopy cover is complete. Timing of application can be selected to allow for drying conditions (such as mid-morning or early afternoon) that increase the concentration of leaf-applied nutrients for more efficient foliar uptake.

He stated, “that overhead irrigation, likewise, can be used to apply nutrients to the soil with uniformity and at required increments. Then went on to say “overhead fertigation therefore offers flexibility, reduces loss of nutrients, increases efficiency of uptake, reduces cost of fertiliser application and prevents excess trafficking and soil destruction”.



## Why Feeding Nutrients by Overhead Irrigation improves Crop Nutrition

Dr Nassery explained that in Centre Pivot Irrigation, the application of water to horticultural crops, field crops or pastures in the range of 600mm to 1000mm per hectare per season is common.

At these rates, the wash-out of nutrients from leaves is considerable. The nutrients most washed-out from leaves by overhead irrigation include potassium and other cations like magnesium, calcium and metallic trace elements. For example two published scientific papers on the subject have concluded :



- that frequent sprinkler irrigation with saline water to capsicum increased uptake of sodium, calcium and chloride resulting in leaf injury. The extent of injury (foliar uptake) was linearly related to frequency and duration of sprinkler application, thus water quality at high rates of overhead irrigation can cause nutrient imbalance or toxicity in leaves. *Maas, et al. (Irrig Sci. 1982)*
- that overhead irrigation at high rates causes removal of cations as well as sulphate, phosphate and even waxy layer of leaf epidermis. *Baker (2006, New Phytologist)*

Dr Nassery added “if irrigation water contains essential and needed ions such as using a suitable liquid fertiliser in the system, the wash-out of endogenous ions from plant leaves is reduced. Indeed, depending on the composition, frequency and period of overhead fertigation, accumulation in leaves rather than loss of nutrients from leaves can occur”.

By contrast, using only water for overhead irrigation, nutrients are lost from leaves at the expense of energy that the plant has used to take up these nutrients. It is well known that plants spend energy at least at two locations for every single ion that is accumulated in leaves.

## Why does this Loss of Nutrient occur during Overhead Irrigation ?

Dr Nassery suggested “that before considering the quantitative aspect of nutrient loss, let us look at how overhead irrigation causes nutrient loss”.

Xylem sap that reaches leaves carrying nutrients that are absorbed by the roots, is in equilibrium with the liquid in Leaf Free Space from which the leaf cells take up ions actively across their cell membranes (by spending cellular energy or ATP). It is from this Leaf Free Space pool that rain and irrigation also washes-out nutrients.

In the Technical Bulletin Dr Nassery explains in greater detail the quantity and composition of nutrient loss from the leaves during the overhead irrigation process, and references several authors in establishing both percentage and element losses, and how this loss varies depending upon factors of composition of rain or water as well as duration and frequency of leaf wetting.

Dr Nassery also describes that washing the roots will cause loss of nutrients from Root Free Space similar to leaves. He added “indeed, nutrients are washed more readily from root than from leaves, with the reason being permeable root epidermal structure allows for loss to occur across all root surface, whilst in leaves the impermeable waxy epidermis prevents loss across all surface area”.





## Compare nutrient loss from leaves and roots

### RLF Products that are Suitable for Injection in Overhead Irrigation Systems

RLF has a range of Specialty Fertiliser products that are the best choice for injection in overhead irrigation systems for foliar and root uptake, and the following specialised products are amongst them :

#### Power N26

A concentrated nitrogen solution with the following specification :

- mildly acidic (pH =6) suited for foliar and soil application
- contains a balanced ratio of nitrogen and sulphur as per crop requirement and removal
- has 10% of its total nitrogen as ammonium ion ( $\text{NH}_4^+$ ) and the rest as urea that converts to ammonia in leaf cells. Ammonium ions can be incorporated into proteins rapidly, and unlike nitrate do not require energy to be reduced for incorporation into protein
- is leaf-safe compared to UAN or ammonium nitrate since urea per unit nitrogen has half the osmotic pressure or water stress of the ammonium nitrate
- contains an inhibitor to minimise steel corrosion
- is suitable for crops and pastures
- can be applied at 20 to 50 litres per hectare



#### Power N39

A urea – ammonium nitrate product with the following specification :

- distributes available nitrogen evenly as compared to granular fertiliser
- is less volatile than urea, so when it reaches the soil, loss of nitrogen is less than urea if follow up rain does not occur
- is taken up quickly by the leaf
- contains available nitrogen for immediate uptake by roots
- suitable for crops and pastures
- suitable for dribble-banding
- can be applied at 10 to 50 litres per hectare



#### Power N42

A urea – ammonium nitrate with higher level available nitrogen suitable for foliar and fertigation with similar specification to **Power N39**.

### Power PK (0-10-35)

An exceptional product having concentrated phosphorus and potassium. It has a neutral pH suited for use as foliar or fertigation on its own or when mixed with Power N range of products to get maximum benefit in maintaining NPKS balance of the crop.



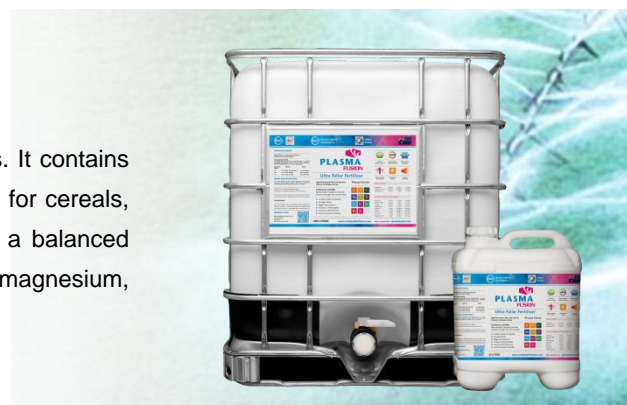
### Plasma Power

Highly concentrated phosphorus and trace element product containing phosphorus, sulphur, magnesium, zinc, manganese and copper. This product can be mixed with Power N range when the boosting of phosphorus and trace elements are required.



### Plasma Fusion

Is a chelated Broad-spectrum product highly suitable for foliar sprays. It contains 12 essential elements with high level of zinc and EDTA. It is suitable for cereals, pastures and legumes to be mixed with Power N or Power PK for a balanced nutrient range. It contains nitrogen, phosphorus, potassium, sulphur, magnesium, zinc, manganese, copper, iron, boron, cobalt, and molybdenum.



### Rapid Max

Has five essential elements being phosphorus, magnesium, sulphur, zinc and copper. This product can be used on its own or in tank mix to boost level of phosphorus, zinc and copper where manganese is not needed.





### Power NP

Contains 6 essential elements being nitrogen, phosphorus, sulphur, zinc, manganese and copper.



### Potassium Plus

Contains high level of available potassium. By having citric acid and high potassium content it is an excellent product to use since loss of potassium under overhead irrigation is the greatest amongst all other nutrient losses.



### Conclusion

Dr Nassery stressed the following six key points as being important considerations to the fertilising routines and practices using overhead irrigation systems.

1. Applying RLF liquid fertiliser products in overhead irrigation allows uptake by leaves, and reduction in endogenous nutrient loss from leaves, resulting in the net accumulation of essential nutrients in the leaves.
2. Losing the nutrients that the plant accumulates in leaves, by spending energy at the root and leaf level is too precious to happen during overhead irrigation. The higher the rate of irrigation, the greater is this loss of nutrient and waste of energy. The challenge is to use liquid fertilisers in overhead irrigation to reduce this loss.
3. Foliar uptake can be enhanced under certain conditions such as frequent application when the leaf surface becomes dry, or is dry.
4. Overhead fertigation offers benefits such as flexibility in split application, saving of labour, reducing fuel cost and preserving soil structure by less trafficking.
5. The specialised range of RLF products mentioned have various characteristics and compositions that suit Centre Pivot or Overhead Irrigation Systems, either singly or in a combined form, to suit the operator's requirements or demand.
6. RLF products that stand out in efficiency and value – even in comparison with granular fertilisers – are Power PK, Power N range, Potassium Plus, and Plasma Power.

You can access all RLF Technical Bulletins and further Product information from the global website [www.ruralliquidfertilisers.com](http://www.ruralliquidfertilisers.com). Technical Bulletins can be downloaded.



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