Introducing 2 Spec MSR (Micro Slow Release)

Matrix Style Micro-encapsulated Fertiliser

Controlled Release Fertiliser

There are several main categories of controlled release fertiliser in Australia today:

1) Nitrogen reacted products: produced by chemical reaction of water soluble nitrogen compounds, such as urea formaldehyde condensates

2) Coated fertilisers: achieve controlled release by coating a soluble fertiliser core (substrate) with a water-insoluble barrier which limits the access of water to the fertilizer and thus limits its dissolution rate (SCU, PCU, PSCU, etc)

3) Nitrification inhibiting: compounds added that delay nitrate production by depressing activity of *Nitrosomonas* bacteria

4) Matrix type formulations: nutrient is dispersed through a matrix and diffuses through the pores or channels in the final carrier form

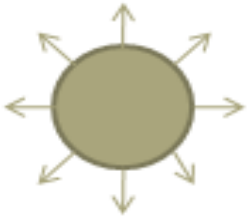
Ref: Abedi-Koupai, J. et al. (2008) Controlled release of microcapsule fertilizer using ethylene vinyl acetate polymer. XVIth International Conference on Bioencapsulation, Dublin, Ireland. Sept 4-6

What is MSR Fertiliser?

- Slow release effect of MSR is achieved by both micro-encapsulation and adsorption/release mechanisms
- Each granule contains all NPK with some organic materials in a fully homogenous prill
- Hundreds of the micro-encapsulated granules are held together to form a maximum size of 100SGN prill which disperse once irrigation is applied – similar principles to WDG technology **Caution some particles can be dust like.
- Lawn Addicts will now offer the 2 Spec MSR technology to the Australian home lawn market

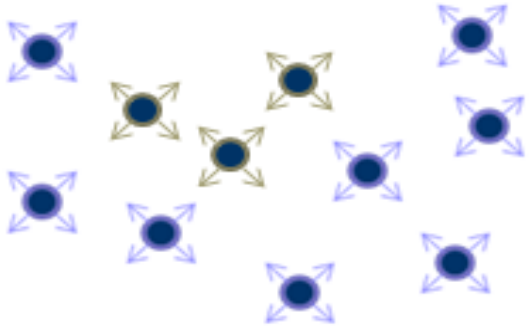
Dispersion Pattern

Coated urea



Localized release of fertiliser nearby the granule only

MSR



Microcapsules disperse easily in water with each microcapsule releasing nutrient slowly

Key Components of MSR

1) Polymer:

- No residues in the soil following application

2) Adsorbents

3) Organic materials

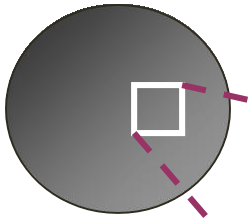
4) NPK

Lawn Addicts will offer two NPK formulations of MSR in:

- 18-2-18 + 2% Fe
- 25-1-10 + 2% Fe

Principles of MSR

MSR
Fertiliser granule



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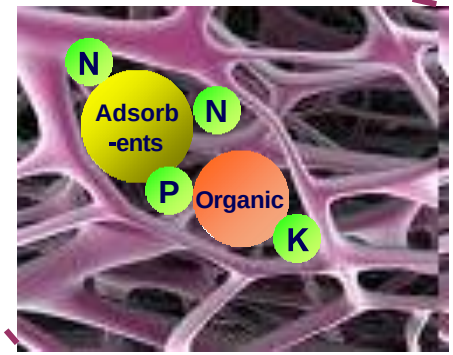


Polymer matrix forms
Micro-capsules

Key Components

Polymer

Polymer matrix forms micro-capsules to control release of nutrient & adsorbent/ organic carriers

Adsorbents

A stable material which allows nutrient to be adsorbed on the surface

Organic materials

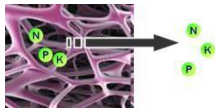
A decomposable material which allows some nutrients to be chelated and enhance slow release patterns

Plant nutrients

Release slowing from:
(a) Polymer micro-spaces;
(b) Adsorbent surface
(c) Organic decomposition

Slow Release Mechanism

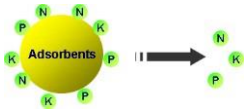
(I.) Polymer



In Granule: Nutrient is encapsulated inside the micro-space created by the polymer matrix during the manufacturing process

In Soil: Due to the slow solubilisation of the polymer matrix, the entrapped nutrient slowly releases out

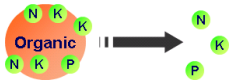
(II.) Adsorbents



In Granule: Nutrient is held on the surface of the adsorbent materials

In Soil: Ions are being retained on the colloid and are made useful by the plant through ion exchange and uptake

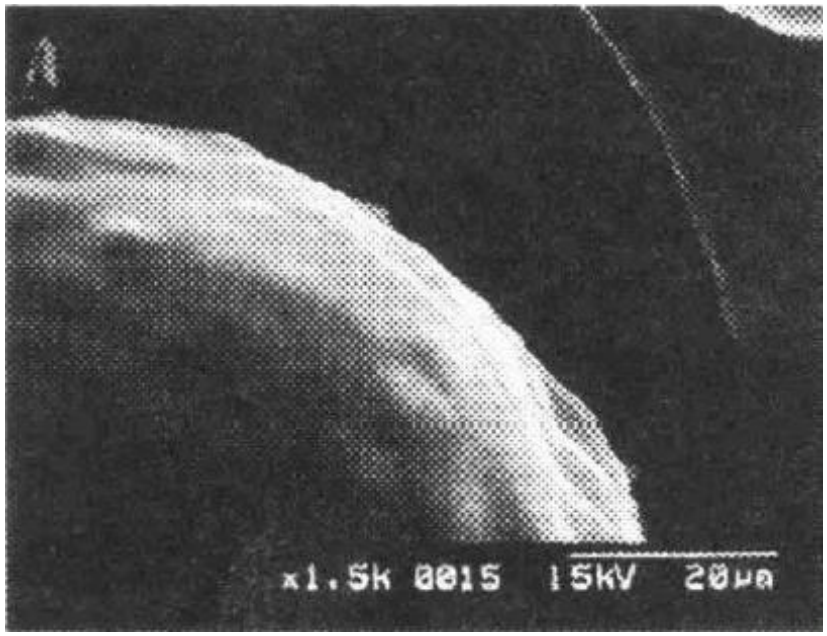
(III.) Organic materials

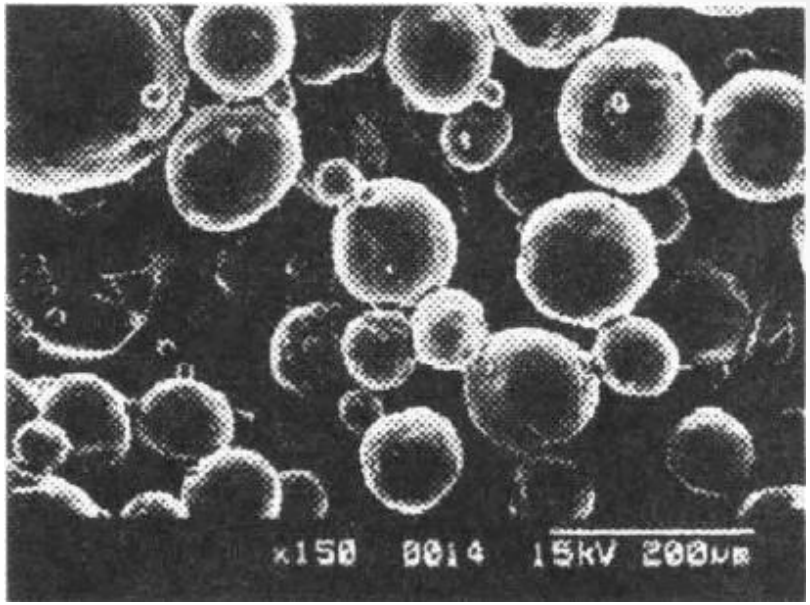


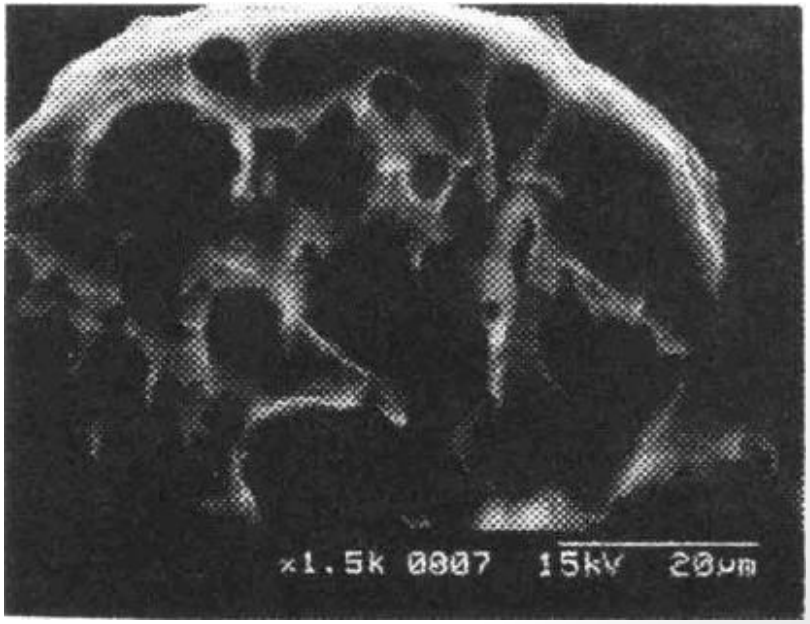
In Granule: Some nutrients are chelated through organic acids

In Soil: Microbial decomposition of organic acids slowly release chelated nutrient in the soil

SEM Images

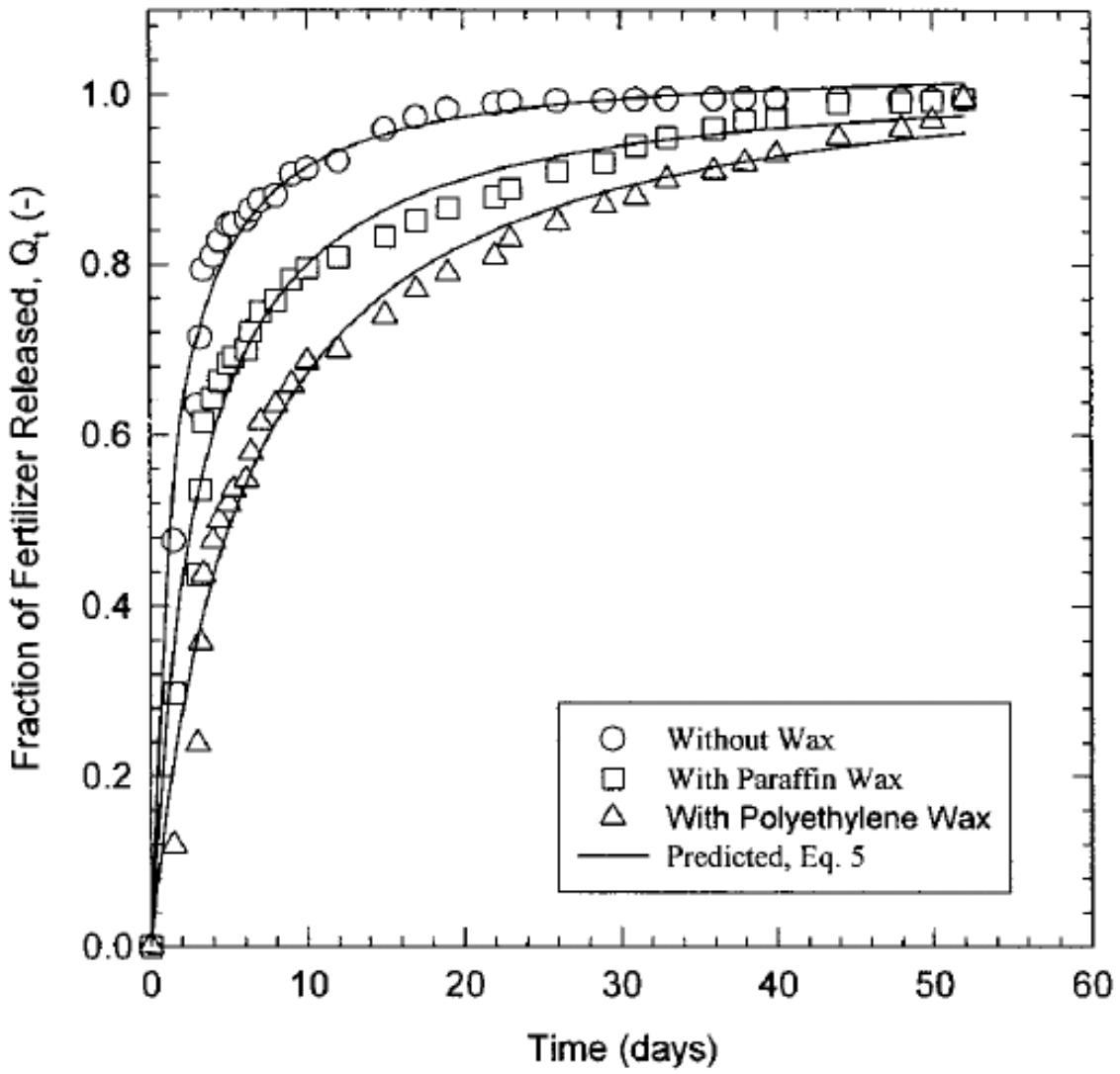






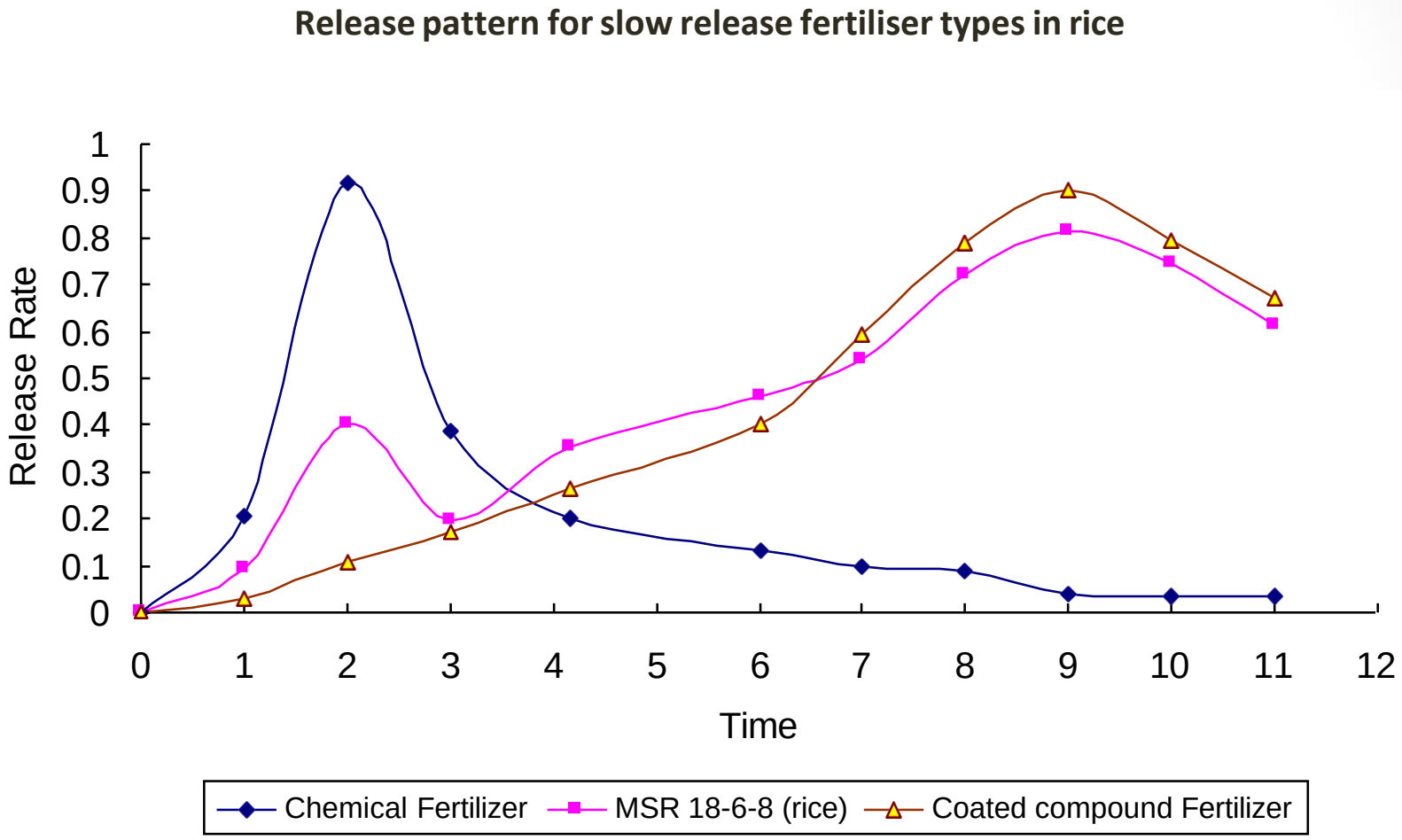
Futaki S., Yoshizawa H., Matsuo M., Kusumoto M and Kitamura Y (2002) Fertilizer Microencapsulated with Biodegradable Polymer. pp. 127-131.

Control release fertiliser curves



Ref: S. M. Al-Zahrani (2000) *Utilization of polyethylene and paraffin waxes as controlled delivery systems for different fertilizers.* Ind. Eng. Chem. Res. 39: 367-371.

Nutrient Release Pattern



Benefits of MSR

- Unique multiple release mechanisms allows stable controlled release of nutrient to the plant
- Dispersal of microcapsules releases the fertiliser nutrient over a widespread root zone
- Fully homogenous prill
- No soil residue as all components are broken down by micro-organisms
- Release not determined by soil temperature, moisture, microbial activity, etc, as compared to traditional slow release fertilisers
- MSR release is determinant on the amount of the polymer matrix added to the formulation at time of manufacture
- The 2 Spec MSR fertilisers will provide around 8 weeks sustained release