GRANULOCK FACTSHEET

January 2004

- **Zinc, copper or sulfur-enriched ammonium phosphate fertilizers;**
- **Ideal planting fertilizers for grain and cotton;**
- **Even distribution of nutrients, including micronutrients (trace elements) in the crop row.**

Up to 1990, Incitec Pivot Limited manufactured diammonium phosphate (DAP) and monoammonium phosphate (MAP) at Brisbane, Newcastle and Geelong. Around this time, it became more economical to import the finished fertilizers into Australia, rather than import phosphate rock and manufacture DAP and MAP locally. Australian manufacture of DAP and MAP ceased and did not recommence until 2000, this time by WMC Fertilizers in north west Qld. using locally mined Duchess phosphate rock.

The cessation of DAP and MAP manufacture at Incitec Pivot Limited's granulation plants in Brisbane and Newcastle left idle (unused) granulation capacity. The company recognised that there was an opportunity to import off-spec MAP, add other nutrients such as sulfur or zinc to it, and re-granulate it in Australia. The result was a range of unique value-added ammonium phosphate fertilizers that were particularly suited to the Australian market. These fertilizers are marketed under the "Granulock" name.

Extra sulfur and zinc can be added to planting fertilizers in a variety of ways, including:

- Coatings of elemental sulfur or zinc oxide. Potential disadvantages are that abrasion during handling may dislodge some of the coating. Furthermore, soil bacteria must first convert elemental sulfur to the sulfate form before it is of use to plants. When applied at planting, this may not occur quickly enough to meet early plant demand, particularly during the winter months when soil temperatures are low.
- Blends with additives such as Gran-am (granulated ammonium sulfate) and zinc sulfate monohydrate. With trace elements such as zinc, which are applied at low rates, there may be insufficient point sources of zinc in crops planted at narrow row spacings, e.g. winter cereals at 18 cm. Not all seedlings may have access to the applied zinc.

Granulock technology overcame these limitations. Imported MAP is co-granulated with locally-sourced by-product crystalline sulfate of ammonia (to supply additional sulfur) and/or zinc oxide. The co-granulation of zinc with MAP was the first time this had been done in the world.

The resultant products provide sulfur in the immediately available sulfate form, and a more even distribution of zinc in the crop row than can be achieved with blends as there will be some zinc in each fertilizer granule.

Initially, Granulock products were manufactured in Australia. These days, to meet the increasing demand and to service those parts of the market remote from the manufacturing facilities at Brisbane and Newcastle, a number of like products are also imported and sold as part of the Granulock product range.

Incitec Pivot
Because the land is your life.

Point of Manufacture or Supply	Product	%N	%P	%S	%Cu	%Zn
Brisbane	Granulock ST-Z	10.5	19.5	2.2		2.5
Newcastle	Granulock 12Z	11.3	17.0	4.7		2.0
	Granulock 12Z Lite	11.4	17.6	4.6		1.0
	Granulock Copper	11.4	17.2	4.5	1.7	
	Granulock 12 (I)	8.0	18.0	7.0		
	Granulock 15	14.3	12.0	10.5		
Geelong & Adelaide	Granulock 10Z	11.5	21.5	3.5		1.25
	Granulock S-15	13.0	14.3	15.0		

Sulfur (S)

Sulfur is usually required in canola, and to a lesser extent in grain legume crops. Sulfur may also be required where reduced tillage is practiced. The reduced use of single superphosphate has also resulted in an increase in the area in which responses to sulfur can be expected.

Zinc (Zn)

The incidence of zinc deficiency in Australian agriculture has also increased in recent years. There are several reasons for this including:-

- In many areas, agriculture has expanded onto poorer (less fertile) classes of land.
- Yields have increased (improved varieties and cultural practices), increasing the demand on the soil for all nutrients, including zinc.
- Soil zinc concentrations have declined, as a result of crop and pasture removal (nutrient depletion).
- Soil pH has increased in some soils and districts. This has occurred as a result of the use of lime; irrigating with alkaline water; and cultivation, land levelling or erosion exposing or bringing more alkaline sub-soil to the surface in semi-arid regions. Plant-availability of zinc is reduced in alkaline (high pH) soils.
- Fallow management practices have changed, with greater use being made of herbicides for weed control. Bare fallows reduce soil VAM (Vesicular arbuscular mycorrhizae) populations. VAM is a beneficial fungi which infects most crop roots (canola is an exception). The mycelium (fungal threads) acts like fine root hairs, greatly increasing plant uptake of immobile nutrients such as phosphorus and zinc. VAM numbers will decline during bare fallows or if non-host crops are grown.
- Some pre-emergent herbicides also affect VAM and root growth and in turn uptake of zinc.
- Less zinc is applied as an impurity in phosphorus fertilizers, as a result of changes in the source of the phosphate rock from which these products are made.