

## PEAK PHOSPHORUS – WHAT IS IT ?

And why understanding this global challenge for agriculture is important



### THE DEFINITION AND CURRENT VIEW

Peak phosphorus is a defined concept. It is accepted and used globally to describe the point in time that maximum global phosphorus production is reached.

From this (future) point in time, access to phosphorus reserves will decline and become less available to many markets. This – not only because of its scarcity – but also because high production costs, limited geographical availability and extreme market competition will put this resource outside of the reach of many markets, particularly smaller developing marketplaces.

The predominant source of phosphorus comes in the form of phosphate rock. However, in the past guano deposits have been used. No other means, other than the mining of phosphorus, is currently available to the world because of its non-gaseous environmental cycle. According to some researchers, the earth's phosphorus reserves are expected to be completely depleted in 50–100 years. Others suggest that supplies will last for several hundreds of years. So, the question is not fully settled and researchers in different fields regularly publish different estimates of the life of the rock phosphate reserves. But it is a very real problem and worthy of serious consideration. Because, the ongoing availability of phosphorus is fundamental to food production and every effort must be made to protect its longevity and ready availability.



## THE REALITIES OF PHOSPHORUS

Commentators across the world have been discussing this issue for some time, and the following factors have been extracted from their considerations :

- **Without phosphorus we cannot produce food**

As an essential nutrient in fertilisers for food production, phosphorus has no substitute. Phosphorus is as essential as water, carbon and oxygen. Phosphorus ensures the world's agricultural soils remain fertile, that crop yields are high, and that farmer livelihoods are supported so that they remain competitive. It is an imperative for world food security.

- **Phosphate rock is finite and becoming increasingly scarce**

It is becoming increasingly uncertain whether the world's main source of phosphorus will be available and accessible in the future. As a commodity it is expensive and concentrated in only a few countries. Farmers all over the world need phosphorus, yet five countries between them control 85% of the world's remaining phosphorus rock reserves. Morocco, in the north-western region of Africa, controls three-quarters of the world's remaining high-quality phosphate. Other areas with significant reserves are China, Western Sahara, the United States of America and Jordan.

- **Efficiency and better management is urgently required**

Inefficient and mismanaged use of phosphorus is said to generate wastage of as much as 4/5ths along the production line from the phosphate rock mine – to the farm field – to the food chain – to the human body. Overuse and run-off pollutes rivers and oceans, causing toxic algal blooms that effect both clean water supply and marine food systems. It is considered that global action is urgently required before it is too late. The 2008 crisis of supply that followed the massive spike in prices at that time, affected farmers across the world – even in highly sophisticated agricultural economies like Australia. This experience, more than any, exposed the fragility of the world's food system and its dependence on phosphorus. This scarcity is likely to threaten the world's ability to produce food in the future if concerted action is not soon taken by policy makers, scientists, the agricultural industry, and the community at all levels.

- **Phosphorus cannot be commoditised**

Like oxygen or carbon, phosphorus is critical for growing crops. It can't be commoditised. Yet it appears that no public institution is taking responsibility for governing its long-term availability to protect this most vital of food security necessities. The issue, appears to have 'fallen through the cracks'. Effective and sustainable solutions all require multi-sector participation. It is hoped that cooperative partnerships can be forged between government, industry, fertiliser scientists and researchers, the agriculture and food processing industries, together with a wide range of nutrition, health, sanitation, environmental protection and sustainable systems experts so that sustainable solutions can be sought.



## QUESTIONS FOR THE PHOSPHORUS FUTURE

Food demand is on the rise globally, with no slowing down in sight. More demand for meat and dairy products within the Asia region, and especially in China and other rapidly growing economies, means more demand for fertilisers. Some of the key questions to be considered and answered are :

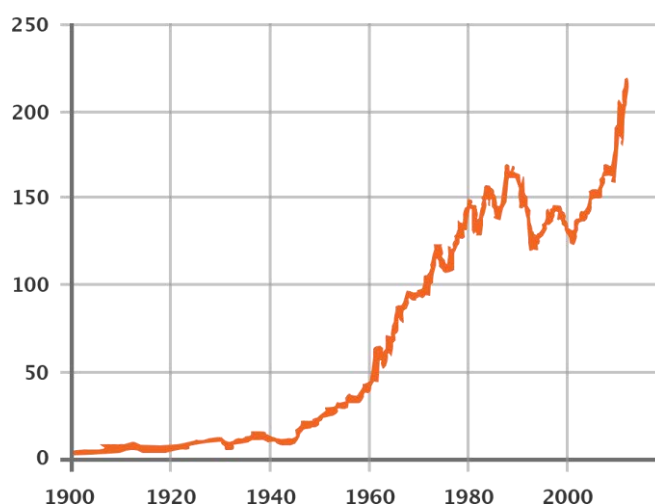
- We are told that our bodies only need around 0.4 kg of phosphorus each year, but to satisfy this need we are currently mining equivalent to 22.5 kg of phosphate rock for each person's diet. Is this sustainable ?
- Water and energy are now openly considered as critical for meeting the future food demands of a burgeoning global population. However, there is little acknowledgement of the role of phosphorus and its increasing scarcity as a key limiting factor in meeting this future food security goal. Yet without phosphorus, there simply would be no food. Is this position sustainable ?
- There is currently no single international body responsible for managing global phosphorus resources for the long-term, unlike the resources of oil, water and nitrogen. Is this position sustainable ?



## SUMMARY

Unlike oil - which is lost once it is used - phosphorus can be recovered and used over and over again if present in sufficient concentrations. Between the phosphate rock mine and the food in our stomachs, up to 80% of phosphorus is lost in the process from fertiliser production, application on fields, uptake by crops, food processing and retailing and final consumption. This tells us, that in addition to increasing efficiency in the entire process, we can look for opportunities to increase recovery of phosphorus in crop residues, food waste from supermarkets and household bins, manure, struvite (a phosphate mineral) and other sources such as bone meal, ash and algae.

This is an interesting and thought-provoking topic, and one that we should seek to understand better, and contribute to when an opportunity exists. The following graph shows world phosphate rock production between the years 1900 - 2012. This demonstrates very graphically how agricultural development and increasing food demand has utilised this resource.



Source : US Geological Survey

Currently, there are no clear answers. Although indications are that scientists within the agricultural industry are looking for more efficient and better ways of utilising phosphorus.

At RLF our own unique modern-farming Integrated Fertiliser Management (IFM) approach to fertilising supports this reality. **BSN Seed Primer**, which delivers phosphorus directly to the seed is a targeted and efficient product helping to set greater yield potential and greater root exploring capability from the very start of the plant's life. Further, reductions in granular phosphorus use are required in tandem with the seed priming process. This concept is well documented and worthy of consideration and can be found [here](#).



## FURTHER READING

For added reading about the issues raised in this article the following link explores in much greater detail the question of the future of phosphorus :

<http://phosphorusfutures.net/>

Trial results and client insights can be found at :

### IN52

#### NEW FERTILISER STRATEGY GIVES GREAT RESULTS Achieving long-term gain to a healthier all-round system with BSN-SS



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#### IFM RESULTS FROM 'BRITTAS' HARVEST Excellent Yield and Profit Details from RLF's Demonstration Site at Canowindra NSW Australia

### IN69

#### BEVERLEY LAND CONSERVATION DISTRICT COMMITTEE (LCDC) TRIAL A review of the 5-year randomised trial program of Field Crops



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