

## The importance of soil phosphorus fertility for nitrogen use by plants

By JEFFREY EVANS

In the previous issue of *AOJ* (Winter 2005, p36-37) I discussed the potential for using reactive phosphate rock to manage soil phosphorus fertility. I mentioned that phosphorus is an essential component of plant tissue – in cells it plays a vital role as a component of the genetic material and in the storage and transfer of cellular energy, each essential to the growth of plants, for both shoots and roots.

Importantly, plants with large root systems, as a result of receiving adequate phosphorus, use soil nitrogen more efficiently; and legumes with adequate phosphorus fix more nitrogen. In broad-acre organic agriculture nitrogen fixation is the most feasible strategy for maintaining soil nitrogen fertility.

Recent experimental data from organic farms shows how plant uptake of N increases as plant uptake of phosphorus increases. On these farms plant-available phosphorus in soil was modified with the use of reactive phosphate rock with and without blending with the element sulphur. The data includes cereals and grasses (indicating that more plant phosphorus has resulted in more soil nitrate being used by these plants) and legumes (indicating more plant phosphorus has resulted in more nitrogen fixation).

A comparison was made of the amount of nitrate nitrogen in soil on one of these organic farms three seasons after soil

treatment with either nil phosphorus, or a blend of reactive phosphate rock with elemental sulphur. Because the latter improves soil phosphorus fertility, it increased plant uptake of phosphorus each season, in turn increasing plant uptake of soil nitrate, with the result that there was less nitrate in the soil profile in the winter of 2004 when the measurements were taken. This is important environmentally – when plants remove nitrate from soil, not only does this increase production (ie, pasture and grain yields), it also decreases the risk of soil nitrate moving to and polluting water ways.

Care of soil phosphorus means better use of soil nitrogen, better capacity to restore soil nitrogen via legumes, reduced capacity for environmental pollution from nitrate and greater crop and livestock production.

Further articles will consider the role of composts, green manures and different plant species in enhancing soil phosphorus fertility and update on-going investigations with reactive phosphate rock fertiliser. ■

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### CORRECTION

The author apologies for an error in his article in *AOJ* Winter 2005. The reactive phosphate rock (RPR) had 4.2% of P soluble in 2% citric acid, ie, 29% citric acid soluble P.

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