

Phosphorus - energy for life

Q: What happens to photosynthesis when phosphorus is scarce or runs out?

A: Without phosphorus, photosynthesis won't happen. Most growers know that we need phosphorus to get things moving as plants start to grow. We think of it as an essential nutrient. But it may not be known everywhere that without available phosphorus there is no photosynthesis at all.

Plants capture carbon dioxide from the atmosphere and make carbohydrates, using light as their energy source. When they do this, phosphorus is an essential ingredient. Phosphorus is the element used to make the special energy transport compounds which store light energy. So when phosphorus is scarce, no matter how much sun there might be, the plant simply can't store the energy.

Similarly, when sugar is made by plants during photosynthesis, one piece of phosphorus is used for each unit of carbohydrate that is made. If there is no phosphorus available, plants can't make these sugars.

Unfortunately for plants growing in Australia, most of our soils have a strong attraction for phosphorus and most of what is added as nutrient is very quickly bound to soil particles as a result. When this happens, plants no longer have access to the phosphorus. So even after applying large amounts of phosphorus to the soil, plants can be starved for available phosphorus.

Even when times are good, plants don't make enough energy transport compounds to store the energy they need for growth. About 20% of the energy transport compounds plants need have to come "readymade" and "pre-fitted" with phosphorus from the soil. Plants rely on this supply of energised phosphorus compounds to complete their own photosynthesis. When it doesn't happen, they don't grow well.

The good news is that healthy soil contains microbes

which also photosynthesise. Where plants are unable to use phosphorus once it is bound to the soil particles, there are special microbes whose job it is to release the phosphorus and make it available in a soluble form.

There is a fascinating community effort which goes on below ground when soil is healthy which keeps phosphorus "in play" in a pool of phosphorus which plants and other microbes can use. Depending on the way in which soil is looked after, the community of organisms which keep phosphorus available either increases or diminishes. In most farmed soils these organisms are now much lower in population than they once were.

Keeping soil biology healthy is an integral part of making phosphorus available for plant growth. Plants can't source enough phosphorus or enough energy on their own. They need the community effort below the soil to manage both the supply of phosphorus needed to make sugars and the supply of the energy transport compounds (which contain phosphorus) needed to capture light energy. Soil communities including photosynthetic bacteria recycle phosphorus continually. These microbes outsource the manufacture of energised phosphorus compounds for plants. When they are happy, we need to add less phosphorus. When they aren't working, everything stops.

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Something of Interest

A Farmers Thoughts

It was the night of the 1st of June, all was quiet at Kalamia Mill. Growers waited with great anticipation for the switch to be flicked for the roaring turbines. Every year we nervously hold our thumb on the lighter, waiting to strike the burner for the first time. We watch as everyone moves into place... the contractor and his men fire up the water tractor and yell "Righto fellas! Let's go!"

The fuel hits the trash and explodes and it is only then you tell yourself quietly 'I should have put more diesel in this mix'. The fire begins to roar and you know at this point there is no turning back. The sound likens to a never ending thundering applause. As the fire grows and begins to draw the cool night air down the headland you feel a rising sense of prosperity and power just like a cave man discovering fire for the first time.

As the moisture quickly exits the leaves you hear the crack of the fire slowly creeping from stalk to stalk, the cane falling under its own weight as the trash is burnt. The sun has completely set however the night sky is as

bright as ever only lit by the flames of the fire which seem to reach the clouds above.

As quickly as it began, the fire is gone leaving nothing but a few sporadic crackles acting like the final notes of an orchestras finale.

The contractors drive away and leave you with the ghostly silence of the singed field.

What a wonderful way to end the day. You return to your ute listening to the haunting chant of the curlews.



Kalamia
Cane Growers

8