Photosynthesis, Oxidation & the Energy Equation

It is common for soils under standard production management, to have a low supply of energy.

This happens for two reasons, and they usually go hand in hand.

1. there isn’t enough energy, which is generated by plants, going into the system
2. the system is losing too much energy, through the oxidation of organic matter

This is a self-perpetuating issue because energy is needed for the biological activity in the soil environment that creates the conditions for, and supports healthy plant growth, and healthy plant growth is what provides the energy and organic material for this biological activity to happen.

Organic materials burn up faster in high oxygen environments and with exposure to heat.

This is more prone to happen in dry and hot conditions, but many standard production practices, i.e. tillage, application of salt fertilisers, removal of protective cover etc… also have a very oxidative effect.

Plants and their associated micro-organisms possess mechanisms and employ measures to counter and manage excess oxidation, but this uses energy that would otherwise go towards growth and activity.

On top of this, manganese and iron, which are needed for efficient plant photosynthesis, become plant unavailable in oxidised (and alkaline) conditions.

What’s apparent in this equation, be it from poor plant growth/photosynthesis or excess oxidation of organic matter, is that as energy supply drops, the capacity of a system becomes increasingly compromised and at a certain point, starts to go backwards.

This is how fertile ecosystems are turned into deserts.

So, what can be done to avoid or turn-around such situations?

The worse things are, the more we have to do.

Firstly, we need to find ways to minimise the use of practices that have an oxidising effect on the soil and/or damage soil life.

This involves moving towards conservation/minimal/no tillage, biologically considerate nutrition, pest, disease and weed management methods, keeping the soil covered to avoid exposure, etc…

Simultaneously we must implement strategies that provide soil microbes with more fuel to drive beneficial activity.

These include the growing of cover crops and interplanting companion species, increasing plant diversity, mulching with organic residue, composting, targeting nutritional applications to optimise photosynthesis, managing grazing to improve pasture growth, etc…

As energy supplies build, biological systems start to gather momentum and take on a life of their own, then all we need to do is keep steering them in the right direction.