

WHY ARE MYCORRHIZAS IMPORTANT FOR GRAPEVINES?

When I am out in the vineyards with clients I often discuss the importance and role of soil biological activity. Microorganisms in the soil are responsible for recycling of organic matter, help with nutrient uptake, protect the vine against some pathogens and help make nutrients available. They also reduce leaching of nutrients.

In more than one sense, soil biological activity plays an important role in the expression of Terroir in wines.

Of particular interest are a special group of fungi; the mycorrhizal fungi. They are beneficial fungi that live on the roots of vines. In return from some energy (carbohydrate) from the plant, they help the plant source phosphorus, zinc and other nutrients. They help with calcium uptake, and play a role in water supply to the vines. The presence of mycorrhizas (this is how we call this mutually beneficial relationship on the roots of plants) helps protect against nematodes and insect damage, and may even strengthen the vines own immune system.

At this point some of my clients would respond with a “so what? We want some water stress and fertility of the soil is high enough, we do not need mycorrhizas for that. As for nematodes and pathogen? Not a problem here”.

That is not the end of it though.

Trials (including some we did on different varieties and rootstocks in our research vineyard) show newly planted vines perform better when mycorrhizas are present. Vines with mycorrhiza also show reduced (iron) chlorosis on calcareous soils, although this may not be a major issue in most NZ vineyards.

Wait, there is more.

Mycorrhizas may well help produce better quality grapes. There are a number of ways this may be the case.

US research by Dr. Elaine Inghams indicates that (ecto)-mycorrhizal fungi have been associated with increase in grape quality, although the exact mechanism has not been determined.

A number of other overseas trials have found a positive correlation between mycorrhizal colonisation and chlorophyll leaf concentration ¹⁾.

Another study ²⁾ found increased photosynthetic rates and increased stomatal conductance for vines under water stress which were inoculated with mycorrhizal fungi, compared with vines that had no mycorrhizas.

“So what?” you might say. Well, this could have implication for quality.

Canopy management is a balancing act making sure on the one hand that vines have enough leaf surface to photosynthesize (collect energy to lift sugars in the fruit) while on the other hand we try to keep the canopy open to reduce shading.

As it appears in the trials that mycorrhizas may increase photosynthetic efficiency, it supports our canopy aims to ensure adequate photosynthesis while minimising shading (reduced vigour and removing leaves which reduces overall photosynthesis).

More work needs to be done to confirm these findings in NZ conditions. In the meantime, please remember that promoting mycorrhizal colonisation of vines is not a new fad that scientists have dreamed up. It is rather the other way round. Grapevines were “born” with mycorrhizas (links between plants and mycorrhizae go back to the start of plant evolution), it is our vineyard management that in many cases has had a negative impact on soil biological activity including mycorrhizal fungi.

- 1) Bavaresco L, Cantu L, Trevisan M 2000. Chlorosis occurrence, natural arbuscular mycorrhizal infection and stilbene concentration of ungrafted grapevine rootstocks growing on calcareous soil. *Journal of Plant Nutrition* 23 (11-12) 1685-1697
- 2) N Nikolaou et al. Effects of Arbuscular mycorrhizae on water relations and photosynthesis of Cabernet Sauvignon grapevine variety grafted onto some rootstocks, under water stress. *Symposium Grapevine Physiology and Biotechnology*, Heraklion, Greece