

Fungi for more efficient use of P fertiliser

P.G. Williams

Department of Agriculture, New South Wales,
Biological and Chemical Research Institute, Rydalmere

A vesicular-arbuscular (v-a) mycorrhiza is a specific fungal infection of a root which increases a plant's ability to take up P from the soil. The infections occur in all soils and in most species of crop and pasture plants. Research at Rydalmere supported by the Australian Meat Research Committee and the Wool Research Trust Fund is aimed at manipulating the fungi which cause v-a mycorrhizas to achieve greater efficiency in the use of P fertilisers.

Field and laboratory experiments have defined a previously unrecognised group of soil fungi which occur in close association with v-a fungi, and are termed companion fungi. The new fungi affect plant growth, apparently by altering the relationship of plants to v-a mycorrhizal fungi. The organisms can not yet be formally named but can be placed in an artificial grouping known as *Rhizoctonia repens*.

Methods

A field trial was set up in which three strains of companion fungi were compared for their effect on the growth of fertilised and unfertilised pasture. The experiment was established in 1978 on a sandy loam, pH 5.4, 3 ppm available P (Bray No.2) at Hartley, NSW. The fungi were inoculated into the centre 1 m² of plots 3 m² as a washed suspension of mycelia. Control plots received water or a suspension of killed mycelia. One set of plots was not fertilised, another set received one application of single superphosphate at 500 kg/ha. All plots were sown with a rye grass, white clover, sub clover mixture. The yield of dry matter was determined in late spring each year by a single cut from the centre 1 m².

Results and Discussion

The data show that in normal seasons superphosphate increased dry matter production at this site 5-6-fold to 3.5 t/ha. This yield increase was accompanied by a significant ($p < 0.05$) increase in the frequency of sown species. One strain of companion fungus, DAR29830, caused a 2-3-fold increase in yield and a change in botanical composition which mimicked the effect of superphosphate. There was no significant effect of fungal inoculation in plots which also received superphosphate.

The results suggest that inoculating soil with particular strains of companion fungi may be a useful method for reducing the need for superphosphate.

Treatment	Relative Yield ¹	
	No P	With P
Control ²	100	398
Strain 29830 ³	208	360
Strain 29832	148	359
Strain 39958	139	391

¹ Grand mean of 3 seasons relative to No P control

² Pooled values of water and killed fungus treatments

³ Accession number in Herbarium, Rydalmere