POSTER 9-9 /LIGHTNING TALK/

Carbon Utilisation by Strains of *Rhizobium* spp. in Sterile Soil

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In New Zealand, the bacterium *Rhizobium leguminosarum* bv. *trifolii* strain TA1 is used to commercially inoculate white clover seed. Recently, the need for inoculating white clover in New Zealand has been questioned. This is due to the inability of TA1 to deliver plant growth benefits because it cannot compete with high titres of naturalised rhizobia in the soil (1). However, naturalised strains have variable symbiotic potential compared with TA1 ranging from 0 – 170% (1). Effective naturalised strains adapted to New Zealand soils could be the key to improving commercial inoculants which are greater than 60 years old (2).

Rhizobium strains that show promise *in vitro*, often fail to perform in the field. A critical reason is lack of understanding of the interactions of the isolates within the soil environment (3). γ MicroResp™ is a novel modification of the 96-well based MicoResp™ system (4) which uses γ-irradiated soil. It allows the measurement of a microorganism's ability to utilize common C sources released in rhizosphere exudates within a physical soil background. This provides fundamental information on a strains free-living saprophytic ability.

For this study, 19 diverse rhizobia strains sourced from an international collection and 9 strains recovered from soils in Canterbury, New Zealand, were tested for their ability to utilise 14 carbon sources. The carbon sources were predominantly sugars and amino acids commonly found in the rhizosphere.

The international strains of rhizobia formed 9 distinct phenotypic groups (p<0.05) and the New Zealand strains formed four distinct phenotypic groups (p<0.05) based on differences in soil C-utilization. Variation in carbon utilization among the 19 international strains could not be attributed to geographic origin. In both the international and New Zealand collections, some groups of strains utilised a wider variety of carbon compounds to a greater degree compared with strains in other groups. The ability to use a broad range of C sources provides information about the ability of a strain to exist saprophytically in the rhizosphere (5). This knowledge will aid in improved selection and deployment of "environmentally fit" commercial inoculants.

References:

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[2] *Lindstrom et al. (2010) Res Microbiol. 161:453-463*
[3] *Berg (2009) Appl Microbiol Biotechnol. 84:11-18*
[4] *Campbell et al. (2003) Appl Environ Microbiol. 69:3593-3599*
[5] *Wielbo et al. (2007) Can J Microbiol. 53:957-967*