

Brassica green manure crops appear to improve soil properties

In field studies by **Hoong Pung, Susan Cross & Peter Aird** (Serve-Ag Research, Tasmania) biofumigant *Brassica* green manure crops could increase the marketable yield of a subsequent lettuce crop by reducing plant loss from *Sclerotinia minor* infection.

However, the brassicas did not reduce sclerotia viability (ie. the pathogen's inoculum level). It appears they are suppressing mycelial growth of the pathogen. As ITC levels diminish rapidly after incorporation into soil, effects for disease suppression are likely to be short term.

Other important benefits of green manures such as reduced soil crusting, improved infiltration, increased organic matter and the subsequent increase in beneficial microflora and microfauna are often overlooked.

Soil improvement following a *Brassica* may produce longer lasting effects on disease suppression and crop health, as well as soil 'health'. Field studies were conducted in an attempt to quantify these beneficial properties.

Soil penetration resistance is a measure of soil compaction, which increases over time with cultivation. Generally, at field capacity, growth of plant roots is not affected at <1000 kPa; while seedling emergence will be retarded and root growth restricted at 1000-2000 kPa; and root growth is impeded other than through cracks, channels and points of weakness at >2000 kPa.

Measurements were taken in each treatment (clay soil at field capacity) following harvest of the lettuces.

Generally, in the topsoil, penetration resistance was lower at 15-210 mm in ground previously sown with the brassicas, compared to fallow (Fig. 1), indicating that plants or residues (Table 1) reduce topsoil compaction. Different brassicas performed equally well. Poor drainage from soil compaction will create a favourable environment for *S. minor* lettuce drop disease.

In the subsoil (255-410 mm), crop residue incorporated by rotary hoe to about 200 mm is less likely to be important. How-

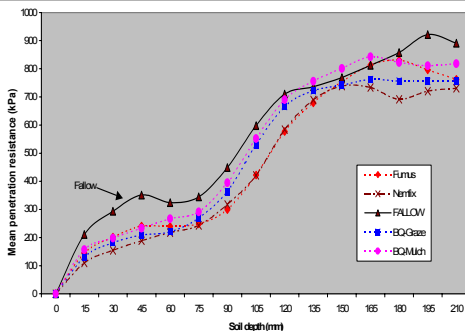


Fig. 1. Topsoil penetration resistance.

ever, *Brassica* taproots may assist in breaking up deep compacted soil. Reduced subsoil compaction was recorded following Nemfix, BQ-Graze and BQMulch, but not Fumus (Fig. 2). The difference may be related to their higher densities from better crop establishment (Table 1). The results indicate that optimum plant density and taproots combine to break up compacted subsoil.

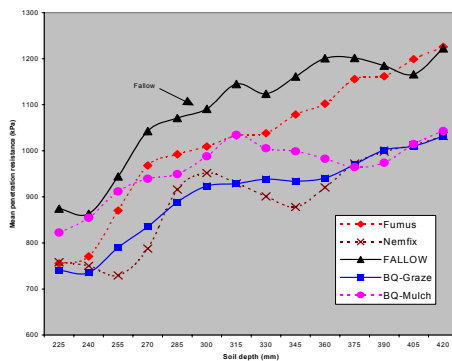


Fig. 2. Subsoil penetration resistance.

Table 1. *Brassica* plant density and biomass.

Treatment (10 Kg ha ⁻¹)	Plants m ⁻²	Dry matter Kg m ⁻²
BQMulch	186	1.28
BQ-Graze	238	1.50
Fumus	75	0.94
Nemfix	186	1.10

Lower soil compaction was also evident in a divided field with either BQMulch or ryegrass grown over winter, followed by potatoes in spring. After harvest, lower penetration resistance occurred in the area previously planted with BQMulch (Fig.

3). The blocks differed in past history, so other factors cannot be discounted.

In another example, compaction following two brassicas and pyrethrum in three adjacent blocks was compared. The perennial pyrethrum was terminated after three years, while the brassicas were sown in winter and rotary hoed in spring. Lower soil compaction was evident in the BQMulch and Fumus blocks, compared to pyrethrum (Fig. 4).

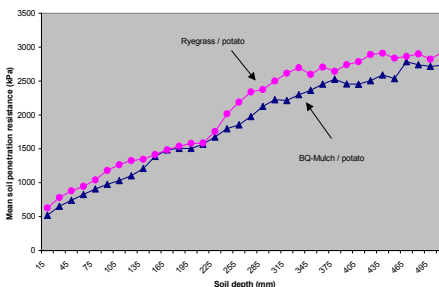


Fig. 3. Soil penetration resistance in a potato field following fodder rape or ryegrass.

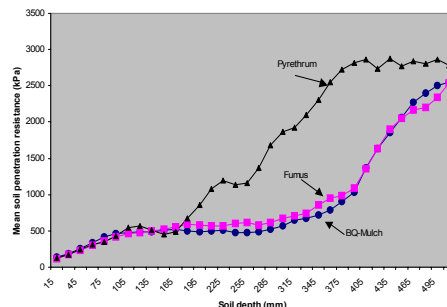


Fig. 4. Soil penetration resistance following brassicas and pyrethrum

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