

The effects of straw mulch on establishment of annual medics

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Surveys of farm paddocks have shown that high concentrations of cereal straw residues lead to low plant densities of self-regenerating annual medics (1). A series of pot experiments were undertaken to determine whether these effects of straw were due to phytotoxicity, physical impedance of medic emergence or enhanced pathogen activity.

Methods

Forty seeds of *Medicago truncatula* cv. Paraggio were sown into a Mallee, sandy loam soil in 110 mm diameter pots. Mulches were applied to the soil surface as either Galleon barley straw, which had been chaffed in a Wiley mill, or shredded polypropylene plastic with similar particle dimensions to the straw. Six rates of barley mulch were used (Table 1) and plastic mulch was applied at 200, 400 or 800 g/m². There were 4 replicates. All pots received equal quantities of rainwater after sowing.

In a second experiment, barley mulch was applied to pots at 400 g/m². Soil which was sterilized by dry heat (9 days at 80°C) was compared with a non-sterile soil. All medic seeds were surface-sterilized and sterilized water was used.

Results and discussion

Seedling establishment was significantly less when concentrations of barley chaff mulch exceeded 200 g/m² (Table 1) but the plastic mulch had no effect (mean establishment with the plastic mulch was 60%).

Table 1. Effects of straw mulches on the establishment of *Medicago* seedlings in pots.

Mulch concentration (g/m ²)	Establishment (Day 21) (%)
0	66
50	70
100	66
200	55
300	48
400	33
LSD (P=0.05)	17

In the second experiment, seedling establishment in the sterile soil treatment was 97% but in the untreated soil it was only 17%. These results suggest that pathogens are stimulated by the presence of large quantities of decaying organic matter on the soil surface and these microorganisms can be a major limitation to the successful establishment of medics under certain conditions of soil moisture and temperature. The emergence of seedlings was not impeded with straw rates up to 400 g/m², however, higher rates of straw should be investigated for possibly impedance effects. Any potential phytotoxins leached from the straw in the second experiment had no effect on seedling density.

1. Quigley, P.E. and Carter, E.D. (1985). Proc. 3rd Aust. Agron. Conf., Hobart, p. 205.
2. Quigley, P.E. and Carter E.D. (1989). Proc. XVI Int. Grassld Cong. (In press).