

## The value of a legume ley in crop rotations

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Since 1921 a long-term crop rotation experiment has been undertaken at Glen Innes, to demonstrate the value of incorporating legume leys in economic crop rotations. Agronomic results accumulated since 1921 indicate that a legume ley increases total grain yield and provides a greater period under grazing (Anon 1948, Mead and Blunt, 1964).

In order to determine the effect of the long-term use of the legume ley on the soil nitrogen status, soil samples (0-10 cm) were collected prior to the spring oats crop from areas receiving yearly crop sequences of Maize-Spring Oats (M-O) and Maize-Spring Oats + Red Clover-Red Clover (M-O-C). The N status of the soils was determined by wetting, with distilled water, 2-5 mm air-dried sieved samples to predetermined moisture potentials and incubating at 25°C for 30 days in loosely capped plastic containers. Water vapour loss was replaced by watering to weight. Following incubation, soil nitrate levels were determined using an Orion specific ion electrode. The study was a randomised complete factorial with 3 replicates. The results are shown in table 1.

**TABLE 1. Mean nitrate-N levels ( $\mu\text{g g}^{-1}$ ) in incubated soils.**

Crop rotation	Moisture potential (pF)					
	7.0	4.8	3.0	2.4	1.5	0.5
M-O	1.2 <sup>a</sup>	1.2 <sup>a</sup>	4.1 <sup>a</sup>	5.1 <sup>a</sup>	1.6 <sup>a</sup>	1.5 <sup>a</sup>
M-O-C	12.5 <sup>b</sup>	14.4 <sup>b</sup>	26.9 <sup>c</sup>	142.0 <sup>d</sup>	21.0 <sup>bc</sup>	21.3 <sup>bc</sup>

Means with different letters differ significantly ( $P < 0.01$ ).

For both soils, maximum N mineralisation occurred at a moisture potential of  $\text{pF} = 2.4$ . In contrast to soil from M-O, soil from M-O-C had significantly higher levels of nitrate-N for all moisture potentials ( $P < 0.01$ ), and mineralised nitrogen at a higher rate in the moisture regime  $\text{pF} 2.4-3.0$ .

The maize-spring oats rotation typifies exploitive farming. Although there is a fallow period of eight months preceding the maize crop in this rotation, the results show that the soils are unable to mineralise nitrogen. By contrast, the rotation incorporating the legume phase (M-O-C) not only has a shorter fallow but also has a significantly higher soil nitrogen status. The results demonstrate that the long-term use of legume leys have a substantial affect on the ability of a soil to supply nitrogen for coarse grain and cereal crop production.

Anon. (1948). N.S.W. Agric. Gazette. 59: 339.

Mead, K.D. and Blunt, R.W. (1964). N.S.W. Agric. Gazette. 75: 871.