Grass pasture leys benefit peanut production in Southern Queensland

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The Krasnozem and Euchrozem soils of the Burnett have proved well suited to peanut production due to their friable, free–draining nature. Intensive land preparation has been associated with regular peanut cropping (2) and although reduced tillage has become more accepted, total vehicle passages remain high (1). Also economic pressure has tended to increase the frequency of the high–return peanut crops in the rotation. There is now a common perception of declining soil fertility on Burnett soils, associated with chemical, biological and physical factors (3,4). Grass pasture leys of varying duration are used to rejuvenate old cultivation on some farms. This paper reports preliminary results of a long term study investigating the effects of grass leys versus continuous cropping on peanut production near Murgon.

Methods

Paired sites, each of 0.5 ha, were established on adjoining plots of a Euchrozem soil. The continuously cultivated (CC) area had been cropped annually to rotations of peanuts and maize or forage sorghum for the previous 20 years, while the grass ley (GL) area had been cropped for 12 years, followed by grazed Panicum maximum pasture for 8 years. Land was prepared, fertilized and planted by the farmer.

Four replicates of two cultivars, with or without irrigation, were established on each paddock. Regular destructive samples were taken during the season. Moisture extraction was measured using a neutron moisture meter and yields were recorded at maturity.

Results and discussion

Both destructive samples (data not shown) and final pod yields (Table 1) show significant effects of treatment.

Table 1. Effects of paddock history, cultivar and irrigation on peanut yield.

Cultivar	Maturity class	Irrigation status	Pod yield (kg/ha) Grass ley	Pod yield (kg/ha) Continuous crop
McCubbin	Short	Irrigated	4237	3052
	(110-120 d)	Rainfed	2348	1563
Early Bunch	Medium	Irrigated	4811	3831
	(120-140 d)	Rainfed	1818	2253
		LSD (P<0.05) = 324		

Supplementary irrigation (180 mm in total) significantly increased yields on both paddock histories for both cultivars. Early Bunch outyielded McCubbin in all except the rainfed GL area. Yields were significantly reduced by CC versus GL rotations in all except rainfed Early Bunch where increased dry matter (DM) production during the early part of the season, combined with • prolonged dry period during pod filling, produced terminal drought stress and lower yields. Reduced yields in the CC area were due to a combination of soil compaction and reduced plant available moisture. A significant hard pan existed in the 10-20 cm zone of the CC profile (bulk density - 1.53 g cc-1 versus 1.34 g cc^{-1}), while lower organic carbon levels (0.9Z versus 1.62) caused reduced aggregate stability, poorer rainfall infiltration and lower levels of stored moisture.

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