Irrigated crop rotations on beds in the Murrumbidgee Valley 1. wheat growth and yield

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Irrigation farmers in southern N.S.W. are facing increasing economic pressures from declining grain prices and rising costs of inputs. It has become clear that farmers will have to look to alternative crops and/or systems which will maximise productivity and increase efficiency of inputs. A rotation experiment at Leeton Field Station was commenced in 1984 to study crop and residue management techniques.

Methods

The 8 treatments ranged from a single wheat crop every 2 years to wheat/ summer crop/wheat in a double cropping system. Sunflower, soybean, maize and millet were the the summer crops. A wheat/winter crop/wheat rotation used wheat, rapeseed or lupins as the winter crop. Treatments were split for plus and minus stubble and all crops were grown on 1.5m raised beds. Direct drilling and post emergent herbicides were used for double cropping, while winter crops in summer fallow were sown into cultivated beds. On the summer fallow plots stubble was either burnt or incorporated. Summer crop stubble was either removed or slashed and left on the soil surface. Nitrogen fertilizer rates for wheat were 60kg N/ha for the 1984 crop and 83kg/ha for 1985. A further 50kg N/ha was applied to the double cropped wheat in 1985.

Results and discussion

The first wheat crop (sown June 4) yielded 4t/ha of grain and 5.5t/ha of straw. In 1985 the wheat following summer fallow was sown on May 13 and following summer crops on May 27. Establishment of all treatments was satisfactory (170 plants/m^2) but early growth where the summer crop stubble was retained was slow and plants were slightly chlorotic. Measurements indicated that part of the reason for this reduced early growth could have been due to lower maximum soil temperatures. For example, the difference in maximum soil surface temperature between plus and minus maize stubble was up to 2.5?C.

Table 1. Grain yields of wheat (t/ha) sown into difference crop residues on fallow.

Stubble Treatment	Crop residue					
	Sunflower	Soybean	Millet	Maize	Fallow	Mean
Burnt	5.3	6.0	5.5	5.2	5.4	5.5
Retained	4.7	5.3	5.0	4.1	5.3	4.9
Mean	5.0	5.6	5.3	4.7	5.4	
LSD P = 0.05	Between crops 0.5t/ha, between stubble treatments 0.3t/ha					

Wheat yields were highest when soybean stubble was removed and lowest where maize stubble was retained on the surface. Yields were significantly depressed wherever stubble was retained on the surface. Generally wheat yields from the double crop treatments where stubble was burnt compared well with the summer fallow.

After harvest of a second summer crop wheat was sown into all plots. A range of nitrogen rates has been applied with the aim of determining the fertility levels under the various rotations.