

## COMPARATIVE WATER USE OF CROP ROTATIONS ON A SANDPLAIN SOIL.

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A large area of the eastern wheatbelt of Western Australia consists of sandplain soils. Water movement below plant roots on these soils has implications for groundwater recharge and secondary salinity. Some of the better soils are able to be profitably cropped. A lupin / wheat rotation is often recommended. Canola has become new crop in the eastern wheatbelt with the release of new short season varieties. Canola has a long tap root similar to lupins which may allow it to extract water from a greater depth than more shallow rooted species as wheat.

### MATERIALS AND METHODS

A rotation trial located on a yellow sandplain soil at Merredin was used. In 1993 this trial was cropped to 2 rotation systems. In 1994 a further two rotations were added. Soil water content to a depth of 270 cm was measured during the growing season using a neutron moisture meter. Water use during the season was calculated from differences in stored soil moisture plus rainfall between sampling dates. Drainage and run-off were ignored in these estimates.

### RESULTS AND DISCUSSION

Growing season rainfall was 278 mm in 1993, while 1994 had only 157 mm. Summer and autumn rainfall in both years was small with the break of each season being well defined. November 1993 was very wet. This rain was too late for crop use in that year. Residual moisture from this rain did carry over into the 1994 season. This was stored between 150-230 cm and estimated to be about 10-12 mm.

Crop water use was much higher for the lupin following wheat than for the continuous wheat rotation in both years (Table 1). Canola following lupin had much higher crop water use than the wheat following lupin rotation in 1994. However, crop water use was very much less for the canola than that for the lupins.

Table 1. Growing season water use (mm) and depth of water extraction (brackets - cm) of the crop rotations on a sandplain soil.

Rotation	Year	
	1993	1994
Lupin after wheat	275 (210)*	183 (210)
Continuous wheat	223 (110)*	153 (170)
Wheat after lupin	-	131 (150)
Canola after lupin	-	155 (230)
Isd ( $p=0.05$ ). Water use.	10	14

\* Estimate as there was movement of water below the root zone.

The reason for this is that the lupin crop of 1993 had extracted water to a greater extent from the soil leaving little residual water to be carried over for the 1994 season crops. Whereas the wheat in 1993, on which the lupins followed, had left some residual water in the soil for the lupins of 1994 to exploit. The same could be said of the continuous wheat rotation. Even though the soil is a deep sand there is some ability to retain unused moisture from one year to the next.