Water use by weeds growing in stubbles

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Farmers in south eastern Australia plant two or more consecutive cereal crops in the same area. The normal practice is to harvest the first crop in December, burn its stubble in the period between March and April, cultivate the soil, then sow the next crop in May. This sequence is repeated for a number of years before the land is returned to pasture. Farmers are prevented from burning the stubble before March and weeds that grow in the stubble are grazed by sheep before this time. There is local interest in the effect that the control of weeds, during the stubble phase, may have on the quantity of soil water available to the subsequent crop.

Materials and Methods

This experiment was conducted on a red duplex soil at Glenloth in north central Victoria. Volumetric soil water content (v/v) was determined on four occasions in the period 26 November 1980 to 15 May 1981 using a neutron moisture meter that had been calibrated on site. A cereal crop had been grown in this area in 1980. Six aluminium access tubes had previously been installed to a depth of 1.65 m and readings were taken on 0.25 m increments from 0.25 m to 1.50 m. The mean of readings from the six access tubes were used to determine soil water content at each level. Precautions were taken to minimise disturbance to both the soil and plants immediately surrounding the access tubes. Following the reading on 15 May 1981 all dry matter, apart from stubble, was harvested from an area within a radius of 0.5 m of each access tube. Dry matter production was determined by drying and weighing all of the harvested material.

Results and Discussion

There was a gradual but continual reduction in the water content of the soil in the period from the harvest of the crop (26 November 1980) until the time for burning of the cereal crop (15 May 1981) as shown in Table 1. During this period 88 mm of water was extracted from the soil, 64 mm of rainfall was received and dry matter equivalent to 338 kg ha⁻¹, was produced. The dry matter consisted solely of hogweed (Poligonum <u>aviculare L.</u>) which in this case had a water use efficiency of 2.2kg ha^{-mm⁻¹}.

Soil	layer (m)	26 Nov 80	2 Mar 81	15 Apr 81	15 May 81	Change Nov 80 to May 81
0	- 0.68	0.315	0.275	0,269	0.255	0.060 (41)
0.68	- 1,68	0.328	0.299	0.294	0.281	0.047 (47)

Table 1 Changes in soil water content (v/v) with time

^dWater content change (mm) in each soil layer is presented in parenthesis.

An interest in weed control in stubble arises from changes in both economics and technology. Cereals are presently more profitable than sheep products and farmers are looking for ways to increase cereal production even if it means reduced grazing. It appears that hogweed has a low water use efficiency and farmers are likely to be able to make more profitable use of soil water if it can be used by cereals. Recent developments in both herbicides and trash retention tillage machinery means that it is possible to control weeds that grow on fallow in the period before fire restrictions are lifted. This may provide a means for increasing the quantity of water stored in the soil for its later use by stubble-sown crops.