

The effect of stubble residues on the germination and early growth of wheat

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Current development of reduced tillage/stubble retention systems, combined with the use of an increasing range of grain legumes, has renewed interest in the problems associated with stubble residues in relation to the growth of subsequent crops.

Australian data (1) indicate the effects of some legumes on the growth of wheat seedlings and suggest that legume residues may cause greater problems than residues of cereals or grasses. In America, grain legume crop residues produced greater levels of toxins than the cereals wheat and barley (2). Toxic effects were found after light rain in the field but, following heavy rain, effects on plants receiving chemicals from the residues tended to be stimulatory. These data suggest concentration effects, as noted by Lovett (3).

A preliminary experiment was established to examine the influence of crop residues of oilseed rape, field pea, lupin, grain sorghum and wheat, as part of a major programme to examine the influence of crop residues on wheat germination, growth, development and yield.

Methods

The residues (complete aerial parts, threshed to remove seed) were collected from field plots of mature crops and were applied to plots 1.5m x 5m in area and recently sown to wheat (cv. Songlen) at the rate of 90 kg/ha. All residues were applied at a rate equivalent to 3 t/ha.

Germination counts were made 18 days after sowing and whole plant samples were removed for root and shoot measurements 4 days later (Table 1).

Results and Discussion

Table 1. Crop residue effects on germination and early growth of wheat.

Residue Treatments	Plant emerged m/row	Length of longest seminal root - mm	Coleoptile length - mm
No. Residue	28	81.7	85.9
3 t/ha Rape	18	67.7	82.0
3 t/ha Pea	6	62.7	79.3
3 t/ha Lupin	20	76.5	82.3
3 t/ha Sorghum	9	69.6	81.5
3 t/ha Wheat	11	69.8	78.2
L.S.D. (P = < 0.05)	11	N.S.	N.S.

These preliminary findings support earlier work suggesting that the residues of peas, sorghum and wheat can depress germination and early growth in field situations. Further measurements will be made on this experiment to determine the effects of residues on weed populations and final grain yield.

1. Kimber, R.W.L. (1973). Plant and Soil 38: 347.

2. Cochran, V.L., Elliot, L.F. and Papendick, R.I. (1977). J. Soil Sci. Soc. Am. 21: 904.

3. Lovett, J.V. (1982). Proc. 33rd Nottingham Easter School in Agric. Science, Butterworths, London (in press).

