

Comparison of effects of direct drilling and ploughing on cereal production in the United Kingdom

A.J. Rixon

School of Engineering, D.D.I.A.E. Toowoomba. Q.4350.

The development of effective herbicides has stimulated a critical evaluation of tillage procedures in the United Kingdom. The major potential advantage of direct drilling in a climate with a high frequency of rain is timeliness in sowing crops; other advantages are reduced labour and machinery costs. Appropriate machinery for direct drilling is however not currently plentiful and fuel costs for farming are much less critical in the U.K. than in Australia.

In a series of field experiments barley was sown in March in a freely draining sandy loam overlying sandy clay loam and was harvested in August (Elliot et al 1977; Ellis et al 1977), and winter wheat was sown in September in a surface water gley and harvested in August (Cannel & Ellis 1976).

The two most important cultural treatments were:

Direct Drilling (DD) consisting of direct drilling the seed (with a triple disc) and covering it by light harrowing.

Mouldboard plough (P) with a conventional mouldboard plough set to work at 20-25 cm depth, followed by secondary cultivations to produce seedbeds using standard commercial tractors and cultivation equipment.

Ploughing resulted in better shoot growth early in the season, more straw and more dicotyledonous weeds in the barley crops but the number of plants at full crop emergence did not differ between cultivation treatments. After direct drilling the bulk density of the 0-5cm horizon and the earthworm population were greater than after ploughing (Ellis et al 1977). Mean grain yields over the five barley crops did not differ significantly between cultivation treatments (Elliot et al 1977).

In the wheat crops more roots were found in the surface 10cm after direct drilling where, owing to soil disturbance, the concentration of nutrients was higher than after ploughing (Cannel & Ellis 1976). By the late Spring, a greater number of roots had penetrated below 40cm on the direct drilled plots than on the ploughed plots. The rapid growth of roots at depth in the ploughed soil however, reduced or eliminated this difference later in the season (Ellis & Barnes 1976). Despite these variations in the distribution of nutrients and roots in the soil, the amounts of nutrients in the above ground plant material were very similar.

Grain yields for the first wheat crop averaged about 5 tonnes per ha. and were about 10% higher after direct drilling than after ploughing (Ellis et al 1976).

Compared with ploughing, direct drilling resulted in greater soil compaction and differences in distribution of nutrients and root growth patterns. Whereas these factors were not of sufficient consequence to effect grain yields of spring barley there were indications that winter wheat was effected.

Cannel. R.Q. and Ellis, F.B. (1976) Letcombe Laboratory Annual Report.

Ellis. F.B. and Barnes, B.T, (1976) Letcombe Laboratory Annual Report.

Ellis, F.B., Christian, D.C., Graham, J.P. and Jackson, R. (1976) Ibid.

Elliot. J.G., Ellis, F.B. and Pollard, F. (1977) J. Agric. Sci. Camb. 89:631.

Ellis. F.B. Elliot J.G., Barnes, B.T. and Howse K.R. (1977) J.Agric.Sci. Gamb. 89:631.

