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A STUDY OF TILLAGE MECHANISMS IN RELATION TO SOIL  
PROPERTIES AND CROP GROWTH.

A thesis presented in partial fulfillment of the requirements  
for the degree of Master of Agricultural Science in Agricultural  
Mechanisation at Massey University.

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1975

### ABSTRACT

Three tillage systems were compared over the 1973-74 spring-summer season on two trial sites. One trial site was tilled and left to fallow over the winter, while the other was left in pasture. The three tillage systems studied were:-

1. traditional plough/disc/narrow
2. direct-drilling or chemical tillage
3. rotary-cultivation.

There were no significant differences between treatments in the subsequent establishment and yield of dry matter of a crop of chou moellier on the trial site which had been left to fallow.

On the non-fallowed site, direct-drilling resulted in a significantly lower number of plants compared to the other tillage treatments. Despite this, dry matter yields were highest on the direct-drilled plots and lowest in the rotavated treatment.

Soil which had been direct-drilled remained the most stable as determined by wet-sieving of soil samples. Soil stability under the rotavated treatment appeared to decrease to a greater extent than under ploughing as the length of time out of pasture increased. Dry-sieving of samples showed the same effect. The rotary cultivation treatment resulted in the greatest proportion of soil in the smaller aggregate size fraction (less than diameter 1.676mm).

Differences between tillage treatments were also observed in soil resistance as measured by a penetrometer, and resistance to wheel compaction between the non-tilled and the two mechanically tilled treatments. In general the ploughed and rotary-cultivated soil required a lower penetrometer force than the undisturbed direct-drilled profile. On the tracked areas, increase in penetrating force of the two mechanically tilled plots was on average

12 times the increase on the direct-drilled plots.

It is probable that soil moisture levels were not affected by cultivation treatment. Differences which occurred, particularly in the non-fallowed trial, were thought to have been an effect of differences in plant density—soil water loss increasing with plant density.

Data from the two trials showed that total fuel consumption for direct-drilled and rotary cultivated treatments to be 9.7 and 1.9 times respectively, less than the traditional ploughing treatment. This did not include the fuel requirements of weed control, which varied between treatments.

### ACKNOWLEDGEMENTS

Throughout the whole of this work Mr C.J. Baker and Mr D.G. Bowler of the Agronomy and Soil Department at Massey University gave considerable amounts of their time to offer constructive advice and criticism. Their contributions are much appreciated. I also wish to thank Mr R. Simms of the Agronomy Department for his interest and suggestions.

Various members of the Agronomy Department's technical staff also showed considerable interest in this project and often gave valuable practical help. Their contribution is also much appreciated, especially that of Mr M. Badger.

I wish to thank various other persons who offered suggestions and in some cases gave practical help, and my parents who did the typing and binding of this thesis.

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