Controlled Traffic in Lucerne Hay Production

T.J. Neale[1] and J.N. Tullberg[2]

[1]Department of Primary Industries, Miles, Qld 4415; [2]Farm Mechanisation Centre, University of Queensland, Gatton College, Lawes 4343

1. INTRODUCTION

Separate cutting, raking and baling operation required in lucerne hay production involve 3-5 tractor based operations. In each operation heavily laden wheels cover approximately 20% of implement width, so a large proportion of crop area, (approximately 50-70%), is wheeled at each harvest, if traffic is random. Douglas, (1994), has reviewed the work of a number of authors who have demonstrated direct, (plant), and indirect, (soil), damage by wheels in lucerne production. Crop and soil damage can be reduced by controlled traffic, where all heavy wheels are restricted to laneways. This has been shown to improve lucerne hay yields, (eg. Sheesley, 1974). This paper describes a controlled traffic hay harvesting system based on conventional haymaking machinery with minor modifications, and sets out production data from the first three harvests of a lucerne crop.

2. METHODS

The experiment was set out in a 1.6ha paddock of medium self-mulching alluvial soil. Seedbed preparation started with deep tillage to 0.5m under dry conditions. The area was planted to 'Sequel' lucerne using conventional seedbed/planting equipment at right angles to the proposed controlled traffic laneways and divided longitudinally into approximately equal areas of controlled and random traffic, (or Grower simulated).

In this trial, the implement operating width was 2.5m, and the tractor/baler/bale wagon wheeltrack width was 1.9m, with one mower conditioner wheel not tracking a tractor wheel. Using an in-line baler, the only equipment modifications were drawbar off-set adjustments and a swath deflector plate for the mower-conditioner.

The controlled traffic lanes were marked out by driving the harvesting pattern in soft soil after planting and irrigation to produce clearly visible, depressed laneways. With the tractor on 0.35m, (14.9in), section tyres, these laneways occupied 28% of field area within the controlled traffic treatment area. The 'total traffic' treatment, produced by four adjacent tractor passes, was superimposed on both controlled and random traffic areas to provide four treatments.

3. RESULTS

Dry matter yield was determined using an implement-width quadrat which allowed separate assessment for different zones within the controlled traffic plots. Results for the first three harvests are illustrated in Figure 1 and 2, as the overall mean yield for each treatment, and the means of traffic lane and non-wheeled area within controlled traffic plots. There were no yield differences at the first harvest between treatments, but some had developed by the second. Yield differences between controlled traffic and all other treatments was significant, ($P<0.05$), by the third harvest. Similar significant differences were noted in plant height, and there were corresponding, but non-significant differences in crown density.

4. CONCLUSIONS

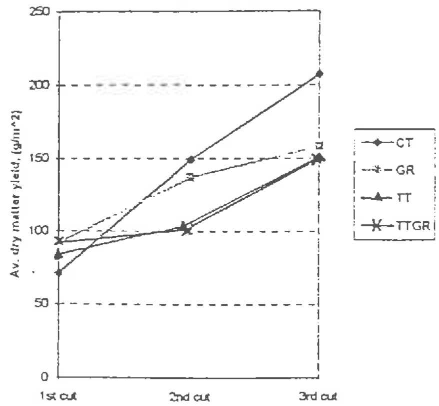
Results of this preliminary experiment confirm that controlled traffic can increase lucerne hay yields, but further work is needed to establish long-term yield effects, and investigate other important production parameters such as stand life and irrigation efficiency. Controlled traffic can be achieved using the conventional hay-making machinery available on many farms. Some inconvenience was associated with the controlled traffic operation, but initial purchase of equipment with compatible working and wheeltrack widths would minimise this problem.

5. REFERENCES

Douglas, J.T.,(1994); Response of Perennial crops...., in Soane, B., and VanOuwerkerk, C.,(eds) - "Soil Compaction in Crop Production", Elsevier Science, BV pp343-364

Sheesley, R.,(1978); "Can controlled traffic boost alfalfa yields?" - Agricultural Engineering. 59(8):20-22

AV. DRY MATTER YIELD OVER THREE CONSEQUTIVE CUTS FOR EACH TREATMENT



TREATMENTS

CT	controlled traffic
GR	grower simulated
TT	total traffic
TTGR	total traffic/grower combination

% IMPROVEMENT IN YIELD FROM CUT 1 TO CUT 3 FOR EACH TREATMENT