6.4 Enhancing Stubble Breakdown – Nile Tasmania

Location: "Winburn", Nile, Tasmania

Funding Organization: National Landcare Program

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Rainfall (Mar-Oct): 224 mm

Summary:
Five different stubble additives were applied to standing stubble: commercial digestor with and without microbes, a Uni of Tas experimental brew with and without a sticker and ammonium thiosulphate. While there was a significant increase in fungal colonisation for some of the treatments there was no significant difference in the amount of stubble dry matter after 6 months i.e. the rate of stubble breakdown was comparable between all treatments. Differences in digestibility and fibre will be further evaluated.

Background:
Excess stubble is a major problem when sowing. Apart from burning and mechanical breakdown there are other potential means of reducing stubble.

In an Honours project at the Uni of Tas in 2005 over 20 fungal species capable of utilising cellulose were isolated from wheat, poppy and lupin crops. These isolates were screened for relative cellulose and lignin degrading activities, and relative growth on ground stubble under optimal conditions to select those having the most vigorous degrading activities. In glasshouse trials however addition of microbial inocula to stubble was relatively ineffective in accelerating the decay, except during the initial stages of poppy stubble decay (7 weeks).

In contrast addition of nutrients (nitrogen and phosphorus) to poppy and wheat stubble had a significant beneficial effect on their decay. A field trial was set up to examine these effects further in a commercial situation.

The aim of this investigation is to develop a means of enhancing stubble breakdown using nutrient and microbial supplements prior to planting of the next crop.

Method:
There were six stubble breakdown treatments:

1. Nil
2. Ammonium thiosulphate (ATS)
3. NTS fertiliser additive (Commercial stubble digestor with no microbes)
4. NTS fertiliser additive + microbes (Commercial stubble digestor including microbes)
5. UTas fertiliser additive
6. UTas fertiliser additive + sticker (to assist additives to bind onto the straw)

The trial was conducted in standing wheat stubble, the paddock having been harvested in Jan 2006. Plots were 20m long x 2m with 4 replicates.

All treatments were applied in March 2006 and additional applications of treatments 5 and 6 were sprayed in early June. Treatments were applied using a knapsac sprayer operated at approximately 250kPa pressure with a walking speed of close to 1m/sec. The recommendation for the commercial additive is to incorporate the stubble but it would be difficult to measure the comparative rate of breakdown once it is buried and so the stubble was left standing.

Dry matter cuts were taken from each plot in October 2006 prior to the paddock being sown with peas. The late cutting date was used to maximize the duration of breakdown and increase any differences between treatments. Stubble was weighed and scored for saprophytic fungal growth before subsamples were dried in an oven at 60^{o}C for 48 hrs. Samples from treatments were pooled and sent to Feed Test, Hamilton for fibre, digestibility, lignin and crude protein analysis.

Results and Discussion:
Saprophytic fungal growth was significantly higher on ATS and one UTas treatment compared with the untreated plots. The other additives also tended to show greater fungal growth compared with no treatment (Table 1). Despite this there were no significant differences in the amount of stubble dry matter remaining i.e. the rate of stubble breakdown was comparable between all treatments. There was also no correlation between fungal score and remaining dry matter.

Table 1. Effect of different stubble additives on saprophytic fungal growth and breakdown of stubble (t/ha), Nile 2006.

Treatment	Fungal growth score 0(none) - 3(high)	Stubble dry matter (t/ha)
Nil	1.25	2.48
Ammonium thiosulphate	2.75	2.46
NTS fertiliser additive	2.00	2.61
NTS fertiliser additive + microbes	1.50	2.22
UTas fertiliser additive	2.25	2.57
UTas fertiliser additive + sticker	1.75	2.18
F prob (0.05)	0.018	ns
l.s.d. (0.05)	0.826	0.598
cv%	28.6	16.4

Even with no weight differences there may be structural changes to the stubble which will increase the digestibility to animals and/or decrease stubble strength so that it breaks more readily upon contact with a cultivating/planting tyne or disc. Only pooled samples from each treatment were analysed by FeedTest but the two NTS treatments were slightly lower for neutral detergent fibre than other treatments (data not presented). The NTS additive + microbes treated stubble was also lower for digestibility but none of this data is replicated and should be treated with caution. Further tests will be conducted to determine whether these are consistent effects. At the time of writing the lignin analysis from FeedTest still had not arrived.

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