4.7 Other Cropping Trials

4.7.1 Use Of Gibberellic Acid To Increase Dry Matter Production Of Dual Purpose Wheat (And Pasture) - Cressy, Tas

Location: "The Glen", Cressy, Tasmania

Author: Geoff Dean

Researchers:
Geoff Dean, Brett Davey, SFS/TIAR
Simon Munford, DPIW

Acknowledgments: Will, Tom and Mike Green

Growing season rainfall (Mar-Nov):
391mm plus 75mm irrigation

Summary of Findings:

The effect of application of gibberellic acid (ProGibb) on dry matter production and subsequent grain yield of dual purpose wheat was investigated. There were large and significant increases in DM production when Pro-Gibb was applied. A high rate (40g/ha) resulted in a more rapid increase in DM but by the 4th week all ProGibb treatments had produced significantly higher DM than the nil treatment. Average dry matter increases were around 30%, i.e. from 1.26tDM/ha to an average of 1.64t/ha. In contrast seven weeks after application the nil treatment produced significantly more DM than the ProGibb treatments i.e. ProGibb treated plants appeared to suffer a payback from the extra growth. Importantly this effect was not carried through to grain harvest with no significant differences between treatments being measured.

Background:

The use of gibberellic acid, ProGibb, to boost pasture production over winter has recently received considerable attention. There have been no scientific reports of Pro-Gibb being used to increase dry matter production in dual purpose cereals and a trial was conducted to assess the performance of ProGibb applied to grazing wheat. Of particular interest was the potential effect on subsequent recovery and grain yield.

The aims of this trial were to quantify the effects of ProGibb on dry matter production of dual purpose wheat and to assess the effects on subsequent plant recovery and wheat grain yield.

Treatments and Method:

ProGibb was applied at recommended rates and twice the recommended rate (40g/ha). Two treatments received a foliar nutrient spray (Balance Foliar) consisting of NPK 9-4-6 plus copper and zinc to assess the response to improved plant nutrition.

1.	ProGibb	10g/ha
2.	ProGibb	20g/ha
3.	ProGibb	40g/ha
4.	ProGibb	20g/ha + foliar spray
5.	Nil	
6.	Nil	+ foliar spray

Treatments were applied on July 20th while the crop was still tillering to a commercial crop of Tennant wheat sown at 90 kg/ha on 10th April with 200kg/ha of 14:16:11. Plant dry matter at the time of treatment application was 0.48 t/ha.

Dry matter (DM) cuts (3 x 0.25M quadrats) were taken at weekly intervals until mid August. Due to time constraints not all treatments were cut each week. All plots were mowed on August 17th (after cut 4) to simulate crash grazing. Subsequent DM measurements were delayed as cattle broke into the trial area (actual crash grazing!) and not surprisingly ate some of the fresh wheat on offer. To ensure uniformity, plots were re-mown. A further DM cut was taken 15 days later on September 18th.

Plots were 10m x 2m and there were four replicates in a randomised complete block design. The grain was harvested on 23rd Jan 2008.

Results and discussion:

Growth and dry matter:

There were large and significant increases in DM production when Pro-Gibb was applied (Table 4.41). These effects were measured from the first cut, 8 days after application. The 40g/ha rate resulted in a more rapid increase in DM compared with the lower rates but by week four (3rd cut) there was less difference between the different rates and all ProGibb treatments had produced significantly higher DM than the nil treatment. Average dry matter increases by the 4th cut were around 30%, i.e. from 1.26tDM/ha to an average of 1.64t/ha. In contrast the latest DM cut, on September 18th, showed that the nil plot produced significantly more DM than the ProGibb treatments over the previous 15 day interval from the second mowing i.e. ProGibb treated plants appeared to suffer a penalty from the extra burst of growth.

▼ Table 4.42: The effect of different rates of ProGibb and a foliar nutrient application on dry matter production (DM) from Mackellar wheat, Cressy 2007-08.

Treatments	DM Cut 1 27/7 (t/ha)	DM Cut 2 3/8 (t/ha)	DM Cut 3 10/8 (t/ha)	DM Cut 4 17/8 (t/ha)	DM Cut 5 18/9 (t/ha)
PG10		0.88		1.59	1.03
PG20	0.59	0.92	1.54	1.65	0.98
PG40	0.66	1.08	1.62	1.68	0.93
PG20 + foliar spr		1.05	1.48	1.74	0.85
Nil	0.50	0.80	1.24	1.26	1.19
Nil + foliar spray	0.52	0.95	1.37	1.31	1.15
F prob	**0.018**	**0.045**	**0.022**	**0.001**	**0.002**
LSD (P=0.05)	**0.096**	**0.185**	**0.221**	**0.223**	**0.121**
CV%	**13.7**	**12.8**	**9.9**	**9.9**	**7.8**

Note: Plots were mown on 17th August (after Cut 4) and 3rd September

ProGibb treated plots were visibly paler in colour and this was incremental with rate (Table 4.42). Application of the foliar spray improved plant colour (PG20 + foliar spray) but although there may have been a trend towards increased DM production from application, effects were not statistically different to the controls at any of the DM cuts.

FeedTest results (from pooled replicates) suggest that crude protein was around 2% lower and fibre (NDF) 1.4% higher in ProGibb treated plots (ProGibb 20g/ha) compared with the Nil treatment ie of lower feed value. Application of a nutrient spray increased the crude protein slightly. A nutrient test produced mixed results with some elements being in lower concentrations in the ProGibb treated sample (phosphorous, sulphur, calcium) and potassium slightly higher. Further tests will need to be conducted to confirm these results as there was only 1 test of each.

ProGibb pasture trial

An additional trial with similar treatments (plus additional mowing and N treatments) was conducted on a 12 month old commercial pasture comprising perennial and annual ryegrass, fescue, lucerne, white and sub clover. Initial treatments were applied on July 20th and dry matter cuts (3 x 0.25m quadrats) were taken at approximately 10 day intervals until the end of August with subsequent less frequent cuts.

Application of ProGibb resulted in a significant increase (over 40%) in DM production at the first cut, 11 days after application. This difference was significant through to the 3rd cut (18% higher), nearly 4 weeks after application. However by the 4th cut (just over 5 weeks after application), there were no measured differences between any of the treatments after the plots were mown. While there may have been a reduction in the growth of ProGibb treated plots at a subsequent date the benefit of additional production over winter will outweigh any reduction in growth in spring when there is more feed available. This of course depends on whether there are long term detrimental effects and the site will be monitored in 2008.

Grain yield:

There were no significant treatment effects on grain yield (Table 4.42). Yield data was however confounded by competition with ryegrass plants and the spacial variability of the ryegrass. Although the lowest yields tended to be from some of the ProGibb treatments the Nil + Foliar spray also tended to be lower yielding.

The effects of ProGibb treatment did however extend through to maturity in effects on plant height with the Nil treatment being significantly taller than the ProGibb 20g and 40g treatments. The ProGibb applied at 10g/ha was also significantly taller than the 40g rate.

Plant samples cut prior to harvest are currently being processed to determine if there were effects on grain yield components.

▼ Table 4.43: The effect of different rates of ProGibb and a foliar nutrient application on plant colour, height and plot grain yield of Mackellar wheat Cressy 2007-08.

Treatments	Colour score 0 (yellow) -5 (green)	Plant height (cm)	Grain yield (t/ha)
ProGibb 10g	4.00	95.75	4.02
ProGibb 20g	3.25	93.42	4.31
ProGibb 40g	3.50	92.92	3.85
ProGibb 20g + foliar spray	4.00	92.58	3.91
Nil	5.00	96.58	4.49
Nil + foliar spray	5.00	95.67	4.10
F prob	**<0.001**	**0.014**	**0.337**
LSD (P=0.05)	**0.442**	**2.525**	**0.659**
CV%	**3.9**	**1.20**	**10.6**

One confounding problem in the trial has been variation in the content of pasture species. It became apparent that annual ryegrass sown with the perennial species was not thoroughly mixed in the drill. Consequently there is some variation in the amount of ARG between drill runs and consequently plots. This problem was only evident with the onset of warmer temperatures in spring and the faster growth rate of ARG.