Risk management trial - Manangatang

Fiona Best *(BCG);* ***James Hunt*** *(BCG);* ***Brooke White*** *(Cropfacts) &* ***Simon Craig*** *(BCG)*

Aim

To determine the most cost effective approach to managing inputs for wheat production in a low rainfall cropping environment.

Take home messages

- *BCG research from 2005 to 2008 has shown that adopting a low to moderate approach to inputs has been the most profitable*
- *Adopting a low input approach to managing variable inputs was the most economic at Manangatang in 2008*
- *Soil sampling at the start of the season is very valuable in determining soil nutrient status.*

Method

This replicated experiment evaluated three different approaches to managing inputs at the northern field day site at Manangatang. The treatments were based around low, best bet and high input approaches (Table 1).

Table 1. The treatments/strategies implemented in this trial.

Treatment	Treatment title	Treatment description
1.	High input	- High sowing rate 74kg/ha targeting 190 plants/m² - High P rate 14kg P/ha (67kg/ha Supreme Z) - Split N rate 12kg N/ha at sowing (top-dress if required in season – determine by fortnightly Yield Prophet™ runs at 20% probability of yield response) - Flutriafol (Impact®) on fertiliser 400ml/ha - Foliar fungicide (determine in-season if required) - Foliar micronutrients (use tissue test in-season to determine if required
2.	Best bet	- Average sowing rate 59kg/ha targeting 150 plants/m² - Moderate P rate 7kg P/ha (33kg/ha MAP) - Top-dress if required in-season – determine by fortnightly Yield Prophet™ runs at 50% probability of yield response - No upfront fungicide - Foliar fungicide in-crop option (determine in-season if required) - Foliar zinc if required (use tissue test in-season to determine if required).
3.	Low input	- Low sowing rate 39kg/ha targetting100 plants/m² - Low P rate 4kg P/ha (19kg/ha MAP) - Top dress if required in-season – determine by fortnightly Yield Prophet™ runs at 80% probability of yield response - No upfront fungicide - Low cost foliar fungicide in crop if required

Segmented soil samples were taken at 0-10, 10-40, 40-70 and 70-100cm on 23 May to measure starting nitrogen and moisture. Phosphorus was measured as Colwell P (0-10cm).

All treatments were sown to wheat (cv. Young) on 6 May 2008 at 300mm row spacing with trifulralin (Triflur X™) 0.8L/ha + 540 gai glyphosate (Gladiator™) 2L/ha and wetter 0.2%, incorporated by sowing.

In-crop fertiliser and fungicide treatments were applied as required, determined by tissue testing and visual assessments. The crop model Yield Prophet™ was used to support nitrogen input decisions.

Emergence density of each treatment was estimated by counting plants in 3m (3 x 1 m) of crop row in each replicate on 27 June. Dry matter at GS30 (11 July) and GS65 (9 September) was estimated for all treatments.

All treatments were harvested on 18 November and grain yield and quality recorded.

Location:	Manangatang
Replicates:	4
Sowing date:	6 May
Seeding density:	190, 150, 100 plants/m² depending on treatment
Crop type:	Wheat cv. Young
Seeding equipment:	Smale bar (knife point press wheel), Trimble (Case IH) auto-steer (2cm accuracy GPS), 300mm row spacing

A gross margin was calculated after harvest to determine the economics of adopting each input management approach.

Results

Total available nitrogen at the site was 160kg/ha (0-100cm), Colwell P was 19 (0-10 cm) with a phosphorus buffering index (PBI) of 76.

The high input, best bet and low input treatments achieved plant densities of 78, 88 and 100 plants/ m^2 respectively.

Tissue tests indicated that no foliar micronutrients were required for either the high input or best bet treatments.

There were no significant differences (P>0.05) in dry matter between treatments at either GS30 or GS65, with a site mean of 170kg DM/ha and 2.1t/ha for each growth stage respectively.

As the crop approached the end of tillering (GS30) in early July, Yield Prophet® showed that there would not be a yield increase in response to additional nitrogen in any treatment. As a result, no nitrogen was top-dressed on any of the treatments.

There were no significant differences (P>0.05) between the grain yield, protein or screenings of any treatments. The averages across all treatments were 1.2t/ha for yield, 14.2 percent protein and 14.2 percent screenings.

The site received 115mm growing season rainfall (April – October).

Interpretation

Lower seeding establishment in the high input and best bet treatments may have been the result of either increased competition in the seed row at 300mm row spacing or due to toxic effects of urea placed with seed.

High initial soil nitrogen levels (160kg N/ha 0-100cm) were more than enough to support crop growth without any additional nitrogen for the yields achieved.

The fact that there were no differences in dry matter between treatments highlights that, even if targeting hay production, the low input strategy was sufficient to reach potential for the 2008 season, given the high soil nitrogen reserve at this site.

This work showed that there were no benefits in yield or grain quality from adopting a high input approach in 2008. Simple economic analysis shows that for the 2008 season, adopting a low input strategy achieved the greatest gross margin of $176/ha (Table 2). There was a difference of $81/ha between the low input strategy and the high input strategy.

Table 2. Simple economic analysis of the three approaches to managing inputs. This analysis was completed using a harvest grain price of $250t/ha. Variable costs were calculated including all input and associated operational costs eg. $4/ha for each spray application as well as the herbicide cost.

Treatment	Gross income ($/ha)	Total variable costs ($/ha)	Gross margin ($/ha)
High input	300	205	95
Best bet	300	159	141
Low input	300	124	176

Application

The results from this experiment and similar work carried out by BCG over the last four seasons has highlighted that in commercial practice, adopting a low input to best bet approach to inputs requires the least risk and is the most economical in a low rainfall environment.

Soil sampling at the start of the season is extremely important in understanding the nutrient status to support in-season input decisions. Decision support tools such as Yield Prophet® can provide valuable guidance when making input decisions, particularly regarding nitrogen application during the season.

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