Winter Wheats Trial

To have high yielding crops, they must grow sufficient plant biomass to support the grain as there is a relationship between total biomass and grain yield (harvest index). Winter wheats require a certain amount of cold weather before they change from vegetative growth (growing leaves and tillers) to reproductive growth (growing the head and stem). Early sowing gives the plant a lengthy period of time to grow a large amount of biomass. This is usually grazed as it is possible that the crop becomes too dense and tillers begin to die. In this trial the aim was to identify the optimum biomass by manipulating sowing rate.

The trial was sown on March 20th, with Adagio, Scenario and Wedgetail, aiming at 60, 120 and 180 plants/m^2 (30 – 100 kg/ha sowing rate) and watered up.
The trial was topdressed with sufficient N for a 10 t/ha crop, and one application of a PGR was made to the entire trial as lodging started to become an issue in August due to the large biomass on all plots. A second application was made at full flag emergence as a treatment in each variety (signified with a "+PGR" in the table below).
The major issue with the trial was the ryegrass competition. The trial site was chemically fallowed in 2014 and assumed to have low ryegrass seed numbers. By watering-up, the chance for a knockdown was lost. As the wheat emerged, so did the ryegrass, which we know is resistant to Group A herbicides. A Group B (Hussar) was applied but did not provide adequate control, which may be due to a combination of factors:

- Group B herbicide resistance
- Low sowing rates result in lots of bare soil and reduced competition from the crop.
- The weeds are growing extremely vigorously at that time of year.

Harvest yields and grain quality

Variety	Population	Yield (t/ha)	Protein (%)	Screenings (%)	Test wt (kg/hl)
Adagio	60	5.64^{cde}	11.4	2.6	80.3
Adagio	120	6.25^{bc}	11.2	3.3	82.5
Adagio	120+PGR	6.40^{ab}	11.4	2.7	80.8
Adagio	180	7.19^{a}	11.2	2.6	81.9
Scenario	60	4.58^{g}	12.4	3.3	78.9
Scenario	120	5.52^{cdef}	11.8	3.3	78.1
Scenario	120+PGR	5.41^{def}	11.7	3.6	80.6
Scenario	180	5.78^{bcd}	12.3	3.4	79.5
Wedgetail	60	4.70^{fg}	12.9	1.0	84.5
Wedgetail	120	4.83^{efg}	13.6	1.3	81.7
Wedgetail	120+PGR	5.00^{defg}	13.3	1.5	84.3
Wedgetail	180	4.26^{g}	13.3	1.2	81.8
p	<0.001				
lsd	0.82				

Yields with similar superscripts are not statistically different.

Adagio, sown to achieve 180 plants/m^2 was the highest yielding treatment. It is difficult to draw too many conclusions from the results due to the weed competition. However the trial did demonstrate the weed control advantage pre-irrigation does give and conversely the problems that may arise when watering up, particularly with cereals, and in the presence of herbicide resistance.

While the theory of maximising biomass to maximise yield still stands, issues with weed control and canopy management still need to be addressed, as well as taking in to consideration the extra autumn irrigation required.