Hyper Yielding Cereal Project
A FEED GRAIN INITIATIVE

# Wheat Germplasm x Fungicide Interaction – Time of Sowing 2 (April 25)

## 2019/20 Yield Results (t/ha) *(Provisional)*

**Sown:** 25 April 2019 **Harvested:** 2 February 2020
**Rotation position:** 1st Wheat after Poppies

**Table 1.** Grain yield (t/ha) of 10 cultivars under plus and minus fungicide protection

| | Fungicide Management | | | | Response to Fungicide | |
|---|---|---|---|---|---|---|
| | Full Protection | | Nil (untreated) | | | |
| **Cultivar** | **Yield t/ha** | | **Yield t/ha** | | **t/ha** | **%** |
| **RGT Accroc** | 12.83 | a | 11.91 | cd | 0.92 | **8** |
| **Annapurna** | 12.56 | ab | 11.48 | d | 1.08 | **9** |
| **RGT Calabro** | 13.07 | a | 11.68 | d | 1.39 | **12** |
| **RGT Relay** | 9.34 | i | 7.90 | k | 1.44 | **18** |
| **DS Bennett** | 11.38 | de | 5.58 | l | 5.80 | **104** |
| **Conqueror** | 10.89 | efg | 8.68 | j | 2.21 | **25** |
| **Genius** | 12.21 | bc | 10.57 | fg | 1.64 | **16** |
| **Kittyhawk** | 9.96 | h | 9.35 | i | 0.61 | **7** |
| **Manning** | 12.74 | ab | 9.94 | h | 2.80 | **28** |
| **Tabasco** | 10.94 | ef | 10.39 | gh | 0.55 | **5** |
| **Mean** | **11.59** | **a** | **9.75** | **b** | **1.84** | **19** |

| | | | |
|---|---|---|---|
| **LSD Cultivar x Fungicide. P=0.05** | 0.53 | **P val** | <0.001 |

***Please read the notes accompanying these provisional results for interpretation***
*Figures followed by different letters are considered to be statistically different (p=0.05), for example a yield of 12.56 ab is considered statistically different to 9.96 h but is considered to be statistically the same as a yield of 13.07 a.*
*All varieties are covered under variety license agreements.*

The principal diseases were Septoria tritici blotch, leaf rust and stripe rust caused by the pathogens *Zymoseptoria tritici, Puccinia triticina and Puccinia striiformis* respectively, which were present at high levels in the trial.

There was a statistical interaction (p=<0.001) between cultivar and fungicide management indicating that cultivars responded differently to full fungicide protection (Table 1), DS Bennett and Manning giving large responses to fungicide protection compared to RGT Accroc, Annapurna, Tabasco and Kittyhawk which showed less response to fungicides. Full fungicide protection had significant impact on grain quality, resulting in an increase in protein in all cultivars except Kittyhawk.

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There were significant interactions between fungicide management and cultivar on test weight and screening results, with the indication that those cultivars giving the greatest yield responses to fungicide application showed the greatest improvements in test weight and screenings. (Table 2).

**Table 2**. Influence of treatment on grain quality (protein (%), test weight (kg/hL) and screenings (%)).

| | Protein | | | | Test Weight | | | | Screening | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Full Protection | | Nil (untreated) | | Full Protection | | Nil (untreated) | | Full Protection | | Nil (untreated) | |
| **Cultivar** | % | | | | Kg/hl | | | | % | | | |
| **RGT Accroc** | 10.8 | efg | 10.3 | gh | 79.8 | abc | 78.9 | bcd | 0.6 | g | 0.6 | fg |
| **Annapurna** | 12.1 | a | 11.5 | bc | 79.6 | abc | 80.6 | ab | 1.1 | d-g | 1.1 | d-g |
| **RGT Calabro** | 11.1 | cde | 10.4 | fgh | 78.8 | bcd | 78.4 | cd | 1.0 | d-g | 1.2 | def |
| **RGT Relay** | 11.4 | bcd | 11.1 | cde | 75.5 | ef | 72.4 | g | 2.0 | c | 3.7 | b |
| **DS Bennett** | 11.0 | de | 10.3 | h | 81.1 | a | 62.9 | h | 1.1 | d-g | 4.6 | a |
| **Conqueror** | 10.3 | hi | 9.8 | i | 75.0 | f | 72.3 | g | 1.5 | cd | 3.5 | b |
| **Genius** | 10.9 | ef | 10.4 | gh | 78.6 | bcd | 77.4 | de | 1.2 | def | 1.4 | cd |
| **Kittyhawk** | 11.8 | ab | 11.8 | ab | 81.0 | a | 80.2 | abc | 1.0 | d-g | 1.2 | d-g |
| **Manning** | 10.3 | hi | 9.2 | j | 80.0 | abc | 77.5 | de | 0.8 | efg | 1.3 | de |
| **Tabasco** | 11.0 | de | 10.9 | ef | 76.2 | ef | 75.8 | ef | 1.2 | def | 1.3 | cde |
| **Mean** | **11.1** | **a** | **10.6** | **b** | **78.6** | **a** | **75.6** | **b** | **1.1** | **b** | **2.0** | **a** |
| **LSD Cultivar p = 0.05** | 0.3 | | | | 1.4 | | | | 0.4 | | | |
| **LSD Fung. p=0.05** | 0.3 | | | | 1.1 | | | | 0.5 | | | |
| **LSD Cult. x Fung. P=0.05** | ns | | | | 2.0 | | | | 0.6 | | | |
| **P val Cultivar** | <0.001 | | | | <0.001 | | | | <0.001 | | | |
| **P val Fung.** | 0.017 | | | | 0.004 | | | | 0.010 | | | |
| **P val Cult. x Fung.** | 0.108 | | | | <0.001 | | | | <0.001 | | | |

*Figures followed by different letters are considered to be statistically different (p=0.05)*

**Table 3**. Margin ($/ha) from additional yield after fungicide input cost and application costs have been deducted (fungicide cost based on $95/ha and application cost based on $45/ha).

| | Response to Fungicide | Extra income from fungicide | Margin after input cost and application | Return on Investment |
|---|---|---|---|---|
| **Cultivar** | **t/ha** | **@$350/t** | **$/ha** | **$ back for every $1 spent** |
| **RGT Accroc** | 0.92 | 322.0 | 182.0 | 2.3 |
| **Annapurna** | 1.08 | 378.0 | 238.0 | 2.7 |
| **RGT Calabro** | 1.39 | 486.5 | 346.5 | 3.5 |
| **RGT Relay** | 1.44 | 504.0 | 364.0 | 3.6 |
| **DS Bennett** | 5.80 | 2030.0 | 1890.0 | 14.5 |
| **Conqueror** | 2.21 | 773.5 | 633.5 | 5.5 |
| **Genius** | 1.64 | 574.0 | 434.0 | 4.1 |
| **Kittyhawk** | 0.61 | 213.5 | 73.5 | 1.5 |
| **Manning** | 2.80 | 980.0 | 840.0 | 7.0 |
| **Tabasco** | 0.55 | 192.5 | 52.5 | 1.4 |
| **Mean** | **1.84** | **644.0** | **504.0** | **4.6** |

**Table 4.** Detail of management levels applied

| | | | |
|---|---|---|---|
| **Sowing date:** | | **25-April** | |
| **Seed Rate:** | | 200 seeds/$m^2$ | |
| **Sowing Fertiliser:** | | 120kg MAP | |
| **Seed Treatment** | | Pontiac | |
| | | | |
| **Management:** | | Untreated | Total Protection |
| **Fungicide:** | GS00 | --- | Systiva |
| | GS31 | --- | Opus 500ml/ha |
| | GS39 | --- | Radial 840ml/ha |
| | GS61 | --- | Prosaro 300ml/ha |
| | | Overall Inputs | |
| **Nitrogen:** | 5 Aug | 130kg/ha Urea | |
| | 31 Aug | 200kg/ha Urea | |
| | 21 Sep | 150kg/ha Urea | |
| **PGR:** | 26 Aug | Moddus Evo 0.1L/ha + Errex 1.3 L/ha | |
| **Insecticide:** | 5 Jun | DominexDuo 0.126L/ha | |
| | 25 Nov | Karate Zeon 0.04L/ha | |
| **Irrigation:** | 17 Oct | 25ml/ha | |
| | 14 Nov | 25ml/ha | |
| | 29 Nov | 20ml/ha | |
| | 5 Dec | 20ml/ha | |
| | 12 Dec | 20ml/ha | |
| | 15 Dec | 20ml/ha | |

**Notes:**

- Sown in late April, all cultivars responded positively to fungicide protection, giving yield increases between 0.55 – 5.80t/ha (5 - 104%).
- RGT Calabro was the highest yielding cultivar and also had the highest thousand seed weight TSW (57.5g) (data not shown). The TSW's were significantly lower in varieties such as RGT Relay and Conqueror which had significantly more erect heads at harvest and lower yields.
- The greatest margin response to fungicide protection came from DS Bennett which returned approximately $14.5 for every dollar spent, a result almost identical to 2018/19.
- Cultivars that were the least yield responsive to fungicide management were the more disease resistant cultivars RGT Accroc, Tabasco, Kittyhawk and Annapurna. However all cultivars were more profitable with fungicide applied, although Kittyhawk and Tabasco gave margin returns of less than 2 for 1 (less than $2 returned for every dollar spent on fungicides).

**Image 1.** 14 November Location of Protocol 1 (TOS 2) at the 2019 Hyper Yielding Cereals site.

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