Yield Prophet® performance in 2020

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Key findings

- Yield Prophet® predictions for wheat grain yield at Hart in 2020 were less accurate when compared to previous years, predicting 1.93 t/ha above actual yield.
- Although Hart had a wet spring finish, both moisture and nitrogen were limiting factors to grain yield due to below average winter rainfall. Differences between the 20%, 50% and 80% yield probabilities in the final simulation (October) were small.

Why do the trial?

Wheat growth models such as APSIM are highly valuable in their ability to predict wheat yield.

Yield Prophet® is an internet-based service using the APSIM wheat prediction model. The model relies on accurate soil character information such as plant available water (PAW) and soil nitrogen (N) levels, as well as historical climate data and up to date local weather information to predict plant growth rates and final hay or grain yields.

This early prediction of grain yield potential means it can be used to directly influence crop input decisions. No other tool is currently available to growers, which can provide information of this accuracy at such a useful time of the season.

How was it done?

Seeding date	May 1, 2020	**Fertiliser**	May 1: 30 kg N/ha
Variety	Scepter wheat @ 180 plants per square metre		July 10: 20-40 kg N/ha

Yield Prophet® simulations were run throughout the season to track the progress of wheat growth stages and changes in grain yield predictions. This data was published for 8 sites across the Mid-North in Hart's Hart Beat Newsletter.

The 20%, 50% and 80% levels of probability refer to the percentage of years where the corresponding yield estimate would have been met, according to the previous 100 years of rainfall data.

Soil at the Hart field site ranges from a loam to clay-loam texture (0-30 cm) and provides moderate infiltration and PAW (Table 1). The starting available soil N into Yield Prophet® was 63 kgN/ha.

Results

The first simulation on June 22 predicted wheat sown on May 1 would yield 4.35 t/ha in 50% of years. In 20% of years the same crop would yield 5.15 t/ha, and in 80% of years, 2.95 t/ha (Figure 1). The 50% yield prediction in June and July was high due to above average April rain and moisture stored in the profile (Figure 2).

With well below average rainfall for May, June and July and stored moisture used by the crop by the August 19 prediction, wheat grain yield was reduced to 2.85 t/ha in 50% of years (Figure 2). By this date, 66 mm of rainfall had been received since the first simulation in June. Growing season rainfall totalled 168 mm. Plant available water had decreased to 33 mm (Figure 3), which reduced crop N uptake.

After receiving above average rainfall in late August, the simulation on September 2 predicted a grain yield of 3.55 t/ha in 50% of years. The final simulation on October 21 predicted a grain yield of 4.45 t/ha in 50% of years, 4.55 t/ha in 20% of years and 4.40 t/ha in 80% of years (Figure 1). This increase in predicted grain yield was attributed to high rainfall received late in the season (late August – October). Growing season rainfall was close to the long-term average for Hart at 300 mm and PAW at 78 mm (Figure 2). The yield predictions reflected the wet finish to the growing season.

Scepter wheat at Hart in 2020 yielded below the 50% predicted yield at 2.52 t/ha. The differences between the simulation and actual yield can be attributed to the inability of the model to predict yields under a dynamic season of wet-dry-wet conditions reducing actual N uptake, crop access to soil moisture and utilising these for growth. Across the district, many growers also noted varieties matured quicker when compared to previous seasons.

A model of predicted and actual yields at Hart over nine years (2012-2020) shows that there is a moderate to strong correlation between Yield Prophet® predictions and observed yields. Over nine years, 77% of yields at Hart were close to those predicted by Yield Prophet® (Figure 3).

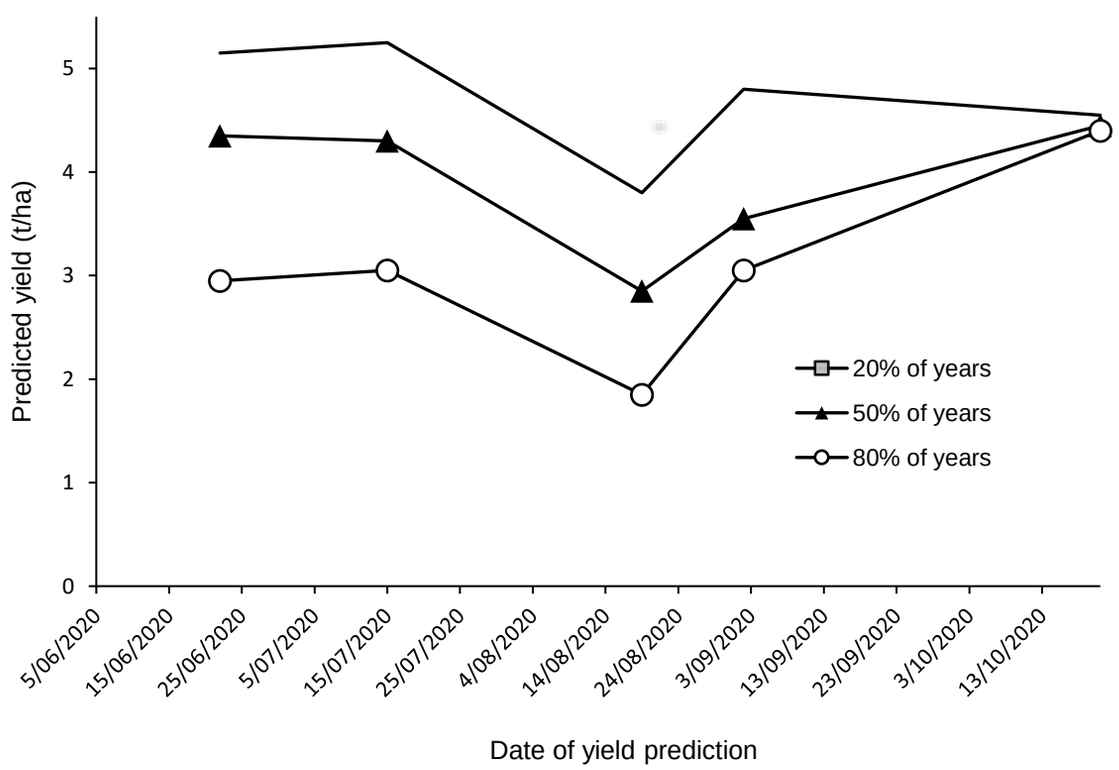

Figure 1. Yield Prophet® predicted yields at 20%, 50% and 80% probabilities at Hart, 2020.

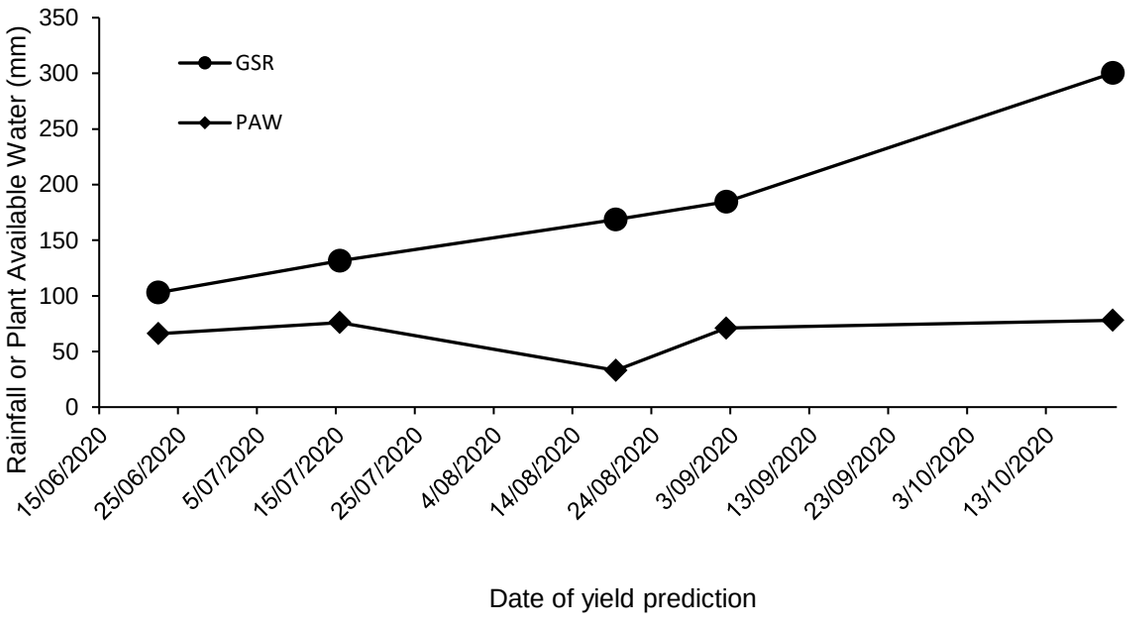

Figure 2. Growing season rainfall (GSR) and plant available water (PAW) on simulation dates at Hart in 2020.

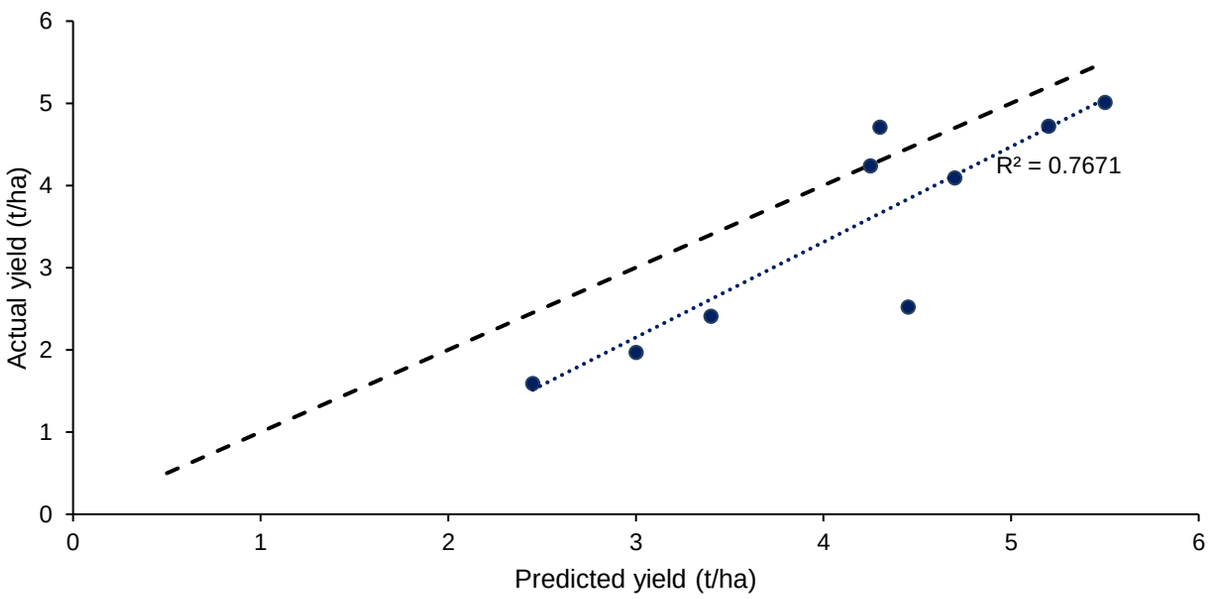

Figure 3. Relationship between Yield Prophet® predicted yields and observed yields at Hart across nine seasons (2012 – 2020). Predicted yields have been generated from August simulations.

Acknowledgements

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HART BEAT - yield predictions through the growing season for 8 Mid-North sites

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The *HART BEAT* newsletter, first introduced in 2009, is an initiative of the Hart Field-Site Group.

It is aimed at providing farmers and agronomists with regular updates of current and predicted crop and soil conditions as a season progresses.

We believe it will assist in making informed choices on the need for additional nitrogen and fungicide applications.

The Yield Prophet® simulations featured are not a crystal ball but provide a realistic prediction of the available soil water and nitrogen status of your crop.

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