

Yield Prophet® performance in 2022

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Key findings

- A correlation is observed between Yield Prophet® predictions and actual yields at Hart from 2012 – 2022. Across ten years, 77% of wheat grain yields were close to those predicted by Yield Prophet®.
- Actual yield received for a comparison Scepter wheat crop with similar nitrogen (N) inputs yielded 86% of the predicted Yield Prophet® simulation. N deficiency contributed to low predicted grain yield for wheat at Hart, following excellent rainfall August – November, placing Hart at a decile 8 for GSR.

Introduction

Wheat growth models such as APSIM are highly valuable in their ability to predict wheat yield. This model simulates the effects of the environment and crop management on yield.

Yield Prophet® is an internet-based service using the APSIM wheat prediction model. The model relies on accurate soil information such as plant available water (PAW) and soil nitrogen (N) levels, as well as historical climate data (100 years of data) and current local weather information to predict plant growth rates and final hay or grain yield predictions.

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

Yield Prophet® simulation

Location	Hart, SA	Fertiliser	May 1: 20 kg N/ha @ seeding
Seeding date	May 1, 2022		July 21: 40 kg N/ha
Variety	Scepter wheat @ 180 plants/m ²		

Yield Prophet® simulations were issued monthly during the growing season (June – October) to track the progress of wheat growth stages and changes in predicted grain yield. This data was published for 8 Mid-North sites and can be viewed on Hart's website:

<https://www.hartfieldsite.org.au/pages/resources/hart-beat-newsletters.php>

Hart Beat newsletters report the average grain yield prediction for Scepter wheat sown on May 1 and May 20, representing an early and late sowing time. These reported yields are based on a 50% probability (or decile 5 season) for the remainder of the season.

Growing season rainfall (GSR) deciles provide an update on how Hart's rainfall is tracking based on the previous 100 years of rainfall data. For example, if the GSR is decile 3, Hart is in the 30th percentile (or the lowest 30% of rainfall records). A decile 9 would mean that 90% of years had less than the current season.

Soil at the Hart field site ranges from a loam to clay-loam texture (0-30 cm) and provides moderate infiltration and PAW. The estimated starting available soil N entered in Yield Prophet® at Hart in 2022 was 63 kg/ha. Yield Prophet® uses APSOIL, a national soil data base to collect pre-characterised soil information from various locations. Soil data for sites includes; layer depth, EC (dS/m), pH (CaCl2), Cl (mg/kg), ESP%, Boron and Aluminium. Pre-seeding nitrogen and water content (%) values were entered into the prediction model to determine accurate starting levels. It's important to note that only soil water content (%) is physically measured in the field for Hart Beat newsletters. This is to provide an estimate of soil water in each location pre-seeding. Soil water content generally varies as a result of soil type and summer rainfall.

Results and discussion

The first yield prediction was simulated on June 16, 2022 for Scepter wheat sown on May 1 and was estimated to yield 3.6 t/ha in 50% of years. In 20% of years, the same crop would achieve a grain yield of 4.4 t/ha and in 80% of years, 2.15 t/ha (Figure 1). The 20%, 50% and 80% level of probability refers to the percentage of years where the predicted yield estimate would have been met, according to the previous 100 years of rainfall data at Hart.

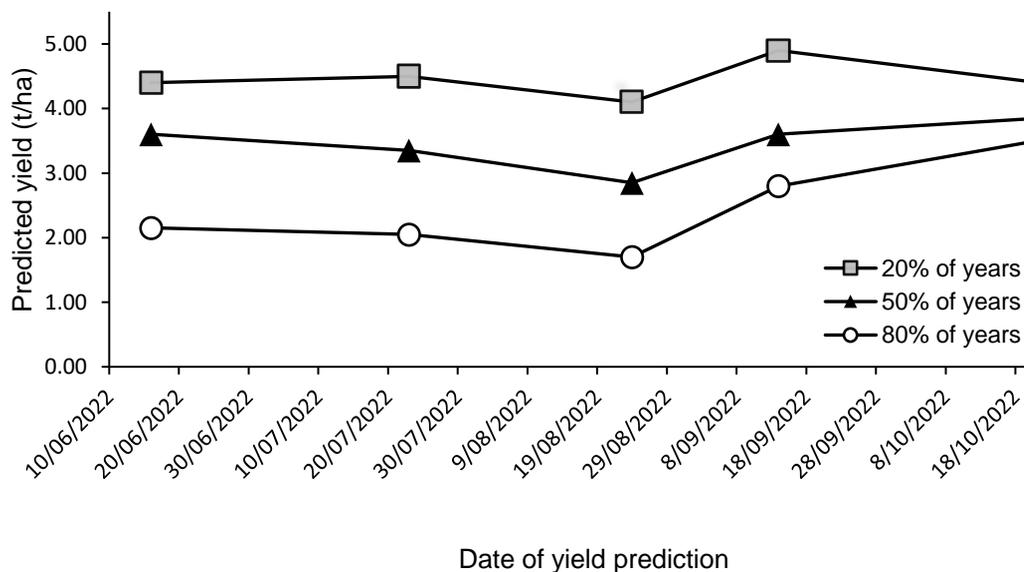


Figure 1. Yield Prophet® predicted yields at 20%, 50% and 80% probabilities at Hart, 2022.

Below average rainfall was received for July (15 mm), reducing predicted yields to 3.35 t/ha (a difference of -0.25 t/ha since June). At this time GSR was 102 mm and total soil PAW was 50 mm (Figure 2). The August Yield Prophet® prediction estimated an even lower yield of 2.85 t/ha, with a prediction of 98 mm rainfall left for the growing season, based on historic rainfall data. The reduction in yield potential was likely due to N-limiting factors with increased rainfall received.

September and October both received well above average rainfall, totalling 185 mm, with the October simulation predicting an increase in wheat grain yield to 3.9 t/ha, similar to yield estimated in June. A wheat crop sown at Hart on May 5 with similar N inputs, yielded 2.69 t/ha (86% of predicted yield). Many wheat crops at Hart, and more broadly within the Mid-North region, produced well above average yields, however N deficiency contributed to low predicted grain yields at Hart, with excellent decile 8 GSR rainfall (355 mm) and decile 10 for annual rainfall, receiving 519 mm (Table 1) in total.

A model of predicted and actual yield at Hart over ten years (2012-2022) demonstrates a moderate to strong correlation between Yield Prophet® predictions and observed yields. Over ten years, 77% of wheat grain yields were close to those predicted by Yield Prophet® (Figure 3).

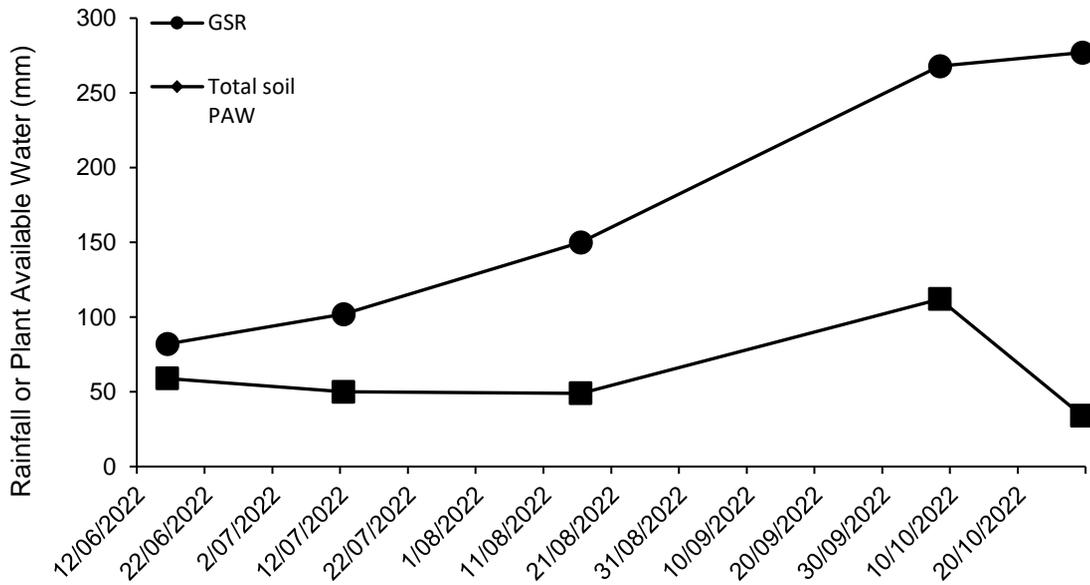


Figure 2. Growing season rainfall (GSR) and plant available water (PAW) on simulation dates at Hart in 2021.

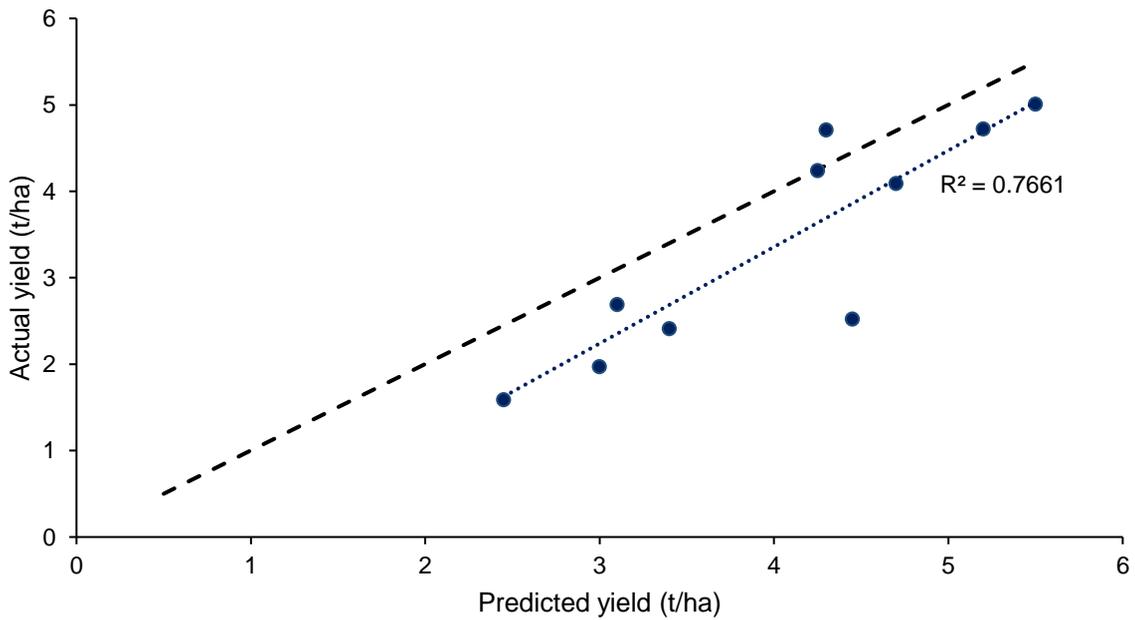


Figure 3. The relationship between Yield Prophet® grain yield predictions and actual yield at Hart across ten seasons (2012 – 2022). Predicted yields have been generated from August simulations. Yields from 2021 are not included in this data set, due to grain losses prior to harvest.

Table 1. Long-term average (100 years) and 2022 rainfall at Hart. Shaded values show months with above average rainfall (mm).

Month	Long-term monthly rainfall average (mm)	2022 Monthly rainfall (mm)	+/- Rainfall difference (mm)
January	20	27	+7
February	22	15	-7
March	16	0.8	-15
April	29	6	-23
May	43	45	+2
June	47	47	0
July	47	15	-32
August	47	58	+11
September	43	68	+25
October	35	117	+82
November	27	62	+35
December	24	59	+35
Rainfall total	400	519	

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Useful Resources

Yield Prophet Lite (Free online tool)

<https://www.yieldprophet.com.au/yplite/>

Hart Beat Newsletters (updated June – October each year)

<https://www.hartfieldsite.org.au/pages/resources/hart-beat-newsletters.php>

Yield Prophet 2017, 'How it works'

<https://www.yieldprophet.com.au/yp/HowItWorks.aspx>

The Very Fast Break

<https://www.youtube.com/channel/UCIDCIII7gRZhUs03opGqH1g/videos>

Climate outlooks – weeks, months and seasons

<http://www.bom.gov.au/climate/outlooks/#/overview/summary>

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

HART BEAT



Yield Prophet® simulations for 8 sites across the Mid-North of SA

Hart | Spalding | Condowie
Kybunga | Farrell Flat | Pinery
Eudunda | Tarlee



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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.

Current (and historical) editions are all available online now, for free:

www.hartfieldsite.org.au

