

Yield Prophet® 2006 – saving a packet in a drought season

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Take Home Messages

- Yield Prophet® saved many subscribers from over investing in inputs during the 2006 season. From early in the 2006 growing season, Yield Prophet® predicted that profitable yields in our region were unlikely.
- The value of Yield Prophet® as a risk management tool is often overlooked because of a common perception that Yield Prophet® is only a nitrogen management tool to be used in good seasons. An analysis of Yield Prophet® predictions made throughout 2006 busts this myth.

At the end of another tough season, many people comment that they were again ‘denied the opportunity to use Yield Prophet®’. This complaint accompanies the perception that Yield Prophet® is nothing but a nitrogen calculator to be used only to assist in pouring urea on lush crops in good seasons. Yield Prophet® is much more than a simple calculator – it is first and foremost a tool for managing climate variability, and 2006 was exactly the sort of year where Yield Prophet® can be of enormous value to a farm business.

It is an unfortunate fact that our climate is hugely variable; growing season rainfall at Birchip over the last 100 years has varied from 71 mm in 1982 to 436 mm in 1973. Consequently, potential wheat yields vary across those years from 0 to in excess of 6 t/ha (Figure 1).

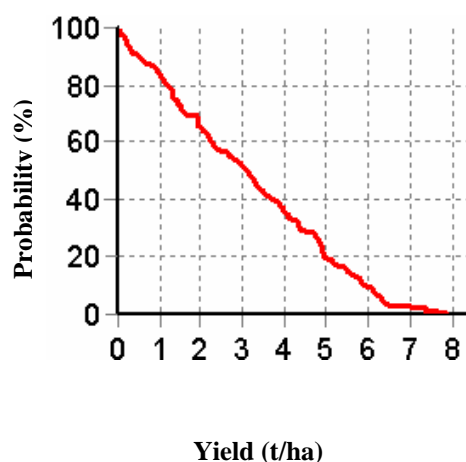


Figure 1: The full range of probabilities of wheat yield outcomes for the last 100 years from Birchip, as generated by Yield Prophet assuming 0 mm available soil water on January 1 and adequate nitrogen.

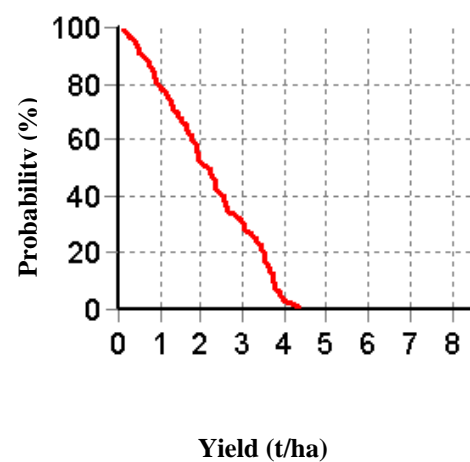


Figure 2: Wheat yield probabilities generated by Yield Prophet® for the BCG main site on 23 May 2006, just after the crop was sown.

The challenge for farm managers is to try and adapt inputs, finances, insurance and marketing strategies to each season. The primary role of Yield Prophet® is to assist in this process by reducing the uncertainty of the current season as it unfolds. We can use the Yield Prophet® forecasts from the un-harvestable Birchip main site in 2006 as an example of how this information can be used to progressively assess production risk.

From the start of the 2006 season, Yield Prophet® was already telling us something of value – BCG was not going to grow a bumper crop at the main site. Comparing the Yield Prophet® output generated just after the site was sown on 23 of May (Figure 2) to the full range of yield possibilities presented in Figure 1, you can already see that the high end of the probability curve cuts off at 4.4 t/ha instead of around 6.5 t/ha, and that the 50% probability has shifted from 3.0t/ha down to 2.0 t/ha. The reason for this was the very dry summer and autumn of 2006, which meant there was no stored soil water available for crop use when it was measured in May. Not the best news, but already our uncertainty about the nature of the coming season was reduced.

One seasonal forecasting tool that Yield Prophet® incorporates to further reduce the yield uncertainty of a season is the phase system of the Southern Oscillation Index (SOI). You can read about how this system works in detail on the web;

www.longpaddock.qld.gov.au/SeasonalClimateOutlook/RainfallProbability/index.html.

Essentially, it looks at how the SOI is behaving in the current season in relation to similar SOI conditions in previous years and what rain subsequently fell in those seasons. Yield Prophet® uses this information to reduce uncertainty by presenting yield probabilities calculated using only season finishes from years in the last hundred in which the SOI was in the same phase as the current season (e.g. the dotted line in Figure 3), as opposed to season finishes for all of the last 100 years (the solid line in Figure 3).

The SOI phase system is currently one of the better forecasting tools available for our region, but it has its limitations. As long as we understand and work within the limitations of this system, it is significantly better than nothing - particularly when coupled with a crop model such as Yield Prophet®.

One of the major limitations of the SOI phase system specific to our region is that although a forecast is issued every month of the year, the only time that it produces a sufficiently reliable signal is from June-September. Also, the system has 5 forecast ‘phases’ which indicate the current value or change in value of the SOI – Positive, Rising, Falling, Negative and Neutral. A Positive SOI phase in July to August increases our chances of receiving a wetter growing season; a Negative phase from June to August increases our chances of receiving a drier growing season. The single most common phase is Neutral, which far from indicating an ‘average’ growing season means that ‘anything is possible’ i.e. uncertainty is not reduced and it is best to consider the variability from the last 100 years. Rising and Falling phases do not provide us with significant signal strength in terms of rainfall alone, however one of the real advantages of Yield Prophet® is that by calculating yield, which takes into account factors other than total rainfall, such as temperature and rainfall distribution, Rising and Falling phases can give statistically significant *yield* forecasts even though *rainfall* forecasts alone may not. In summary, when used in conjunction with Yield Prophet®, the SOI phase system is useful to us from June to September when in a Rising/Positive or Falling/Negative phase but not when it is in a Neutral phase.

On 1 June of 2006, the SOI was in a Falling phase. In terms of rainfall alone, this phase does not provide a significant forecast at Birchip. However, when yield outputs from Yield Prophet are considered, this phase *does* significantly reduce the yield uncertainty further such that on 1 June there was only a 30% chance of achieving a yield greater than 2 t/ha (dotted line in Figure 3) - and the crop hadn’t even emerged yet! On 1 June 2006 many crops in the Mallee were yet to be sown, and already there was only a 50% probability of producing a 1.2 t/ha crop at the BCG main site when the current phase of the SOI was taken into account! This should have been a time for serious reflection on seasonal conditions – right from the start we were behind the eight ball.

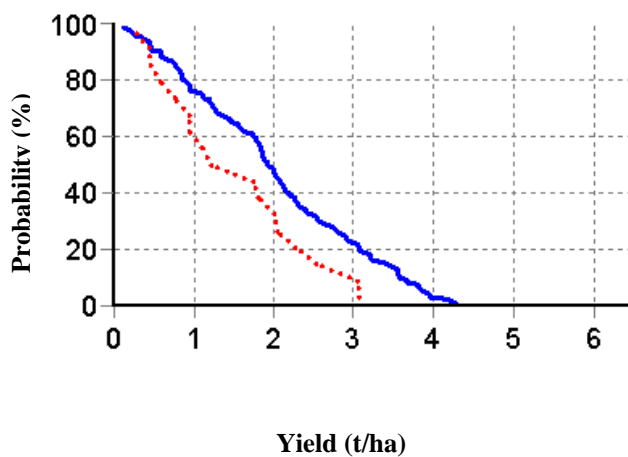


Figure 3: Wheat yield probabilities at the BCG main site calculated on 1 June 2006 using season finishes from the last 100 years (solid line), and only those years in which the SOI phase was Falling on 1 June (dotted line).

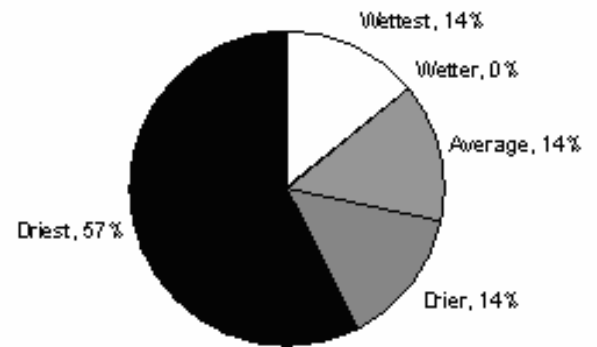


Figure 4: Rainfall probabilities for July to September at Birchip from a Negative SOI phase in June, which is released on 1 July.

When the crop did start to emerge following rain on 14 July, the SOI had moved into a Negative phase. This phase at this time of year gives us a very strong signal indeed, and greatly decreases our chances of receiving much rain during July-September (Figure 4). This further reduced the uncertainty of the yield outcome to a 30% chance that the crop was going to yield more than 0.5 t/ha (Figure 5).

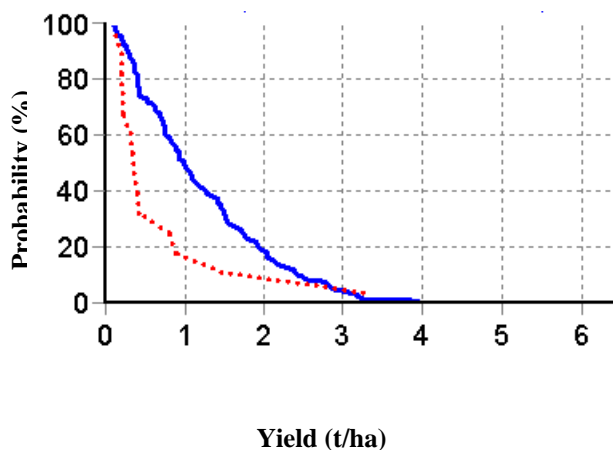


Figure 5: Yield probabilities at the BCG main site calculated on 14 July 2006 using season finishes from the last 100 years (solid line), and only those years in which the SOI phase was Negative on 1 July (dotted line).

Obviously, this was not pleasant news to anyone, but to be forewarned is to be forearmed, and benchmarking studies of Australian grain farms find time and time again that the most profitable and hence sustainable enterprises are those that are able to keep their costs down, particularly in tough years. The above information should be a clear enough signal for most farm managers to start seriously considering their position with regard to further crop inputs,

insurance, marketing, finances etc. It is somewhat distressing to learn that a month later when conditions had deteriorated further that urea was still being spread in the Mallee.

So, whilst we are greatly looking forward to the season when Yield Prophet® will be used to work out how much nitrogen to pour on 6 t/ha crops, people must realise that whilst it is not really much *fun*, Yield Prophet® is as much about picking the bad seasons as early as possible as it is about maximising returns from the good. It is foremost a tool to manage climate variability, and its capacity to reduce the uncertainty of a season as it unfolds is of extraordinary value to a farm enterprise in any year, regardless of whether it is a 1982 or a 1973, or anything in between.