



# N BUDGETING TO MEET YIELD POTENTIAL Yield Prophet®



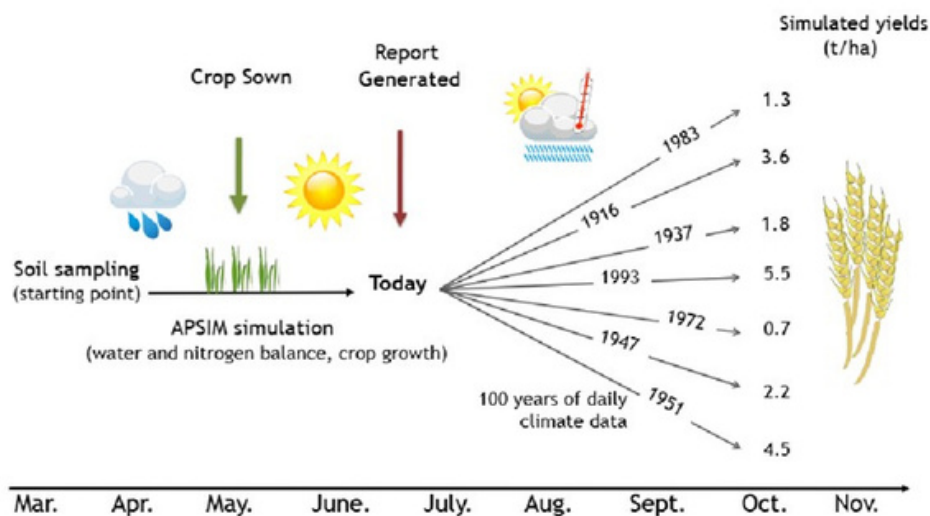
# N BUDGETING TO MEET YIELD POTENTIAL

## INTRODUCTION

### Decision support systems for making N decisions

The decision support system, Yield Prophet®, is another option for growers to estimate yield potential.

Yield Prophet® is an online crop production model providing real-time information about growing a crop. It is a user-friendly interface of APSIM which generates crop simulations and reports to assist in matching nitrogen (N) input to yield potential based on seasonal conditions. This potential is presented as a probability distribution to represent a range of seasonal outcomes (Figure 1).



**Figure 1. How a Yield Prophet® report is generated to represent a range of yield outcomes (a probability distribution).**

Yield Prophet® crop simulations are created by combining the essential components of growing a crop including:

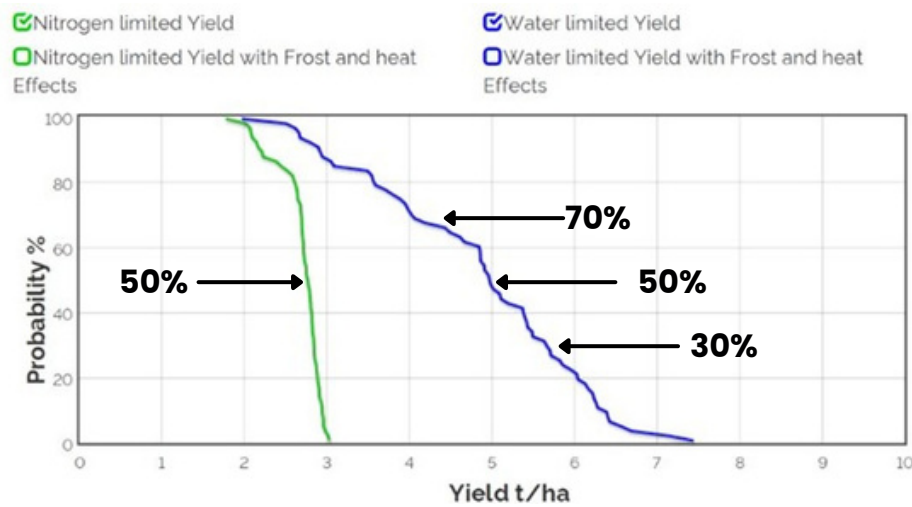
- results from soil tests sampled prior to planting
- a soil characterisation selected from the Yield Prophet® library of ~1,000 soils, called APSoil, selected as representative of the production area
- historical and current climate data taken from the nearest Bureau of Meteorology (BOM) weather station or current climate data from your privately owned weather station (optional)
- individual crop details such as sowing date; and
- fertiliser and irrigation application rates and dates during the growing season.

Using historic climate data, in combination with current crop resources, Yield Prophet® simulates the biological and physical process of crop growth and development to determine the crop's yield potential which is represented as a probability curve (Figure 2., on the next page).

As part of the GRDC RiseWi\$e project, BCG has been testing Yield Prophet® in a network of N management trials to establish risk and reward profiles.

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## INTERPRETING THE YIELD PROBABILITY CURVE



**Figure 2. Probability curve of grain yields in nitrogen-limited and water-limited scenarios**

The green and blue curves denote the maximum possible yields; the green line represents yields where N is limited (and water is unlimited) and the blue line is where water is limited (and nitrogen is unlimited).

These figures can help guide N application decisions, in conjunction with knowledge of rainfall outlooks, crop potential and in-paddock conditions.

### Example:

Marty is a grower and wants to find out the yield potential for a wheat crop he is sowing this year. He has soil-sampled the paddock and knows the start-of-season N and soil characteristics to select an appropriate soil characterisation site. Along with N, Marty also tested for EC, pH, Cl, ESP, B and Al which are helpful in refining the predictive modeling in APSIM. Marty sets up his Yield Prophet® report using this information to generate a report for his wheat crop that includes Figure 2.

Looking at Figure 2, the yield probability percentage at 50% yield (decile 5) indicates that this wheat crop would yield 2.7t/ha with the current N supply, but could yield nearly 5t/ha if more N was supplied. N potentials for the water-limited yield potential scenarios for 25% (decile 2.5) and 75% (decile 7.5) yield probabilities are 4t/ha and 5.5t/ha respectively and demonstrate the yield potential for above and below average.

Based on the rule of thumb that 40 kg/N is required to grow a tonne of wheat, a decile 5 season could yield 5 t/ha water limited (N unlimited) requiring 125 kg N/ha. If soil tests indicated 70 kg/ha N was already available at sowing, 55 kg/ha N (or 119 kg/ha urea) is required at top dressing. These calculations can be adjusted if Marty was expecting a higher or lower than average season.