# TIME OF SOWING INFLUENCE ON PHOSPHOROUS REQUIREMENTS AND SOIL TESTING

# RESEARCH SUMMARY

AS216

## FAST FACTS

### PROBLEM

Applying phosphorus at sowing is necessary to ensure wheat crops reach their full potential. It is unknown how time of sowing could affect the amount of phosphorus required to support wheat crops and whether there is a cost saving to be made.

### PROJECT

This research investigated how time of sowing influences how much phosphorus is needed by plants and the effect of phosphorus inputs.

### PARTICIPANTS

**Agronomy Solutions:** Sean Mason

### DATES

**Start:** 1 July 2016
**Finish:** 30 June 2019

Phosphorus is necessary for crop growth and is applied as a fertiliser at seeding for maximum efficiency. Just like soil nutrient levels, the time of sowing can influence crop growth, depending on factors such as available soil moisture and temperature. The relationship between sowing date and soil nutrition and the potential for influencing the amount of phosphorus required by a crop in South Australian soil types is unknown.

This research found that phosphorus inputs can be reduced in optimal sowing conditions with warm and adequate soil moisture. This is because plants establish quickly in these conditions and can readily access residual phosphorus reserves in the soil. Phosphorus inputs are essential in cooler and drier sowing conditions.

## BACKGROUND

Growers often vary time of sowing depending on the size of their cropping program, or to take advantage of conditions such as forecast rainfall and available soil moisture. The time of sowing of a crop can influence emergence, flowering time, frost exposure and a number of other factors.

This project explored the relationship between time of sowing and required phosphorus inputs. Knowing how conditions at the time of sowing affect a crop's overall need for phosphorus and the response to applied phosphorus will assist growers to make economic decisions in regard to yield and input costs.

## RESEARCH AIMS

The core objectives of the project were to:

- Determine the influence of different soil temperatures and soil moisture levels on phosphorous availability and how that affects the fertiliser phosphorous requirements of wheat.
- Investigate how the phosphorus input requirements of two different wheat varieties change due to different sowing times.

## IN THE FIELD

The research was conducted in two parts:

- Glasshouse trials in 2017 provided a controlled test of field conditions encountered during April and June sowing dates at either end of the sowing window. This allowed crops to be planted in warmer conditions and longer days in April and cooler conditions and shorter daylight hours in June. The trials used five soils with contrasting phosphorus levels in dry and wet sowing conditions.
- Field trials in 2017 and 2018 were conducted at six sites located

across the Yorke Peninsula and Mid North including Urania, Arthurton, Condowie and Brinkworth. Each site was sown with two wheat varieties, Mace and Trojan, across three times of sowing in late-April, mid-May and early-June. The trials were treated with five different phosphorus rates using monoammonium phosphate (MAP) from 0 to 50 kilograms per hectare. Nitrogen imputs were balanced with Urea. The need for phosphorus inputs and the level that produced the greatest yield in the two wheat varieties was analysed across the different sowing times and sites. The difference between the optimal rate for the greatest yield and the greatest economic gain was also considered.

## RESULTS

Time of sowing dates can significantly influence the response of wheat varieties to applied phosphorus. Potential nutritional budget savings through reduced phosphorus requirements by sowing early is heavily dependent on soil moisture levels at the time of sowing.

There are potential savings to be made if growers can sow wheat crops in ideal conditions, particularly in April. However, there are concerns this could affect phosphorus reserves for future crops with the efficient use of residual soil P reserves. Soil sampling and testing to monitor replacement phosphorus levels is recommended.

Sowing in April to capitalise on the reduced requirement for applied phosphorus inputs relies on effective rainfall prior to sowing. The cooler conditions experienced from mid-May onwards restricts P availability and root development and places a higher reliance on applied phosphorus.

Gross margins from applied phosphorus can be maximised by sowing varieties in their optimal window during cooler sowing conditions. This will be when both responses to phosphorus and fertiliser requirements are at their greatest.

## VALUE FOR GROWERS

Growers can manipulate phosphorus inputs when adequate soil moisture conditions are available in the warmer or earlier period of the sowing window. Crops establish quickly in this scenario, allowing for efficient capture of residual phosphorus reserves and a lower reliance on phosphorus inputs. There is potential for growers to time their sowing in ideal conditions to reduce their fertiliser budget.

Two field walks were held at the Urania site during the project. The results were presented at the Landmark agronomy conference held in February 2019 and a paper was presented at the 2019 Agronomy Conference.

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Three times of sowing were tested across six sites during 2017 and 2018 to investigate the amount of phosphorous required at sowing and which sowing time was optimal for economic decisions.