

# Drill for Yield: Optimising seed rate for cereal crops

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## Introduction

- Economically optimum cereal seed rates vary within different parts of a field due to variation in soil type and fertility (affecting plant establishment and tillering).
- Sub-optimal seed rates result in low yields whilst super-optimal seed rates increase seed costs and the risk of lodging (Figure 1)
- Optimising seed rate will increase yields, reduce crop variability and reduce inputs such as PGRs and herbicides, thus increasing gross margin.

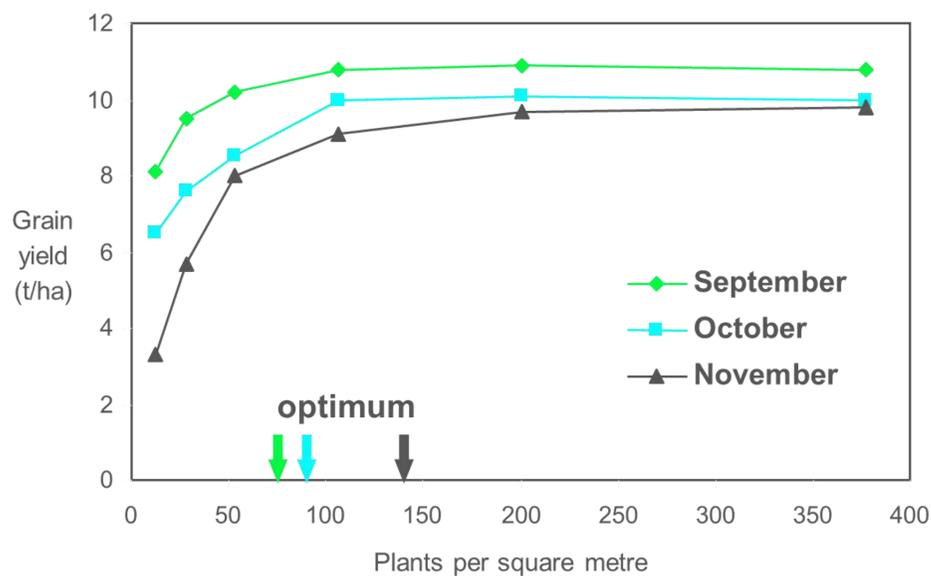


Figure 1. Effect of seed rate and sowing date on grain yield.

## Project Aim

- Develop a practical affordable tool for creating **reliable variable seed rate maps for wheat and barley** from remotely sensed measurements of intra-field variation in shoot number and canopy size.

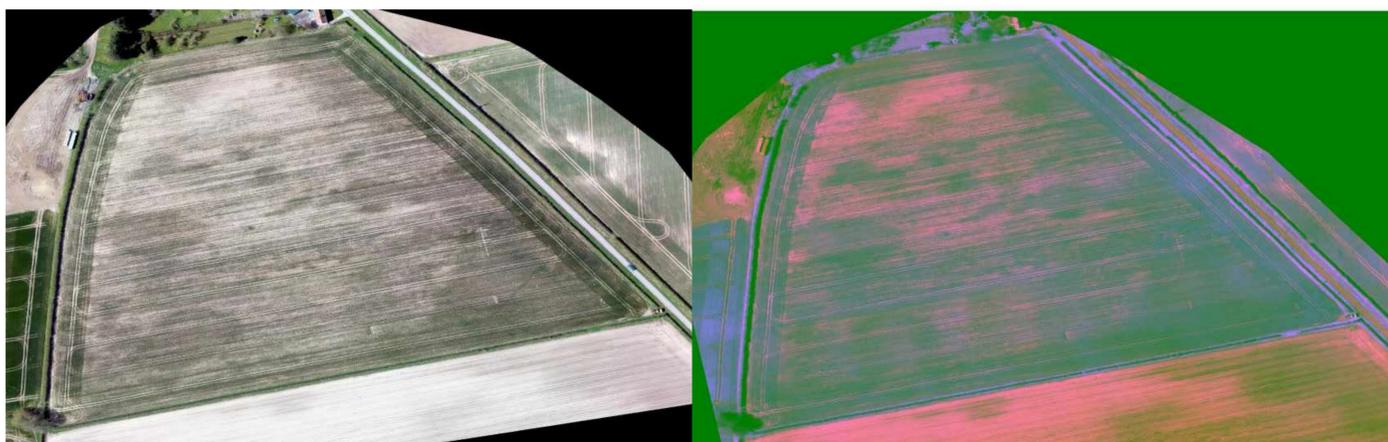


Figure 2. RGB (left) and Infra Red (right) drone aerial image of the 2018 wheat field.

## Acknowledgements



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## Development

- 6 spring barley and 6 winter wheat fields will be ground truthed during the project, with 6 fields done in 2018.
- Each ground truthed field was drilled with seed rates: 50, 100, 200, 400 and 600 seeds/m<sup>2</sup> or had a naturally varying plant population.
- Aerial images from a drone were collected measuring light reflected at a range of wavelengths (e.g. Figure 2).
- At key growth stages, the fields were sampled to determine canopy size, shoot number and biomass.
- The results have indicated some promising correlations between a number of different spectral reflectance indices and shoot number.



Figure 3. Example field scale trial which will be used for validation.

## Validation

- The project will use field scale trials (Figure 3) and **Agronomics** technology to ground truth, test and validate the innovative algorithms and seed rate maps in spring and winter cereals in 2019-2020. These algorithms will be based on using spectral reflectance indices to predict shoot number and therefore optimum seed rates.