

# Rainfall variability trial at Hart in 2021

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## Key findings

- A 17 mm (8%) difference in rainfall was recorded across the 40 ha Hart field site during the 2021 growing season (April – October).
- Rainfall patterns were variable, with results showing that no single location in the paddock received significantly higher rainfall at each rain event.
- Rainfall received for winter and spring months had the most consistent distribution of rainfall across the site when compared to Autumn, with a coefficient of variation (CV) percentage of 8.4% and 10.4%, respectively.

## Why do the trial?

Rainfall distribution is known to be widely variable across agricultural areas. The variability of measured rainfall across these regions is common, due to factors that include the duration and intensity of weather events. The use of remote weather stations, including the Mid-North Mesonet have become useful tools for growers to track rainfall events and compare measured rainfall against various locations, however, the variation of rainfall distribution across smaller cropping areas, is not well known.

This trial aims to identify seasonal rainfall trends and capture the variability of rainfall differences for individual rain events, at a paddock-scale.

## How was it done?

In 2021, 11 manual rain gauges were positioned across 40 ha at the Hart field site (Figure 1). Rainfall measurements from the gauges were measured and recorded after each rainfall event.

Rainfall events ranged from 1 – 5 days, dependent on the persistence of rainfall during this time. This is displayed in Table 1, showing that 44 rainfall events were recorded manually at Hart, compared to the Mesonet with 95 actual rainfall days.

All gauges were calibrated prior to the first rainfall event, ensuring the volumetric capacity of water (mm) was consistent for measurement accuracy. Events below 0.4mm were not recorded.

Rainfall at the Hart field site was mapped using a GIS program to display rainfall patterns for each event, through inverse distance weighted (IDW) interpolation maps (Figure 2).

The variability of autumn, winter and spring rainfall, growing season rainfall, annual rainfall and individual rainfall events was measured.

Table 1. Growing season and annual rainfall summary for the 2021 season at Hart. Rainfall data was sourced from the Mid-North Mesonet.

	Rainfall (mm)	Decile
Annual rainfall	401.0	5
Growing Season (GSR)	231.6	3
	Mesonet (rainfall days)	Manual gauges (recorded rainfall events)
Number of recorded rainfall events	95	44

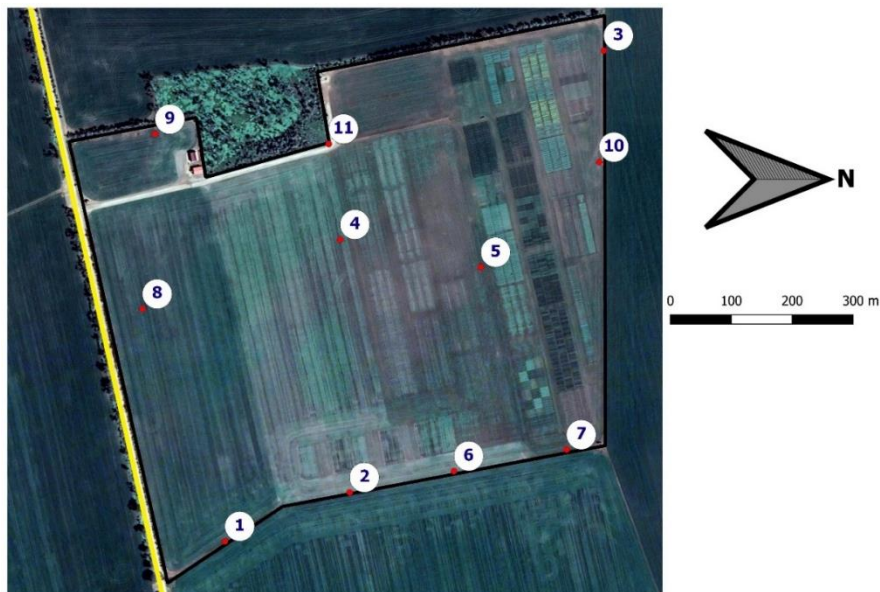


Figure 1. Location of manual rain gauges positioned across the Hart field site in 2021.

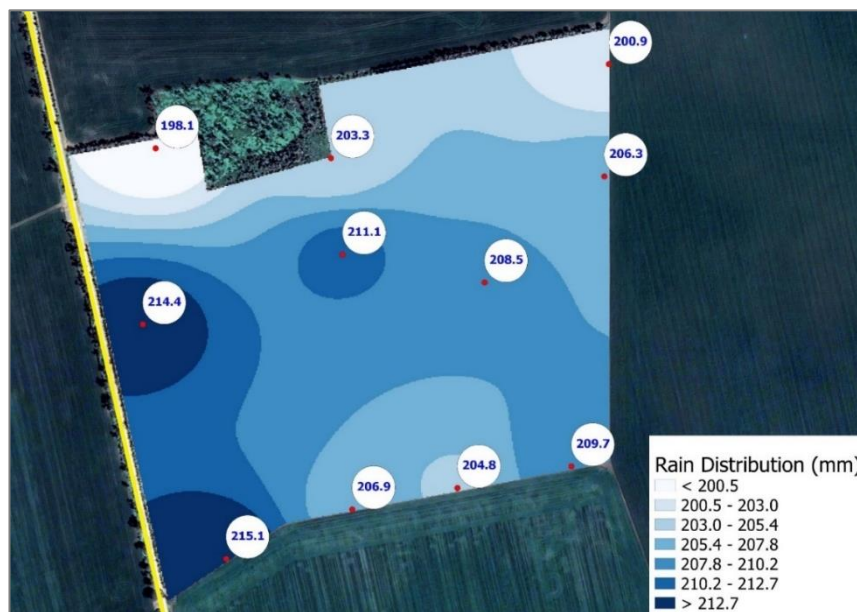


Figure 2. The distribution of recorded rainfall for the duration of the growing season (April – October) for each gauge at Hart.

## Results and discussion

### *Growing season rainfall*

At the Hart field site in 2021, a total of 44 rainfall events were recorded across the growing season, totalling 209 mm of measured rainfall. The highest gauge recorded 215 mm rainfall, compared to the lowest of 198 mm. These observations show that there was a 17 mm (8%) difference in rainfall recorded across the 40 ha site at Hart from April – October (Figure 2).

### *Comparison of single rainfall events*

Rainfall events at Hart less than (<) 5 mm had a higher coefficient of variation (CV%) when compared to events over 5 mm. This means that there were greater differences in rainfall observed for smaller events across the 40 ha paddock, compared to events greater than (>) 5 mm.

Measured rainfall at Hart for events < 5 mm varied by 40 – 80% at each rainfall timing. This means that the recorded rainfall can range from 3 mm to 5 mm across the paddock, as a result of spatial variation. This is considerably higher when compared to events > 5 mm, showing that differences between the lowest and highest rainfall readings for all gauges varied by up to 18%.

Rainfall patterns observed were variable, with results showing that no single location in the paddock received significantly higher rainfall at every recorded rain event. This is displayed in Figure 3.

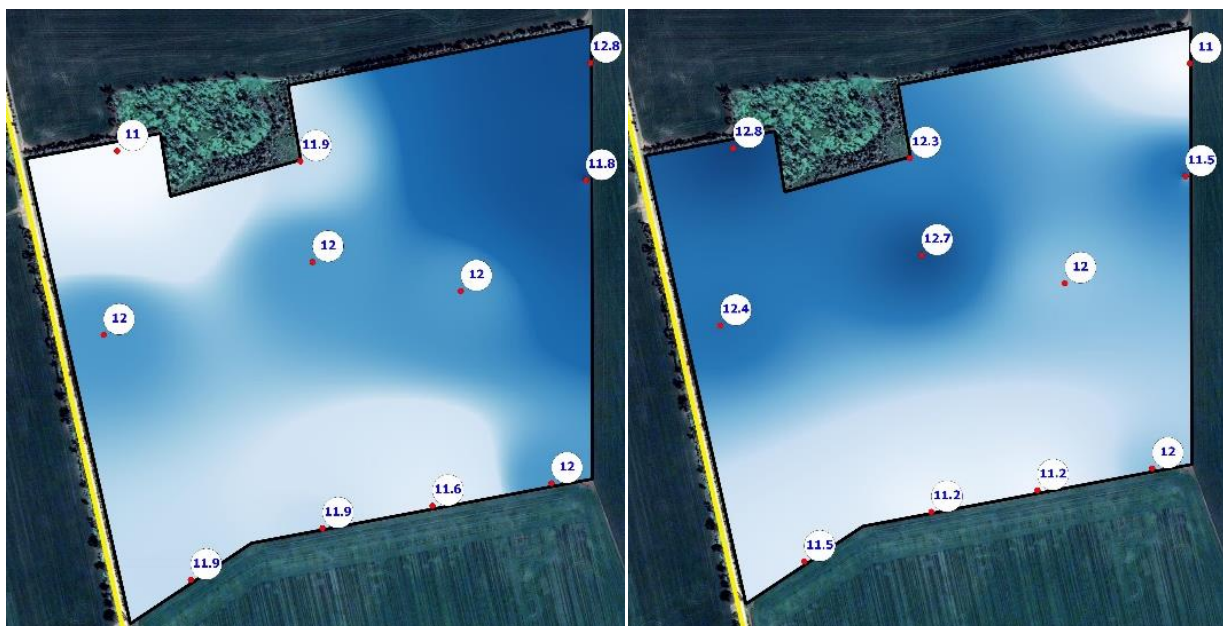


Figure 3. Rain distribution maps of two ~12 mm rainfall events on July 5 (left) and August 3 (right) at Hart in 2021.

### *Rainfall variability across seasons*

The 2021 growing season at Hart had below average rainfall across autumn and winter months. Hart also had below average rainfall for spring, until late November when 118 mm was received. Rainfall for winter and spring months had the most consistent distribution and spread of rainfall across the 40-ha field site, with a CV% of 8.4% and 10.4%, respectively (Table 2). Autumn rainfall was less consistent across the 40 ha site, with a CV% of 19.1%.

Table 2. Seasonal rainfall data including; coefficient of variation (CV%), rainfall event average (mm), rainfall days and total seasonal rainfall (mm) (sourced from the Mesonet).

	Autumn	Winter	Spring
CV%	19.1	9.4	10.4
Event Average (mm)	3.8	3.6	4.3
Rainfall days	14	43	36
Total season rainfall (mm)	52.6	153.8	153.7

At Hart in 2021, seasonal rainfall patterns were variable in their distribution of rainfall across the 40 ha field site (Figure 4). Further rainfall observations would be required to validate trends seen in 2021.

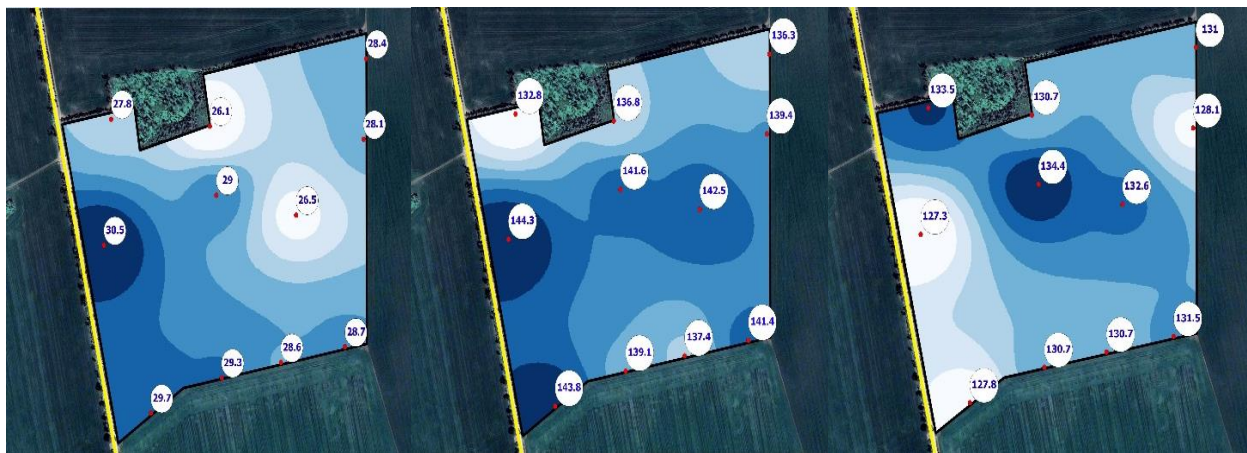


Figure 4. (L-R) Rainfall distribution maps for autumn, winter and spring months at the Hart field site. Dark blue shading represents greater rainfall areas and white shading represents lower rainfall areas for each season at the Hart field site.

## Acknowledgements



The Hart Field-Site Group would like to acknowledge the generous support of our sponsors who provide funding that allows us to conduct this trial. Proceeds from Hart's ongoing commercial crop also support Hart's research and extension program.