Optimising
Irrigated Grains

GRDC
GRAINS RESEARCH & DEVELOPMENT CORPORATION

FAR AUSTRALIA

Irrigated Cropping Council
Promoting irrigated agriculture

Key Learnings (Pre irrigation)

2020 and 2021

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SOWING THE SEED FOR A BRIGHTER FUTURE

Pre irrigation – it's not just 'add water' and enjoy the high yields

Key Learnings:

- **Water savings can be made with improved irrigation infrastructure such as overhead sprays.**
- **Irrigation districts have varying access to water during the winter season, with some irrigators having no access from mid-May to mid-August.**
- **Not having sufficient soil moisture going into winter may leave the crop susceptible to 'winter drought', that can have a negative impact on yield.**
- **Similarly, having a full soil profile at the beginning of winter may increase the risk of waterlogging, particularly with surface irrigation in systems that don't drain well.**
- **Soil type, location and appetite for risk all play a part in irrigators' decisions regarding pre-irrigation.**

Two years of GRDC's Optimising Irrigated Grains (OIG), on top of research conducted under the 'Smarter Irrigation for Profit' project, have highlighted the irrigation decisions that need to be made by irrigators on how and when to use their irrigation water to set up their irrigated crops to be the most profitable.

The changing irrigation environment has seen irrigation water become an input where the price can be highly variable based on seasonal conditions and allocations. Efforts to make irrigation more efficient has seen investment in improved layouts and infrastructure such as overhead sprinklers or fast flow surface irrigation, giving irrigators flexibility in the amount of water applied and the choice of crops.

Pre-irrigation (where fallow paddocks are irrigated prior to the sowing of a crop) has always been a judgment call by irrigators, based on timing to enable timely sowing and adequate moisture for the crop to develop over winter. Using surface irrigation, this could mean using anywhere between 0.75 to 2.0 Mega litres/ha (75-200mm/ha) to wet up the soil profile. The timing of pre-irrigation must be considered in order to allow the paddock to dry sufficiently to enable sowing on time, but not to dry too much and then be at the mercy of 'the autumn break' for sowing similar to a dryland grower. Many irrigators have a story about the pre-irrigation that went badly – where it rained, and sowing couldn't proceed or winter waterlogging was detrimental to the crop as the soil profile was full going into winter. However, pre-irrigation does provide soil moisture over winter as some irrigation regions do not have access to water between 15 May and 15 August to allow the water authorities to service and repair the water delivery network.

Irrigators have installed overhead irrigation as a means to be able to have more control over the amount of water applied. Instead of the large volume of water applied via surface irrigation as a pre-irrigation, irrigators can apply enough water to ensure timely establishment of their crop. This can be a considerable saving of water but does then run the risk of a 'winter drought' if the winter period is dry and winter rainfall is inadequate to meet the needs of the crop. In these cases, yield potential is lost before the irrigation water becomes available in the spring. In shorter season crops or in warmer regions where spring growth occurs earlier (before mid-August) yield potential starts to be reduced since crops are stem elongating but without the water reserve to sustain this period of rapid development.

The OIG project, with its geographically diverse project partners, has illustrated the different thinking that drives irrigators decision making on irrigation. Higher rainfall regions are unlikely to pre-irrigate due to the risk of autumn irrigating leading to waterlogging if they go into winter with a full profile.

Similarly, those in the east of the Murray and Murrumbidgee valleys are more confident of a timely break for sowing and follow-up winter rainfall to get the crop through to the spring when irrigation can commence. Those to the west who have soils (e.g. grey clays) that require more water to fill the profile, are less confident of the break being in late April/early May and have lower winter rainfall to tide them over until the irrigation season opens in the spring. Depending on the crop type, restoration of yield potential with spring irrigation following a winter drought can be more limited with early maturing wheat, since it has already started developing rapidly whilst the crop is under spring drought conditions. In some cases, the restoration of yield potential is adequate (e.g. faba beans) but this does depend on whether heat stress was additional to the lack of soil moisture and becomes part of the yield equation. These geographical differences also manifest themselves in the responses to disease management where irrigation does not appear to favour conditions that promote the fungal diseases compared to the naturally more disease prone high rainfall zones.

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