



ADDING VALUE TO AUSTRALIA'S CANOLA INDUSTRY



Australian grain growers have increasingly embraced canola as a profitable winter crop option with annual plantings tripling over the past 20 years to more than 2.5 million hectares.

The challenge

Australia currently produces three to four million tonnes of canola each year which contributes more than \$2 billion to the national economy.

With more than two thirds of the national crop exported, Australia is a major player on the global export stage, dominating the European market where it is primarily used as a biofuel feedstock.

Canola's versatility lies in the fact it can be processed into both oil and meal which contributes to the stability of grower returns, particularly given the burgeoning growth in consumer and end-user demand for healthier oil alternatives, biofuels and meal for stockfeed.

In addition to its gross margin potential, canola provides agronomic benefits as a rotational break crop for cereal root and crown diseases and offers a wide spectrum of weed management options.

However, canola production isn't without its challenges, particularly in the less-reliable rainfall regions. Although growers recognise the crop's profitability potential and farming system benefits, there remains a perceived production risk due to the high level of inputs required, such as seed, nitrogen fertiliser, sulphur fertiliser and windrowing.

Overcoming these challenges necessitates better adapted varieties, an improved understanding of canola's yield drivers and the development of more robust agronomic management guidelines across a range of production environments.

The response

Over the years, the GRDC has invested in an extensive range of projects to improve knowledge and management of weeds and pests, diseases, soils, farming systems,

herbicide use and tolerance as well as improvements in nutrient and water efficiency use.

Between 2013/14 and 2017/18 alone, the GRDC individually invested more than \$36 million in 67 canola research projects focussing on improving yield. With research partner contributions and in-kind support, the total industry investment in yield improvement projects over this period totalled \$76 million.

This included projects such as tactical break crop agronomy and achieving stable and high canola yield across the rainfall zones of Western Australia; as well as several projects focussing on areas such as heat stress and crop establishment conducted under the GRDC and New South Wales Department of Primary Industries (NSW DPI) strategic agreement, the Grains Agronomy and Pathology Partnership.



In recognition that yield increases are critical to boosting farming system productivity and profitability, significant research efforts have been directed into improving the understanding the drivers of canola yield.

An example of this work is the Optimised Canola Profitability (OCP) project (CSP00187) which has conducted fundamental research on canola phenology, physiology and tactical agronomy to improve canola yield and profit.

Spanning nine cropping zones in the GRDC southern and northern regions, the research was a collaborative effort between the GRDC, CSIRO and NSW DPI in partnership with the South Australian Research and Development Institute (SARDI), Charles Sturt University, Mallee Sustainable Farming and Birchip Cropping Group.

Although targeted at the low and medium rainfall zones, the project has linked with similar GRDC supported projects in Western Australia and high rainfall zones.

The OCP project conducted a broad range of field experiments and modelling simulations to improve canola profitability including:

- Phenology experiments to determine the triggers for canola development and help understand when a variety will flower in a particular environment.

- Variety x time of sowing experiments to examine how flowering time influences canola yield and water use efficiency across a range of environments.
- Critical stress period experiments to ascertain the period (growth stage) when canola yield is most vulnerable to external stresses such as water, heat or frost.
- Risk management experiments aimed to make canola yield more stable and profitable in the low rainfall zone.
- Experiments to improve the way the canola accumulates biomass to optimise grain yield across a range of environments. In general biomass accumulation drives yield as harvest index is reasonably stable.
- Improving the ability to model canola growth and yield using Agricultural Production Systems sIMulator (APSIM). The canola model was developed some time ago with older varieties and different grower practices.
- Improving harvest management, particularly through improved windrow timing. Despite a focus in northern NSW, the message to not windrow too early (with significant yield penalty) holds true in the southern region.

Field experiments and modelling conducted in the first few years of the project helped to better understand the drivers of canola

development (temperature, day length) in modern varieties, as well as improving the understanding of how early sowing of canola influences varietal phenology (flowering time) and grain yield.

This information improved researchers' ability to simulate canola growth under Australian conditions, so that models could be used to evaluate a range of scenarios not possible in just a few years of field experiments.

The impact

The OCP project demonstrated the importance of matching sowing time with varietal phenology as a means of optimising canola yield, so that the start of flowering occurs in a window where the risk of water, heat and frost stress to flowers and pods is minimised.

Phenology information for most of the currently available canola varieties, particularly their response to early sowing, is now known and can be used to aid variety selection.

At the same time, well-adapted hybrid varieties planted in the low rainfall zones have been shown to produce profitable, stable canola yields, even in dry seasons.

A recent OCP Impact Survey report compiled by the CSIRO highlighted the extensive industry value and adoption of the research, finding that:



- 84 per cent of the 90 consultants surveyed were aware of the OCP project.
- The area of canola managed or consulted to by those surveyed was approximately 700,000 ha.
- Of those aware of the project, 68 per cent had made practice change as a result of the OCP work.
- The estimated value of the practice change was \$74 million annually.

This equates to an additional \$29.60 per hectare per year of revenue following the adoption of the OCP practice change.

The OCP project’s practical value typifies the broader return on investment across GRDC’s portfolio of canola research projects.

Since 2013/14 there has been a net increase in the value of production of canola, above the rainfall trend, suggesting that the range of research projects into improving yield and refining agronomic management are translating into benefits for the industry.

Cost benefit analysis undertaken by GRDC shows that every dollar invested in canola research by GRDC and its research partners returned \$2.78 in benefits to industry within the first five years, with the returns accruing significantly over time.



Port Lincoln grain grower and chairman of LEADA, Mark Modra, says “As growers we recognise the value of early sowing opportunities given that early sowing can be a key yield driver.” Photo: GRDC

Validation

South Australian grain grower Mark Modra is a strong supporter of research into canola phenology, agronomy and pathology, believing it is crucial for the long-term viability of the Australian canola industry.

He’s hosted a range of research trials on his farming properties on the lower Eyre Peninsula, including as part of the OCP project.

Canola has long been part of the Modra’s crop rotation given its suitability to the growing conditions, farm management program and gross margin potential.

However, staying abreast of research outcomes and the resulting implications for agronomic and disease management is a priority

from a crop risk management perspective, particularly given input costs and disease pressures.

He has closely followed the outcomes of the OCP trial work and said they confirmed the importance of targeted agronomic planning and management, especially in varietal selection and time of sowing.

“Timing is everything and it’s critical to identify the optimum flowering window for your region and then match the variety and sowing date accordingly,” Mr Modra said.

“That said, we are fortunate that our production environment favours a relatively broad canola planting window which enables us to take advantage of early or delayed sowing opportunities as dictated by the seasons.



“As growers we recognise the value of early sowing opportunities given that early sowing can be a key yield driver.

“But at the same time, we’re conscious of managing other factors such as crop nutrition and disease - particularly blackleg but also sclerotinia stem rot - to fully capitalise on yield opportunities.

“Research like the OCP project is vital because it strengthens our understanding of the link between canola physiology and tactical agronomic management and means we can make informed decisions to maximise potential crop yield and profitability.”

Outcomes from the OCP project have attracted widespread interest from growers and in late 2019, the GRDC and its research partners conducted a series of workshops across New South Wales, Victoria and South Australia providing practical insights into sowing time, growth periods and flowering, regional varietal selection, seed placement and rates, weed, pest and disease management, soil nutrition and windrow timing. These were attended by 472 people who influenced canola decisions on 710,000 or close to 2/3 of the canola area grown in the project region.

References and resources

Canola GrowNotes
Ten Tips to early sown canola
<https://grdc.com.au/10TipsEarlySownCanola>

2019 Update paper
<https://grdc.com.au/resources-and-publications/grdc-update-papers/tab-content/grdc-update-papers/2019/02/optimised-canola-profitability-an-overview-of-five-years-of-canola-agronomic-research-in-south-australia>

GroundCover article
<https://grdc.com.au/resources-and-publications/groundcover/groundcover-134-may-june-2018/growing-canola-the-never-ending-lesson>

GRDC podcast *Canola First*
<https://grdc.com.au/news-and-media/audio/podcast/canola-first>

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