

Early sowing systems improve profitability and reduce risk for canola production in south-eastern Australia

Julianne Lilley¹

Laura Goward¹
John Kirkegaard¹
Jeremy Whish²
Rohan Brill³
Andrew Ware⁴

¹ CSIRO Agriculture and Food, Canberra, Australia

² CSIRO Agriculture and Food, St Lucia, Australia,

³ BrillAg, Ganmain, Australia,

⁴ EPAG Research, Port Lincoln, Australia

Background:

Matching the critical period of yield development to optimal seasonal conditions through variety and sowing time choice maximises potential yield. The optimal period for flowering in canola has been established across the Australian cropping zone (Lilley et al. 2019). Modern agronomic practices and canola breeding developments have made early-sowing systems feasible and previous field experiments have demonstrated the potential benefits of earlier sowing (Kirkegaard et al. 2016).

Objective:

We aimed to determine the combination of sowing dates and cultivar phenology to optimise productivity and reduce risk for early-sowing systems across a broad range of sites and seasons across the Australian cropping zone.

Methods:

We conducted 40 field experiments from 2014–2019 comparing traditional (after 25-April) and earlier canola sowing systems (early to mid-April) in south-eastern Australia. In addition to sowing date, agronomic factors including cultivar (hybrid vs OP), plant density and nitrogen rate were varied at 14 locations over 5 years. We used the data to validate the APSIM-Canola model and conducted a factorial simulation analysis to assess the impact of the same factors across a greater range of seasonal conditions.

Results:

Sowing slow-developing cultivars in early to mid-April rather than in late-April, provided average yield benefits of around 0.4 t/ha (often up to 1 t/ha) while major yield penalties occurred when fast-maturing varieties were sown too early. Contrary to industry concerns, early-sown hybrids with robust N supply generally outyielded later-sown low-vigour varieties even under dry seasonal conditions. The simulation analysis predicted the highest median yields of 4.2–4.8 t/ha for winter canola sown between 15-March and 1-April, and slow-developing spring cultivars between 1–15 April at cool, higher-rainfall sites. Under drier conditions (low-rainfall sites, or dry years), varieties with faster rates of phenological development had increased yield when sown later (15-April to 15-May). The greatest yield penalties for mis-matched phenology type and sowing date were seen for spring types with fast rates of development sown before mid-April (up to 2 t/ha loss) while penalties for sowing slow cultivars late were smaller (up to 1 t/ha). An analysis of rainfall distribution demonstrated that southern NSW had the greatest potential yield benefits from early sowing (before 20-April) due to more early sowing opportunities linked to reliable April rainfall.

Conclusions:

Earlier sowing systems provide benefits of increased productivity in much of the south-eastern Australian cropping zone and sowing recommendations changed significantly as a result of this work. Successful earlier sowing systems require matched sowing date x cultivar combinations to minimise risk of stress during the critical period for yield development and agronomic packages. These include considerations of hybrid varieties, recommendations for N management and soil water/rainfall triggers for successful establishment.

References:

- Kirkegaard JA, Lilley JM, Brill RD, Sprague SJ, Fettell NA, Pengilly GC. (2016). Re-evaluating sowing time of spring canola (*B. napus* L) in south-eastern Australia – how early is too early? *Crop & Pasture Science* 67:381–396.
- Lilley JM, Flohr BM, Whish JPM, Farre I, Kirkegaard JA (2019). Defining optimal sowing and flowering periods for canola in Australia. *Field Crops Research* 235:118–128.