

Lentil phenology and grain yield response to sowing date in southern and central western NSW

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Lentil (*Lens culinaris* Medik.) growth is affected by genotype, management and environmental conditions such as temperature and soil water availability during the growing season. Lentil research conducted under the Grains Agronomy and Pathology Partnership (GAPP) aims to understand the phenological drivers of crop development across three contrasting environments of southern and central western NSW.

Experiments were conducted in 2018 at Yanco, Wagga Wagga and Leeton in southern NSW, and Trangie in central western NSW. A total of eight diverse varieties were sown on each of four sowing dates, occurring fortnightly from mid-April to the end of May. Phenology, biomass, yield and yield components were evaluated to understand the drivers of crop growth and development. The 2018 growing season was one of the most difficult and extreme on record with a high incidence of frost and below average growing season rainfall across the experimental sites.

At all sites, as sowing was delayed, lentil took longer to emerge, had accelerated development and flowered and podded quicker. Sowing time had no effect on establishment. Yield was largely driven by temperatures during flowering and podding, with lower temperatures resulting in flower and pod drop. In the southern sites, initial findings indicate that late April and mid-May are optimal sowing times. However, in the warmer central western site at Trangie, optimum yields were obtained in the mid-April and late April sowing dates. Results from the Leeton trial site demonstrated that when optimal water levels are available during sowing, the optimum sowing window can be lengthened to include late May sowing. This however would not be recommended as harvest efficiency may be decreased due to lower plant and pod heights.

High biomass levels in the early April sowings at the Leeton experiment combined with the dry spring conditions resulted in exposure to higher levels of moisture stress during pod fill. Limited pre-irrigation coupled with only 87 mm of in-crop rainfall affected overall plant biomass accumulation, and resulted in low mean yield as observed at the Yanco experiment.

Severe frosts and moisture stress interacting with sowing date, variety and phasic development had the most significant impact on grain yield. There were significantly higher numbers of unfilled pods in the mid-April sowing due to an interaction between flowering time and frost damage. This research will improve lentil profitability through better understanding the adaptation to different environments and agronomic management for lentil in the southern and central western NSW regions.