

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

Lancelot Maphosa¹

Tony Napier¹, Leigh Jenkins¹, Aaron Preston¹ and Mark Richards¹

¹ NSW DPI

Chickpea (*Cicer arietinum* L.) growth is highly dependent on environmental conditions such as temperature and soil water availability experienced during the growing season. Chickpea research conducted under the Grains Agronomy and Pathology Partnership (GAPP) aims to understand the phenological drivers of crop development across three contrasting environments of central western and southern NSW. Experiments conducted in 2018 at Yanco, Wagga Wagga and Leeton in southern NSW, and Trangie in central western NSW, aimed to increase the understanding of phenological drivers of chickpea productivity in these regions. Sites were selected due to their different environmental characteristics. Four sowing date treatments were applied (SD1–SD4), occurring fortnightly from mid-April to the end of May. Phenology, biomass accumulation, yield and yield components were measured to understand the drivers of crop growth and development and genotype × environment interactions. 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.

Initial findings indicate that time of sowing did not affect establishment. As growing degree days (GDD) affect time to emergence, emergence was delayed in later sowing dates as temperatures decreased in late autumn and photoperiod decreased. The critical 115 GDD threshold for chickpea emergence was reached in 6 days (SD1) to 12 days (SD4) in the cooler southern sites and between 6–10 days in the warmer central western site. The mean accumulated thermal time to flowering ranged from 1049 to 1117 GDD at Leeton and Yanco respectively for SD4, and from 1227 to 1544 GDD at Yanco and Wagga Wagga respectively for SD1.

At Yanco, limited pre-sowing moisture and low (87mm) in-crop rainfall shortened the duration of the growth season, causing varieties such as PBA Striker and GenesisTM 079 to flower and pod significantly earlier than normal. This resulted in low biomass accumulation and a mean yield of 1.23 t/ha averaged across sowing dates and varieties. As a comparison the Leeton site, 7km west of Yanco, had optimal water availability at sowing, widening the sowing window, and showed significant interaction between sowing date and variety on grain yield.

Overall yield was influenced by a number of yield components such as the number of pods, filled and unfilled pods, seed number and seed weight. Grain yield was driven to a large extent by temperatures during flowering and podding, with lower temperatures resulting in flower and pod drop.

Across ecological zones, differing optimum sowing dates were observed for different varieties, with the second and third sowing dates (end of April to mid-May) producing higher

yields at Yanco and Wagga Wagga, while there was no effect of sowing date at Leeton and Trangie. Late planting exposed seedlings to low temperatures which affected biomass accumulation, flower viability, pod drop and overall yield.

This research will improve chickpea profitability through better understanding the adaptation to different environments and agronomic management in the southern and central western NSW regions.