

Soybean Seeding Depth Evaluation

Soybean yield was maximized by seed depths ranging from 0.75–1.75 inches, with 1.25 inches producing the greatest yield, on average. There was no benefit to chasing moisture and seeding soybeans deeper than 1.75 inches.

DRY CONDITIONS OVER the past few years have enticed farmers to drive soybean seed deeper than usual (>2 inches) to connect with soil moisture. The current recommendation to seed soybeans between 0.75–1.5 inches deep is based on guidelines from other regions and the range of seed depths reported by farmers and agronomists is much wider. Understanding the yield impact of soybean seed depth under Manitoba conditions became a clear priority.

The objective of this study was to identify the optimum seeding depth for soybeans in Manitoba, through evaluation of plant density, nodulation, root rot, pod height, maturity and yield.

Seeding depths ranging from 0.25–2.25 inches were tested at Arborg (clay soil) and Carman (loam soil) from 2017 to 2019 in small-plot field trials. All trials were seeded into tilled stubble, except at Arborg in 2017 which was seeded into tilled fallow. Growing conditions were drier than normal across all site-years, with cumulative May and June precipitation at 40–87% of normal. Although soil moisture was not measured, moist soil was often observed to be at 1.25 inches or deeper at the time of seeding.

Soybean seed depths of 0.5–2.25 inches resulted in maximum plant density, with plant stands ranging from 140–170,000 plants/ac, on average. Shallow seeding (0.25 inches), on the other hand, significantly reduced plant stands to 81,000 plant/ac, on average. Shallow seeded soybeans were subject to moisture fluctuations at the soil surface, which resulted in desiccation and failed germination. Deep seeded soybeans (2.25 inches) produced an acceptable plant stand but emergence was delayed, increasing risk of soil pathogens and pests,



and seedlings showed signs of stress, including hypocotyl swelling, loss of cotyledons and chlorosis.

The seed depth range that maximized yield was 0.75–1.75 inches, with yield maximization at 1.25 inches (Figure 1). Shallower and deeper seeding reduced yield by 19% and 10%, respectively. Shallow seeding was more detrimental than deep seeding, likely due to dry conditions. Yield loss from non-optimal seed depth in this

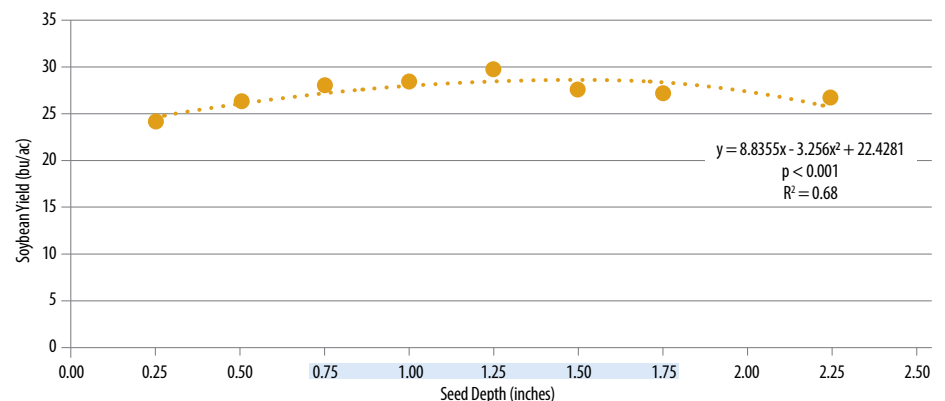
study was likely due to delayed emergence, reduced plant stand and reduced seedling vigour (e.g., hypocotyl swelling, chlorosis and loss of cotyledons).

To answer questions posed by farmers and agronomists, pod height, days to maturity, nodulation and root rot were all evaluated. Pod height was significantly influenced by seed depth and environment, although environment had a greater influence. Seed depths of 0.5–2.25 inches produced the highest pods (3.5–3.9 inches, on average), while shallow seeding significantly reduced pod height (3.1 inches, on average). Soybean maturity was influenced by environment but not seed depth. There was no effect of seed depth on nodulation nor root rot.

Overall, soybeans should be seeded within the optimal range of 0.75–1.75 inches, adjusting within this range depending on soil moisture, soil type, equipment and management practices.

This study provides evidence that even under dry conditions there is no benefit to chasing soil moisture beyond 1.75 inches. ▶

Figure 1. Relationship between soybean seed depth and soybean yield based on six site-years in Manitoba (Arborg and Carman from 2017–2019). Seed depths of 0.75–1.75 inches maximized yield.



PRINCIPAL INVESTIGATOR Kristen P. MacMillan, University of Manitoba

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