

SOYBEAN PLANTING DATE IMPACTS THE RESPONSE TO AGRONOMIC MANAGEMENT



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Objective: Assess how early planting date influences the management practices that are needed to optimize soybean productivity.

Introduction

In the midwestern US, corn (*Zea mays* L.) is typically planted before soybean [*Glycine max* (L.) Merr.] due to its higher yield and greater potential for profitability per acre compared to soybean. However, with advancements in genetics and seed treatments resulting in a more resilient crop, soybean can now be planted earlier, and this change has clear implications on how the crop needs to be managed for optimal productivity.

Materials and Methods

Soybean was sown at 345,000 plants ha⁻¹ at Champaign, IL on a Flannigan silt loam soil with conventional tillage on either 23 April, 9 May, 31 May, or 15 June 2022. Typical soybean planting dates for the region would be the middle of May. At each date, the yield response to four management factors was evaluated in a split-split-split block experimental design (Figure 1).

The factors evaluated were:

- 1) 16 varieties [2.7 to 4.2 maturity group (MG)]
- 2) Two row spacings (51 or 76 cm)
- 3) Two preplant fertility plans (none or 67 kg P₂O₅ and 17 kg S ha⁻¹ as MicroEssentials S10)
- 4) Two foliar protection plans (none or R3 fungicide as Miravis Top with insecticide as Endigo ZC at 1 L and 292 ml ha⁻¹, respectively)

All plots were harvested for grain yield and expressed at 0% moisture.

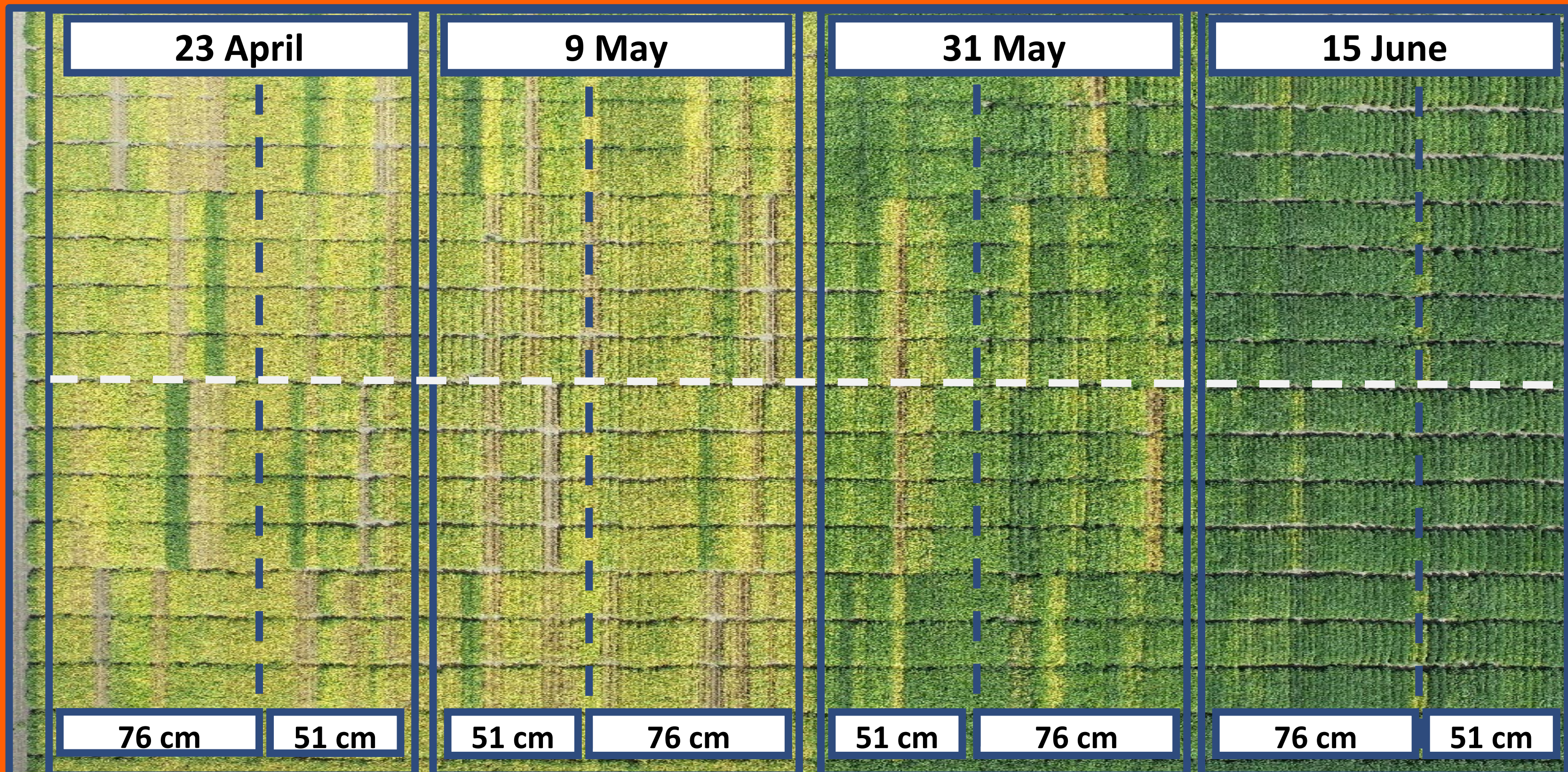


Figure 1. A split-split-split block design utilized to assess how an individual soybean variety responds to different planting dates and management practices. Drone photo displays two of four replications.

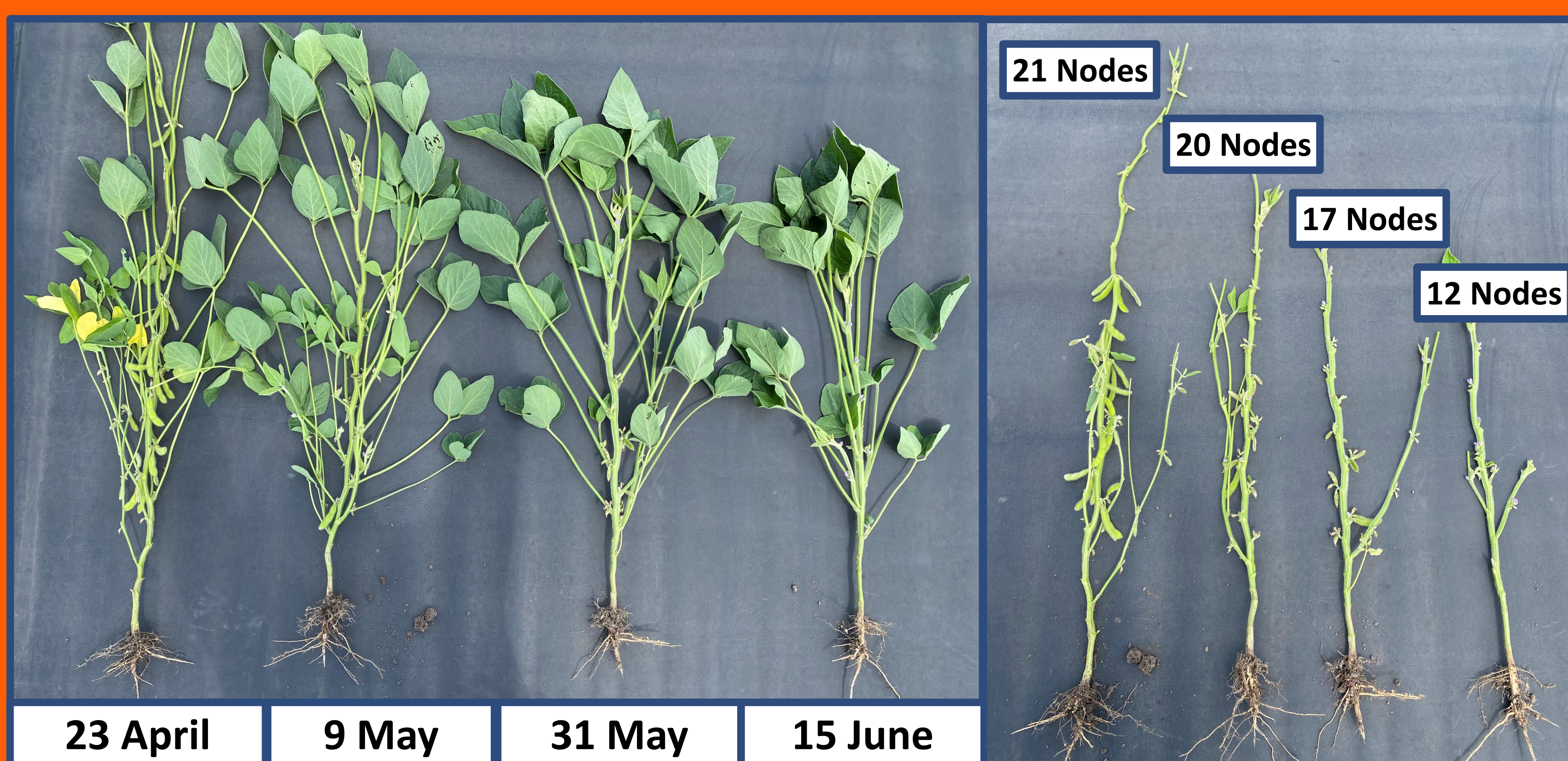


Figure 2. The effect of planting date on soybean node growth. Picture of variety GH373XF taken 31 July.

Results and Discussion

Early planting led to taller soybean plants with more leaf area per plant and with more nodes per plant (Figure 2). More nodes increases the possibilities for more pods and seeds that are important for producing greater yields.

Averaged across the management practices and varieties, grain yield was highest with earliest planting date and decreased linearly at a rate of 22 kg ha⁻¹ dry weight per day with each successively-later planting date (Figure 3A). Later MG varieties were needed to optimize yield when planted early but were not a penalty with the middle or late plantings, and early MG varieties were not better with the late plantings (data not shown).

Row spacing interacted with planting date to affect yield. The 9 May planting yielded significantly more in the 76 cm rows, but for all the other dates, there was numerically greater yields when grown in 51 cm rows (Figure 3B).

Fertilizer only modestly increased grain yield, and only significantly for the 9 May and numerically for the 31 May planting dates (Figure 3C). Somewhat surprisingly, fertility was not required for the earliest 23 April planting date, even though it resulted in the highest grain yield.

Foliar protection was the only management practice that consistently increased grain yield at all planting dates with increases ranging from 0.18-0.23 Mg ha⁻¹ (Figure 3D). These consistent increases suggest that the value of maintaining leaf health is similar regardless of the yield level and regardless of the amount of leaf area or the growth stage timing of leaf protection application.

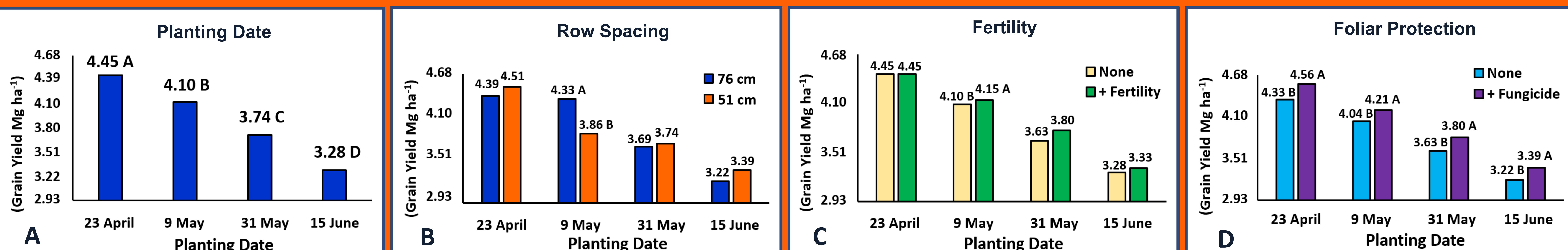


Figure 3. Soybean yield averages presented with differences in planting date (A) and its interactions with row spacing (B), fertility (C), and foliar protection (D). Yields are presented at 0% moisture and are the average of sixteen varieties.

Conclusions

Early planting of soybean is a management practice that can significantly increase grain yield compared to normal or late planting dates, and other than using later MG varieties for the region and providing foliar protection it does not appear to require any additional management to optimize yield.

Conversely, late-planted soybean may need additional management such as fertility and narrow row spacing to achieve optimal yield even though the final yield is less than the maximum potential.