ToPPS-2025: Key Findings At A Glance

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Abstract

The Total Potato Production System (ToPPS) 2025 evaluated potato crop performance across major growing regions of New Brunswick. Ten commercial fields representing processing and table stock varieties were monitored weekly to assess emergence, growth, yield, and tuber development. Crop emergence was strong and provided a consistent foundation. Varietal differences were evident, with processing types such as Russet Burbank and Innovator showing greater vegetative growth.

As the season progressed, precipitation differences became the key driver of variability. Northern regions received above-average rainfall, Wicklow experienced near-normal conditions, while southern areas faced below-average precipitation and late-season dryness. These differences influenced canopy development and plant height.

At harvest, moisture conditions affected yield and tuber size. Adequate rainfall supported higher yields and larger tubers, while drier conditions reduced yield and increased the proportion of small tubers. Stem number and tuber set remained largely consistent across locations, indicating that moisture stress primarily affected later growth stages, while early-season conditions were generally favorable, as supported by precipitation data. Planting date also influenced outcomes, with earlier plantings generally achieving higher yields, while later plantings were more exposed to moisture stress during tuber bulking.

1. Introduction

The Total Potato Production System (ToPPS) 2025 project was carried out to monitor and evaluate potato crop development, pest and disease pressure, tuber quality, and overall crop performance across major potato-producing regions of New Brunswick. Ten cooperating growers—representing both table stock and processing potatoes—were selected from key production areas between Woodstock and St. André, including Carleton, Victoria, and Madawaska Counties. One field from each participating farm was monitored weekly throughout the growing season, providing a representative overview of crop performance under local management practices and environmental conditions.

Standardized field assessments were conducted throughout the season to collect data on crop emergence, stem count, plant height, tuber development, and pest and disease incidence. During the preharvest period, additional measurements—including tuber number, tuber size distribution, and estimated yield—were recorded. Field data and local weather information were analyzed at the Potato Development Centre in Wicklow, and weekly field-specific and regional summaries were shared with growers to support in-season decision-making.

This report summarizes the key findings from the 2025 season, incorporating weather trends alongside field observations to better understand the factors influencing crop growth and yield.

2. General Information of Participating Farms

The participating farms in the ToPPS 2025 project represented both the South (Carleton County) and North (Victoria and Madawaska Counties) potato-growing regions of New Brunswick. A range of commonly grown processing and table varieties—including Russet Burbank, Lamoka, Innovator, Caribou Russet, and Highland Russet—were planted between mid-May and early June, with in-row spacing varying from 9" to 18.5" depending on farm practices and equipment. Crop rotations (Table 1) differed across farms, ranging from two-year to three-year cycles and incorporating various preceding crops such as cereals, legumes, forage mixes, and cover crops.

Table 1. General Information of the Participating Farms

Farm Code	Region	Variety	DOP	Spacing	Rotation
Farm S1	South	Russet Burbank	29-May	17.3"	3 (Oat–Wheat f.b. Fall Cover Crop* – Potato)
Farm S2	South	Lamoka	4-Jun	9"	2 (Barley – Potato)
Farm S3	South	Lamoka	17-May	11.8"	3 (Soybean – Oat – Potato)
Farm S4	South	Russet Burbank	17-May	15.5"	3 (Potato – Corn – Sudan/Millet)
Farm S5	South	Innovator	13-May	10"	3 (Oat – Cover Crop** – Potato)
Farm N1	North	Russet Burbank	14-May	17"	3 (Oat – Clover+Ryegrass – Potato)
Farm N2	North	Caribou Russet	14-May	10.5"	2 (Potato – Oat – Hay)
Farm N3	North	Russet Burbank	28-May	18.5"	2 (Sorghum Sudan Grass – Potato)
Farm N4	North	Russet Burbank	12-May	16"	2 (Red Clover+Ryegrass – Potato)
Farm N5	North	Highland Russet	29-May	11"	3 (Alfalfa Grass Mix – Alfalfa Grass Mix – Potato)

f.b.: Followed by. * Sorghum Sudan Grass, Oat, Oilseed Radish,
** Underseeded Red Clover, Timothy, Alfalfa

3. Crop Emergence, Crop Growth and Yield

3.1. Crop Emergence

Emergence progressed well across all monitored fields, with most crops reaching full emergence by late June. Warmer conditions in mid-June supported rapid emergence across all regions. Overall, emergence performance was strong and generally consistent across processing and table varieties.

Figures 1–3 summarize emergence status relative to planting date, variety, and plant stand counts. French fry varieties—primarily Russet Burbank—showed emergence ranging from 89% to 103%. The chip variety Lamoka displayed uniform emergence at 87% across both planting dates, supported by strong plant populations. Table stock varieties (Caribou Russet and Highland Russet) also showed consistent emergence, both at 87%, with plant populations reflecting good stand establishment despite differences in spacing.

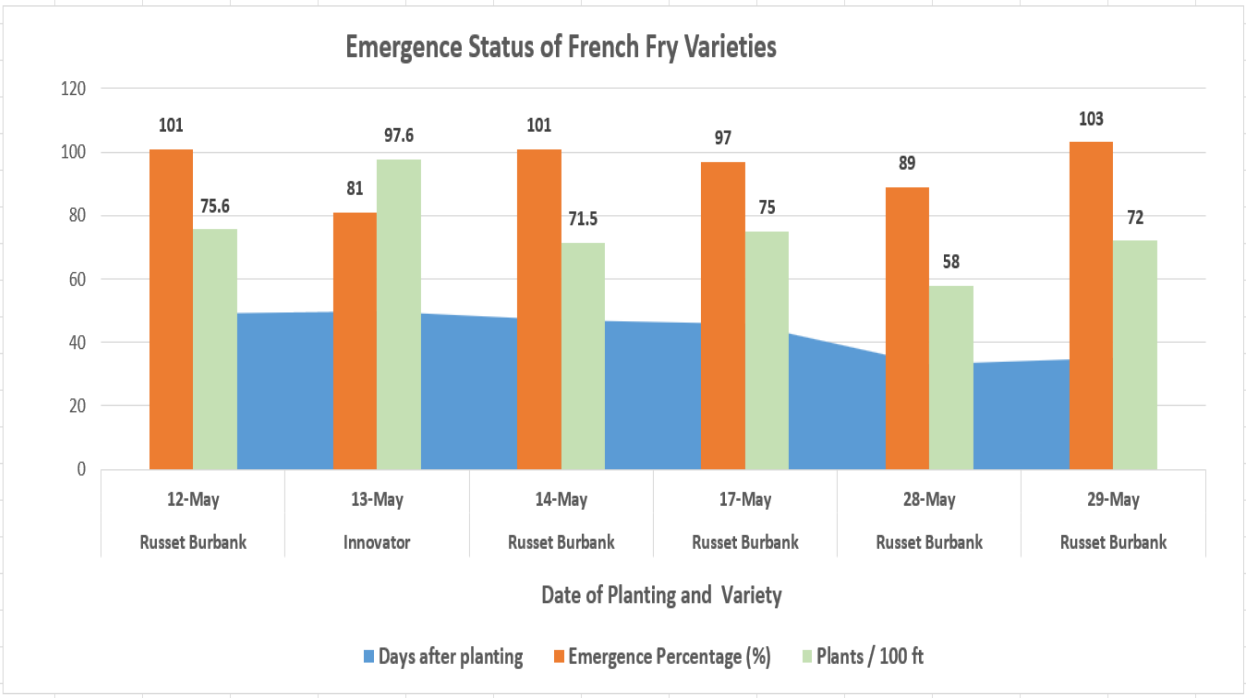

Figure 1. Potato Emergence Status by Planting Date, French Fry Variety, and Days After Planting

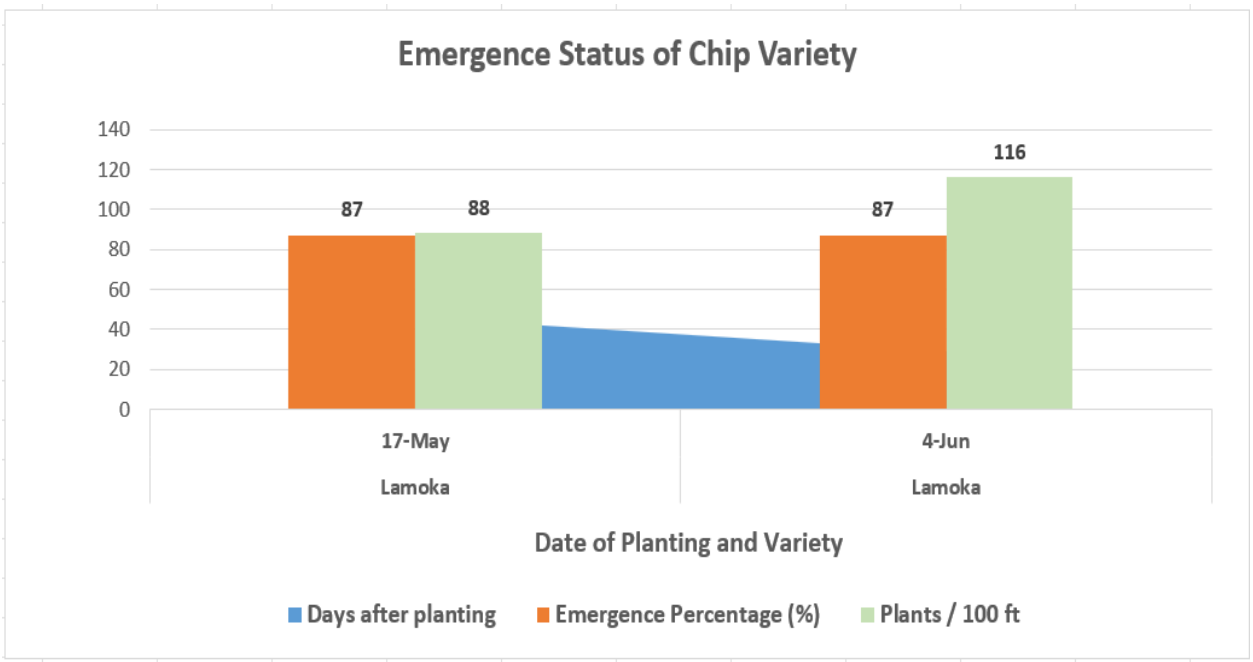

Figure 2. Potato Emergence Status by Planting Date, Chip Variety, and Days After Planting

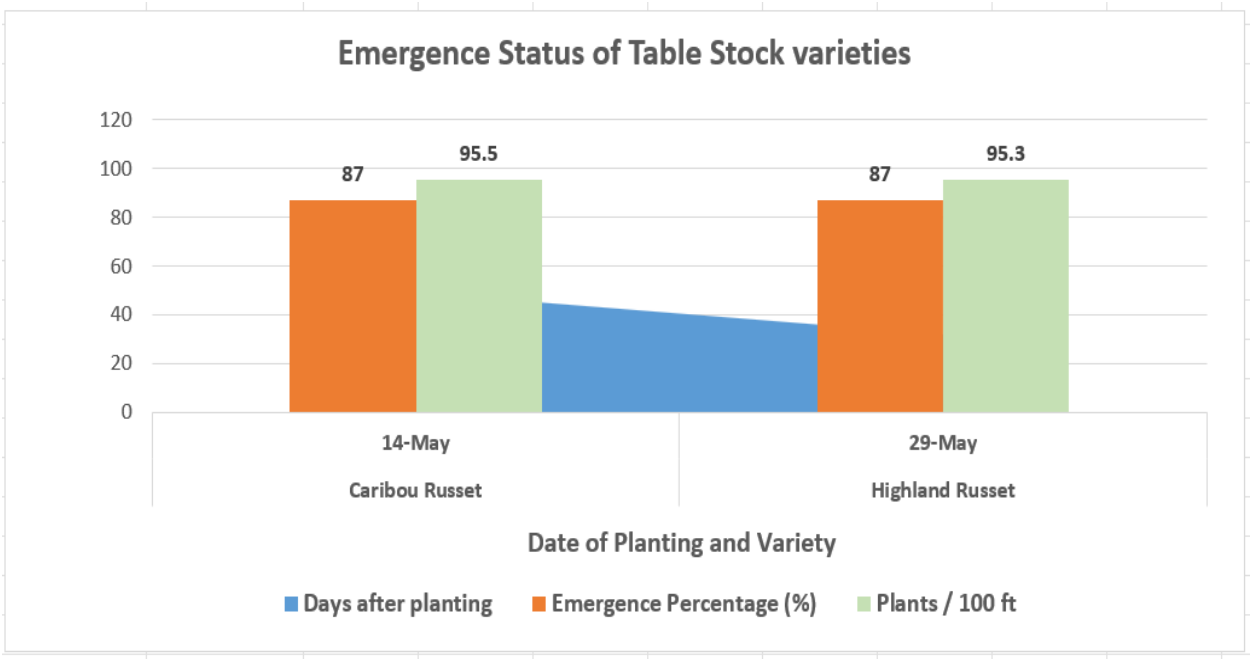

Figure 3. Potato Emergence Status by Planting Date, Table Stock Variety, and Days After Planting

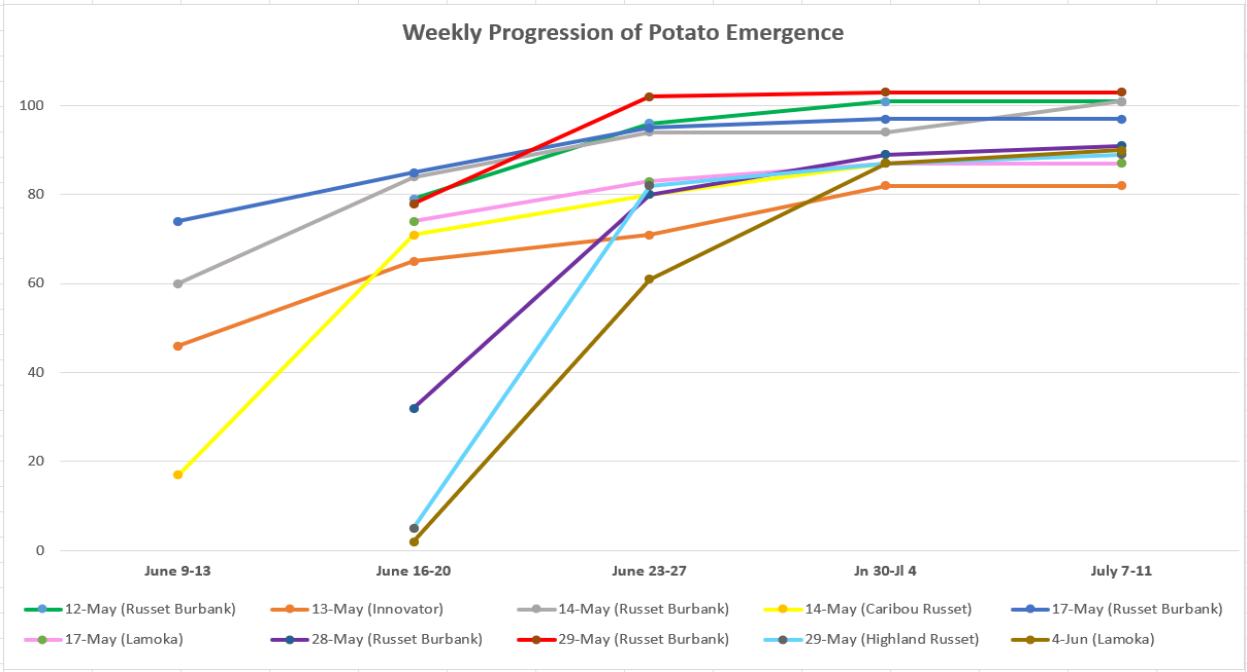

Figure 4. Weekly Progression of Potato Emergence by Planting Date and Variety

Figure 4 illustrates the weekly progression of emergence. Most fields experienced a rapid increase between June 16 and June 27, coinciding with rising soil temperatures and adequate moisture. By early July, nearly all fields had reached their maximum emergence levels. This consistent and timely emergence established a solid foundation for early canopy development across the ToPPS sites.

3.2. Stem Count

Stem number per plant varied across varieties and fields, reflecting differences in seed piece size, variety characteristics, and planting conditions (Figure 5). Russet Burbank consistently produced higher stem counts, ranging from 3.5 to 4.7 stems per plant, indicating strong sprout development across most sites. Innovator also showed robust stem production at 4.0 stems per plant.

In contrast, the chip variety Lamoka recorded moderate to low stem counts (2.2–2.3). Table stock varieties displayed moderate to low stem numbers as well, with Caribou Russet at 2.5 and Highland Russet showing the lowest overall at 1.8 stems per plant.

Overall, the stem count distribution reflected expected varietal traits, with processing varieties—particularly Russet Burbank—exhibiting higher stem numbers that support larger tuber sets under favorable growing conditions.

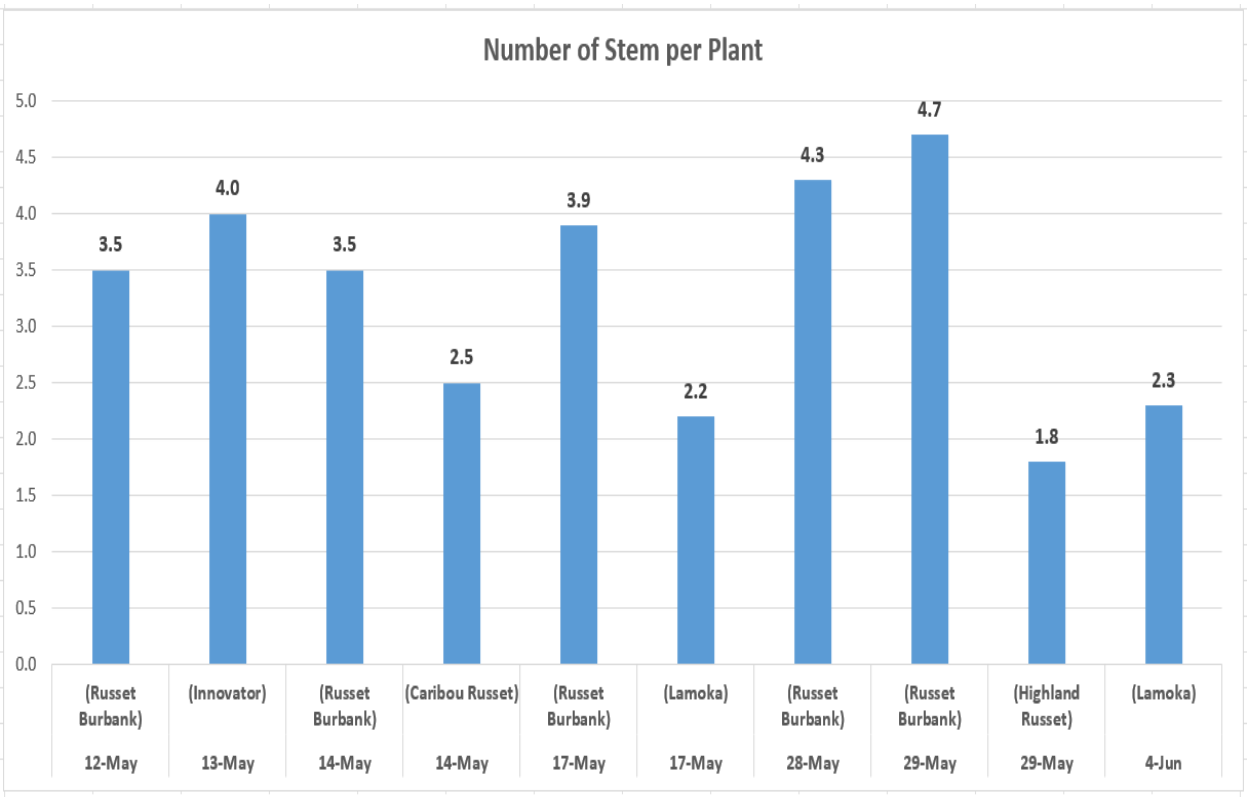

Figure 5. Number of Stem per Plant recorded by Planting Date and Variety

3.3. Plant Height

Maximum plant height varied by variety and planting date. Russet Burbank and Innovator reached the tallest plants, with maximum heights for Russet Burbank ranging from 37.8 to 46.2 inches, and for Innovator reaching 40.4 inches. Caribou Russet achieved intermediate heights (36.9 inches), while Lamoka and Highland Russet were generally shorter, with maximum heights below 34 inches (Figure 6).

Weekly progression graphs indicate that, in general, mostly earlier-planted varieties showed greater plant height during the initial weeks, although this trend did not always persist throughout the season. Russet Burbank reached its peak height by the 2nd or 3rd week of August, while Innovator peaked in early August. Highland Russet and Caribou Russet attained maximum height in mid-August. Early-planted Lamoka peaked by the 3rd week of July and almost maintained this height for the remainder of the season (through senescence), whereas later-planted Lamoka peaked in early August. These patterns highlight the influence of both variety and planting date on plant development (Figure 7).

3.4. Estimated Yield

Estimated yields varied by both planting date and variety, with earlier planting generally associated with higher production. The highest yield was observed for Russet Burbank planted

on May 12 (266 barrels/acre), followed by Russet Burbank on May 14 (241 barrels/acre) and Caribou Russet on May 14 (237 barrels/acre). Innovator planted on May 13 produced a moderate yield (227 barrels/acre). Yields declined with later planting dates across varieties, with Lamoka planted on June 4 showing the lowest yield (154 barrels/acre). These results highlight the strong influence of planting date on final productivity, with early-season planting providing a clear yield advantage (Figure 8).

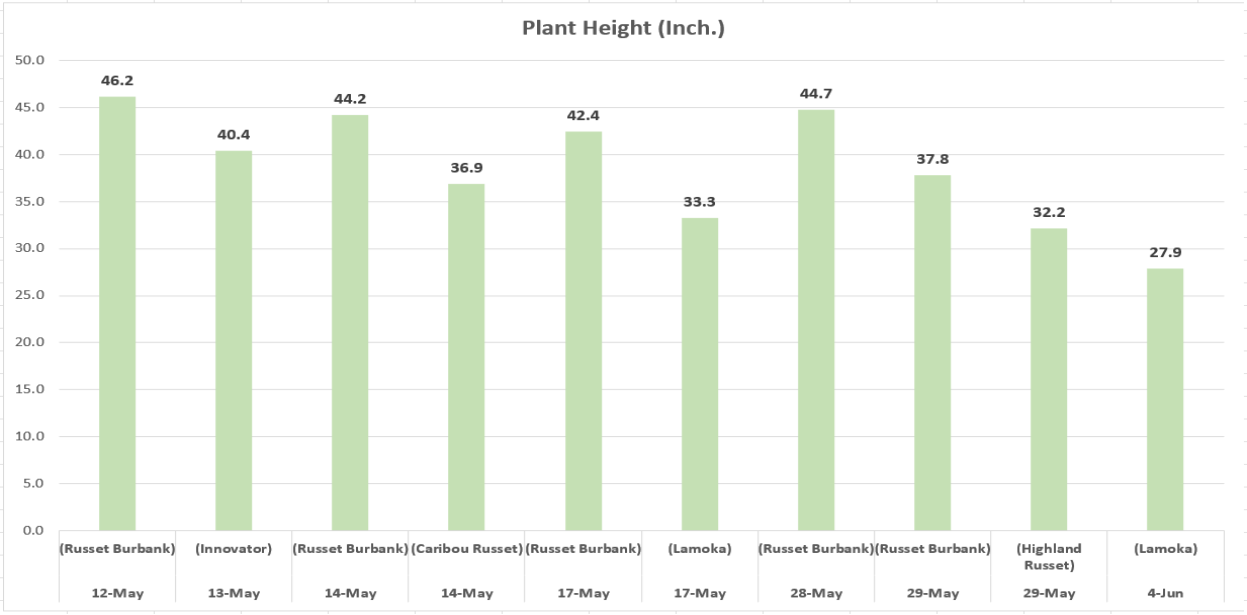

Figure 6. Maximum Plant Height (in inches) recorded by Planting Date and Variety

4. Growth and Yield Analysis in the Context of Precipitation Variability

4.1. Precipitation variability

Seasonal precipitation from May 1 to September 30, 2025 varied across the ToPPS regions. Grand Falls recorded well above-average rainfall (755 mm vs. 549 mm 5-year average), while Woodstock received below-average precipitation (511 mm vs. 636 mm). Wicklow ended the season slightly below the 5-year average (550 mm vs. 591 mm), indicating near-normal conditions overall (Figure 9).

Cumulative precipitation trends show Grand Falls remained consistently above the long-term average from early June through late September, resulting in a significant seasonal surplus (Figure 10). Wicklow rainfall was slightly above the 5-year average through mid-August, near

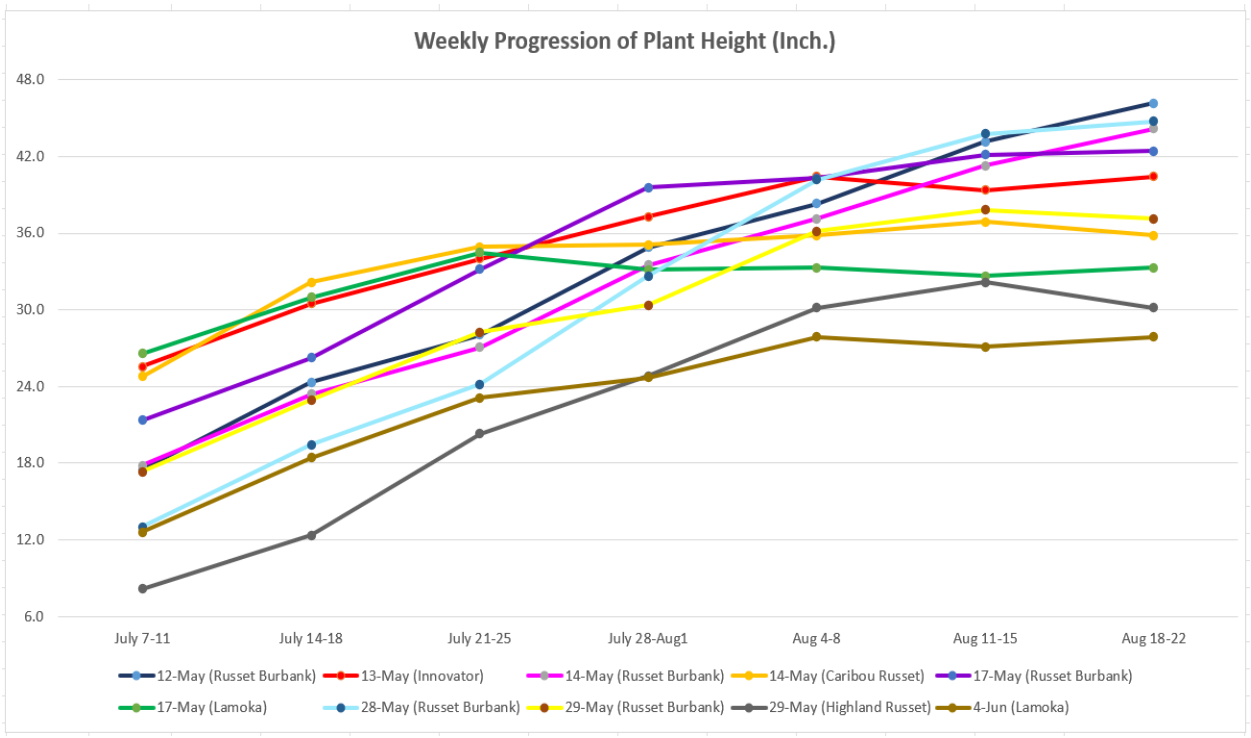

Figure 7. Weekly Progression of Plant Height (Inch.) by Planting Date and Variety

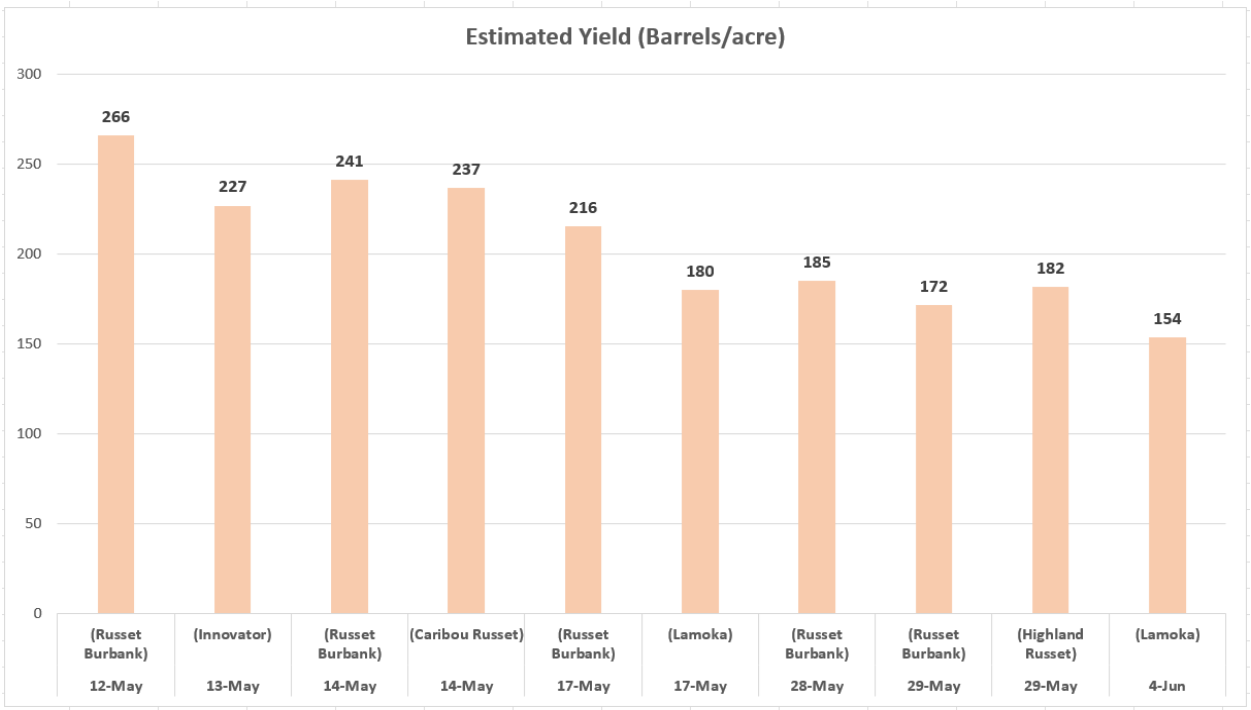

Figure 8. Estimated Yield (barrels/acre) by Planting Date and Variety

average until September 10, and dipped slightly below average in the last three weeks, reflecting mostly typical moisture conditions with a small late-season deficit (Figure 11). Woodstock tracked close to normal early in the season but gradually fell behind the 5-year average, with late-season dryness becoming more pronounced (Figure 12).

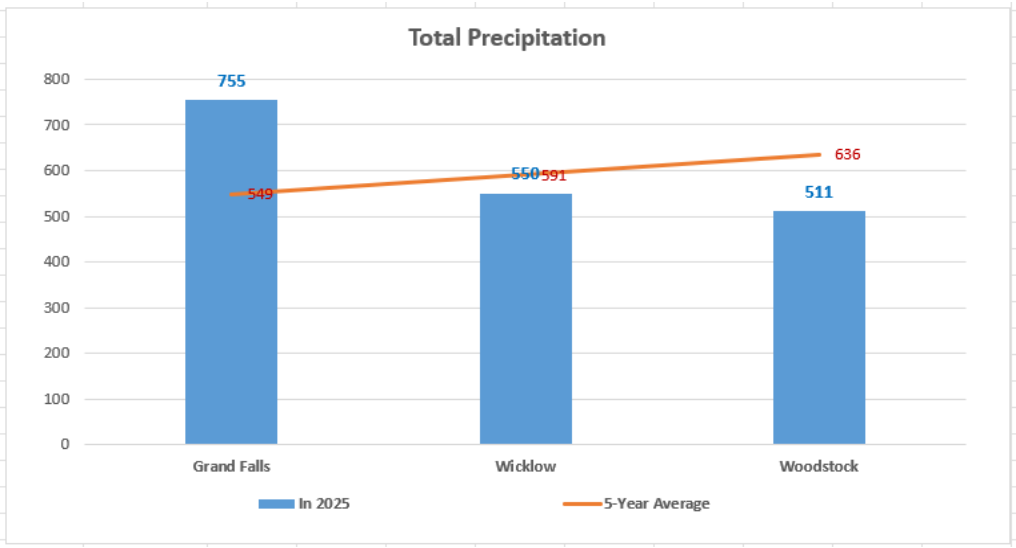

Figure 9. Comparison of Total Precipitation (mm) in Grand Falls, Wicklow, and Woodstock (May 1–September 30, 2025) Relative to Their 5-Year Averages

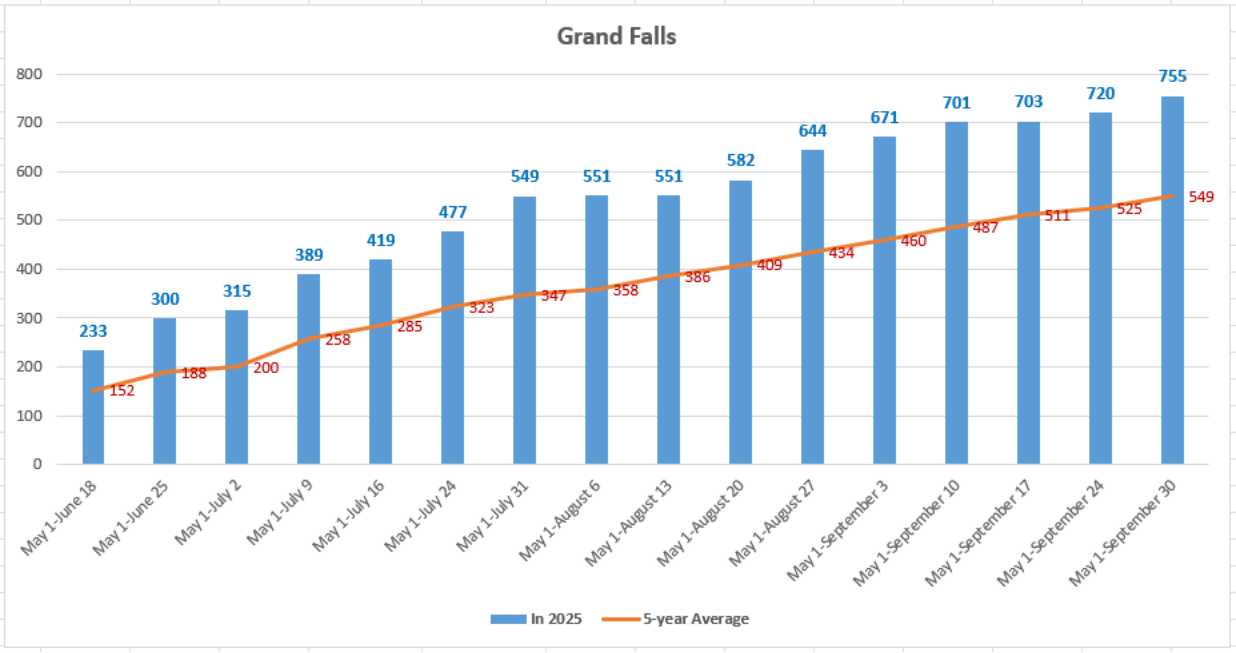

Figure 10. Comparison of weekly cumulative precipitation during the 2025 potato growing season with the 5-year average in Grand Falls

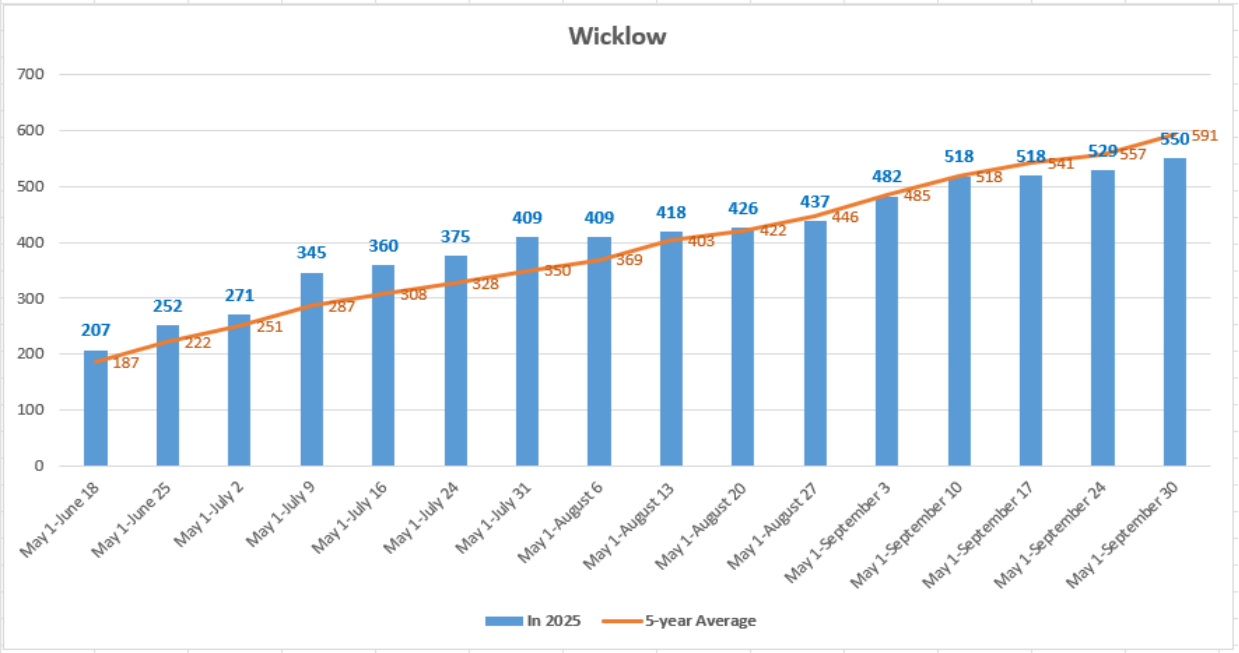

Figure 11. Comparison of weekly cumulative precipitation during the 2025 potato growing season with the 5-year average in Wicklow

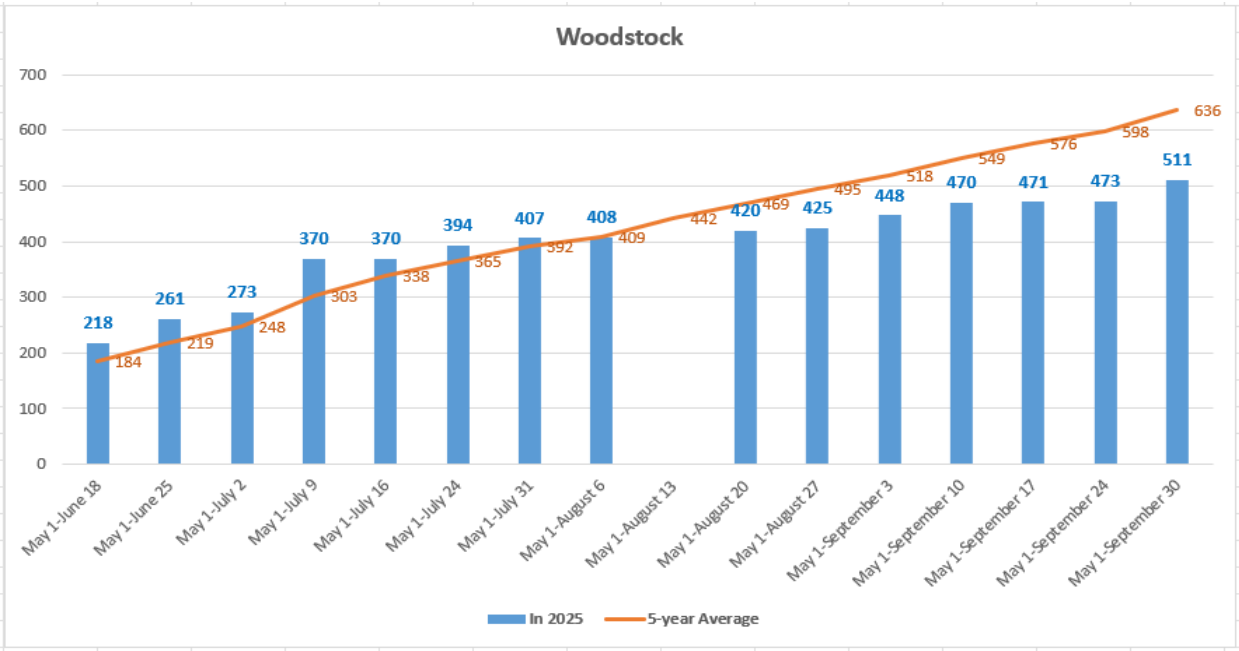

Figure 12. Comparison of weekly cumulative precipitation during the 2025 potato growing season with the 5-year average in Woodstock

Overall, 2025 precipitation highlights excess moisture in Grand Falls, drier conditions in Woodstock, and near-normal moisture in Wicklow, providing important context for interpreting crop growth, yield, and field-level variability across the ToPPS trial sites.

4.2. Plant Height Influenced by Precipitation Variability

Maximum plant height during the 2025 season showed clear differences among the ToPPS sites, reflecting local moisture conditions. When averaging all varieties, Wicklow recorded the tallest plants at 41.4 inches, slightly higher than Grand Falls at 40.8 inches, while Woodstock plants were notably shorter at 33.0 inches (Figure 13). For Russet Burbank, Grand Falls produced the tallest plants at 45.0 inches, followed by Wicklow at 42.4 inches, with Woodstock again showing the smallest plants at 37.1 inches (Figure 14).

These patterns indicate that sites with adequate moisture—whether slightly above average as in Grand Falls or near normal as in Wicklow—supported strong vegetative growth, resulting in taller plants. In contrast, Woodstock's below-average precipitation created moisture stress, which significantly limited plant height. This highlights the sensitivity of potato vegetative development to seasonal rainfall, demonstrating that the deficits in precipitation can substantially reduce above-ground growth.

Overall, the data suggest that sufficient or above-average moisture during the growing season is critical for achieving optimal plant height, whereas moisture-limited conditions, like those in Woodstock, can markedly constrain vegetative development, potentially impacting overall yield potential.

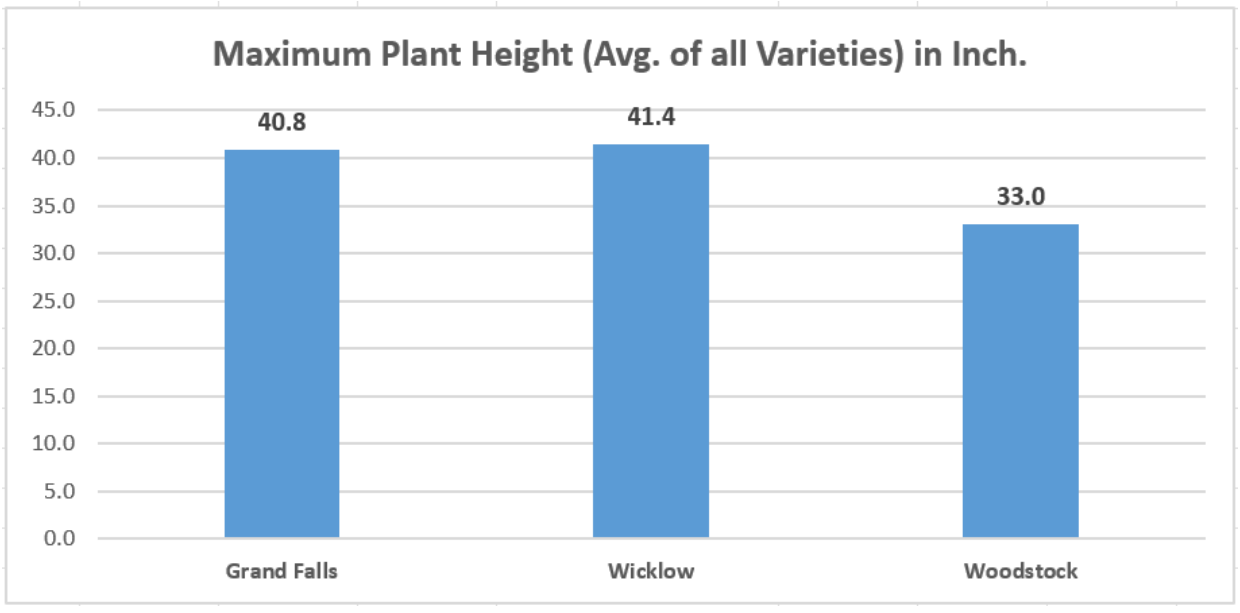

Figure 13. Comparison of the Maximum Plant Height Achieved (Average of All Varieties) in inches for Grand Falls, Wicklow, and Woodstock in 2025

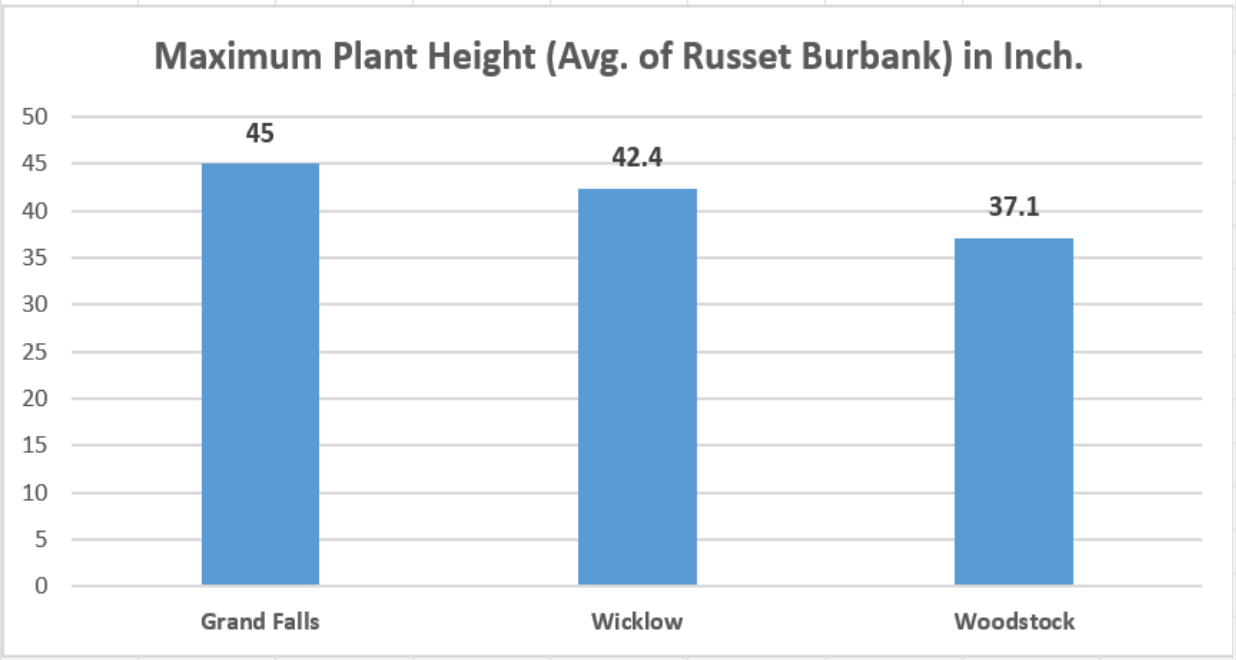

Figure 14. Comparison of the Maximum Plant Height Achieved (Average of Russet Burbank) in inches for Grand Falls, Wicklow, and Woodstock in 2025

4.3. Estimated Yield Influenced by Precipitation Variability

Estimated potato yields in 2025 showed marked differences across the ToPPS sites, closely reflecting the local precipitation patterns. When considering the average of all varieties, Grand Falls and Wicklow achieved similar yields of 222 and 221 barrels per acre, respectively, while Woodstock yielded considerably less at 169 barrels per acre (Figure 15). For Russet Burbank, Grand Falls recorded the highest estimated yield at 231 barrels per acre, Wicklow produced 216 barrels per acre, and Woodstock again had the lowest yield at 172 barrels per acre (Figure 16).

These trends highlight the influence of seasonal moisture availability on potato production. Sites with adequate to above-average rainfall, such as Grand Falls, or near-normal conditions, like Wicklow, supported strong crop growth and high yield potential. In contrast, Woodstock's below-average precipitation resulted in moisture stress, which likely limited tuber development and reduced overall yield.

Overall, the data underscores the critical role of precipitation in determining yield outcomes. Consistent or above-average moisture levels favor both vegetative growth and tuber bulking, leading to higher yields, whereas moisture deficits during the growing season can substantially constrain productivity, as observed at Woodstock. Despite above-average rainfall, the yield at Grand Falls remained high, likely due to effective field drainage preventing excess moisture impacts.

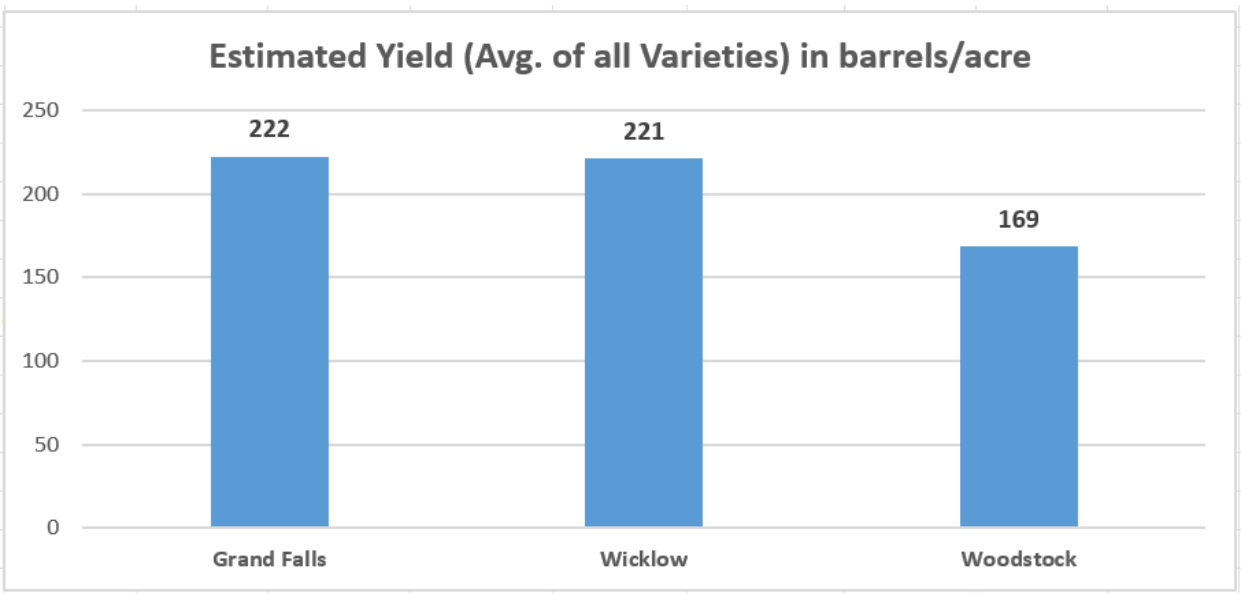

Figure 15. Comparison of Estimated Yield (avg. of all varieties) in barrels/acre for Grand Falls, Wicklow, and Woodstock, 2025

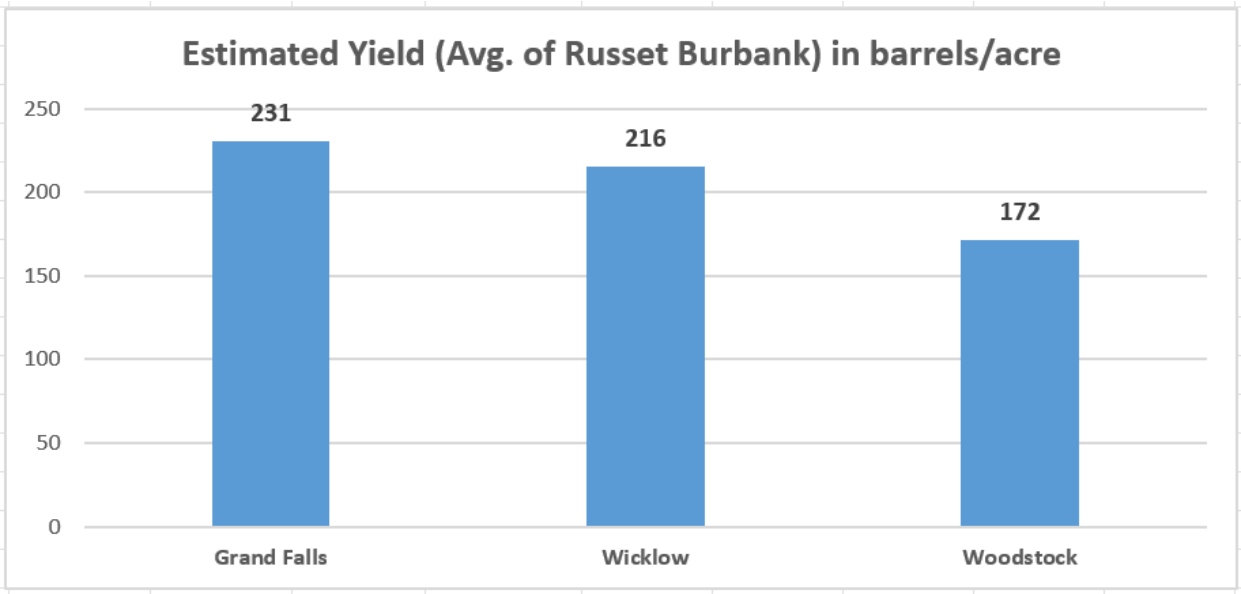

Figure 16. Comparison of Estimated Yield (avg. of Russet Burbank) in barrels/acre for Grand Falls, Wicklow, and Woodstock, 2025

4.4. Tuber Size Influenced by Precipitation Variability

Tuber size distribution in 2025 varied across sites and closely reflected differences in seasonal precipitation (Figures 17 and 18). When averaged across all varieties, among locations, Grand

Falls had the highest proportion of large tubers (22%) and the lowest proportion of small tubers (12%), consistent with the above-average moisture conditions. Wicklow, under near-normal precipitation, produced predominantly medium-sized tubers (80%) with a moderate proportion of both small tubers and large tubers. Woodstock, which experienced below-average rainfall,

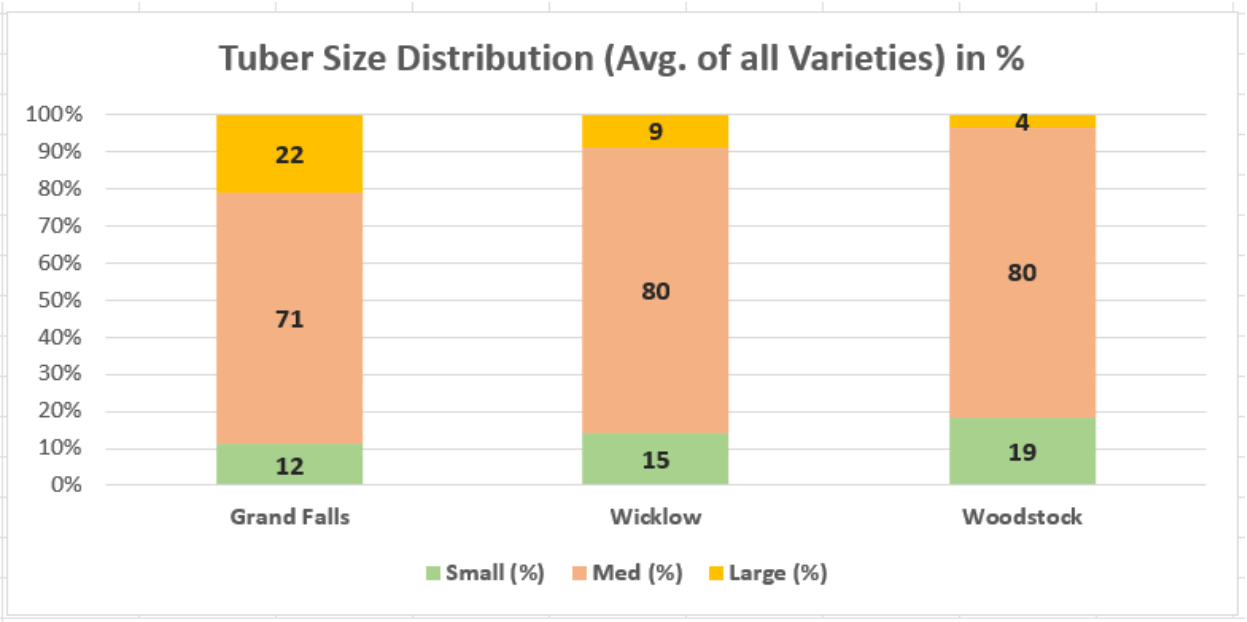

Figure 17. Comparison of Tuber Size Distribution (avg. of all varieties, %) for Grand Falls, Wicklow, and Woodstock, 2025

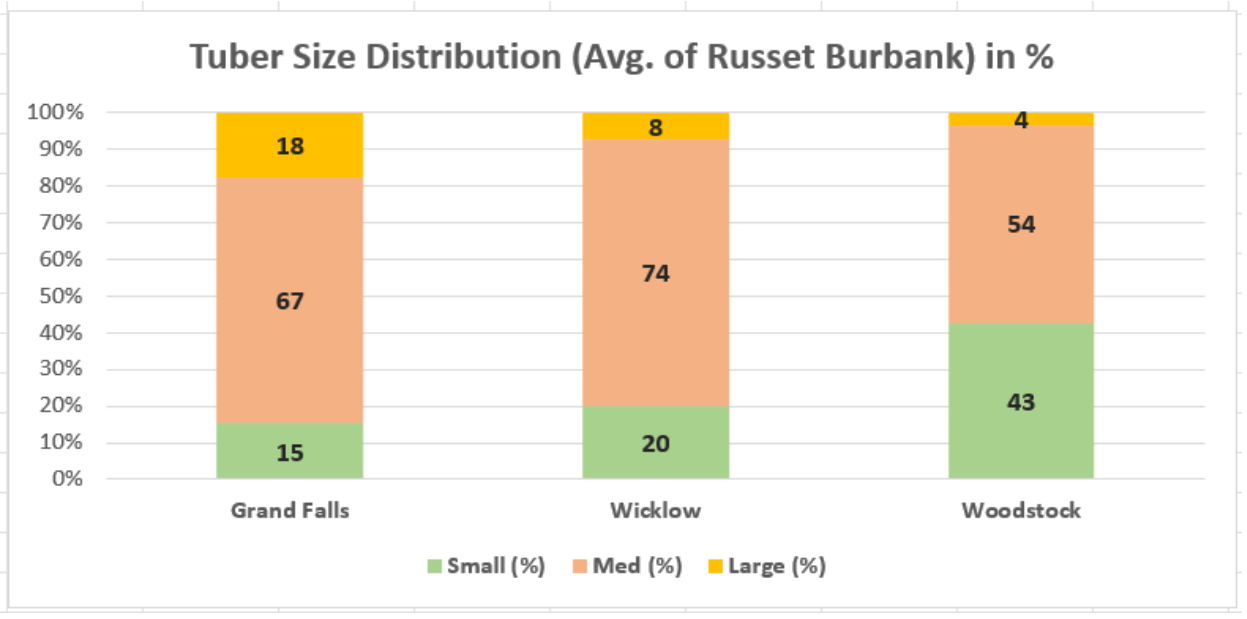

Figure 18. Comparison of Tuber Size Distribution (avg. of Russet Burbank, %) for Grand Falls, Wicklow, and Woodstock, 2025

showed the highest proportion of small tubers (19%) and the lowest proportion of large tubers (4%) among the locations.

4.5. Number of Stems per Plant and Tuber Number Not Influenced by Precipitation Variability

The number of stems per plant and total tuber number showed limited response to precipitation variability across the ToPPS sites in 2025. Average stem counts across all varieties were similar at Grand Falls and Woodstock (3.1 stems per plant), with slightly higher values observed at Wicklow (4.0 stems per plant) (Figures 19). For Russet Burbank, stem counts varied modestly among locations, and there was no clear association with seasonal moisture differences (Figures 20).

Total tuber number followed a similar pattern (Figures 21 and 22). When averaged across all varieties, tuber numbers varied among locations but did not align with precipitation patterns. Although Russet Burbank showed notable differences in tuber number among sites, these differences did not correspond to the timing or severity of moisture stress observed later in the season.

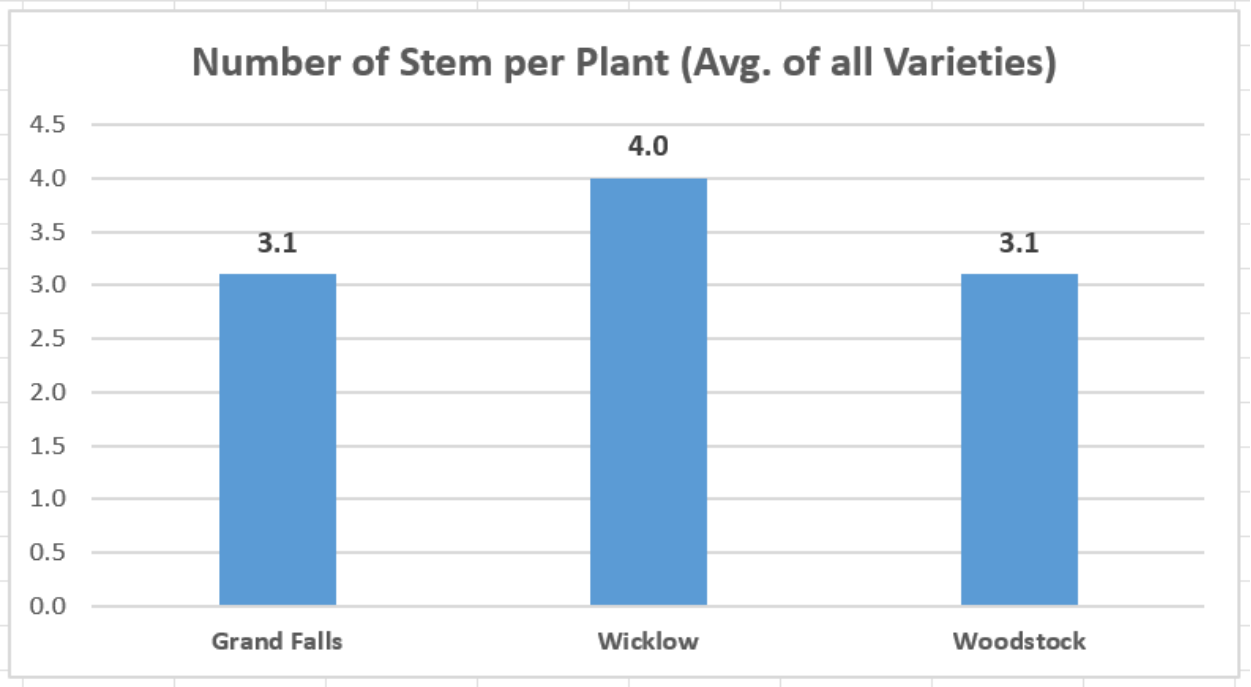

Figure 19. Comparison of the Number of Stem per Plant (Average of All Varieties) for Grand Falls, Wicklow, and Woodstock in 2025

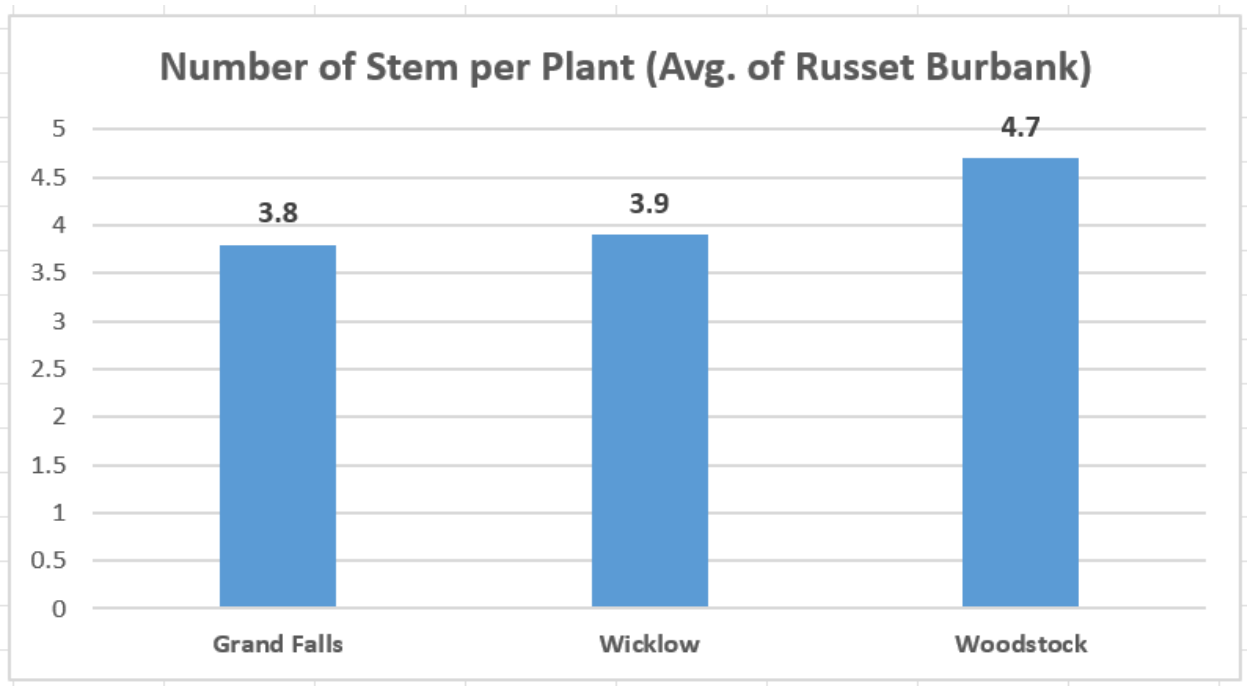

Figure 20. Comparison of the Number of Stem per Plant (Average of Russet Burbank) for Grand Falls, Wicklow, and Woodstock in 2025

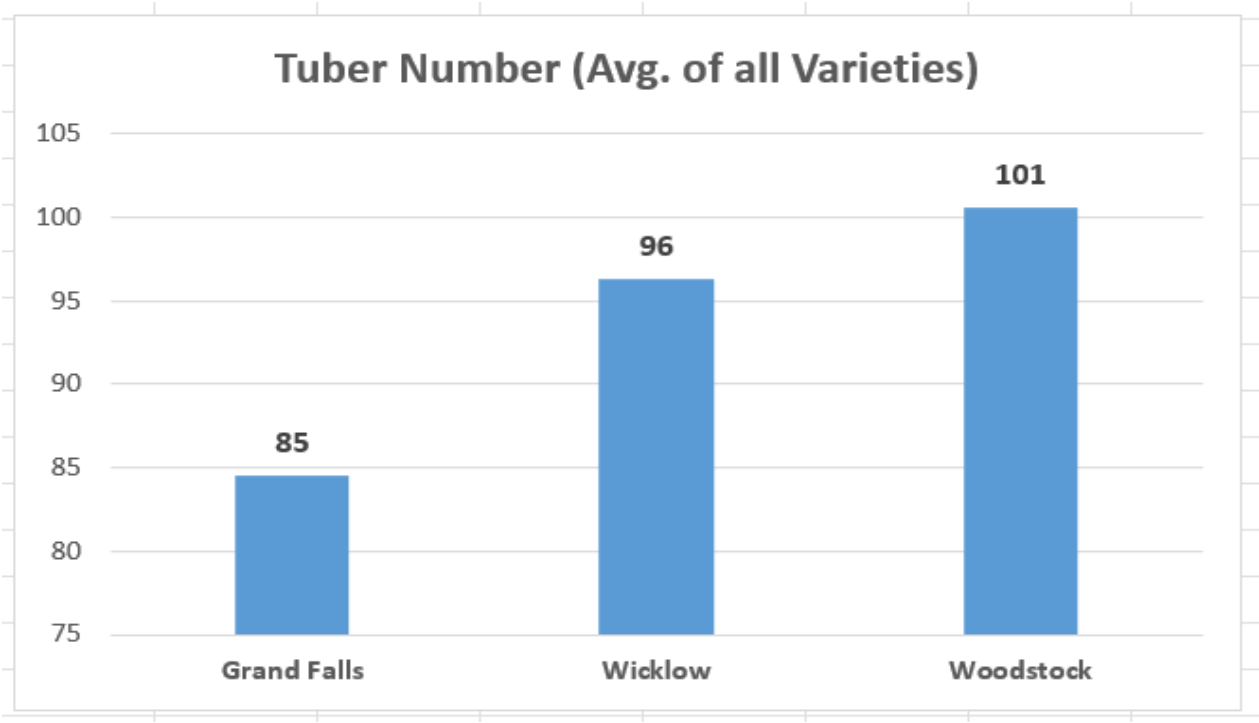

Figure 21. Comparison of Tuber Number (avg. of all varieties) for Grand Falls, Wicklow, and Woodstock, 2025

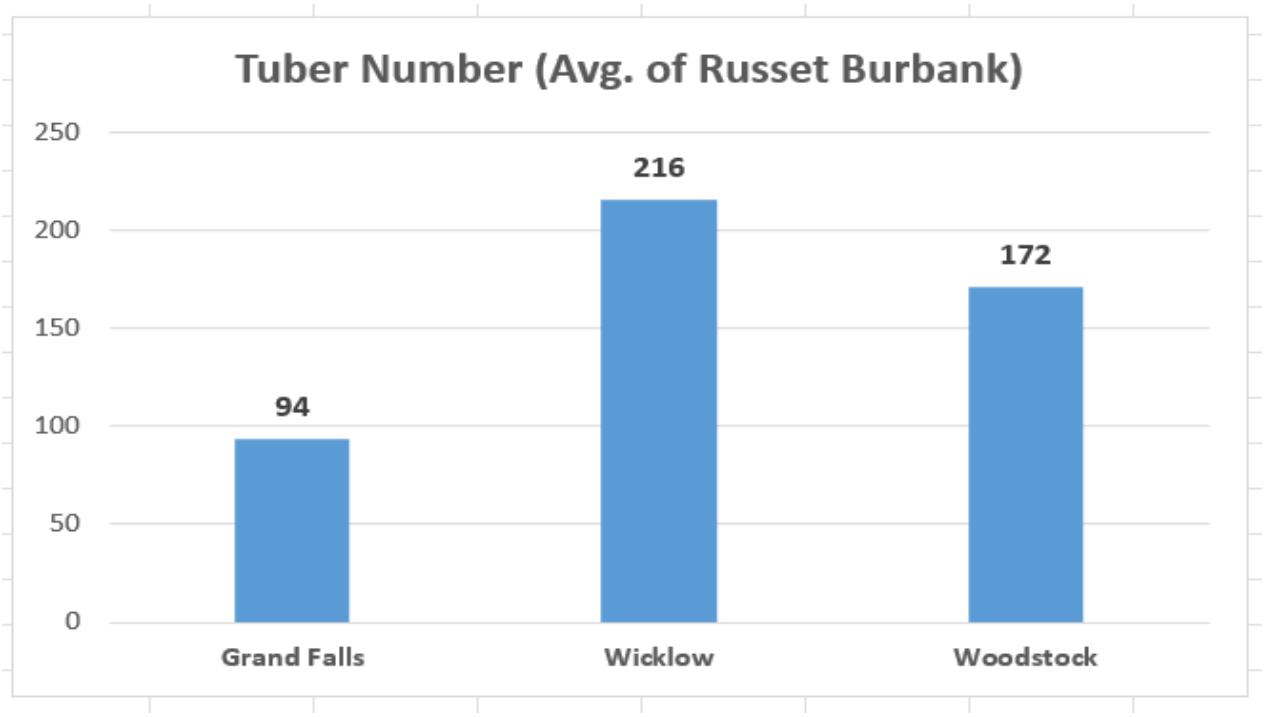

Figure 22. Comparison of Tuber Number (avg. of Russet Burbank) for Grand Falls, Wicklow, and Woodstock, 2025

These results suggest that stem establishment and tuber initiation occurred under adequate and relatively uniform moisture conditions across locations, as supported by precipitation data showing no moisture stress during early growth stages. Moisture deficits developed later in the season, influencing tuber bulking rather than stem formation or tuber set.

5. Yield Analysis in the Context of Planting Date

In 2025, estimated yield varied with planting date for both Russet Burbank and Lamoka (Figures 23 and 24). For Russet Burbank, the highest estimated yield was recorded for the May 12 planting (266 barrels per acre), followed by May 14 (241 barrels per acre) and May 17 (216 barrels per acre). Estimated yield declined for later planting dates, with values of 185 barrels per acre and 172 barrels per acre for the May 28 and May 29 plantings, respectively.

For Lamoka, the May 17 planting resulted in an estimated yield of 180 barrels per acre, while the June 4 planting recorded a lower estimated yield of 154 barrels per acre.

The observed yield differences by planting date occurred under 2025-specific conditions, during which moisture stress developed in both the southern and central regions at the later growth stage, being more pronounced in the south. The results presented here reflect these conditions, and additional years of data will be required to evaluate the consistency of planting-date effects under different seasonal moisture patterns.

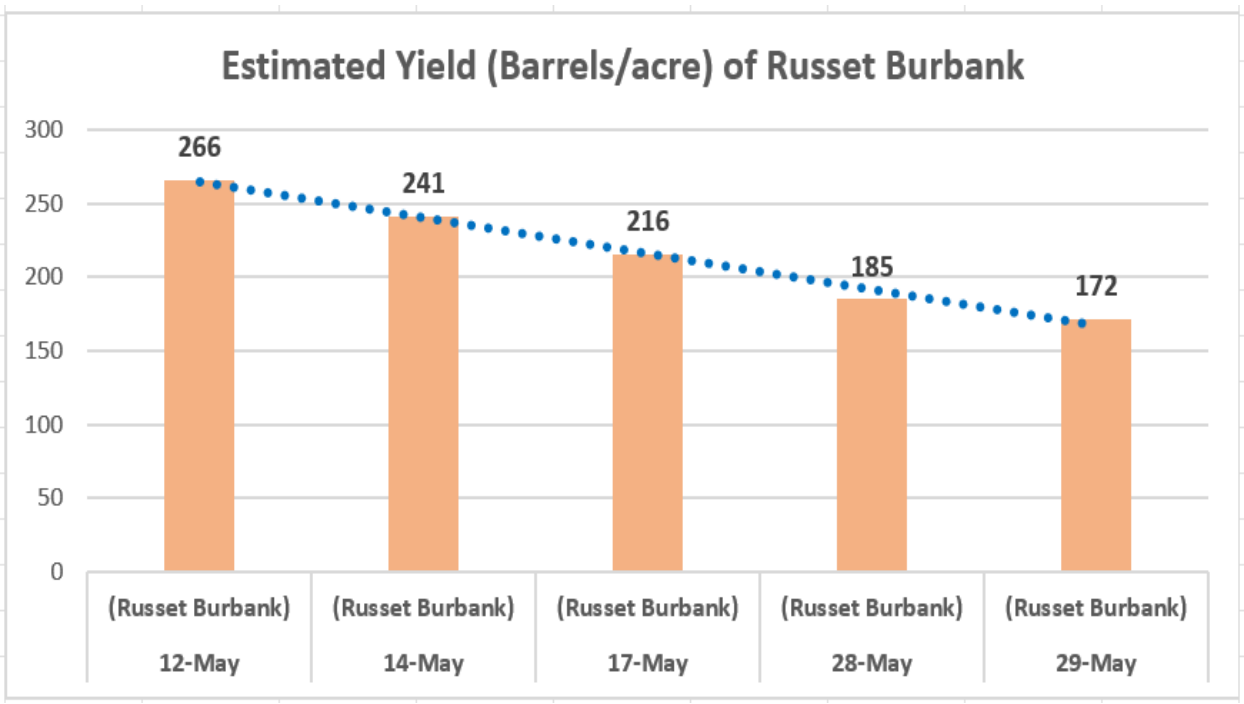

Figure 23. Estimated Yield (barrels per acre) of Russet Burbank as influenced by Planting Date

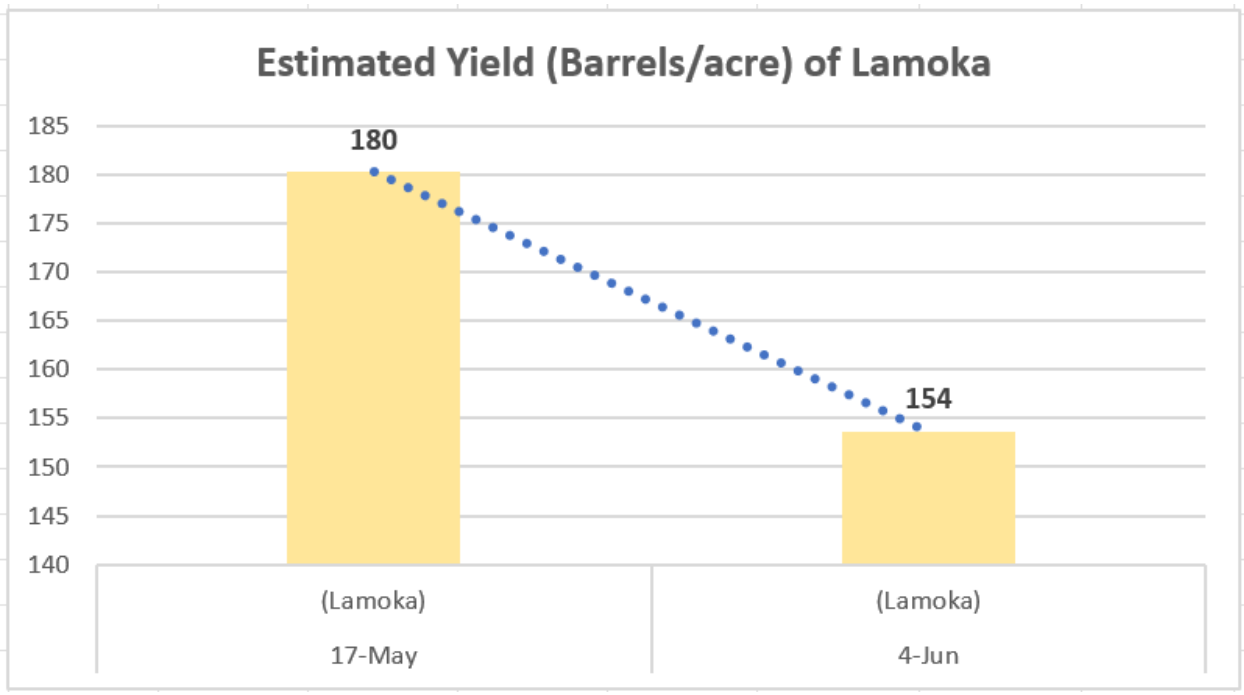

Figure 24. Estimated Yield (barrels per acre) of Lamoka as influenced by Planting Date

6. Conclusion

The ToPPS 2025 results demonstrate that seasonal moisture conditions were the primary factor influencing potato crop performance across the major potato-growing regions of New Brunswick.

Regions with adequate or above-average rainfall showed better plant growth, higher yields, and improved tuber size. In contrast, moisture-limited conditions reduced plant height, restricted tuber bulking, and lowered yields, with a greater proportion of smaller tubers. Crop emergence, stem number, and tuber set showed limited variation, indicating that early-season conditions were generally favorable, as supported by precipitation data. Planting date also influenced outcomes, with earlier plantings generally achieving higher yields, while later plantings were more affected by late-season moisture stress.

Overall, the findings emphasize the importance of adequate moisture and timely planting in optimizing potato yield and quality. The study also highlights the need to consider contingency irrigation strategies, as increasing weather variability and climate change are likely to intensify moisture-related risks.