Canadian Prairie Canola Yield Trends from 2011 to 2020

Justine E. J. Cornelsen and Nathaniel W. W. Ort
Canola Council of Canada, Winnipeg Manitoba

Introduction

Canada is the largest producer of canola/oilseed rape globally, harvesting 18.7 M tonnes in 2020. Canadian Prairie canola yield has increased from 2011 to 2020 with an average yield increase of 51 kg ha^{-1} (0.9 bu ac^{-1}) per year, since 2001 (Figure 1). The maintenance of and increase in yield leading up to the recent decline are commendable. Positive yield trends are largely because of improved genetic resistance to yield-limiting diseases, the development and adoption of pod shatter tolerant cultivars, and the optimization of agronomic management practices.

Environmental conditions vary each year, and 'heat blast' caused by high temperatures during flowering have been the reason for some yield loss. The 2011 through 2016 precipitation values were similar or greater than normal, while the most recent years have received less precipitation than normal. High temperatures and low precipitation remain a concern for canola production moving forward.

Genetic Resistance

Advances in genetic resistance have reduced the impact of yield-loss causing pathogens in canola. Cultivars available to farmers have undergone extensive blackleg disease ratings and are resistant (R) or moderately resistant (MR) to the disease (Figure 2). In 2017, the Canadian canola industry adopted a blackleg resistance gene labelling system which has been made available through the identification of 22 resistance genes and 13 avirulence *Leptosphaeria maculans* genes. This system provides farmers the opportunity to strategically deploy resistant cultivars to counter predominant *L. maculans* races within their fields. This helps to prevent yield losses and increases the longevity of resistance sources.

The soil-borne disease, clubroot, continues to spread across the Prairies. Only introduced in 2009, clubroot resistant (CR) cultivars now comprise over 40% of Prairie acres seeded to canola (Figure 3). The use of CR cultivars has been a strong component of the integrated approach to managing this disease. Since pathogen shifts have overcome some CR cultivars in certain fields, the industry has shifted to encouraging farmers to deploy CR cultivars on all fields.

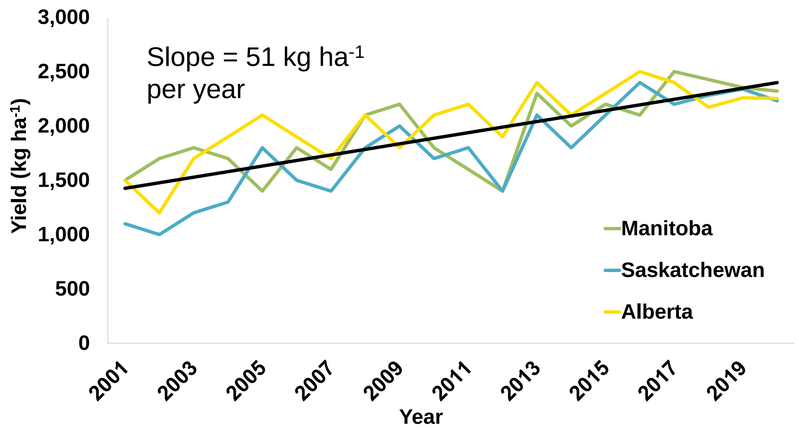

Figure 1. Average canola yield (kg ha^{-1}) in Manitoba, Saskatchewan, and Alberta from 2001 to 2020 (*Source:* Statistics Canada 2021).

Figure 2. Susceptible cultivar to blackleg (L) vs. resistant cultivar (R). Susceptible cultivar was lodging at flowering and did not survive to harvest.

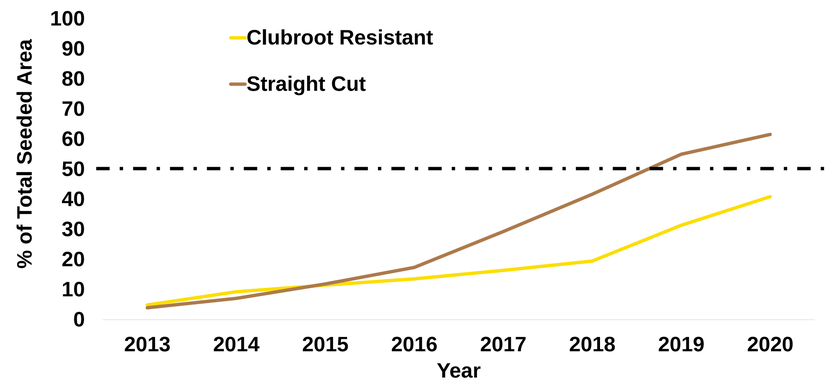

Figure 3. Percent of seeded area in Manitoba, Saskatchewan, and Alberta seeded to a clubroot resistant or a straight cut recommended cultivar from 2013 to 2020. (Source: Canadian Grains Commission 2021).

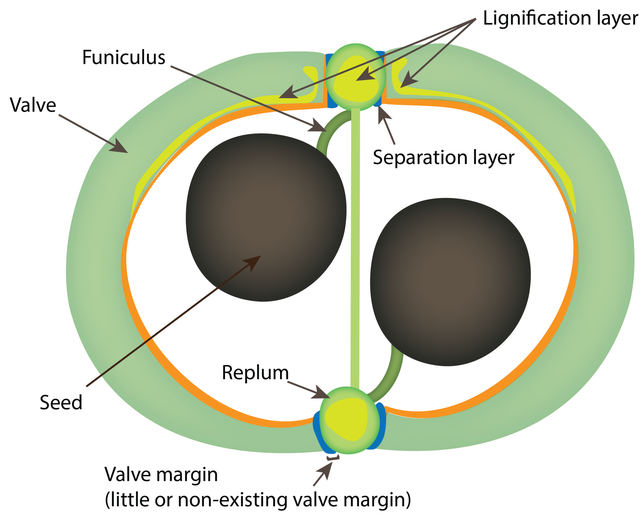

Figure 4. Canola shatter tolerant canola can include adjustments to the typical dehiscence process. The improvements may result in differences of the separation layer between the replum and the valves, endocarp thickness, differential thickening of the pericarp, and larger and wider main vascular bundle in the dehiscence zone.

Agronomic Management Practices

Management practices for increasing yield, improving input use efficiency, and for refining the environmental footprint of canola production continue to be researched, optimized, and implemented. Results from 2011 and 2020 surveys of about 1000 growers in the Prairie provinces indicated that recording plant counts has increased from 21% in 2011 to 55% in 2020. The proportion of farmers who sought advice from agronomists when determining fertilizer rates increased by 11% between 2011 and 2020. In 2020, farmers ranked drought, increased pest pressure, temperature stress, and herbicide-resistant weeds as the greatest risks to canola production. Furthermore, managing flea beetle and fungicide spray decision for sclerotinia are two large agronomic challenges for farmers.

Canola Shatter Tolerance

In 2014, cultivars were made available to farmers with patented pod shatter reduction technology. This trait strengthens the pod seam and connective tissue to help retain seeds for straight cutting or delayed swathing (Figure 4). Quick adoption of this has driven seed companies to market cultivars suitable for straight cutting, driving Prairie growers to seed over 60% of canola seeded area to a recommended straight cut cultivar in 2020 (Figure 3). Discrepancies in pod integrity remain among companies and cultivars, however, all strive to mitigate environmental stress and reduce the risk of pods shattering prior to harvest.

Next Steps

The following research initiatives are recommended to further maintain and increase Canadian Prairie canola yield levels:

- Increased abiotic stress tolerance.
- Increased nutrient & water use efficiency.
- Enhanced IPM; identify and quantify practices to decrease inoculum from major canola diseases.
- Examine and quantify factors impacting canola germination and emergence.
- Re-assess and update pest control thresholds under current recommended plant stand densities.

References

1. Statistics Canada 2021. Table 32-10-0359-01 Estimated areas, yield, production, average farm price and total farm value of principal field crops, in metric and imperial units
2. Canadian Grain Commission 2021. Grain varieties by acreage insured. https://www.grainscanada.gc.ca/en/grain-research/statistics/varieties-by-acreage/
3. Insightrix Research Inc. 2021. Canola Grower Best Practice Management Survey 2021.

Contact
Justine at cornelsenj@canolacouncil.org or Nate at ortn@canoalcouncil.org