Canadian Food Inspection Agency | Agence canadienne d'inspection des aliments

The role of PBR in plant breeding efforts to address climate change mitigation and adaptation: Canadian public sector breeding

UPOV Seminar – 2022/10/12

Canada

Climate Change Impacts on Canadian Agriculture

- 1948 - 2016, the annual temperature increase is 1.7C for Canada as a whole and 2.3C for northern Canada, and is accelerating.
- Increase number of frost free days will encourage the northward expansion of warmer weather crops, such as corn and soybean, displacing cereals and canola.
- Reduced precipitation later in the growing season, coupled with increased heat will cause stress to plants and may have a negative impact on yields.
- More frequent spring flooding, summer droughts and extreme weather events are already happening, and will increase.
- A warmer climate may bring new pests and diseases.

The “New Normal”…nothing is normal anymore!

July 2020 July 2021

*Photo courtesy of CBC News – Shows AB farmer Richard Owen in the same field – In 2020, 100 bu/ac malting barley variety, in 2021 yielded less than 10bu/ac under extreme drought conditions

“New Normal”

May 2022

*Photo courtesy of the Western Producer – Shows farmer’s fields on May 15, 2022 in MB – a time that should be the peak of planting season,. Seeding delayed by over 1 month.

Public Research

Example: Digital Imaging Technology and Plant Phenotyping of Wheat Varieties

- Research conducting plant phenotyping in publically bred wheat varieties released by Agriculture and Agri-Food Canada (public sector) since 1904 ‘Marquis’ wheat.
- Many varieties bred during periods of drought in the Canadian Prairies: 1919-21, 1929-37, 1961, 1986-88, 1999-2005, 2021.
- Digital imagery reveals differences in plant canopy temperatures between varieties.
- Differences identified between varieties in respiration rates and plant dehydration.
- Historic drought tolerant varieties can be used as breeding material for introgression into modern high performing varieties

Linking to UPOV-based PBR

- All wheat varieties released by AAFC are PBR protected. Art 14. of UPOV secures the investments made by taxpayers and farmers. Royalties from sales and licensing are re-invested back into breeding and research, creating a self-sustaining funding environment.
- Art 15 (1) (ii) “researcher’s exemption” supports ongoing research, and scientific publication, dissemination of knowledge about the qualities/attributes of specific varieties.
- Art 15 (1) (iii) “breeder’s exemption” ensures that all PBR protected varieties are available for breeding purposes. Breeder’s have information on varieties that are drought tolerant, and can access those varieties to introgress into their breeding program.
- Art 19, the breeder’s right is finite. Unprotected varieties are “public domain”, AAFC varieties deposited in ITPGRFA – MLS system.

Concluding Thoughts

- Supporting breeding efforts to address climate change mitigation and adaptation requires collective action, including; farmers, breeders (public and private), and policy makers. All actors play a critical role.
- UPOV-based PBR provides a framework to support these goals, ensuring the proper balance between incentives and rewards, and restrictions on the breeder's right by way of "exemptions", that ensure access to knowledge and the use of protected varieties for breeding purposes.

Thank you!

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