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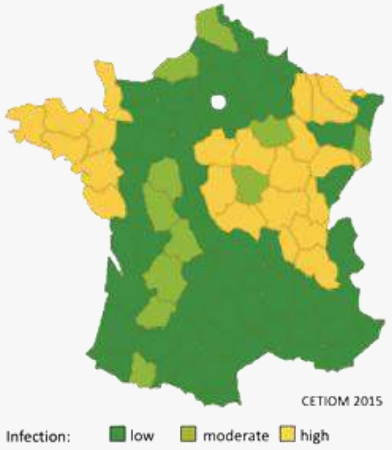
Advancing Clubroot-Resistant Canola through Genomics and AI

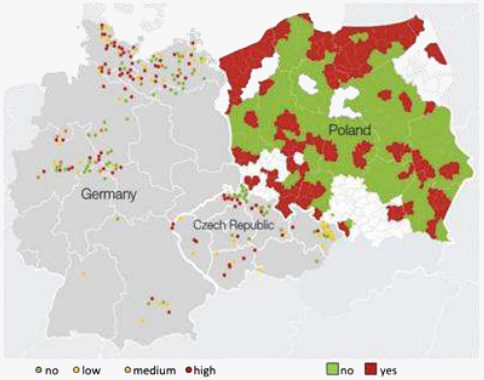
Breeding Broad-Spectrum Clubroot Resistance in Spring and Winter Canola

Canola Clubroot Resistance

- Clubroot is a soil-borne disease that is steadily spreading in Canadian Prairies
- To date, canola varieties are either sensitive to the disease or confer resistance only to certain pathotypes. Some pathotypes (e.g pathotype-5X) overcome all forms of resistance on the market today
- No broad range, durable resistance was reported to date in canola

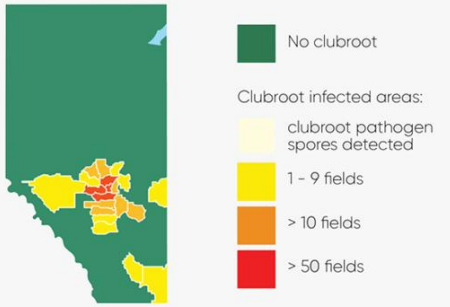
A growing threat in Europe:
(CEITOM, 2015)



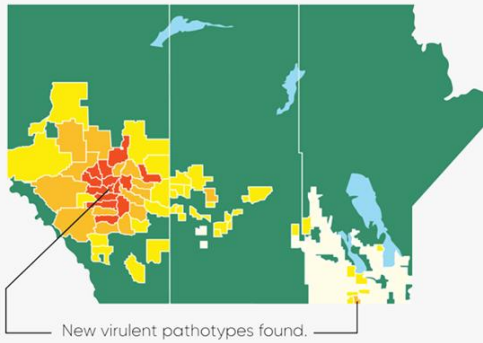


A growing threat in Western Canada:

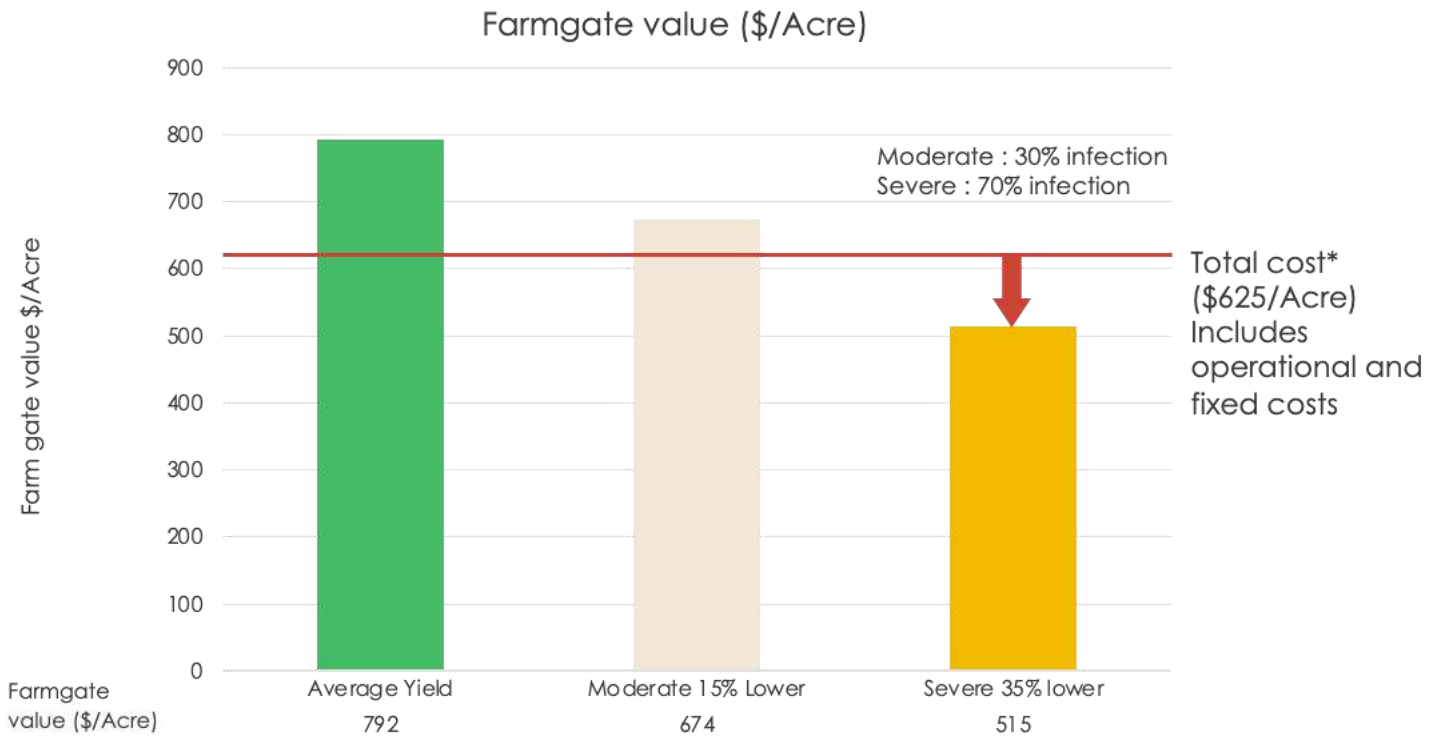
Clubroot affected areas in 2011



Clubroot affected areas in 2018-2019

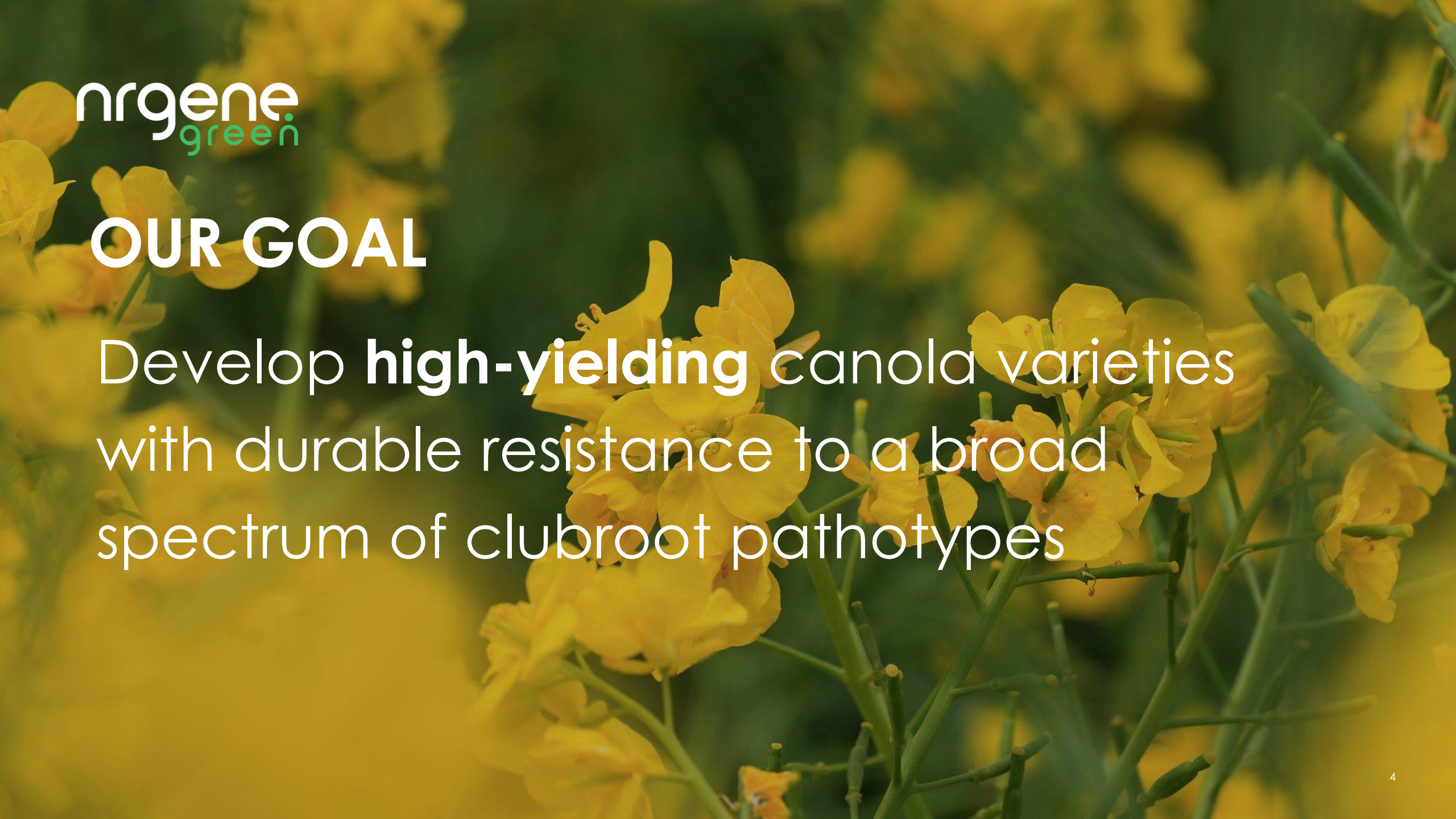


Clubroot Effect on Farm Gate Value
(CAD$)



Farm gate values are directly impacted by infection levels, with severe clubroot cases causing even greater yield losses than previously recorded.

*Cost of production 2022, Government of Manitoba Manitoba.ca/agriculture



OUR GOAL

Develop **high-yielding** canola varieties with durable resistance to a broad spectrum of clubroot pathotypes

Our Approach

Using Genomics and AI to Identify and Introduce Clubroot Resistance from Exotic Accessions to Elite Canola Germplasm

New genetic material

Discovery of novel resistant germplasm and characterization of genetic resistance loci

Pyramiding

Combining multiple resistance genes with other preferred traits in elite lines without linkage drag

Faster Introgression

Develop reliable SNP markers to assist Marker-Assisted Breeding (MAB*)

* Supported by Canola Council of Canada & partially funded by IRAP

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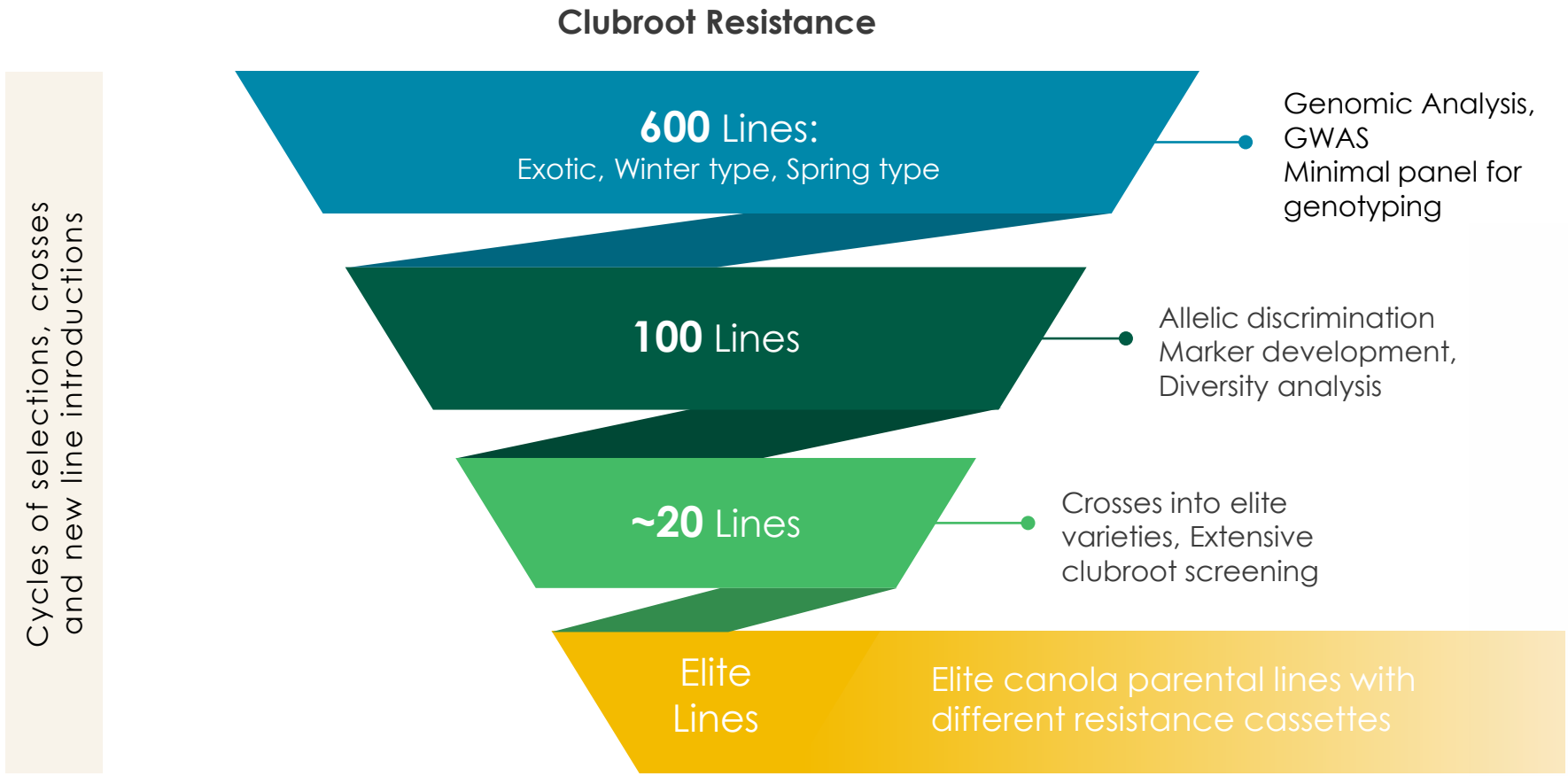
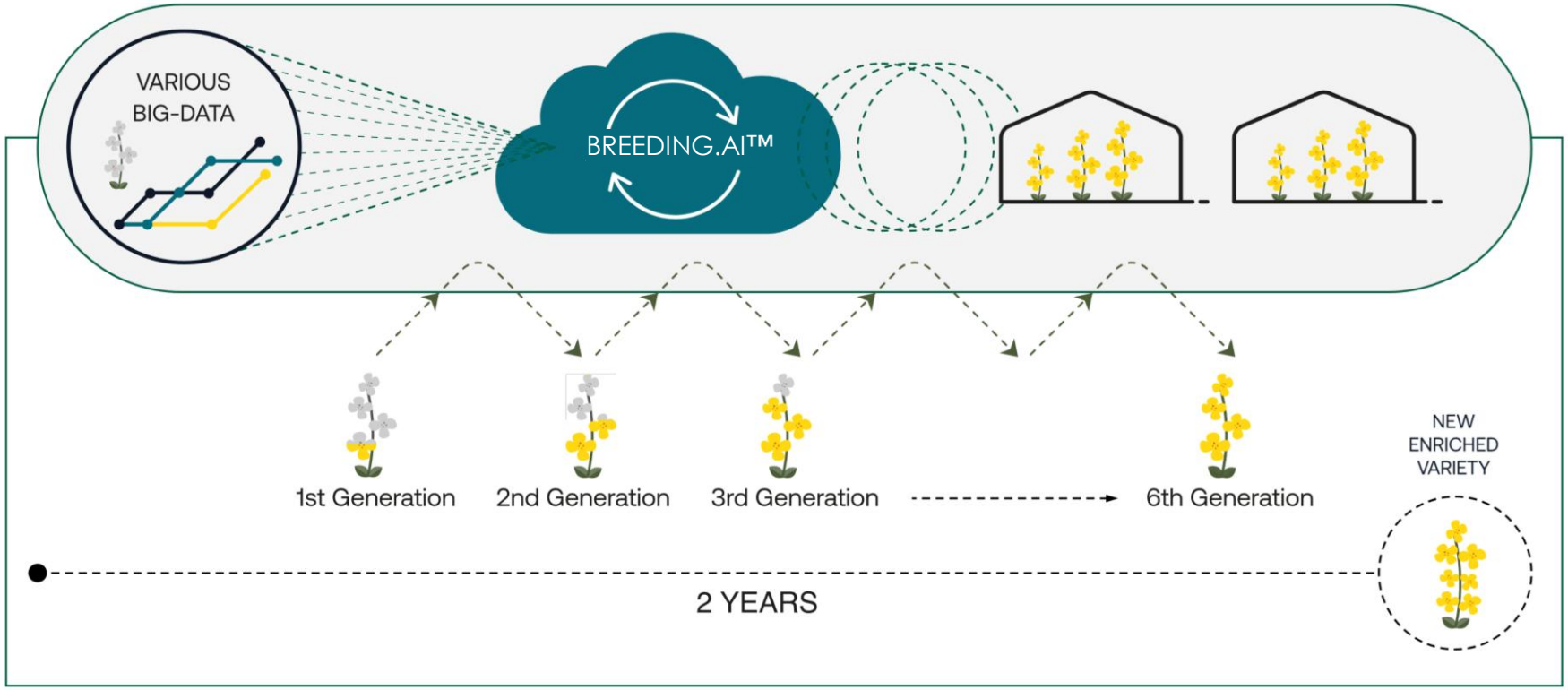
The Solution: Robust, Genomic-Based Pre-Breeding



The Technology: Enhanced Variety Development Through AI Breeding

NON-GMO



The benefits

- ✓ Reduces development time
- ✓ Reduces costs
- ✓ Increases likelihood of success

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Outstanding Results: Canola Clubroot Field Results

First-generation check

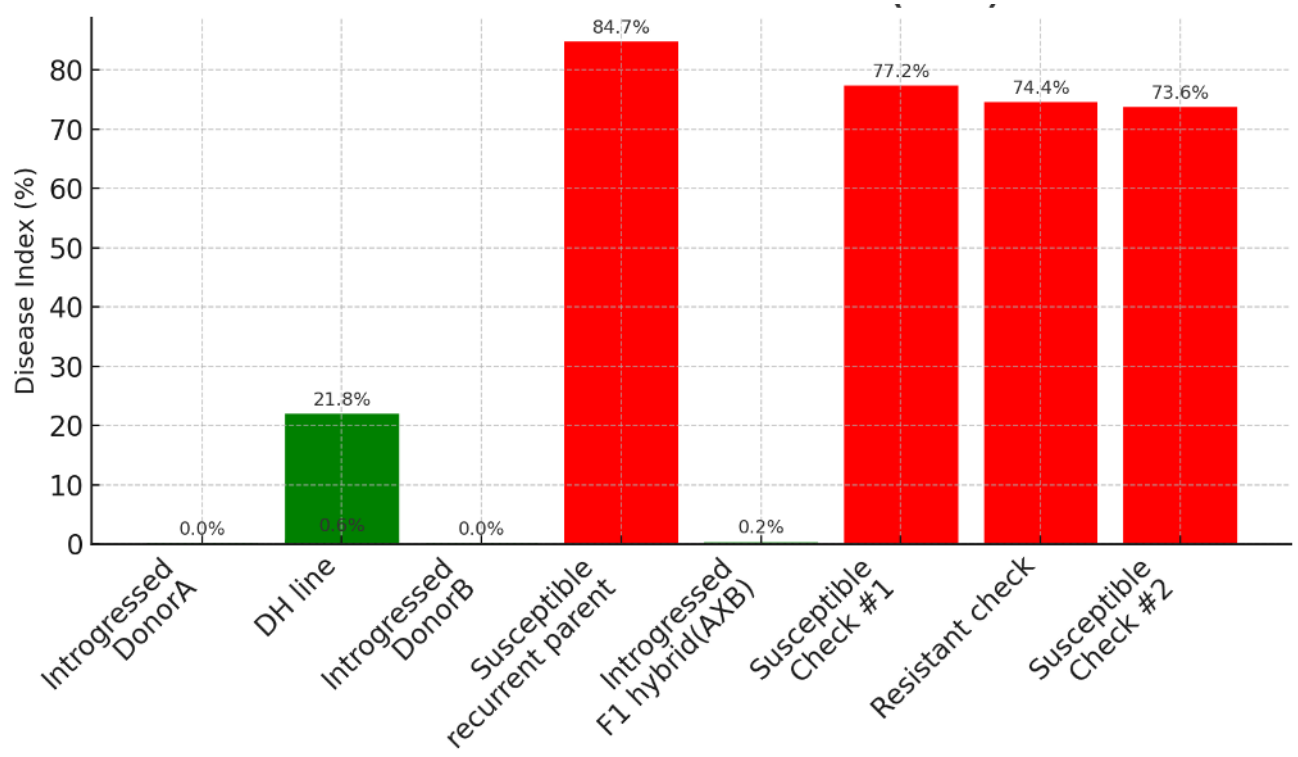
NRGene Green "New Line"

Canadian Susceptible line

Resistant line

Outstanding Results: Canola Clubroot Field Results

Zero infection: Donor A & B introgressed lines at 0% disease index. Hybrids: F1 introgressed hybrids at 0.2%. Robust



Thank you!

NRGene Ltd. nrgene.com info@nrgene.com