

# **Plant breeding in crop improvement**

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# Overview

- Crop improvement: what for?
- Why genetic improvement or plant breeding?
- Phases of genetic improvement
- New plant breeding technologies

# I. Crop improvement: what for?

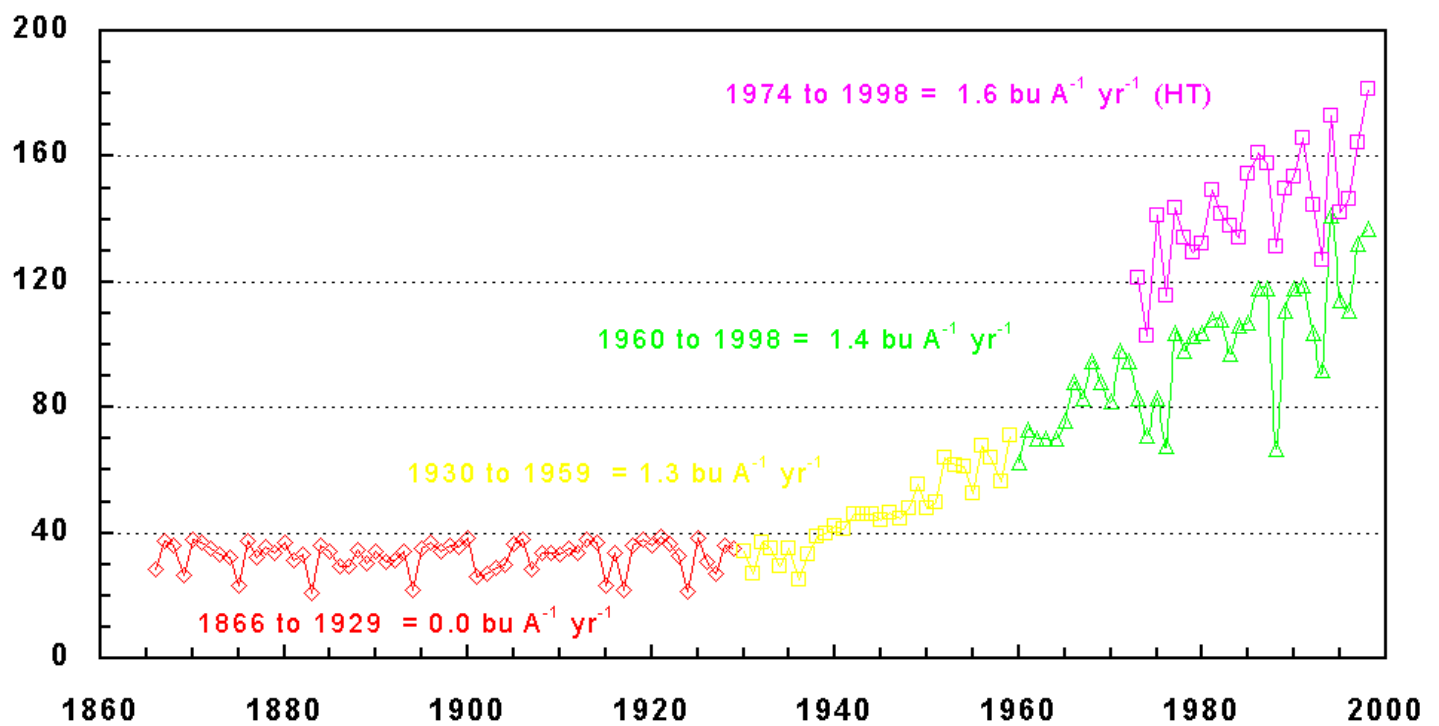
## ■ Production:

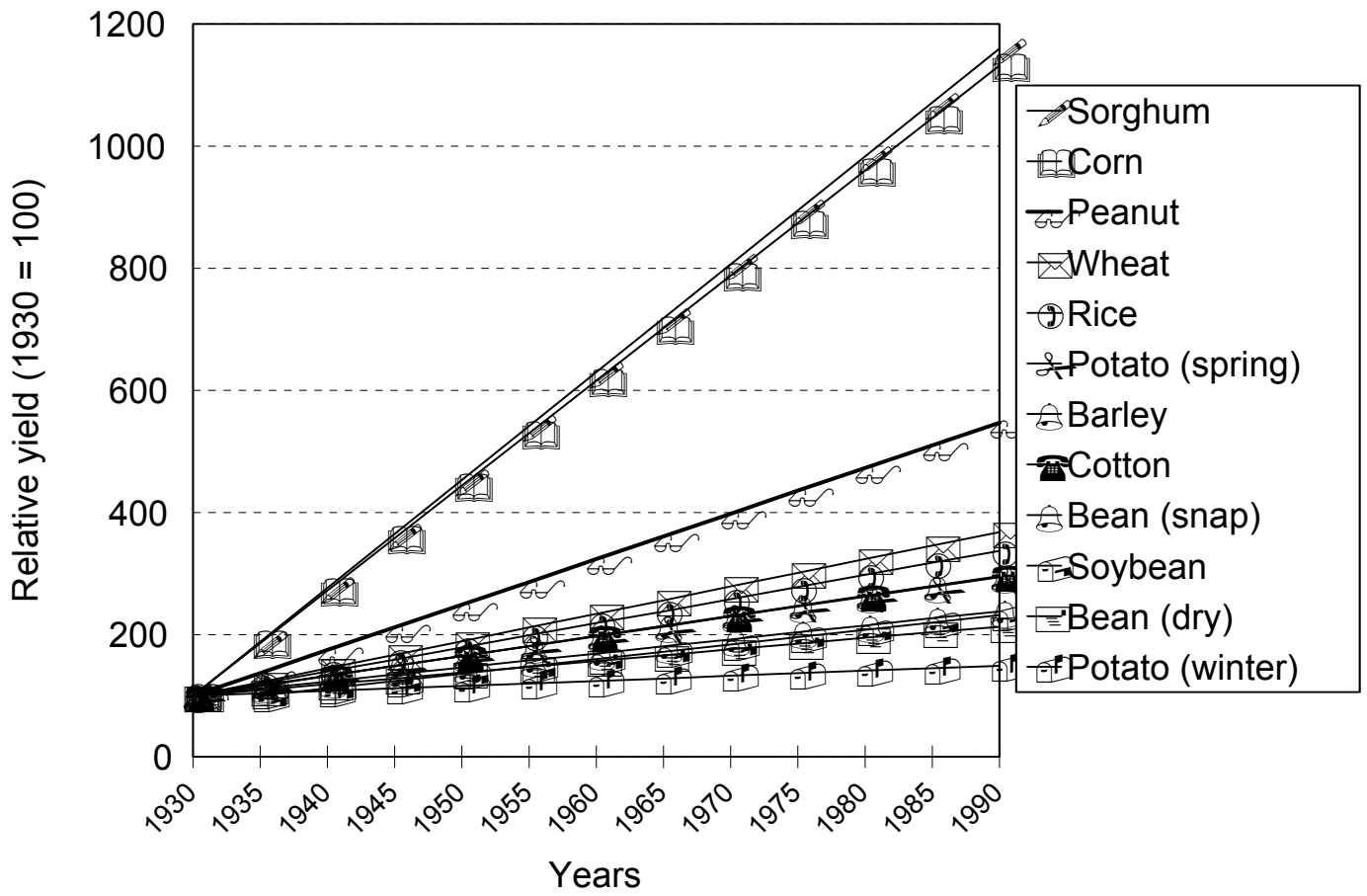
- < Yield
- < Phenology
- < Disease and pest resistance
- < Tolerance to abiotic stresses
- < Etc.

## ■ Consumer:

- < Nutritional characteristics
- < Shelf-life
- < Processing
- < Alternative products
- < Etc.

## Corn Yield (bu/A) in Wisconsin Since 1866







**Barley yellow dwarf virus**



**Cotton pests**

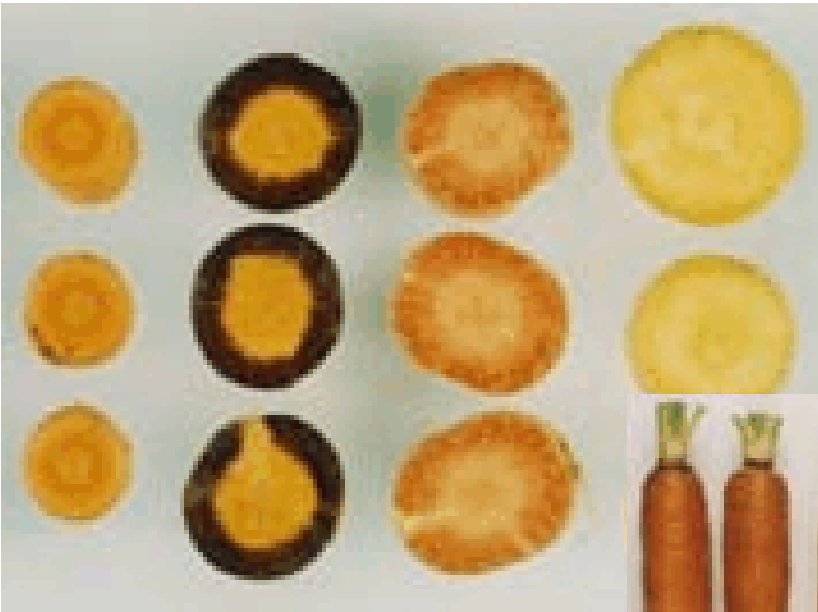
# *Brassica napus*



Vacuolar Na<sup>+</sup>/H<sup>+</sup> antiport: 200 mM NaCl

(Zhang et al. 2001)

Carotenes (primarily alpha- and beta-); typical carotenes plus anthocyanins; lycopene; xanthophylls, not carotenes.



High carotene carrots



Enhancing the vitamin E content or modifying the balance of fatty acids in canola.



## II. Why genetic improvement or plant breeding?

- Rule of thumb for yield: “*The increase in productivity stems for about 50% from improved cultural practices and for 50% from improved varieties.*”
- Other traits:
  - < Disease and pest resistance, tolerance to abiotic stresses: combination of resistance and cultural practices
  - < Nutritional, shelf-life, processing improvements: often genetic