

# European perspectives on Organic Plant Breeding

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# Different ranking of varieties in OA vs Conv

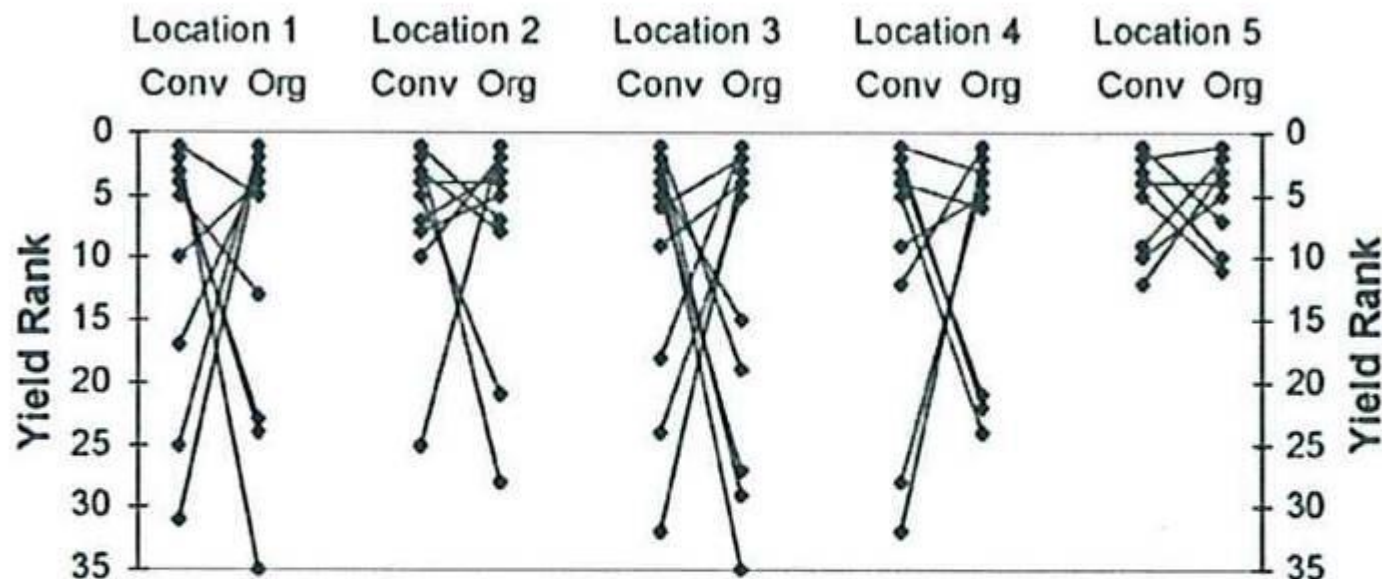


Fig. 1. Genotypic change in rank between organic and conventional wheat nurseries. The top five ranking genotypes for yield in both organic and conventional systems were compared at each location. Genotypes are ranked from 1 = highest yield to 35 = lowest yield.

*(K.Murphy et al., 2007)*

# Mineral vs organic fertilisers

- Lower input level of N and slower release in spring;
- More weed sensitive.



Conventional 29.4



Organic 29.4

*FiBL, 2009*



# Mono vs Multipurpose variety (1)



**Heine 7 (1943)**



**Jubilar (1961)**



**Modern varieties**

*photos: Lochow-Petkus*

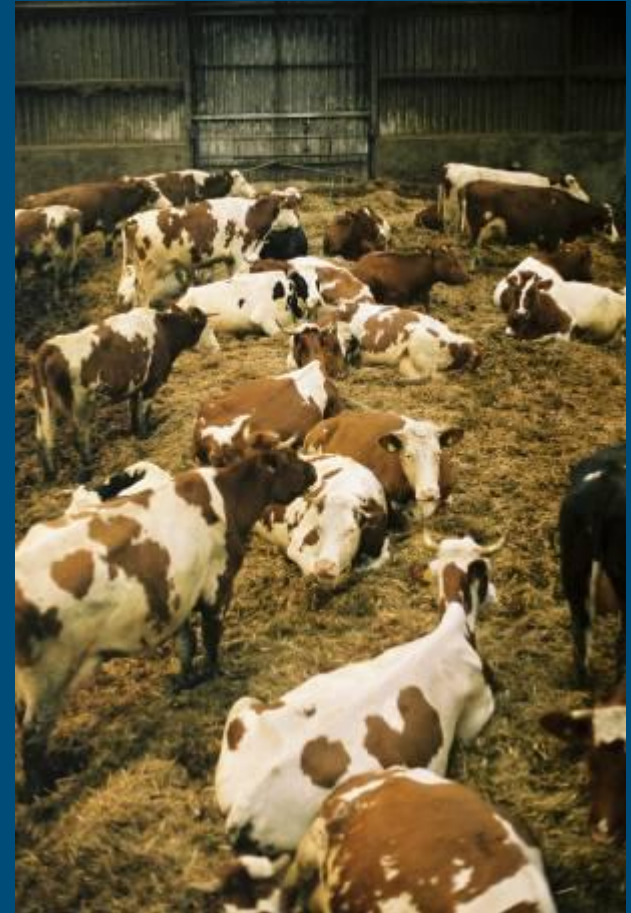
# Mono vs multi-purpose varieties (2)



for food & feed



for soil structure



for straw

# Conclusion - challenge

- Organic Agriculture should not depend on the occasionally successful varieties derived from conventional breeding programs!
- But take the lead in organising breeding for better adapted varieties!



# Research topics for Organic Plant Breeding

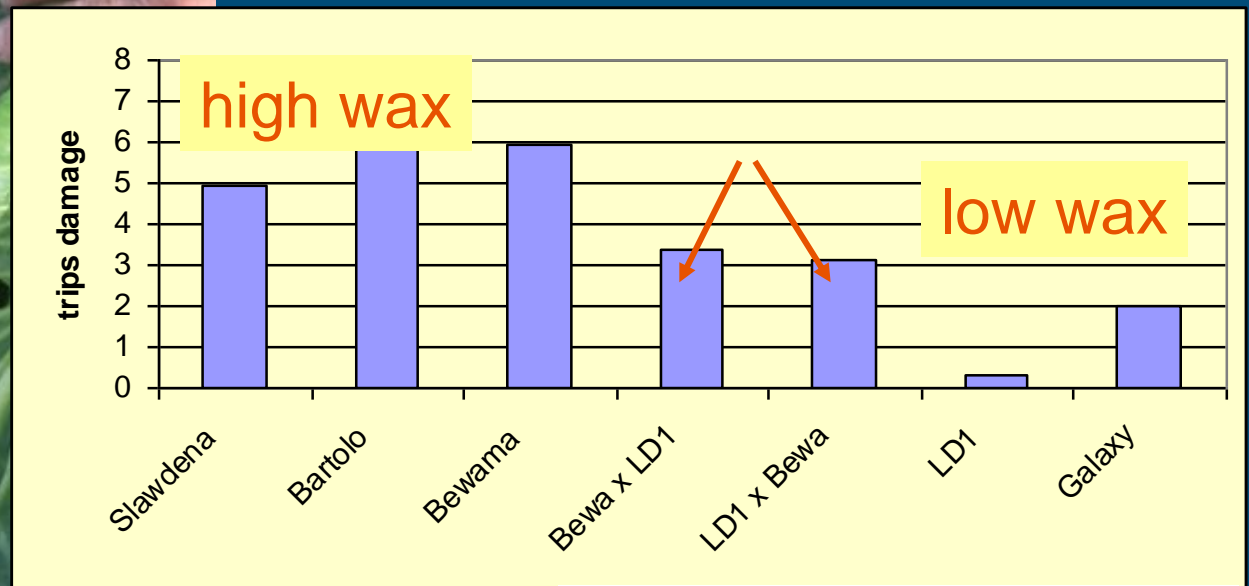
- Selection criteria for robust varieties
  - Factors for plant health
  - Factors for nutrient and water efficiency
  - Relationship between the factors
  - Factors of plant health & human health!
- Selection strategies
  - Selection environment
    - conv vs org, direct vs indirect selection
    - wide or specific adaptation
  - Genetic diversity
  - Participatory selection
  - Field selection versus mol. markers
- Socio-economic & legal aspects



# Breeding research for trips resistance in cabbage



Breeding for more wax layer on leaves against trips damage in cabbage



*Voorrips et al., WUR & LBI 2004-2011*



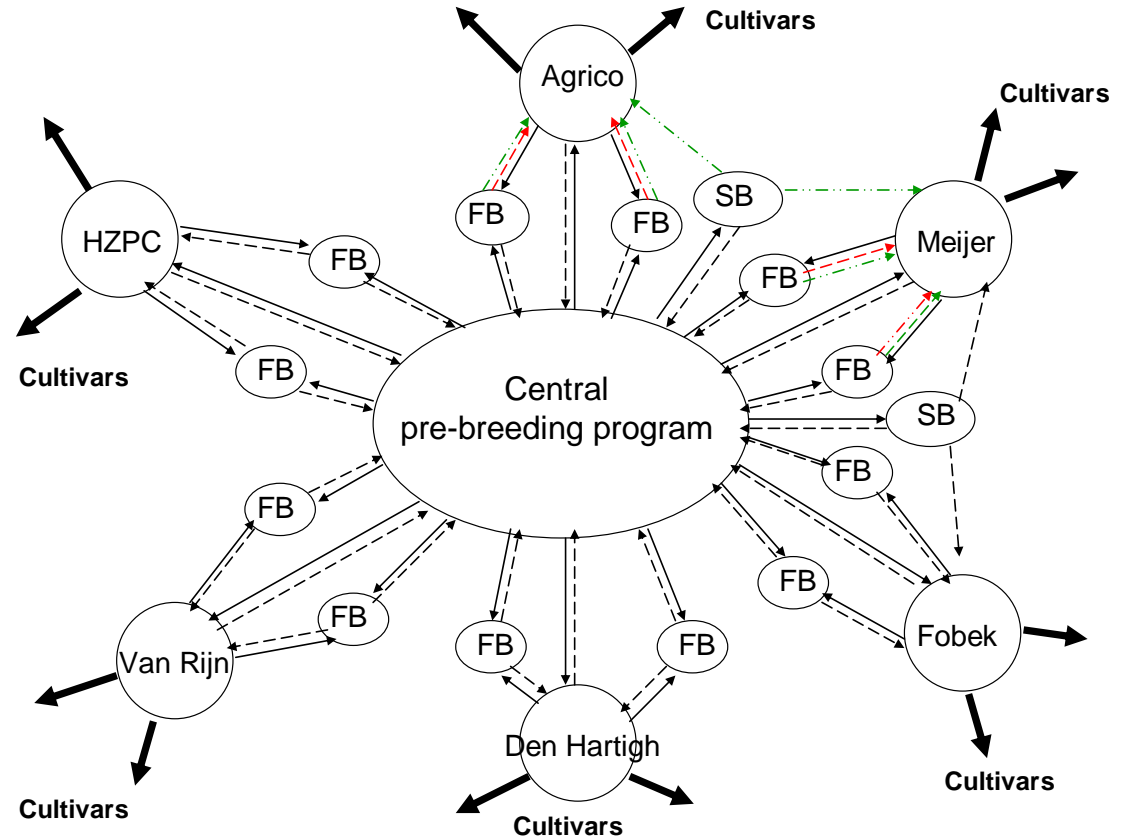
# Onion: improved root system (WUR-NL)

- Onion needs high level of nutrients
- Root system of onion
  - lack of root hairs
  - shallow and scarcely branched
- Uptake improvement
  - Better root system
  - Higher mycorrhizal responsiveness



*Picture from De Melo & Kik, 2003*

# Exploiting different models of PPB in LBI-WUR/NL



# Participatory approaches (PPB) in broccoli - USA

- Started from an initial broad base population;
- 500 - 1000 seeds sent to each grower to plant, select, allow random mating and harvest seed;
- Portion of harvested seed returned to breeder;
- Seed mixed and redistributed for 3 cycles;
- Cultivar development.



*J. Myers, Oregon State University*



# EU projects on breeding

- Farm Seed Opportunities (coordinator INRA/France) 2007-2009
  - regulation on conservation varieties
- NUE crops (coordinator university NewCastle) 2009-2014
  - improving nutrient efficiency on wheat, potato, oil seed rape, maize
- SOLIBAM (coordinator INRA/France) 2010-2015
  - beans, cabbage, wheat tomato

- **Group 1: Empowerment of rural areas**

*Coordinator: Susanne Padel, Aberystwyth University, Wales*

- **Group 2: Eco-functional intensification**

*Coordinator: Niels Halberg – ICROFS, Denmark*

**5 breeding topics!**

- **Group 3: Food for health and well-being**

*Coordinator: Machteld Huber, Louis Bolk Institute, The Netherlands*