Developing pulse varieties for Northern European conditions

Plant Protein Seminar 18.-19.11.2019 Helsinki

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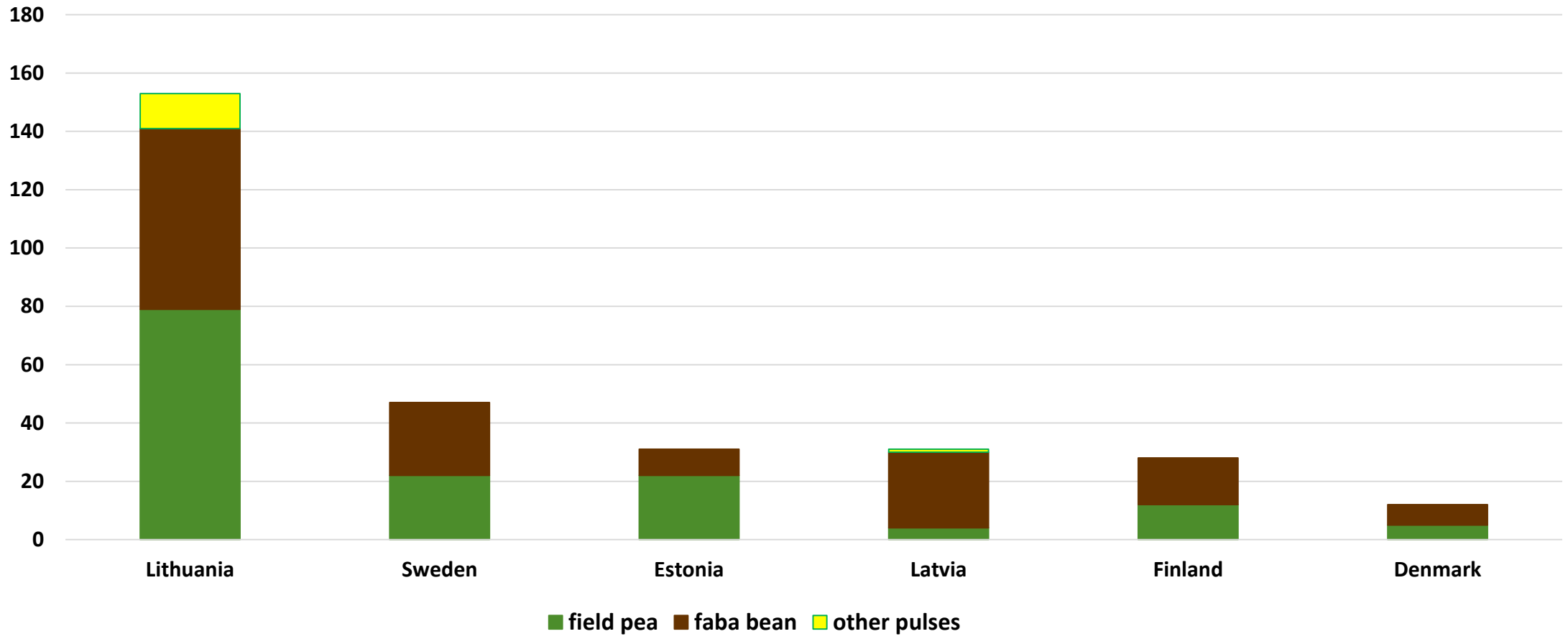
Boreal Plant Breeding

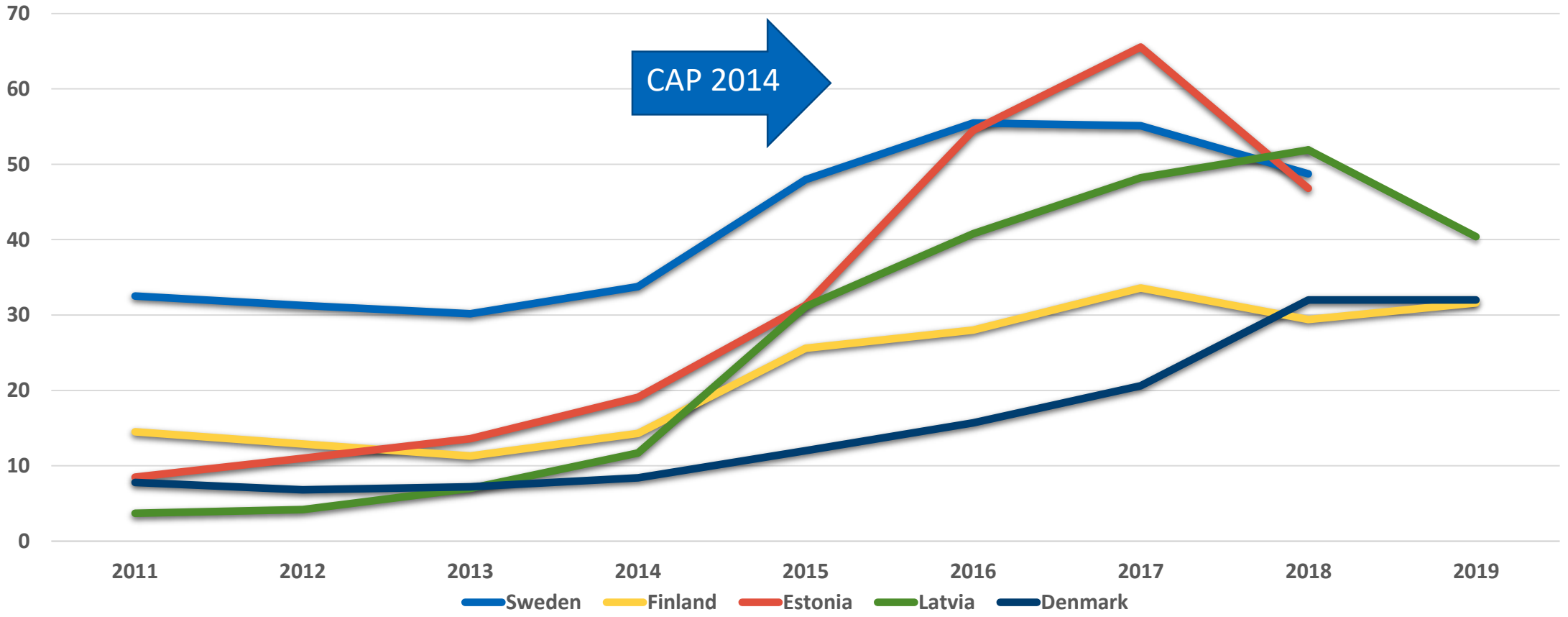
Topics

- Cultivation of pulses in Northern EU
- Status of faba bean and field pea breeding in North
- Breeding goals for pulses
- Future perspectives

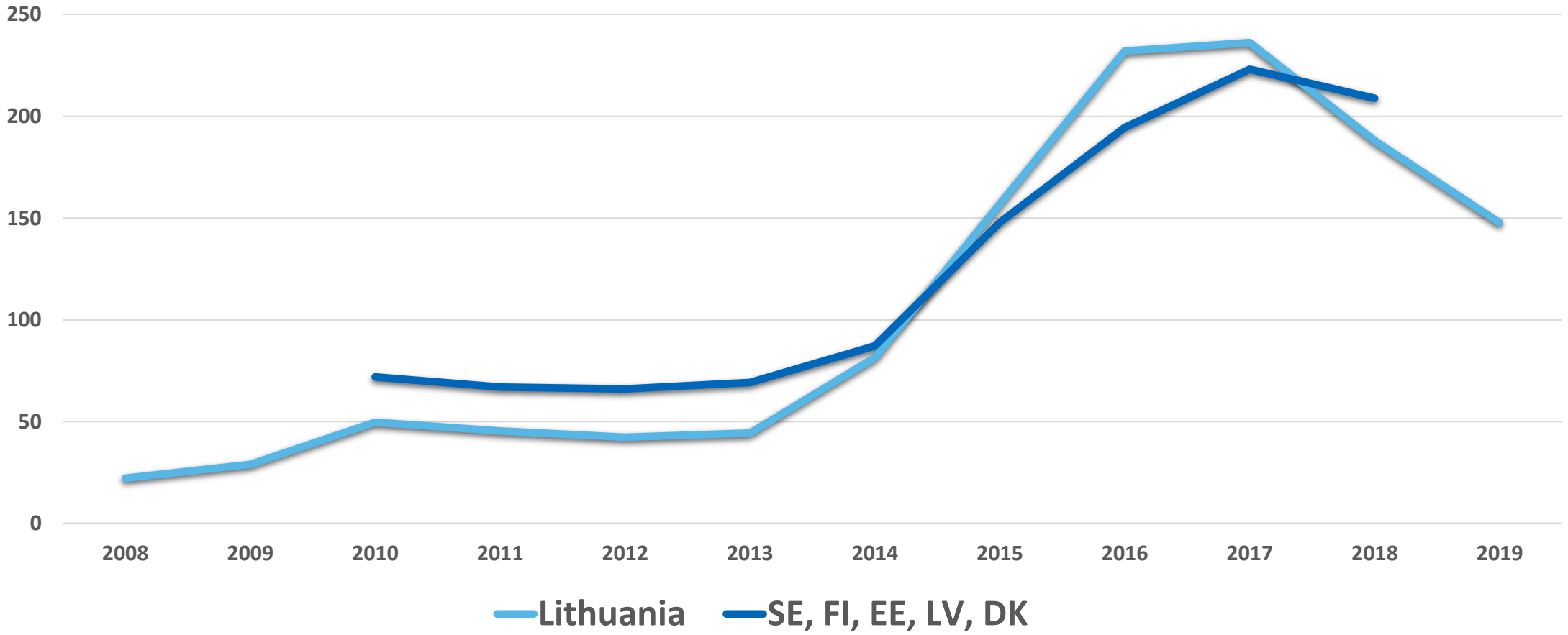
Pea and faba bean are dominating pulse species in Baltic and Nordic EU countries (EUROSTAT data 2015)



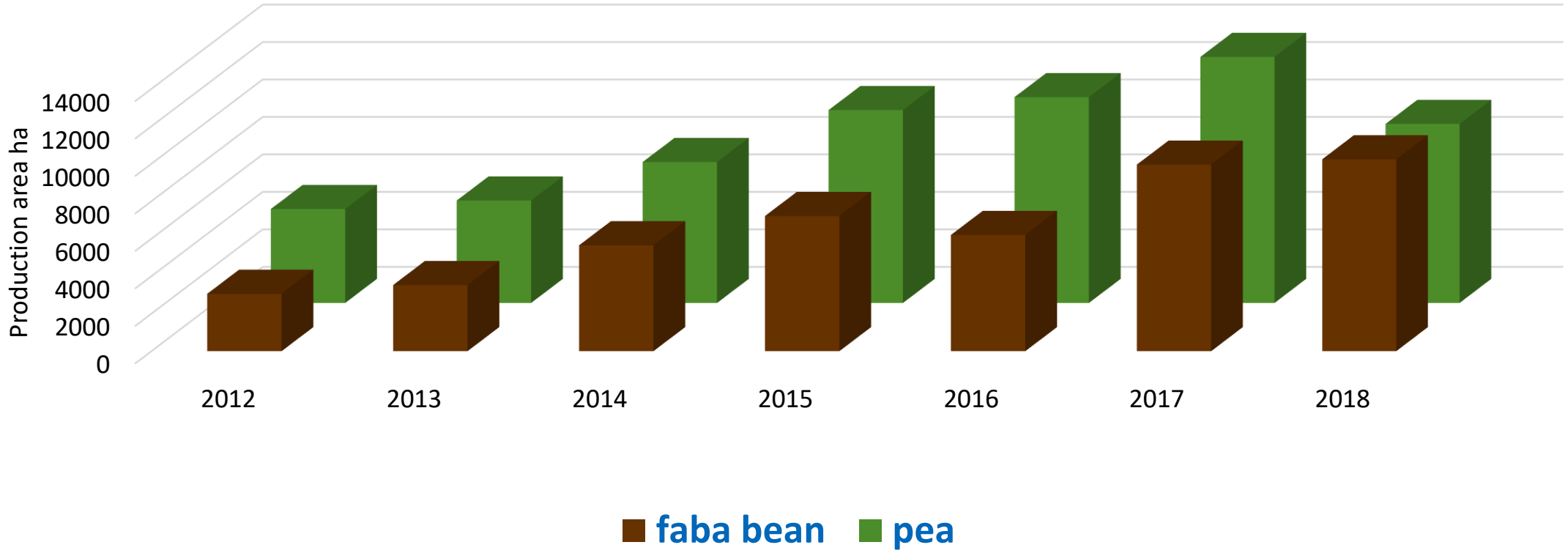
Area of pulses has increased in Nordic and Baltic countries after last CAP-reform



From 2013 to the record year 2017 the area of pulses increased from 113 000 to 460 000 hectares



Production of certified seed has followed the demand for pulses: three fold increase in countries under study (2012-2018)



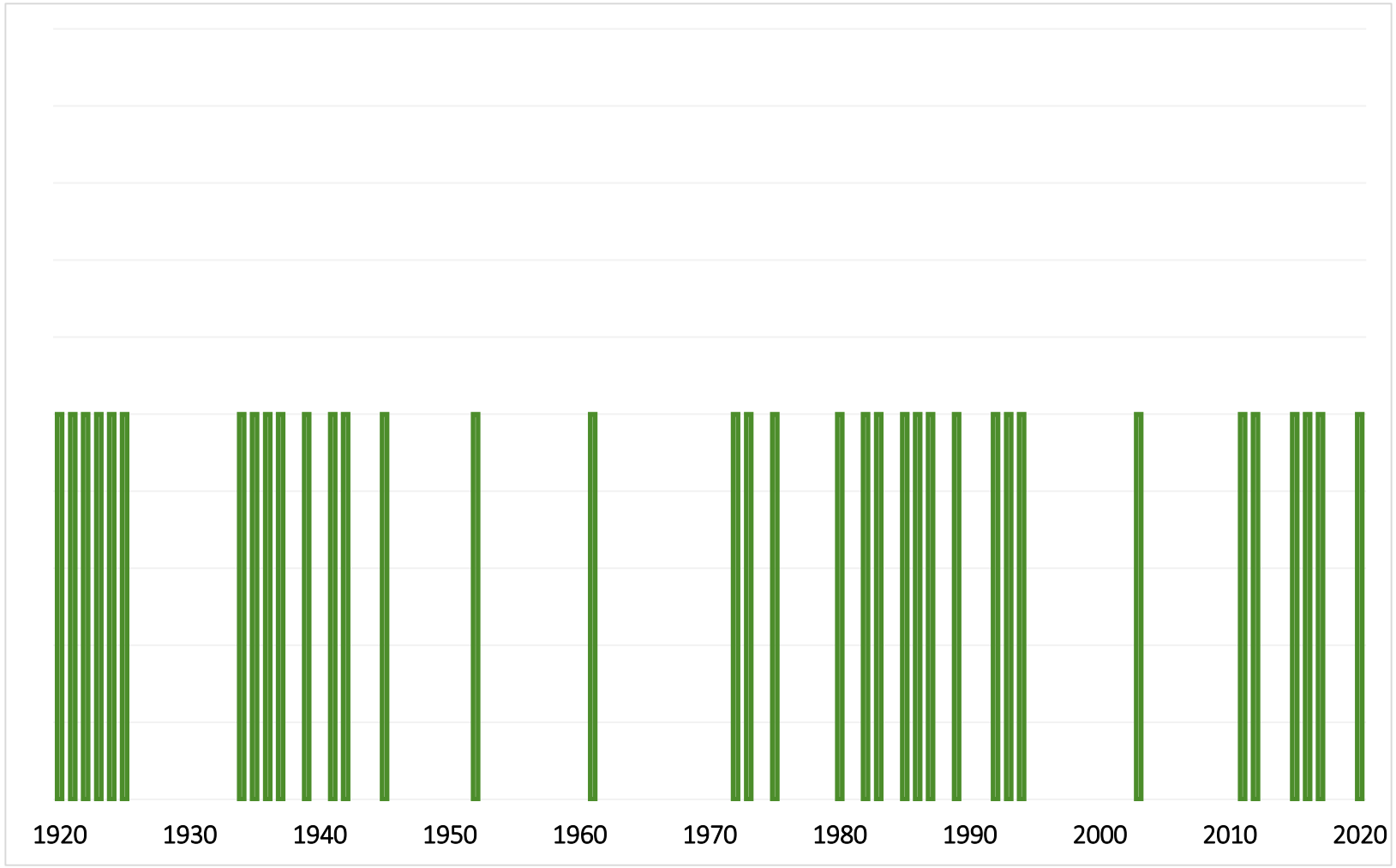
Breeders have reacted to the change in seed markets

- **Estonian Crop Reserch Insitute**
  - Field pea, faba bean and soybean breeding restarted 2019 with new crosses
- **Latvia, Inst. Agroresources and Economics**
  - Small pea program, faba bean breeding restarted 2017
- **Lithuanian Res. Centre for Agric. and Forestry**
  - Full size pea breeding program ongoing, also a small lupin program

Breeders have reacted to the change in seed markets

- **Sweden**
  - Lantmännen and SLU have started a program for faba bean genomic research and breeding in 2019
- **Denmark**
  - Large faba bean program (Norfab) launched by Nordic Seed, Sejet, Univ. Aarhuset and Univ.Copenhagen in 2016. Breeding of faba bean and development of genomic tools for the breeding.
  - Pea breeding program in Nordic Seed
- **Finland**
  - Boreal has raised the size of the pulse breeding program to the level of main cereal species

Finnish breeding companies have released 35 pea varieties since 1920



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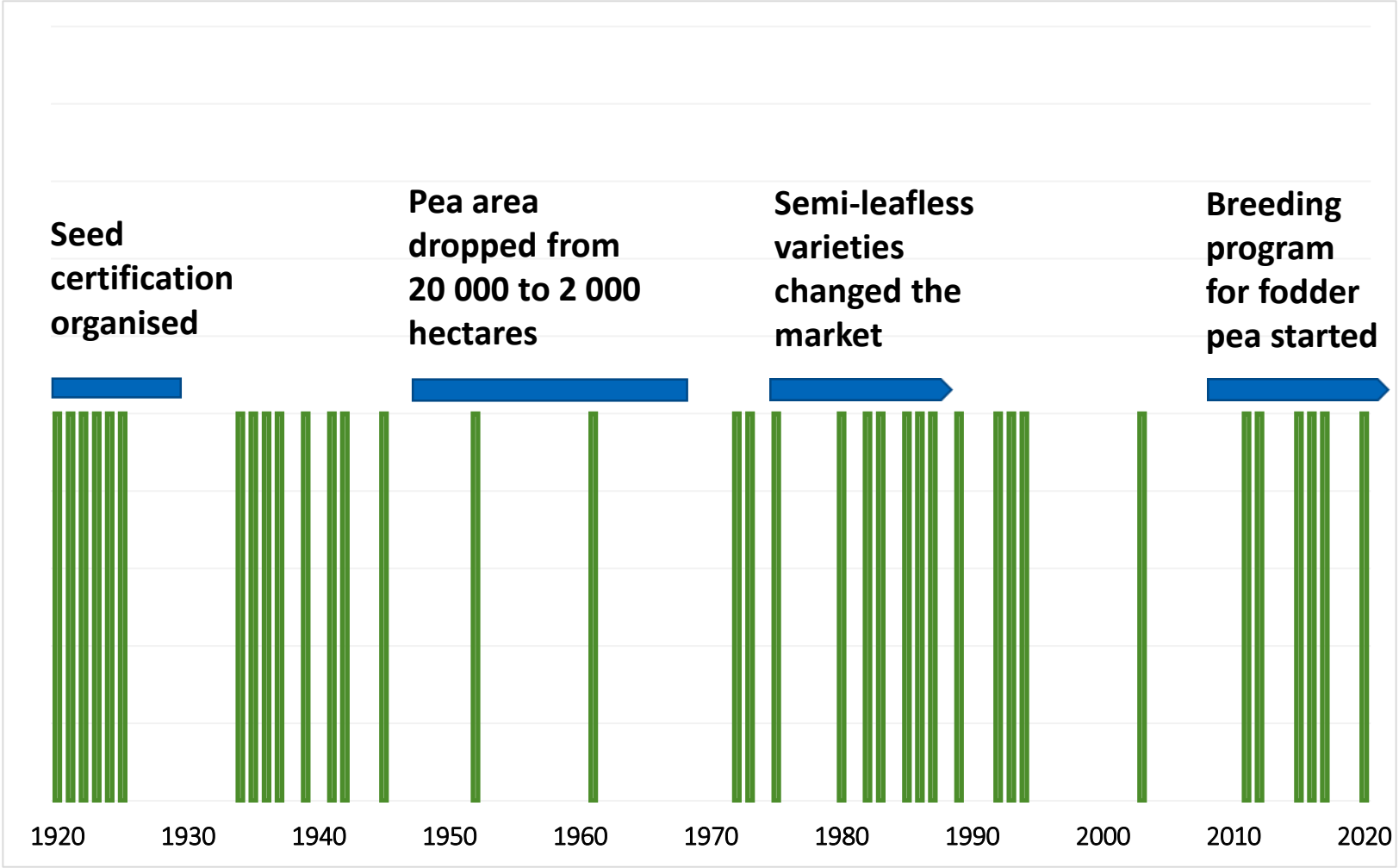
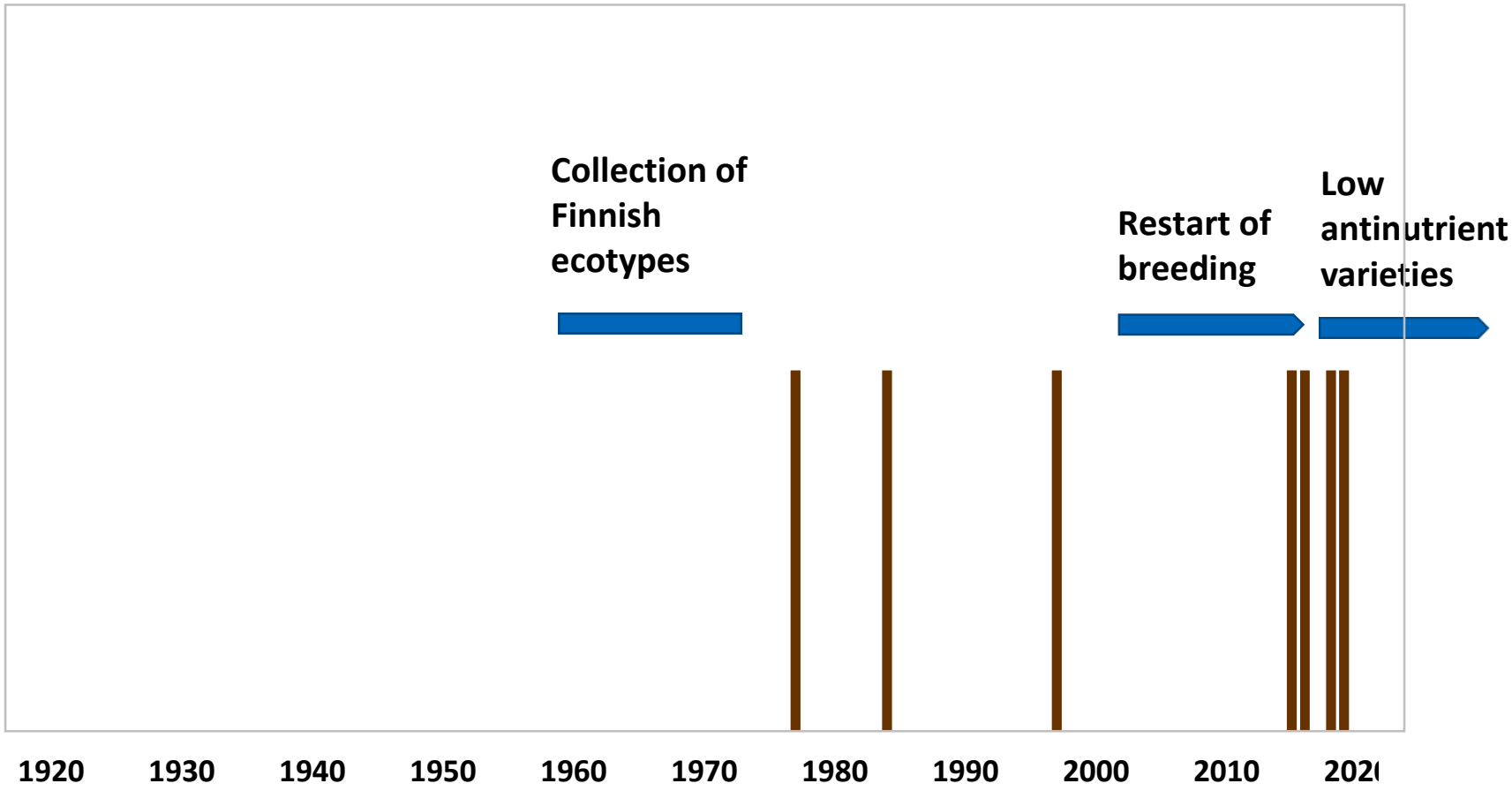
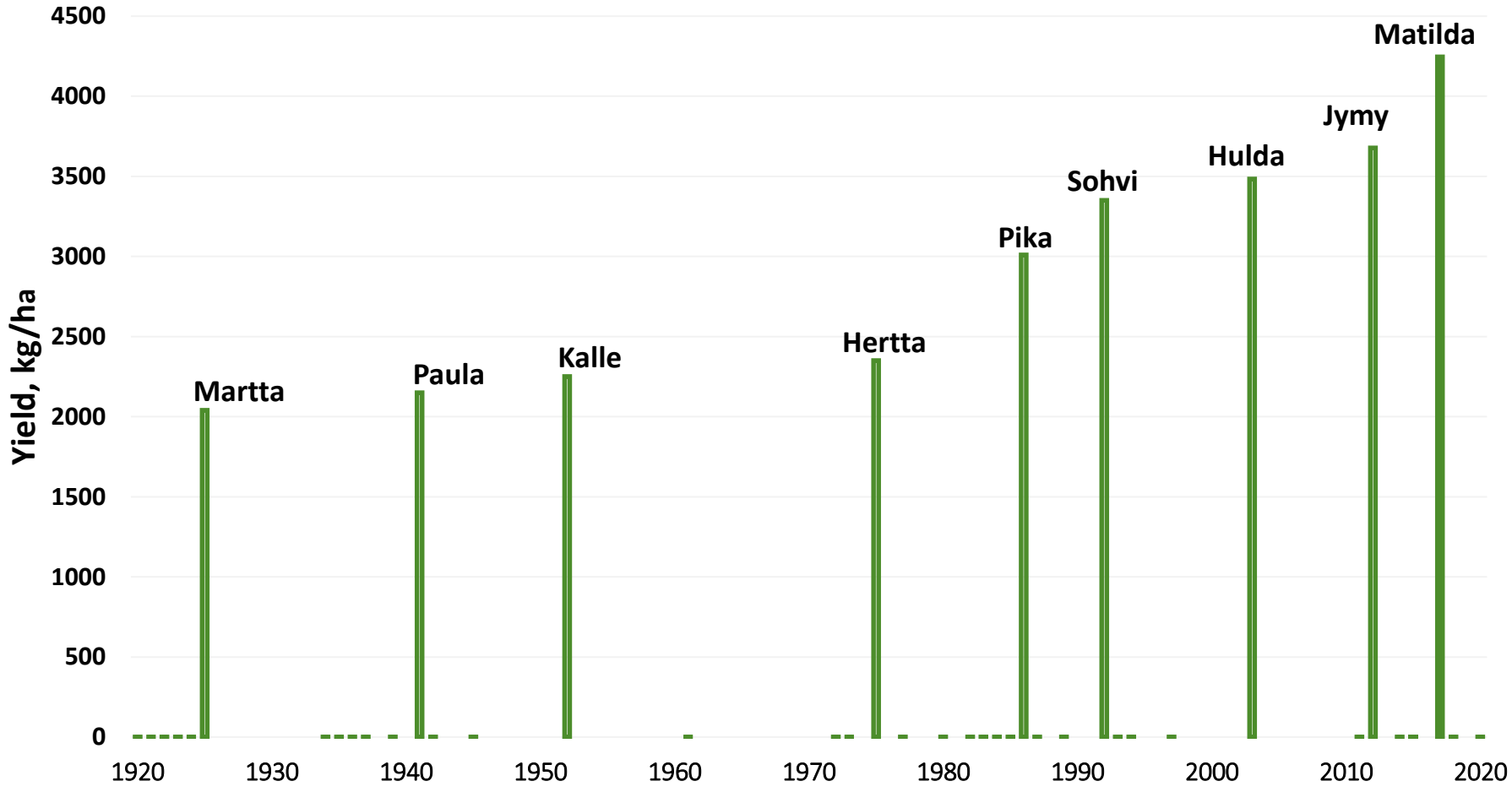


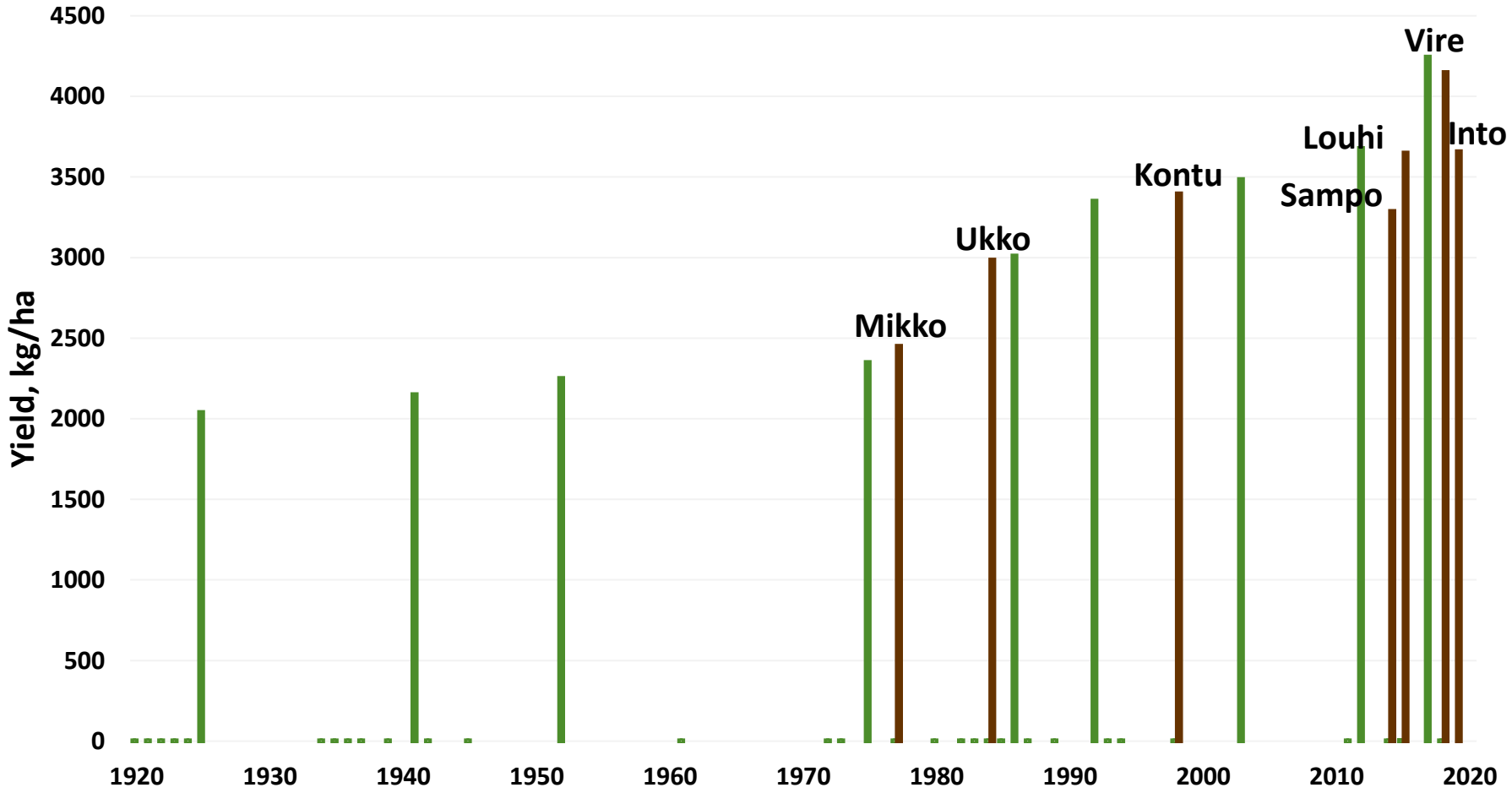
History of faba bean breeding in Finland is short - seven varieties registered so far



Pea's yield potential has doubled in Finland due to plant breeding



Yield potential of new faba bean varieties has followed progress in pea



Target traits in breeding

- **Yield**
- **Protein**
  - protein content (%), protein yield (kg/ha)
- **Disease resistance**
  - Chocolate spot, leaf blight, rust in faba bean
  - Fusarium and Ascochyta diseases in pea
  - Soil born diseases

Target traits

- **YIELD STABILITY**
  - Field pea
    - lodging resistance
    - tolerance to excess of water
  - Faba bean
    - earliness
    - tolerance to drought
- **QUALITY**
  - Field pea
    - cooking quality
  - Faba bean
    - vicine-convicine content
    - tannin content

Future perspectives

- Genomic selection
  - will shorten selection cycles and improve genetic gain
- Breeding of novel quality traits for food and feed
  - micronutriens
  - lectine
  - phytines
  - level of resistant starch
  - etc.
- Gene editing?
- High-through-put phenotyping
- Plant-rhizobia interaction


BOREAL