

Hybride aardappelveredeling op weg naar de markt

Pim Lindhout

NVTL-Studiedag

Wageningen

8 maart 2016





(Ex-)minister of Agriculture Sharon Dijksma
supporting Solynta breeding in greenhouse



Theo Schotte, breeding

Pim Lindhout, R&D

Hein Kruyt,
business
development

Johan Trouw,
Seed producti

Solynta staff in 2006 - 2011



Solynta staff in 2015

Potato is 3rd global food crop

- However:
- Big losses by *Phytophthora*: 10 B\$/year
- Slow multiplication rate of seed potatoes
- Contaminated seed potatoes reduce yield
- Introduction of one trait takes 15 to 50 years
- Trait stacking takes > 50 years
- So, slow breeding: Russet Burbank released in 1876!

Conclusion:

- No innovations in potato breeding in 145 years

50% of all crop protection chemicals in
The Netherlands is used to protect potato
against *Phytophthora infestans*

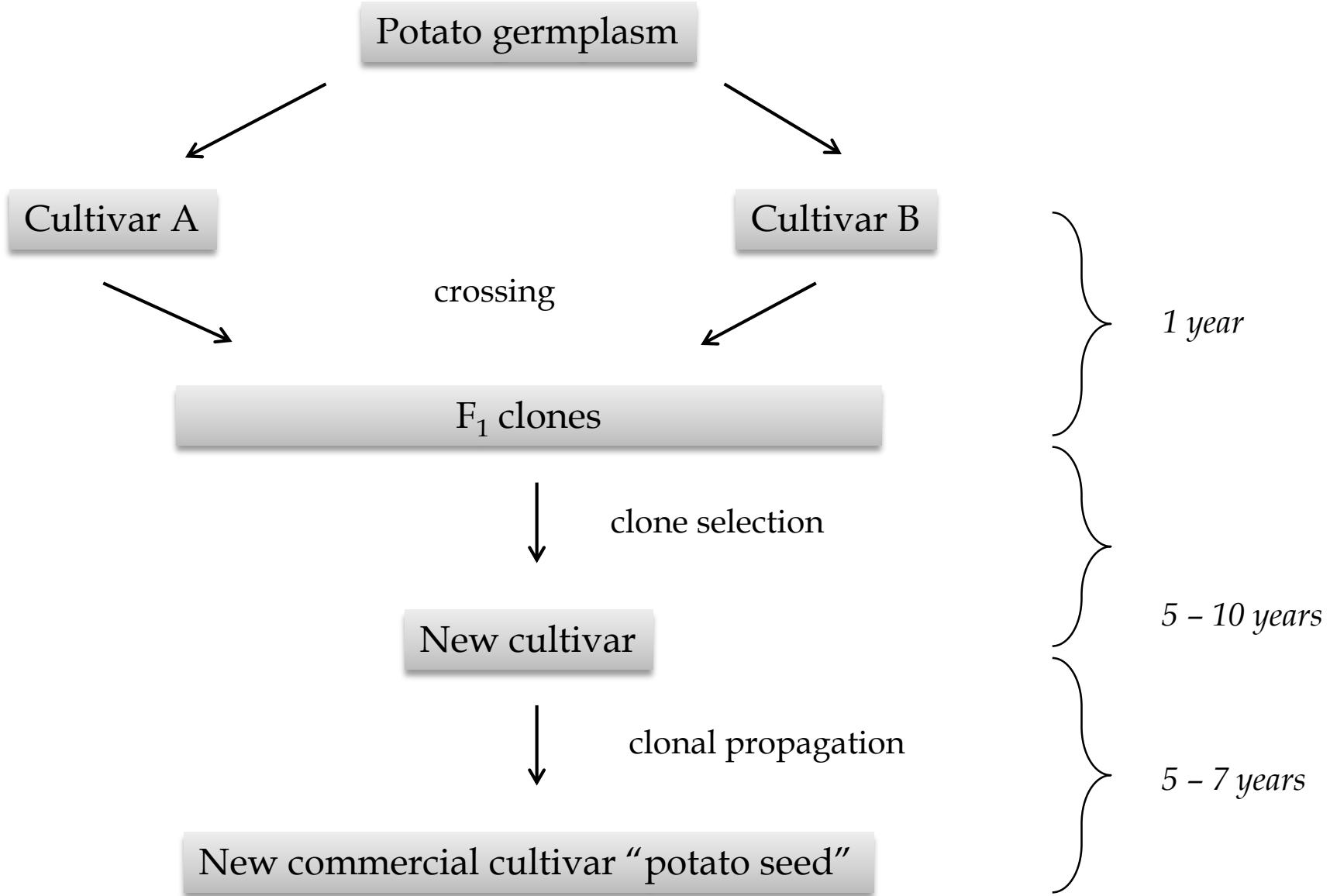




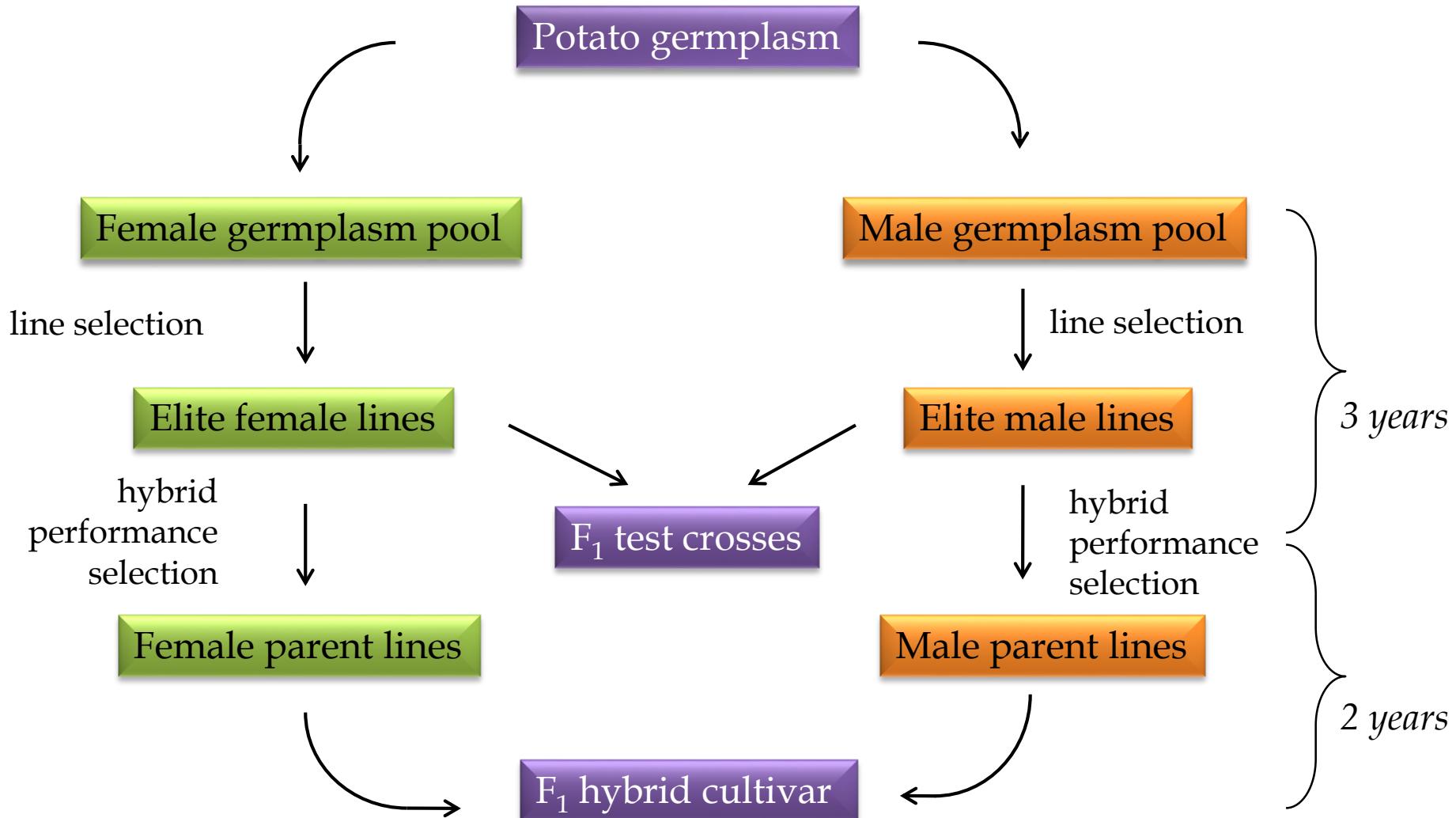
Solution:

Hybrid breeding

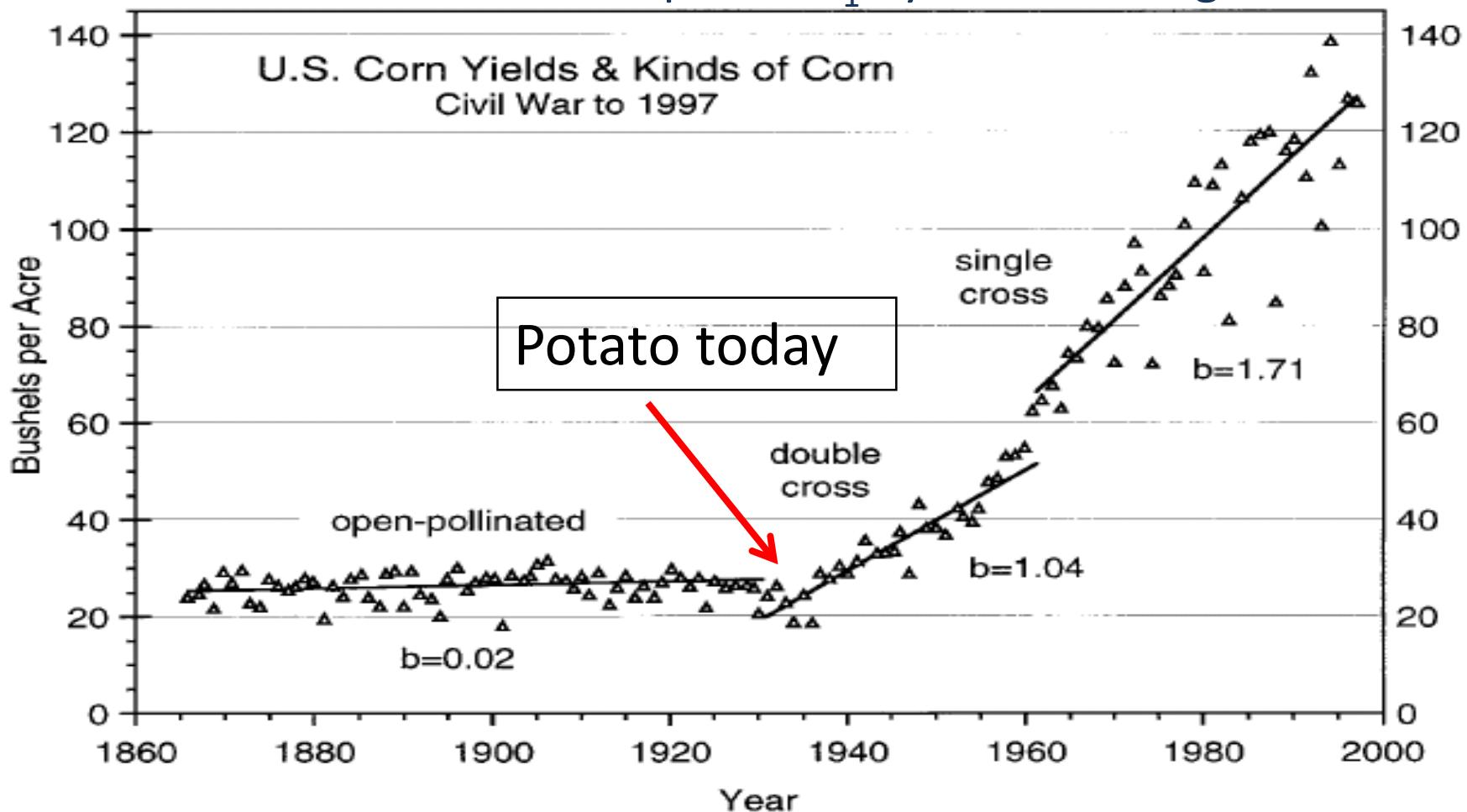
Traditional tetraploid empiric breeding



Diploid F₁ hybrid breeding



Corn as example for F_1 hybrid breeding



Hybrid breeding has great advantages

	Traditional breeding	Hybrid breeding
Introduction one trait	15 – 50 years	2 – 3 years
Trait stacking	Impossible	3 – 7 years
<i>Phytophthora</i> resistance	> 50 years	4 years
Multiplication	Vegetative > 5 y	½ year
Seed health	contaminated	clean
Conclusion	Russet Burbank (1876)	Dynamic introductions of innovative products Value creation Disruptive change



400.000 plants = 10 ha commercial potato field
~ 200 gram seeds = envelope
~ 25 ton seed tubers = big sea container



S/i parent Elite clone



F₃ progeny clones



2009: Proof of principle F₁ hybrid breeding

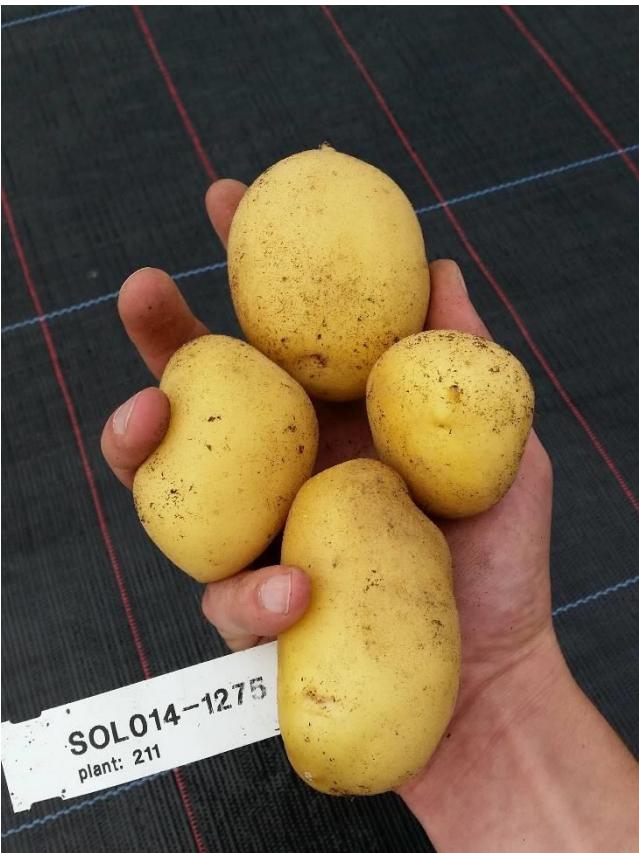


Breeding started in 2010

A photograph of a rural landscape showing agricultural activity. In the foreground, a large green tractor with red accents is positioned on the left, facing towards the center. In the middle ground, another smaller red tractor is operating in a field, with two people standing nearby. The field is filled with lush green crops. The background features a line of trees and a clear sky.

Planting mechanisation

Solynta breeding germplasm



F2

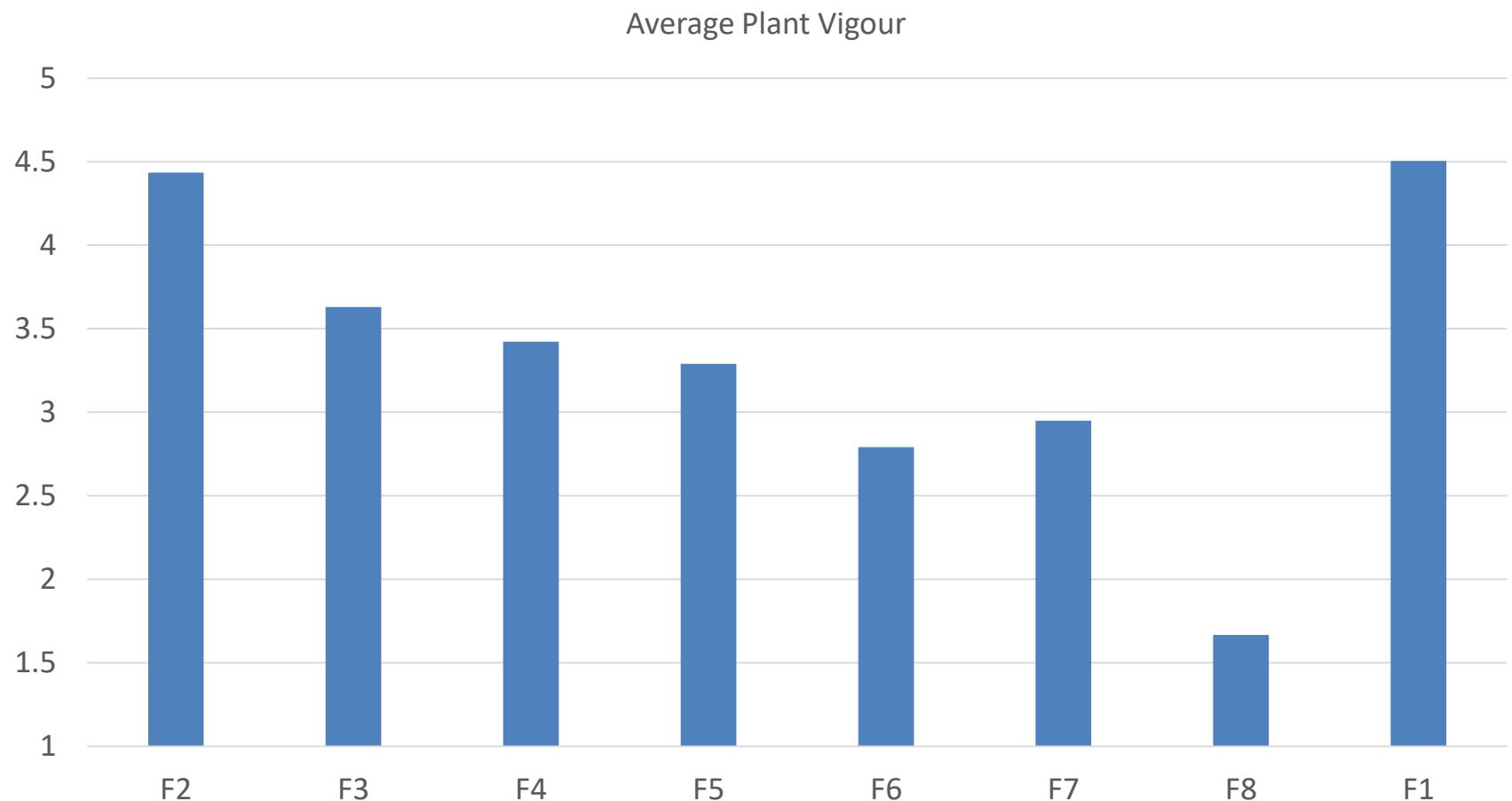


F2



F3

Inbreeding depression and hybrid vigour



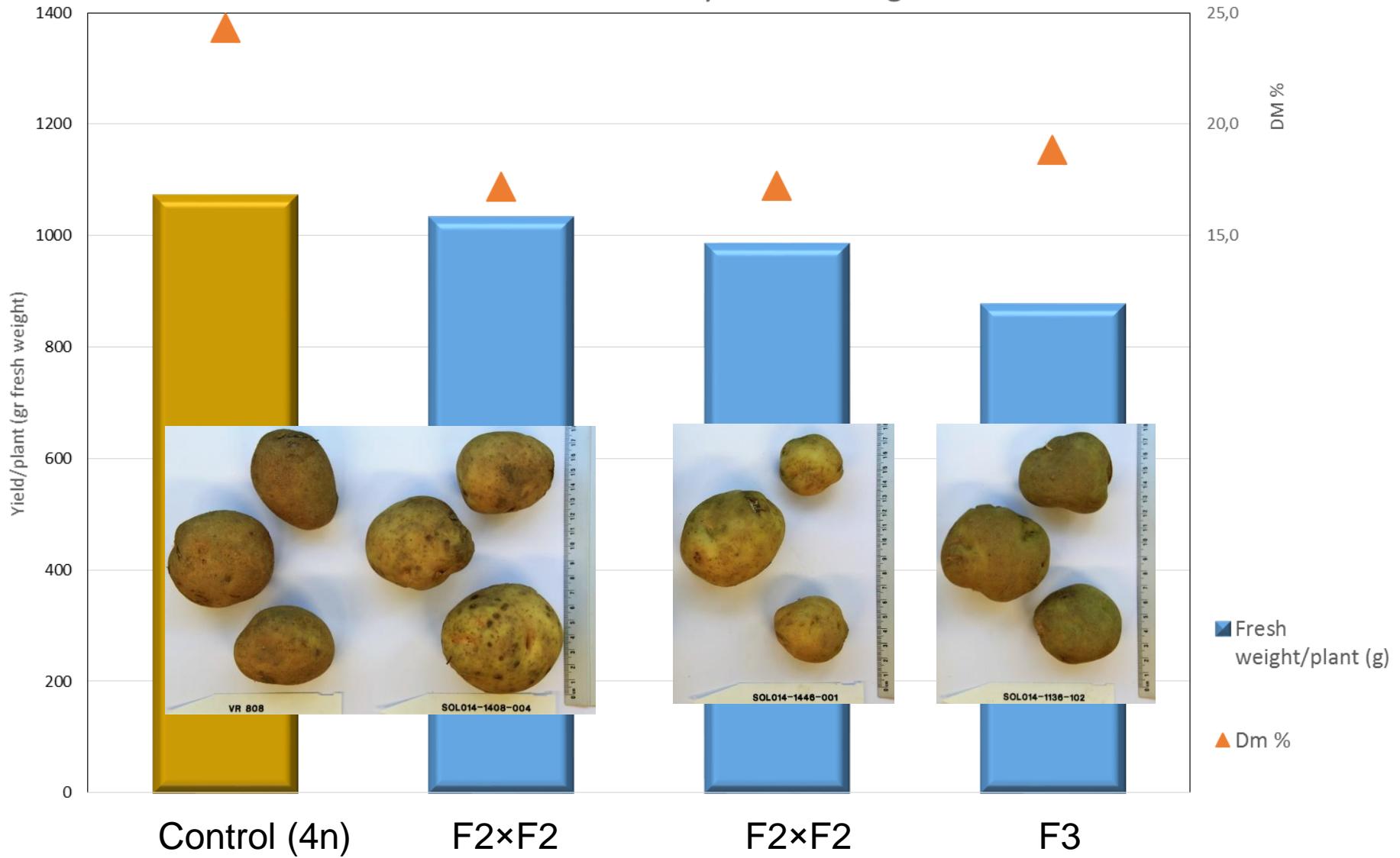
- Inbreeding depression is still present but declining
- It will take decades before inbred lines are at same level as hybrids

What about the hybrid varieties?

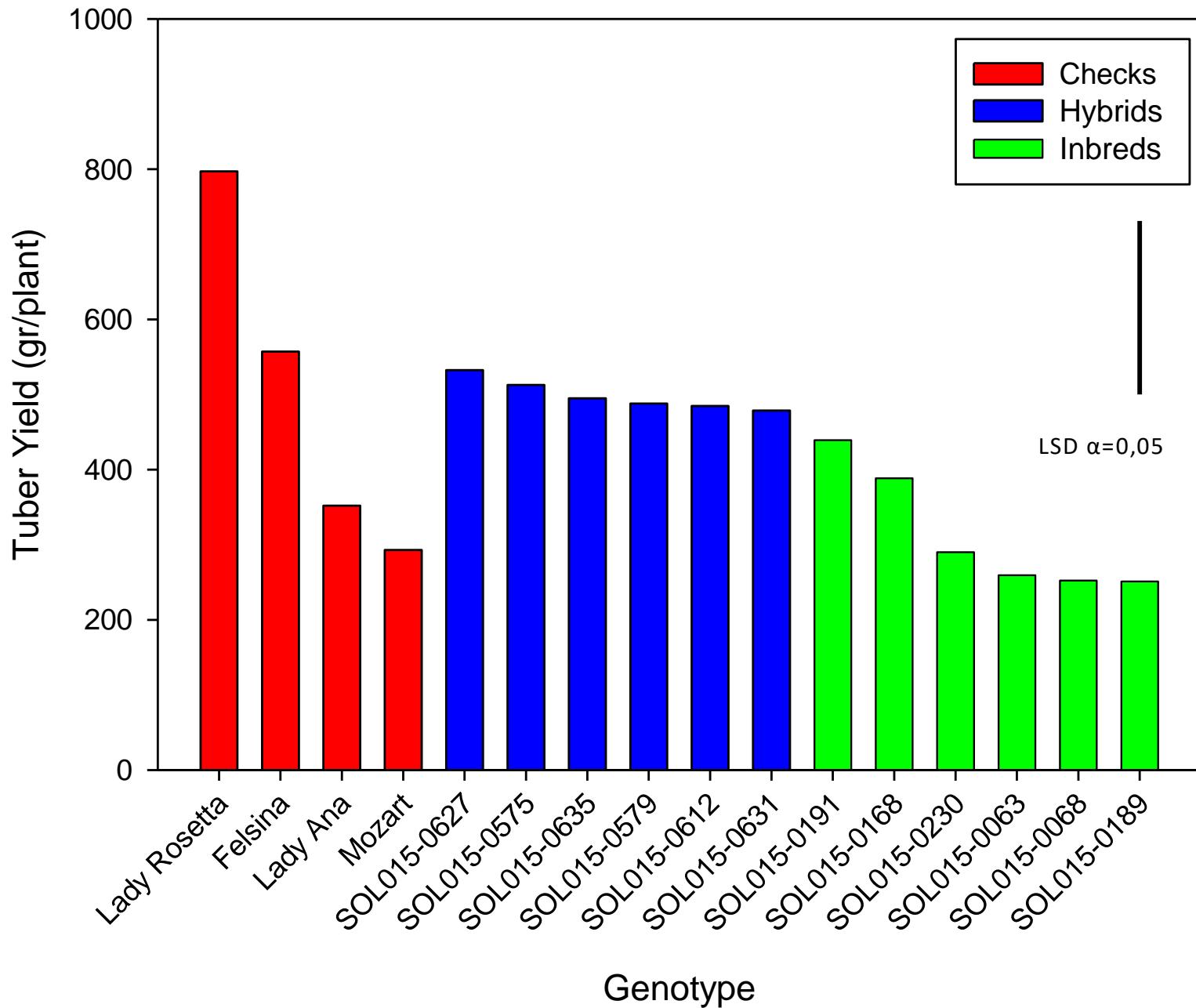


Yield trials in 2015

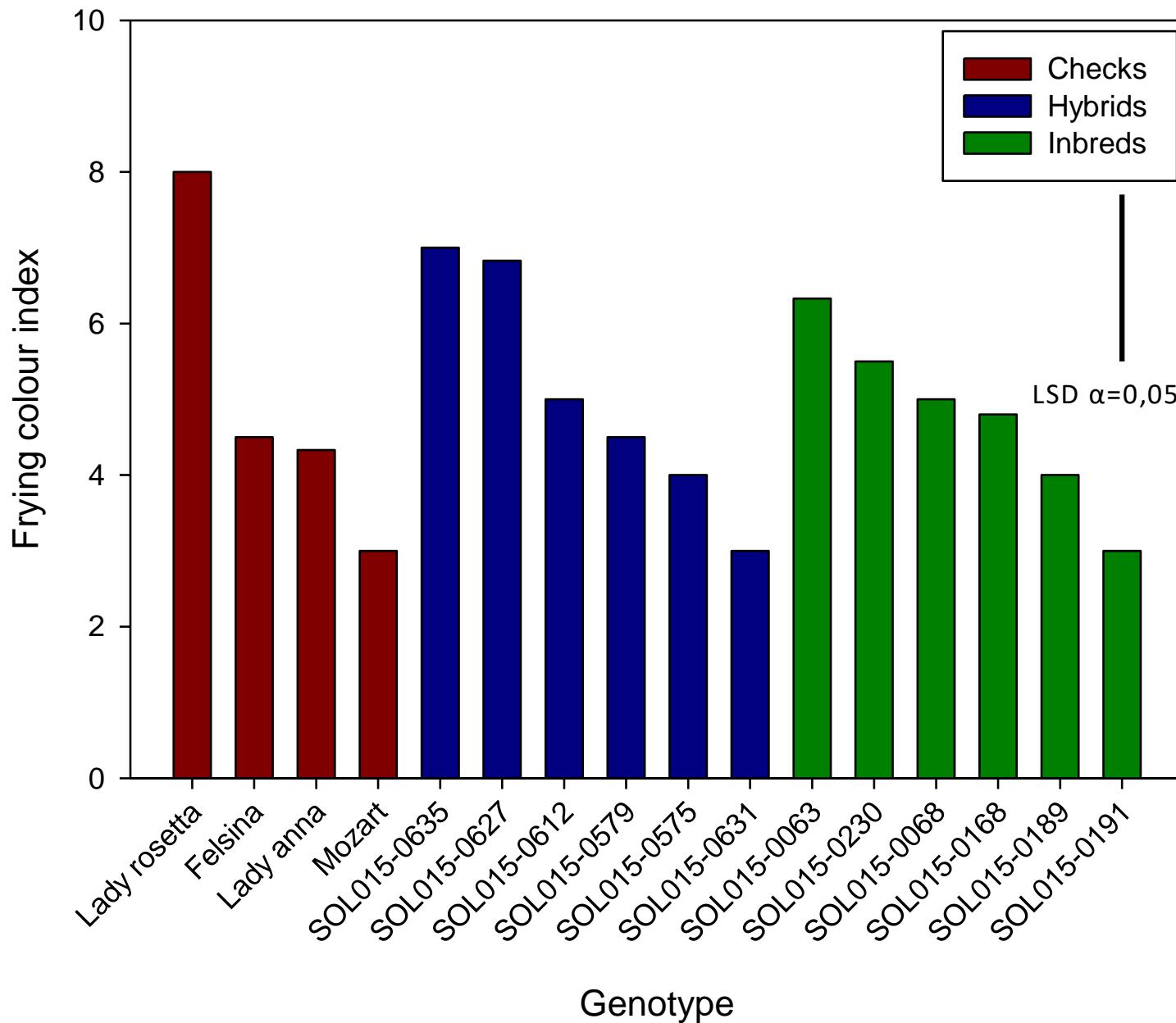
Some breeding germplasm



Diploid Hybrids and Inbred lines vs 4n Checks



Diploid Hybrids and Inbred lines vs 4n Checks



Example of Hybrid Vigour

Harvest 2015; Sandy soil; Two plants



Female Parent F3



Hybrid



Male F5



EU demonstration project: Marker assisted backcrossing in potato

Objective for 2017:

Double stack

Phytophthora resistant varieties

Future of potato breeding is in hybrid seeds

