Diploid potato collection in Poland

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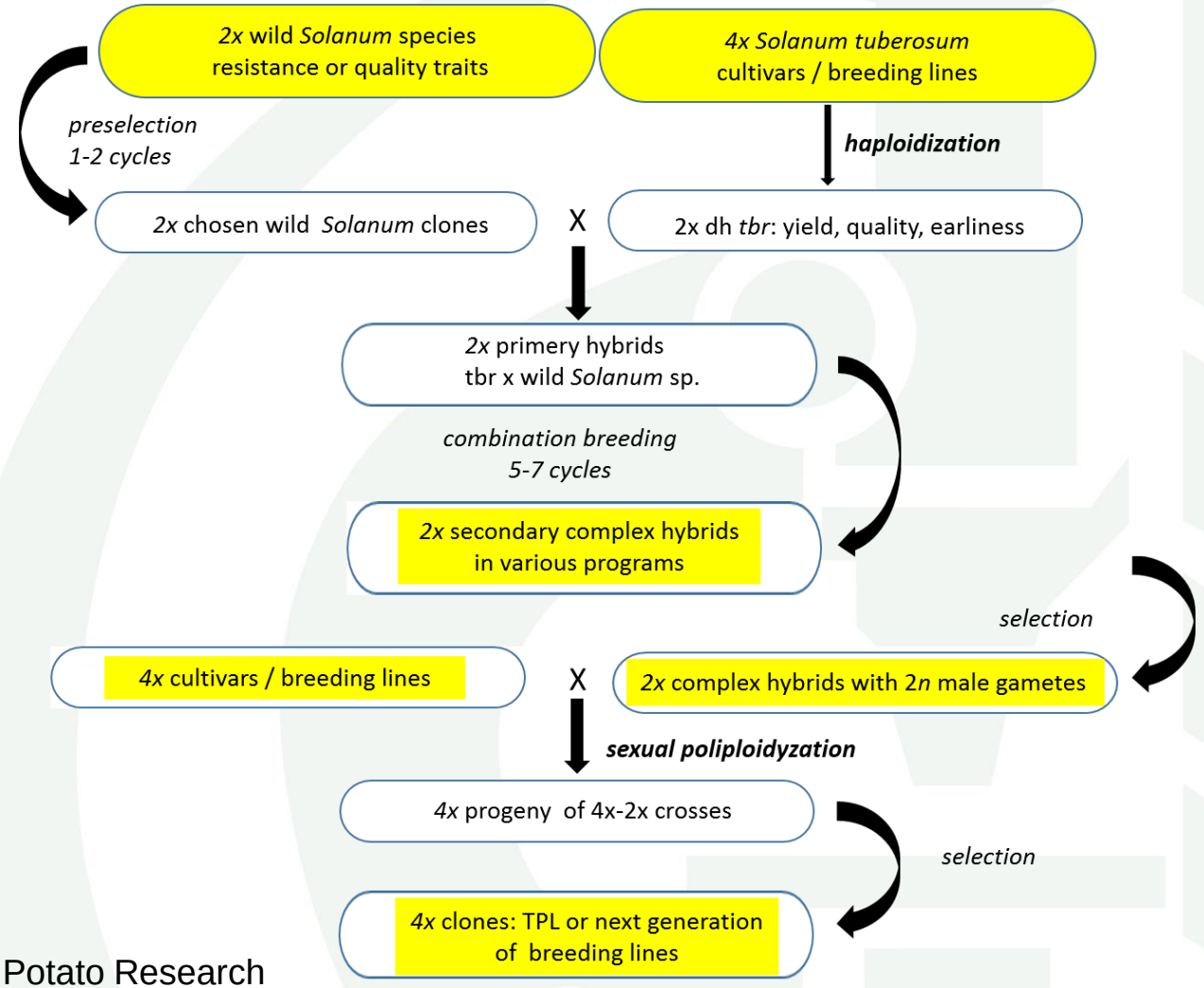
Potato parental line breeding in Poland

- **Diploid** level
- **Tetraploid** level – parents of 72 Polish varieties

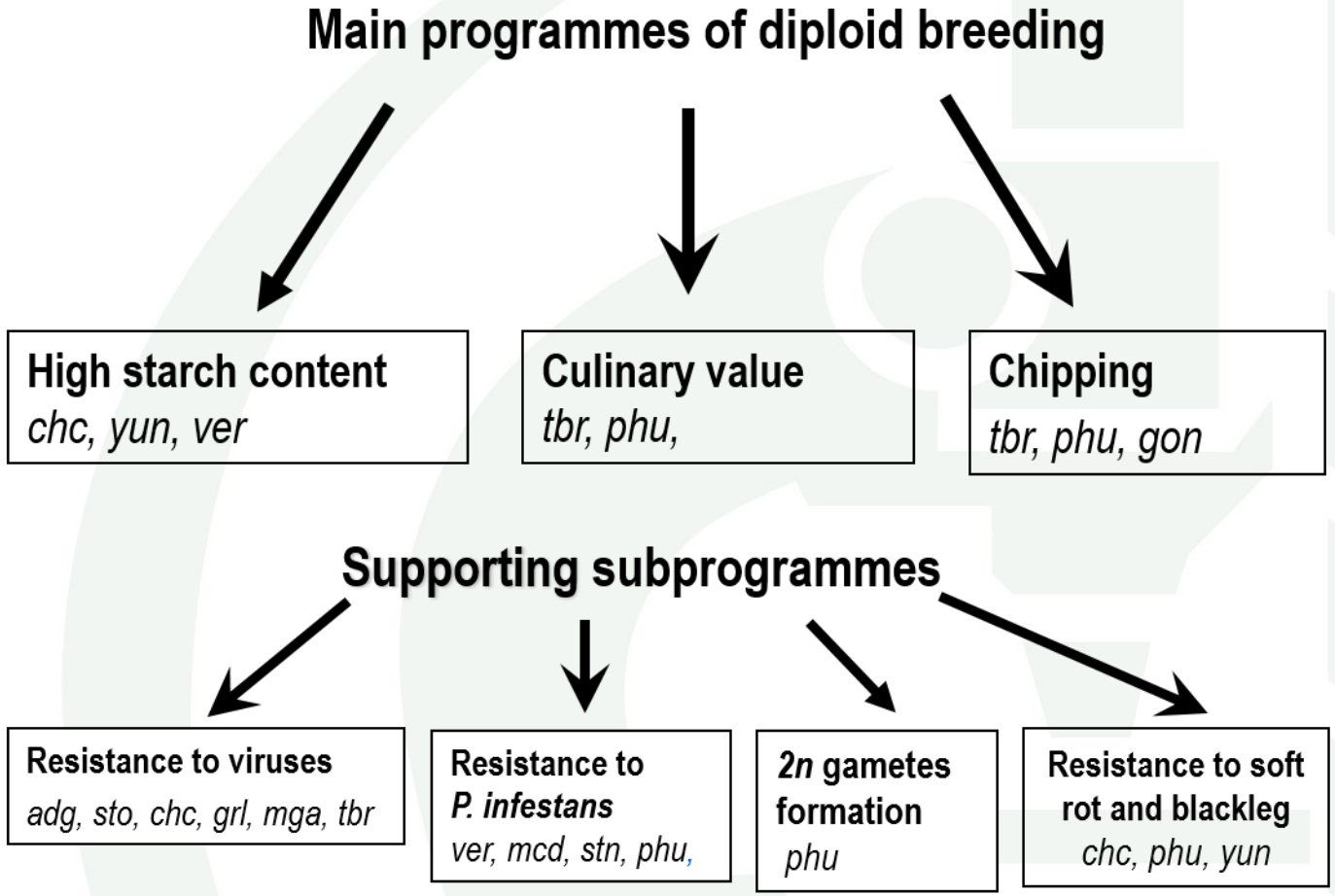
IHAR-PIB Młochów Division

The scheme of diploid potato breeding at IHAR-PIB



Zimnoch-Guzowska and Flis 2021 Potato Research

Main and supporting programmes of diploid breeding at IHAR-PIB



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Diploid potato collection at IHAR-PIB Młochów

Field – 237 collection objects

Greenhouse – 30 collection objects

https://bankgenow.edu.pl/o-centrum/dzialalnosc/przechowalnia-dlugoterminowa/#

In vitro – 203 collection objects

Cryopreservation – 96 collection objects

Seeds of wild potato species - 111 accesion numbers

Diploid potato collection at IHAR-PIB Młochów

Potato resistance genes and QTL mapped at IHAR-PIB

Trait	Chromosome, location of the *R* gene or QTL											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Resistance to viruses								***Ns***	***Ny-Smira*** ***Ny-1*** ***Gm***		***PLRV1*** ***Ny-2*** ***Rm*** ***PLRV4***	***Ryf-sto***
Resistance to *S. endobioticum*											***Sen2***	
Resistance to pectinolytic bacteria 2000 (QTL)												
Resistance to pectinolytic bacteria 2021 (QTL)												
Resistance to *P. infestans* (QTL)												
Resistance to *P. infestans*				***R2-like***			***Rpi-mch1***		***Rpi-phu1***	***Rpi-rzc1***	***Rpi-Smira1***	

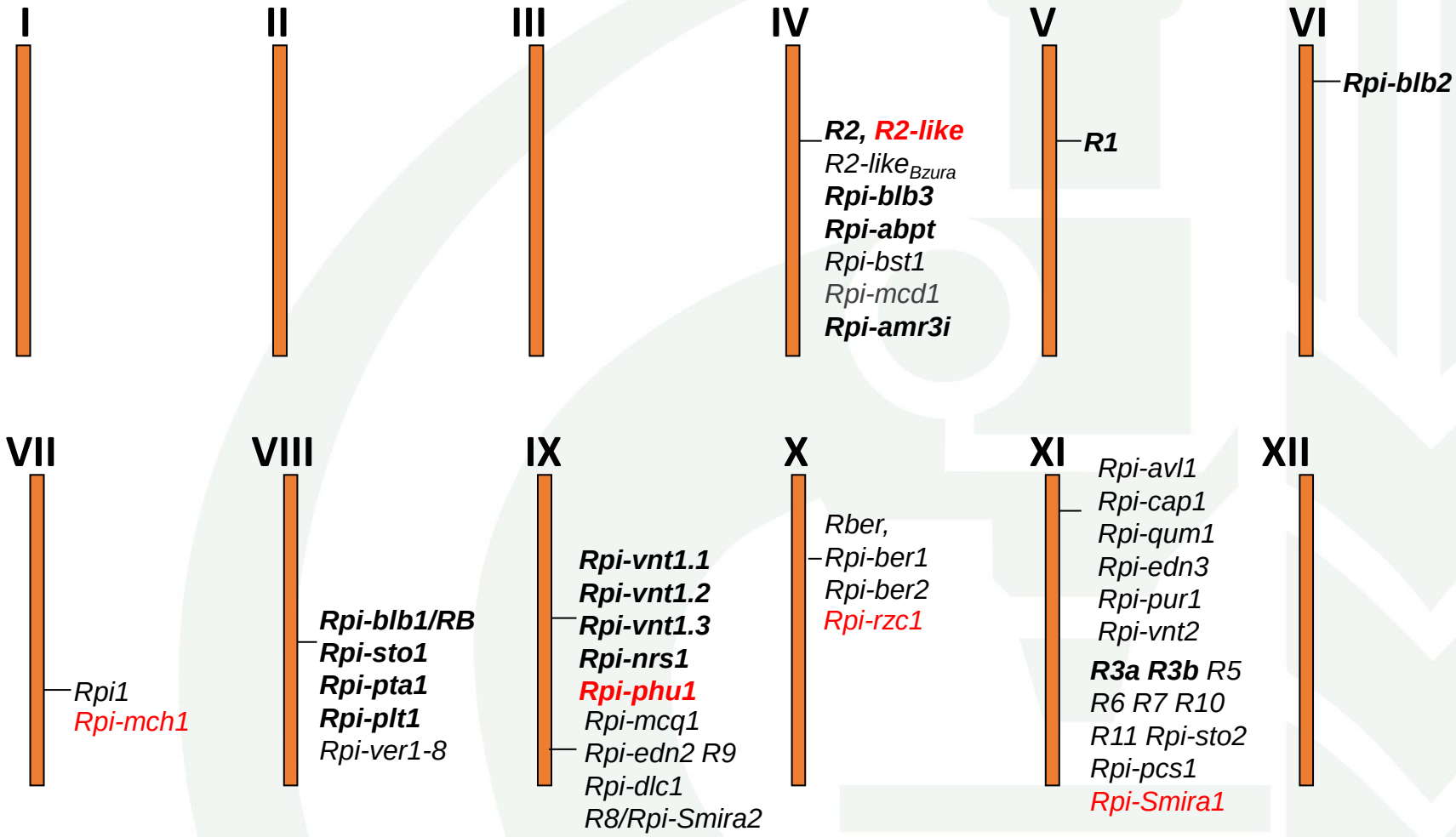
Marczewski et al. 2001, 2002, 2004, 2006; Flis et al. 2005; Szajko et al. 2019; Plich et al. 2018; Zimnoch-Guzowska et al. 2000; Lebecka et al. 2021; Śliwka et al. 2007, 2006, 2012a, 2012b

QTL for other traits mapped at IHAR-PIB

Trait	Chromosome, location of the major genes or QTL											
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Flower colour										*F*		
Maturity												
Tuber morphology and dormancy												
Tuber morphology												
Tuber blackspot bruise and enzymatic discoloration												
Crisp colour												
Starch-corrected crisp colour												
Leaf sucrose content												
Tuber starch content												
Tuber greening												

Śliwka et al. 2008, 2012, 2016; Sołtys-Kalina et al. 2020; Hara-Skrzypiec et al. 2018; Plich et al. 2020

Genes for late blight resistance on potato genetic map



Śliwka and Zimnoch-Guzowska 2013 updated

Rpi-phu1

Solanum phureja

Solanum stenotomum

http://www.cgn.wageningen-ur.nl/pgr/collections/crops/potato/species.htm

Rpi-phu1

- **1970** *S. stenotomum* x *S. phureja* comes from CIP, Lima, Peru
  crosses with *S. tuberosum* 2x
- 1992 first resistant tetraploid (unreduced gametes)
- **2006** mapping the gene (Śliwka et al. 2006, TAG)
- 2009 sequencing, virulent isolate *P. infestans* EC1; MP1162; **= *Rpi-vnt1.1***
  (Foster et al. 2009, MPMI)
- 2010 MAS (Śliwka et al. 2010, JAG)
- 2012 pyramiding with Sárpo Mira
- 2014 GMO field tests in The Sainsbury Laboratory [Jones et al.]
- **2018** Cultivar Gardena by Zamarte Potato Breeding Ltd Group IHAR

Solanum × *michoacanum* (Bitter.) Rydb. 2*x* (1EBN) VIR5763

Resistant genotypes with mean scores ≥ 6

- **Originates from:**

Mexico, state: Michoácan,

- **Natural hybrid:**

S. bulbocastanum* x *S. pinnatisectum

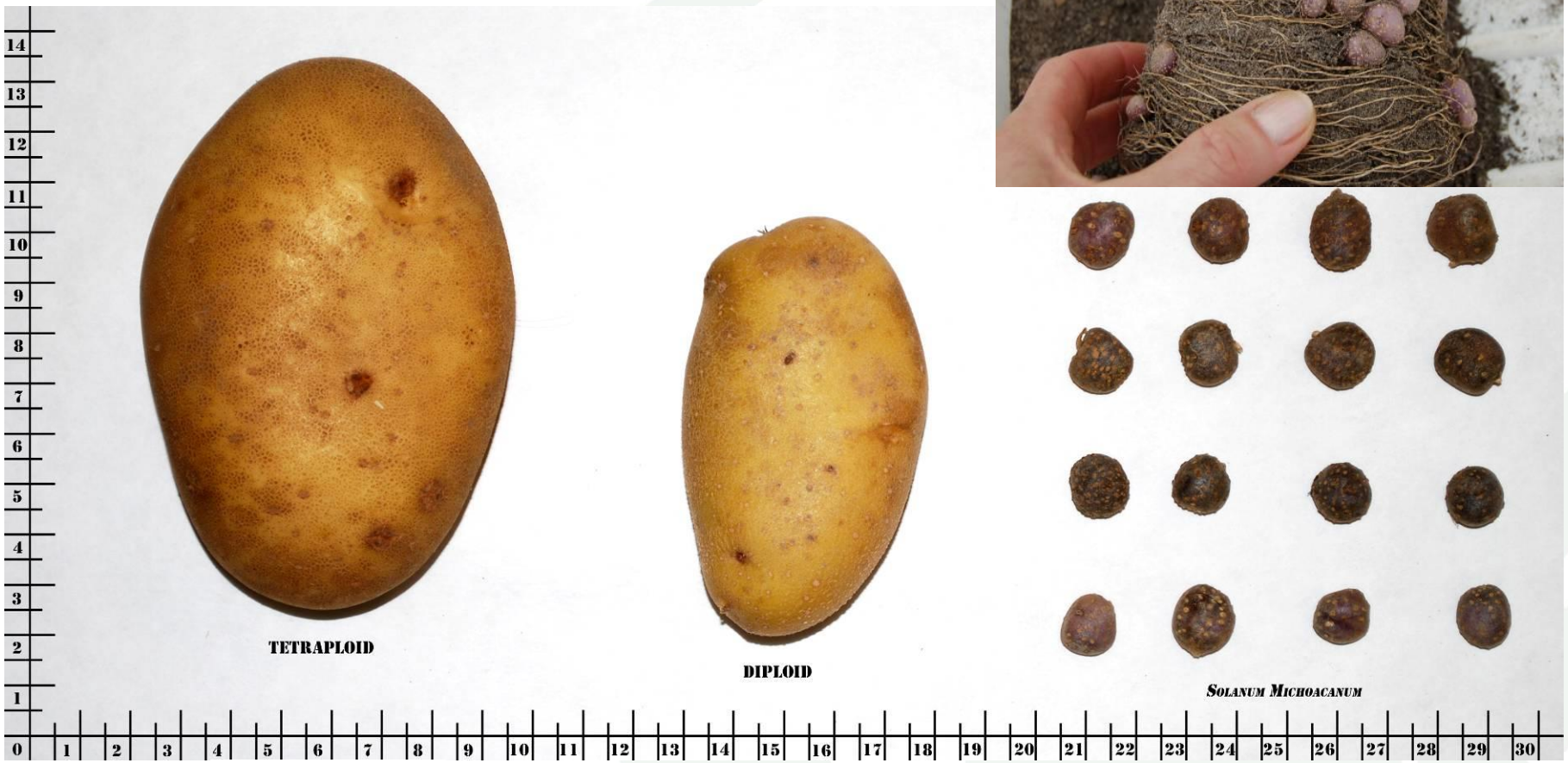
(Hawkes 1990)

- **Selected clones:**

- resistant to *P. infestans* (whole leaf test)

- suitable for cold chipping

Tuber sizes



Tetraploid

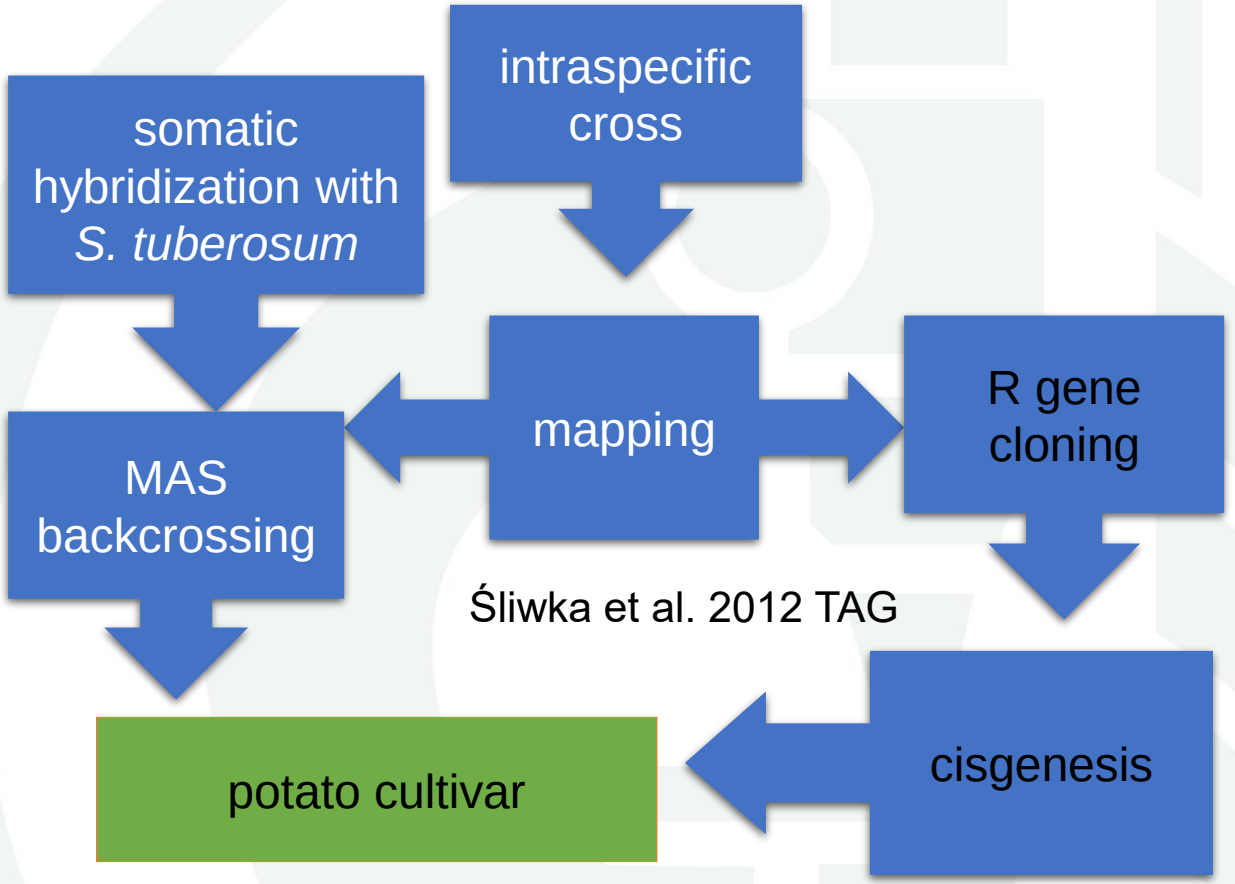
Diploid

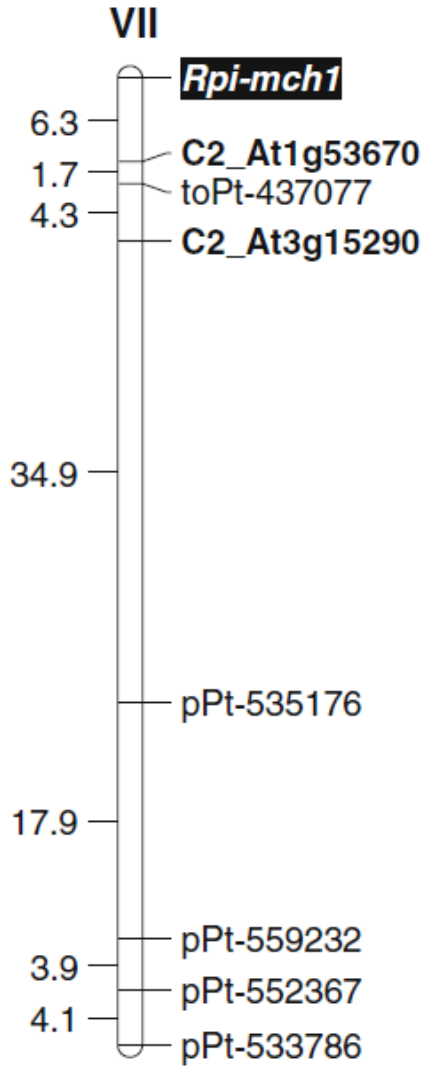
Solanum × *michoacanum*

Transfer of resistance to cultivated potato

Smyda et al. 2012

Smyda-Dajmund et al. 2017





Rpi-mch1 gene was mapped to the chromosome VII of the potato genome

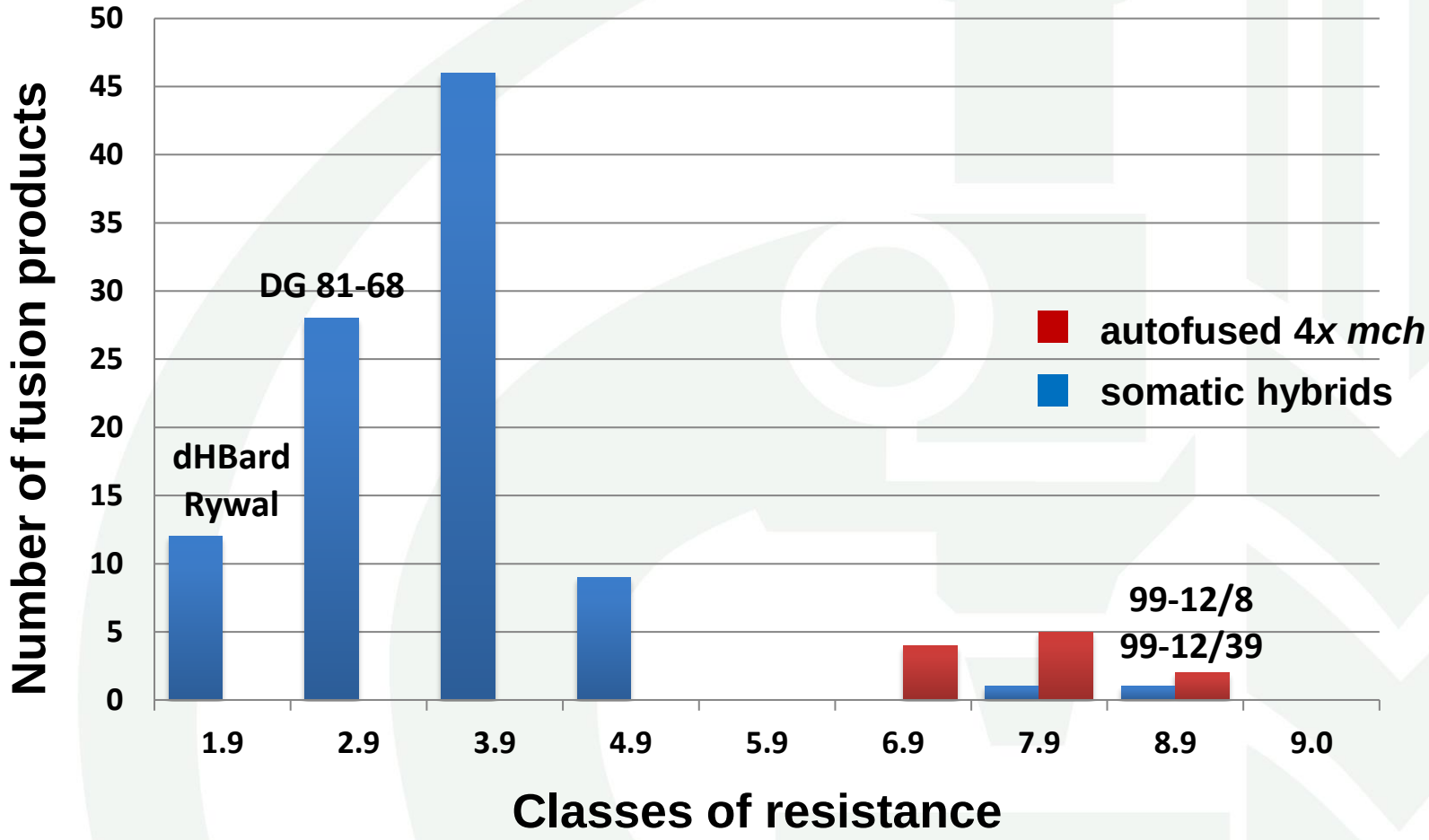
Theor Appl Genet (2012) 124:397–406
DOI 10.1007/s00122-011-1715-4

ORIGINAL PAPER

A resistance gene against potato late blight originating from *Solanum* × *michoacanum* maps to potato chromosome VII

Jadwiga Śliwka · Henryka Jakuczun · Marcin Chmielarz · Agnieszka Hara-Skrzypiec · Iga Tomczyńska · Andrzej Kilian · Ewa Zimnoch-Guzowska

Out of 97 *S.* × *michoacanum* (+) *S. tuberosum* somatic hybrids 2 were resistant to *P. infestans*



(Smyda-Dajmund et al. 2016)

Resistant genotypes with mean scores ≥ 6

BC_1 progeny from *S. michoacanum* (+) *S. tuberosum* somatic hybrids and cv. Flaming

Smyda-Dajmund et al. 2017

Thank you for your attention

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