Kmetijski inštitut Slovenije

POTATO BREEDING FOR RESISTANCE AT THE AGRICULTURAL INSTITUTE OF SLOVENIA

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History of potato breeding at AIS

1. Potato breeding at AIS started between 1947 and 1949
2. 15 varieties had been breed, 2 still in production
3. In early eighties variety Igor dominated on Slovenian potato fields (70 % of acreage)
   – rather resistant to PVY_N

After 1988 a new strain PVY_{NTN} practically eliminated Igor from production within 3 years

1. New potato breeding programme started in 1993
2. Breeding for PVY extreme resistance had first priority
3. 9 varieties breed until now

The importance of breeding programme

1. Adapted to Slovenian growth conditions
2. Resistant to local patogen strains
3. Breed for consumers needs
4. Long term self-sufficiency in seed
5. Income for local seed producers
6. Higher self-sufficiency in food supply
7. Income for local farmers and industry

Breeding programme at the Institute

- Selection of parental lines
- Crossings
- Selection for tolerance to herbicides at seedling stage
- Resistance to pests and diseases
- 8 to 10 year selection of agronomic traits on the field

- Testing for registration
- DUS testing

Selection of important traits

- Selection of genotypes resistant to PVY
- Selection of genotypes resistant to late blight
- Selection of qualitative traits (shape of tubers, colour of skin and flesh, eye deepness, stolon lenght, plant habit…)
- Selection quantitative inherited traits (yield, dry matter, size, number and uniformity of tubers …)
- Tolerance to drought and heat stress (tubber malformations, cracs, internal defects …)
- Storability
- Concumption quality (table, processing...)

Potato Virus Y

PVY strains:

- N, NTN, N-Wi
- O
- C
- other

Resistance genes to Potato Virus Y

Hypersensitivity

Ny_{chc}, Ny_{dms}, Ry_{sto}^{n1}, Ry_{sto}^{n2}

Extreme resistance

Ry_{sto}, Ry_{sto}^{na}, Ry_{sto}^{rna}

Ry_{hou}

Ry_{adg}

Ry_{chc}

S. stoloniferum – resistant also to PVA

Sante, Corine, Bzura, Brda, Bobr, Pirola, Barbara, Bison, Franzi, Mirakel, White lady, Sarpo Mira...

Resistance to infection

Tolerance

Late Blight – the major fungal disease

Population of *P. infestans* is heterogeneus.

Present both A1 and A2 mating types (ratio of type A2 found in Slovenia 20.3 %).

Possibility of primary infections with oospores.

Types of fungus resistant to metalaxyl.

New more agressive patotypes of fungus (more infection, shorter latent period, quicker sporulation).

Resistance to labe blight

Resistance to late blight on leaves:

- *Horizontal - poligenical, vertical – R genes*
- *S. demissum, S. verucossum, S. stoloniferum, S. microdontum, S. brevidens*
- *S. bulbocastanum,*
- Resistance of Sarpo varieties (Hungary)
- Other from wild species

Resistance to late blight on tubers:

- *Solanum tuberosum* subsp. *tuberosum* and S. *andigena*, Neotuberosum, somaclonal variation
- Resistnce depnds on tuber depth, size of lenticels, esistance of skin to spore germination

Resistance to other pests and diseases

Plotato leaf roll virus

Potato cyst nemathodes

Globodera rostochiensis

Globodera pallida (variety Inovator)

Resistance to potato wart disease

Resistance to common scab and other blemish diseases

New Slovenian potato varieties

Pšata - excellent table early maincrop variety with moderate yield

KIS Vipava – early table variety with very long dormacy, suitable for organic production

Bistra – maincrop table variety, suitable also for organic production

KIS Kokra – late blight resistant maincrop variety suitable for organic production

KIS Sora – leading high yielding multipurpose maincrop variety, excellent quality, cooking type A, tolerant to cold storage

KIS Krka – excellent maincrop table variety tolerant to drought, suitable for light sandy soils

KIS Mirna – second early table variety tolerant to droght

KIS Mura – very good maincrop table variety suitable for heavy soils, with a long dormancy

KIS Sotla - multipurpose maincrop variety

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Our future ?

KIS Slavnik

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