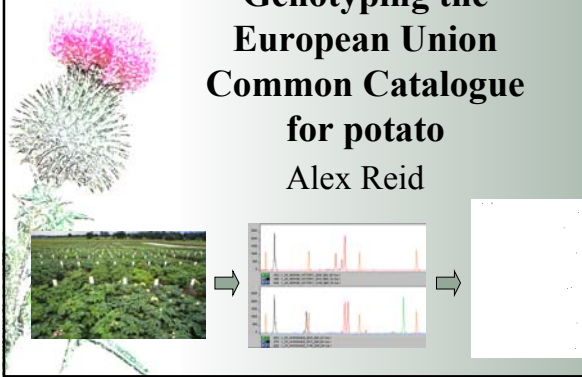


Genotyping the European Union Common Catalogue for potato

Alex Reid



The background

24th edition of the EU Common Catalogue contains 1093 varieties from 25 countries.

In order to pass Distinctness part of the DUS test a new variety must be compared to all varieties of 'common knowledge'.

The maintenance of living reference collections is rapidly becoming impractical due to the large numbers of varieties in terms of space, cost and the possibility of human error.

Many characters are quantitatively expressed and can be influenced by environmental factors.

Morphological descriptions can also be subjective.

This situation is only going to get worse!

The project

To produce a database containing data for SSRs and key morphological features for the potato varieties on the EU Common Catalogue (currently 1093 varieties).

Co-funded by The Community Plant Variety Office.

Scottish Agricultural Science Agency (SASA), United Kingdom

Naktuinbouw, The Netherlands

Bundessortenamt (BSA), Germany

Centralny O•rodek Badania Odmian Ro•lin Uprawnionych (COBORU), Poland

The database will go on line towards the end of the project.

System harmonization

Two of the partners have the capability to perform SSR analysis (UK & Netherlands).

Independently screened a number of markers and agreed on a set of nine that are used in three multiplex reactions.

However both use slightly different machines, polymers, etc. so allele sizes not exactly the same.

Reference varieties which contained all of the possible alleles were analysed at both sites and used to standardize the system. Alleles now assigned a letter and scored as binary data.

Morphological data stored in multi state format based on UPOV scoring system.

Allele scoring

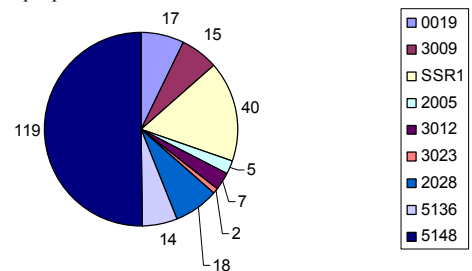


These data are stored in Access database showing presence (1) or absence (0) for each allele to give each variety an 88 digit 'telephone number'

Variety	A	B	A	B	C	D	A	B	C	D	A	B	C	D
Golden Wonder	1	1	0	1	1	0	1	1	0	1	1	1	1	1
Kerr's Pink	1	1	1	1	1	1	1	0	1	0	0	1	1	0

Marker information

Number of unique profiles for each marker



[illegible]

Around 6% of all pairs of varieties fall into this category

Variety (source)	0019	3009	SSR1	2005	3012	3023	2028	5136	5148	% similarity
Carlista (NL)	D F G	BG	A F	A B D	B C	AD	A C D	C E F	B J O P	63.8
Carlista (UK)	B F	BG	AD	A D ^a	B C	A B D	A B	E F I	J O P	
Armova (NL)	F	G	D I	B D	B C ^a F	A D	A B C	E F	I J	82.1
Armova (UK)	F	F	G D	A B D	B F	A B	A B C	C E F	I J ^b	
Fresco (NL)	BG	B D G	A D I	D	B C	A B	A	E F	C D	100.0
Fresco (PL)	BG	B D G	A D I	D	B C	A B	A	E F	C D	
Fresco (UK)	B F	F G	D I	A B D F	B	B D	A C	D E	J O P	

[illegible]

Some have inconclusive morphological data (e.g. Naglerner Kipfler and Asparges)

Characteristic	Asparges (aka Ratte)	Näglerner Kipfler
1st National listed	1872	1956
Maturity	6 (5)	6 (2)
Foliage cover	6 (1)	7 (1)
Flower colour	2 (3)	2 (1)
Flower frequency	5.3 (3)	3 (1)
Berries	3 (1)	1 (1)
Tuber skin colour	1 (6)	1 (2)
Tuber eye colour	1 (1)	1 (1)
Flesh colour	4 (5)	4 (2)
Tuber shape	5.8 (5)	6 (1)
Tuber skin texture	6 (2)	5 (1)
Eye depth	5.8 (5)	7.5 (2)
Tuber size	4.25 (4)	6 (1)
Uniformity	5.7 (3)	6 (1)



The European Cultivated Potato Database

159,868 observations
30 contributors
91 characters
4,119 cultivated varieties
1,356 breeding lines
Information on:
Pedigree
Health status of collections
Resistance to pests and diseases
Botanical, agronomic and quality characteristics

Can search by:
Variety
Characters
Countries
Breeders



Country	Number of varieties
France	1,234
Germany	987
Italy	765
Spain	543
United Kingdom	432
Poland	321
Belgium	210
Netherlands	109
Sweden	98
Denmark	87
Finland	76
Switzerland	65
Austria	54
Czech Republic	43
Slovakia	32
Hungary	21
Slovenia	10
Croatia	9
Serbia	8
Bulgaria	7
Romania	6
Greece	5
Turkey	4
Portugal	3
Spain	2
France	1

1 admixture detected in UK collection (Camelot mixed with Sebastian)

Applications of the system

Identification of potato varieties for:
 culture collections
 breeders
 farmers
 regulatory bodies

Extensively used during trace-back investigations during recent ring rot outbreak in the UK. (Has lead to revision of EU directive 98/85 which now recommends that infected varieties should be identified as part of the process in determining the extent of any future disease outbreak.)

Identification of potato varieties in samples of crisps, chips and dehydrated potato products as part of food authentication studies.

Summary

Identification system based on 9 SSR markers

Rapid method - from plant to identification can be achieved in a single day as most of the process is now automated

Any part of plant can be used for identification

Testing of unknown samples result in accurate identifications

To date 800 varieties entered in database

Morphological data still to be entered

Remaining varieties are being sourced from their official maintainers

Database will go on line towards the end of 2007

