

SSR genotyping of old potato varieties to identify mislabelling & synonyms for AEGIS

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Aegis

AEGIS is a European Genebank Integrated System, to establish a virtual European plant genetic resources collection of genetically unique accessions, maintained with agreed quality standards independent of where the accessions are physically located, and freely available in accordance with the ITPGRFA (International Treaty on Plant Genetic Resources for Food and Agriculture).

July 2009 the MoU establishing AEGIS came into force. AEGIS will improve coordination and share responsibilities for the conservation and access to plant genetic resources in about 500 institutions in the member states of ECPGR (European Cooperative Programme for Plant Genetic Resources). This will reduce redundancy, increase efficiency and improve quality standards. www.aegis.cgiar.org

Introduction

In potato collections in particular old cultivars can be mislabelled. Moreover, some variety names have been used more than once (e.g. Gloria 1921, 1937, 1972) and it is not always clear what the true identity is. This is hampering the selection of the Most Appropriate Accessions (MAA's) for the AEGIS collection.

To assist in granting Plant Breeders' Rights for potato, a standard fingerprinting method was developed [Reid *et al.* 2009, 2011]. The nine microsatellite (SSR) markers were expanded to twelve (with 1016, 1024 & 2022) to increase the level of discrimination. This method was used in the AEGIS project to genotype old potato varieties, in order to assist in setting up the AEGIS collection for potato. Obviously, the method cannot separate somaclonal variants and mutants from the original clone.

Results

SASA genotyped 379 clones from eight European potato collections. Additionally, the UK and Ireland donated 24 and 30 fingerprints of heritage varieties. The 433 accessions show 397 different profiles. The duplication groups are listed in table 1. All SSR profiles have been made public at <http://documents.plant.wur.nl/cgn/pgr/AEGISpotato>. The member states can use the results to improve their selection for AEGIS.

Discussion

The 27 duplication groups within the 433 samples contain two till six accessions. The largest group consists of blue coloured varieties. In the case of the duplicate group Fortuna / Morgane_1985, it is unclear which one has been mislabelled. The Potato pedigree database indicates for Fortuna four different varieties. Also the unexpected not-matching clones are of interest. The labels for Thynia and The Baron have been switched either in the UK or in Ireland (assuming the DNA was correctly sampled).

The 95 allele frequencies of the 433 clones differ slightly from the other 6652 clones in SASA's database. Those mostly modern varieties contain 31 new alleles in low frequencies.

In general, a preferably public database of SSR profiles containing as many clones as possible would be very helpful. CPVO should endorse this and include modern cultivars. Furthermore, harmonization is required to make results from different labs compatible.

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Table 1. Clones with identical profiles for 12 SSRs

Key	Variety denomination	sample	profile
AEG-10381	Flaminia	DEU	12
AEG-0056	Flaminia	FRA	12
AEG-0033	Monika	CZE	50
AEG-0034	Monika	CZE	50
AEG-12139	Adelheid	DEU	67
AEG-10522	Oberambacher_Adelheid	DEU	67
06/308	Aura	GBR	80
AEG-0046	Aura	FRA	80
DAFF-C-146	Tecka	IRL	90
AEG-10452	Wekaragis	DEU	90
AEG-10775-1	Atlas_(1960)	DEU	107
AEG-10775-2	Atlas_(1960)	DEU	107
08/062	Centrifolia	GBR	110
AEG-P067	Rosafolia	CHE	110
AEG-0215	Arran_Cairn	GBR	182
AEG-11264	Arran_Cairn	DEU	182
AEG-10437	Regent_(NLD)	DEU	184
AEG-0037	Regent	CZE	184
13/613	Early_Rose	GBR	214
13/616	Puritan	GBR	214
AEG-P017	Blaue_Schweden	CHE	238
AEG-0080	Congo	SWE	238
AEG-12436	Orion_(Schots)	DEU	247
AEG-0192	Orion	GBR	247
AEG-11462	Gabi_(1989)	DEU	252
AEG-0021	Gabi	CZE	252
AEG-P062	Allerfrüheste_Gelbe	CHE	267
DAFF-T-047	Prevalent	IRL	267
AEG-0019	Fortuna	CZE	269
AEG-0072	Morgane_1985	FRA	269
AEG-10784	Anna_(1947)	DEU	289
AEG-0008	Anna	CZE	289
AEG-0172	Shetland	GBR	301
AEG-0238	Ryecroft_Purple	GBR	301
DAFF-J-061	Tinwald	IRL	326
AEG-0196	Tinwald_Perfection	GBR	326
AEG-0107	Rödbrokig_svensk	SWE	336
AEG-0243	Peachbloom	GBR	336
08/028	Red_Ulster_Premier	GBR	356
08/029	Ulster_Premier	GBR	356
AEG-0211	Bishop	GBR	365
AEG-12256	Bishop	DEU	365
AEG-0170	Eigenheimer	GBR	372
AEG-P024	Tennaer	CHE	372
AEG-12145	Blauwe_Eigenheimer	DEU	372
AEG-10225	Astra_(1983)	DEU	385
AEG-0044	Astra	LVA	385
AEG-0240	Robijn	GBR	137
AEG-P028	Lauterbrunnen	CHE	137
AEG-10606	Robijn	DEU	137
AEG-10845	Flora_(1955)	DEU	340
AEG-0017	Flora	CZE	340
AEG-0018	Flora	CZE	340
AEG-0086	Karjalan_Musta	SWE	359
AEG-12037	Skerry_Blue	DEU	359
AEG-0048	Bleue_dAuvergne	FRA	359
AEG-P053	Blaue_Österreich	CHE	359
AEG-P026	Vitelotte	CHE	394
AEG-12317	Vitelotte	DEU	394
AEG-0073	Vitelotte_Noire	FRA	394
AEG-0040	Unbekannte_Schwarze	CZE	394
AEG-P025	Blaue_Veltlin	CHE	394
AEG-0209	Blue_Peter	GBR	394
DAFF-J-136	Tombola	IRL	195
	Tuskar	GBR	
DAFF-J-085	Arka	IRL	390
	Red Kidney	GBR	

Selection of not matching clones

Key	Variety denomination	sample	0019	1016	1024	2005	2022	2028	3009	3012	3023	5136	5148	SSR1	profile
AEG-P073	Alma	CHE	BF	CDGL	CE	AB	E	AC	FG	BD	ABD	DEFH	BIJ	CDFI	79
AEG-0006	Alma	CZE	BG	DGHL	CE	AB	E	ACE	FG	B	AD	EFH	BO	DFI	186
AEG-12682	Alma (?)	DEU	BEG	DGL	CE	ABD	BE	A	FG	BC	AD	EF	JOP	DFI	68
AEG-0009	Astra	CZE	F	DL	CEG	ABD	BE	AB	F	BCF	AD	EFH	ANP	DI	304
AEG-0044	Astra	LVA	G	DG	CE	ABD	E	ABF	BFG	BD	D	AF	BJOR	FK	385
AEG-10225	Astra (1983)	DEU	G	DG	CE	ABD	E	ABF	BFG	BD	D	AF	BJOR	FK	385
AEG-0010	Athene	CZE	BG	CDL	CE	AB	E	AC	FG	B	AD	EF	BIO	CDI	180
AEG-10543	Athene (1964)	DEU	BEG	DGLM	CE	ABD	BEG	AC	FG	BCD	AD	EF	JOP	ADFI	70
13/613	Early_Rose	GBR	DF	DGL	CE	ABD	BE	AC	BG	BCF	AB	EFH	IJP	DFI	214
AEG-P035	Early_Rose	CHE	DG	DGL	CD	ABD	BE	ACE	FG	BC	ABD	DEH	BJOP	DFI	244
AEG-10381	Flaminia	DEU	B	DM	CEG	ABD	E	ABCE	G	BF	AB	EF	BIJO	AI	12
AEG-0056	Flaminia	FRA	B	DM	CEG	ABD	E	ABCE	G	BF	AB	EF	BIJO	AI	12
AEG-0017	Flora	CZE	FG	DGLM	CE	ADF	E	ACD	FG	BC	AD	DFH	NOPR	ADFK	340
AEG-0018	Flora	CZE	FG	DGLM	CE	ADF	E	ACD	FG	BC	AD	DFH	NOPR	ADFK	340
AEG-10837	Flora (1939)	DEU	BD	DG	CDG	ABD	BE	AC	FG	BCF	AD	DEF	IJO	FI	21
AEG-10845	Flora (1955)	DEU	FG	DGLM	CE	ADF	E	ACD	FG	BC	AD	DFH	NOPR	ADFK	340
AEG-0183	Iris	GBR	FG	DHL	C	DF	BE	ABC	G	BDF	AD	EFH	JO	DI	349
AEG-11515	Iris	DEU	FG	L	CE	ABF	E	AC	FG	BF	ABD	CEF	IJO	AD	380
AEG-10372	Luna (1954)	DEU	BDF	DGL	CE	B	E	C	FGK	BCF	D	EF	NO	DFI	39
AEG-12669	Luna (1998)	DEU	G	DL	CE	AB	E	AC	F	BCDF	AD	EF	EJO	DI	391
AEG-0060	Morgane 1955	FRA	DF	DM	CG	BD	BE	ABC	FG	BC	A	DEFH	JMP	AI	222
AEG-0072	Morgane 1985	FRA	F	DGL	C	ABD	E	AC	BFG	BC	D	CFH	JOP	DFI	270
AEG-0062	Orion	FRA	DF	DHL	CE	B	BE	ACDE	FG	CDF	D	EF	ABO	DI	218
AEG-0192	Orion	GBR	DGH	DL	C	BF	E	AF	BG	B	BD	DF	INP	DI	247
AEG-12436	Orion (Schots)	DEU	DGH	DL	C	BF	E	AF	BG	B	BD	DF	INP	DI	247
AEG-10829	Palma (1951)	DEU	BEF	DG	CDE	ADF	BEG	AC	FG	BF	AD	DFH	IJO	FI	65
AEG-11717	Palma (1972)	DEU	BDF	DG	CE	BD	E	AC	G	BCF	AD	EF	JO	FI	35
AEG-10375	Petra (1958)	DEU	DG	DGHL	CE	BD	BE	AE	DFG	BDF	D	EFH	BJO	DFI	243
AEG-12439	Petra (1991)	DEU	F	DGM	CD	ABD	E	ACD	FG	BC	BD	FH	BIOS	DFI	279
DAFF-J-054	Reina	IRL	BF	DL	CE	ABF	E	ABC	FG	B	AD	EFH	IO	DI	132
DAFF-C-118	Rejina	IRL	F	DLM	CG	AD	E	B	FG	BC	AD	CDE	JO	ADI	308
AEG-10030	Sefton_Wonder	DEU	B	DGL	CE	AB	E	ACE	BFG	B	AD	CEF	EJOP	DFI	8
AEG-0200	Sefton_Wonder	GBR	F	DH	C	BF	BE	A	BFG	BF	AD	CEF	IJ	I	281
AEG-0172	Shetland	GBR	F	DL	C	BF	BEG	AC	BFG	BF	ABD	CDEF	IJO	DI	301
AEG-0173	Shetland_Black	GBR	BFG	DL	CD	DF	BE	AC	B	BDF	AB	DEF	AJMP	DI	167
AEG-0197	Ulster_Concord	GBR	F	DGL	C	ABD	E	A	G	B	ABD	EF	JNOP	DFI	268
DAFF-J-139	Ulster_Concord	IRL	FG	DL	CG	BF	E	A	BG	BCDF	ABD	EH	JOP	DI	367
	Matches UK and Ireland Ulster Dale and Ulster Glade (Teagasc)														
DAFF-J-135	Thynia	IRL	DG	DGH	CE	ABD	BE	AC	G	BC	ABD	EFH	BIJ	FI	242
	Does not match UK Thynia														
DAFF-J-134	The_Baron	IRL	FG	DG	CE	AB	E	ACD	FG	BC	D	CEFH	BEIJ	FI	331
	Does not match UK The Baron, but UK Thynia. UK The Baron matches Millar's Beauty & Symfonia from IRL. (Another Irish sample labelled as Sprint matches Symfonia from UK & NLD.)														