

# The effect of a dominant GB *P. infestans* genotype (13\_A2) on host resistance to foliar late blight

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# Resistance in commercial cultivars

- Robust information on cultivar resistance is a pre-requisite for successful integrated control.
- National List cultivar resistance ratings for foliar blight need to be confirmed.
- Early warning of any deterioration in cultivar resistance
  - due to the emergence of new pathogen genotypes such as those indicative of oospore-derived epidemics.



# Background

Breakdown of some resistant cultivars previously reported

Re-screened breeding material and accessions of wild species  
with 13\_A2 isolates

Programme of testing of commercial cultivars 2008-2010



# Test appropriate cultivars for resistance

- On basis of top 20 commercial cultivars in GB (planted area)
- Foliage Blight resistance rating of  $\geq 5$
- Additionally:
  - Eucablight controls
  - Differential set
  - Resistance from *S. bulbocastanum*

Bionica (Meijer)  
Toluca (Agrico)



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### GB top 10 potato varieties 2011 by area

Rank	Variety	Area (ha) 2011
1	Maris Piper	21,553
2	Estima	7,726
3	Markies	7,289
4	Lady Rosetta	6,119
5	Maris Peer	5,581
6	Melody	4,891
7	Hermes	4,743
8	Desiree	4,318
9	Marfona	4,175
10	Harmony	3,749
	Sub total	70,144
	Other varieties	57,309
	Total	127,453

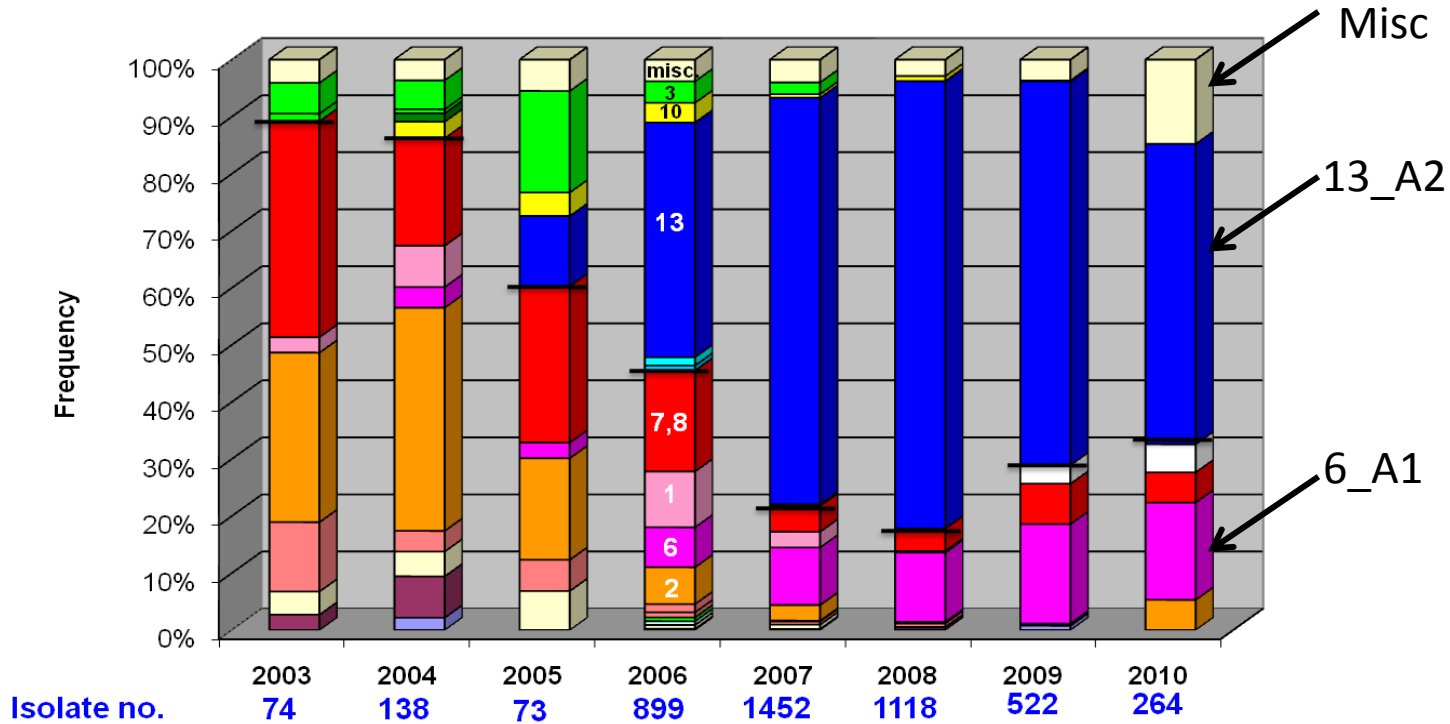
Source – Potato Council

	CULTIVAR	AREA 2008	RATING
1	Markies	3,976	7
2	Nadine	2,214	6
3	Premiere	2,133	6
4	Sante	1,217	7
5	Romano	1,001	7
6	Morene	861	6
7	Orla	656	8
8	Cara	578	7
9	Ambo	476	6
10	Valor	464	5
11	Vales Sovereign	421	6
12	Vales Emerald	371	5
13	Winston	338	5
14	Lady Balfour	312	8
15	Picasso	308	5
16	Rembrandt	281	5
17	Caesar	266	5
18	Kestrel	172	5
19	Dundrod	169	5
20	Kerr's Pink	164	6
	Toluca		
	Bionica		
	Sarpo Mira		



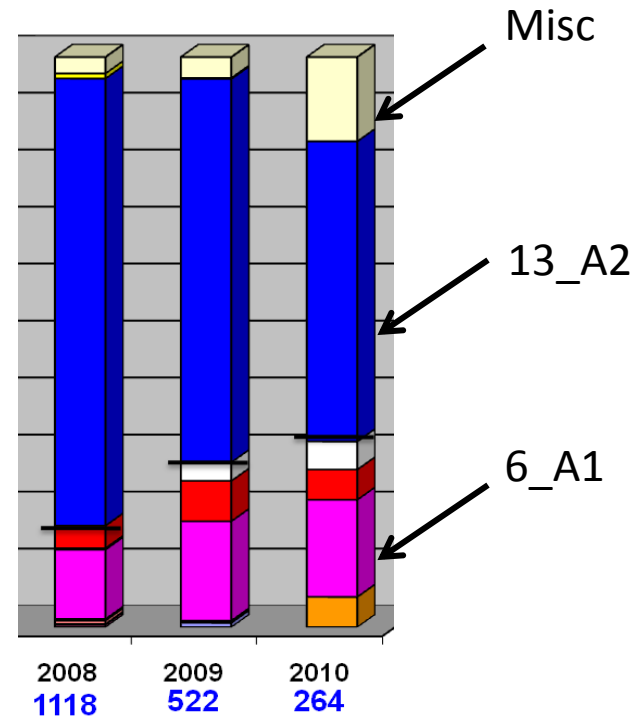
# Current *P. infestans* population - GB

GB genotypes



# Test appropriate cultivars for resistance - choosing the isolates

Code	Genotype	Race
<b>2009</b>		
Isolate 1	13_A2	(1,2,3,4,5,6,7,10,11)
Isolate 2	6_A1	(1,3,4,6,8,10,11)
Isolate 3	8_A1	(1,3,4,6,8,10,11)
Isolate 4	7_A1	(1,2,3,4,6,7)
Isolate 5	2_A1	(1,3,4,6,10,11)
Isolate 6	10_A2	(1,3,4,7,8,10,11)
<b>2010</b>		
Isolate 1	13_A2	(1,2,3,4,5,6,7,10,11)
Isolate 2	6_A1	(1,3,4,7,10,11)
Isolate 3	23_A1	(1,3,4,7)
Isolate 4	7_A1	(1,2,3,4,6,10,11)
Isolate 5	8_2_A1	(1,3,4,7,10,11)
Isolate 6	misc	(3,4,7,11)
<b>2011</b>		
Isolate 1	13_A2	(1,2,3,4,5,6,7,10,11)
Isolate 2	6_A1	(1,3,4,7,10,11)
Isolate 3	23_A1	(1,3,4,7)
Isolate 4	8_A1	(1,3,4,7,10,11)
Isolate 5	misc	(3,4,7,10,11)
Isolate 6	misc	(1,2,3,4,6,7,11)





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# Glasshouse and field tests



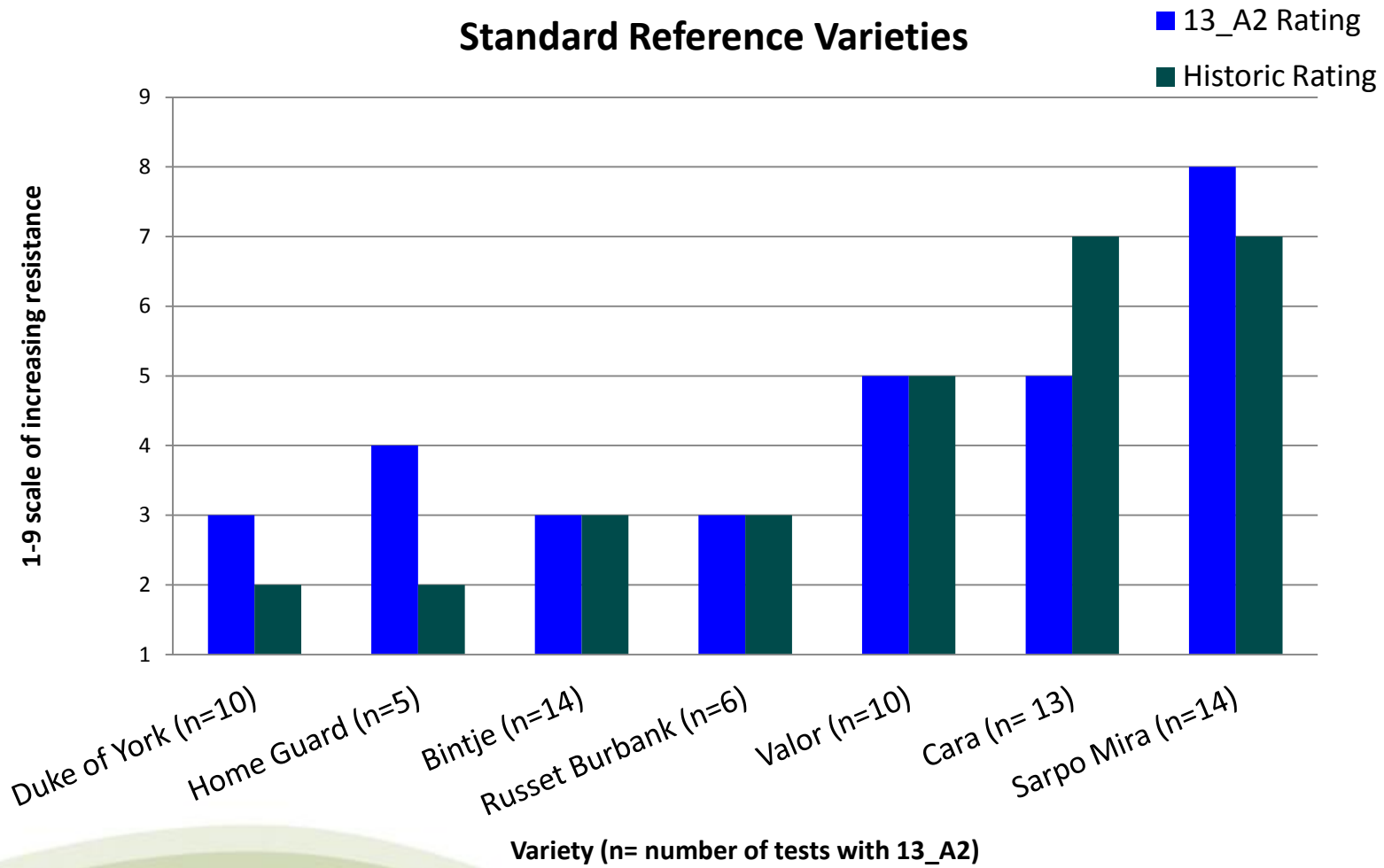
**6 isolates**



**13\_A2**

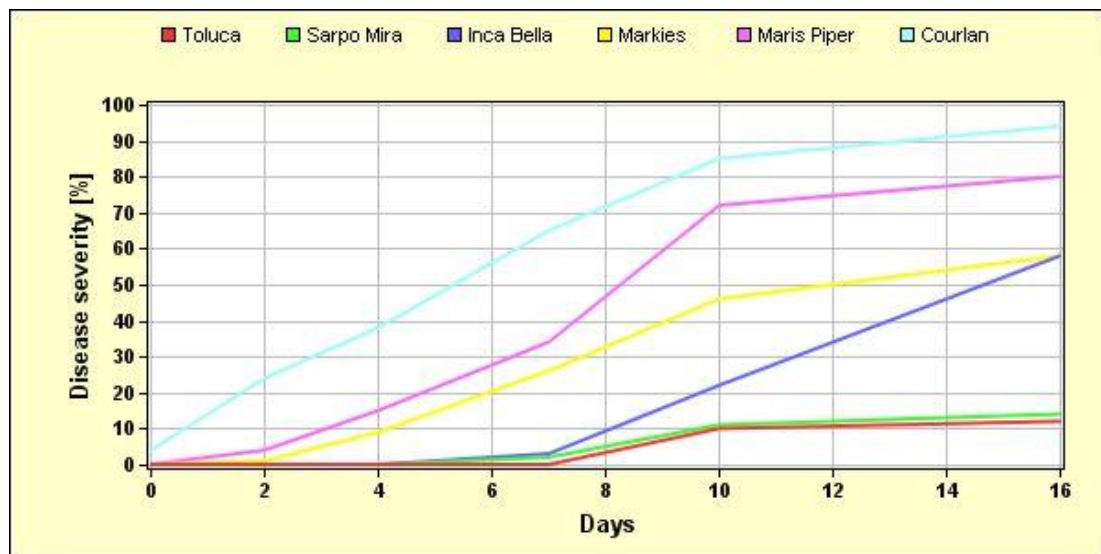


## Standard Reference Varieties

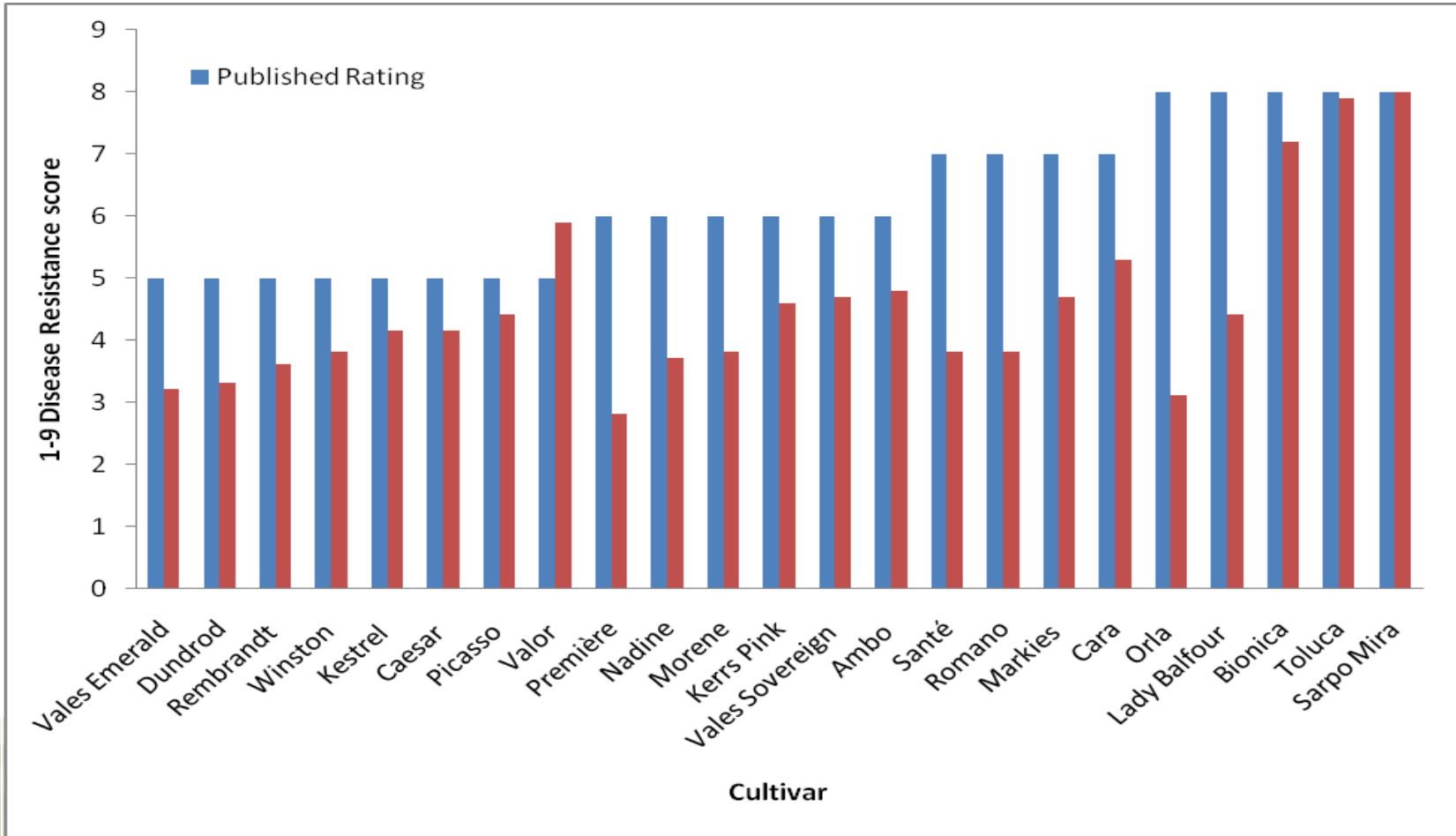


- Consistent ratings of Reference Varieties across trials and years

Material	Published Rating	Mean score 08-10 JHI trials
Sarpo Mira	8	8
Toluca	8	7.9
Bionica	8	7.2
Lady Balfour	8	4.4
Orla	8	3.1
Cara	7	5.3
Markies	7	4.7
Santé	7	3.8
Romano	7	3.8
Vales Sovereign	6	4.7
Kerrs Pink	6	4.6
Morene	6	3.8
Ambo	6	4.8
Nadine	6	3.7
Première	6	2.8
Valor	5	5.9
Picasso	5	4.4
Kestrel	5	4.15
Caesar	5	4.15
Winston	5	3.8
Rembrandt	5	3.6
Vales Emerald	5	3.2
Dundrod	5	3.3
Craigs Royal		3.2



# Field test average results (13\_A2) compared with published ratings



## Changes in foliar blight resistance ratings

- Testing revealed a number of significant shifts in the ratings for some existing varieties when tested using 13\_A2 compared with historic ratings
- Note:
  - Only varieties with an original (or new) Foliar Blight rating of  $\geq 5$  are reported
  - Only varieties where the new rating differs by  $\geq 2$  points were changed
  - ratings can go up as well as down!
  - Not all varieties that originally had a score of  $\geq 5$  have changed
  - Ratings for all new varieties are based on testing with 13\_A2

# Changes to resistance ratings



## The British Potato Variety Database

### Lady Balfour



**Parentage** 8204 A4 x 15119 AC5  
**Breeder** Scottish Crop Research Institute  
**Breeder's Agent** Greenvale AP  
**Plant Breeders Rights (expire)** 2032

Lady Balfour is a very high yielding organic variety with good foliage and excellent tuber blight resistance. Lady Balfour has the highest resistance to G.Pallida to any organic variety currently available. Vigour is exceptional under low fertility conditions. Dormancy is extremely long, allowing long term storage without the use of sprout suppressants.



**Tuber characteristics**  
**Smoothness of skin** Medium  
**Shape of tuber** Oval  
**Depth of eyes** Medium  
**Colour of skin** Red parti-coloured  
**Colour of flesh** White

**Botanical description**  
**Maturity** Maincrop  
**Height of plants** Very tall  
**Frequency of berries** Absent  
**Colour of base of lightsprout** Pink

#### Resistance to Damage, Pests and Diseases

Black dot ( *Colletotrichum coccodes* )  
 Black scurf ( *Rhizoctonia solani* )  
 Dry rot ( *Fusarium coeruleum* )  
 Dry rot ( *Fusarium sulphureum* )  
 Late blight on foliage ( *Phytophthora infestans* )  
 Late blight on tubers ( *Phytophthora infestans* )  
 Powdery scab ( *Spongospora subterranea* )  
 Silver scurf ( *Helminthosporium solani* )

#### Tuber characteristics

**Smoothness of skin** Medium  
**Shape of tuber** Oval  
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#### Botanical description

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#### Resistance to Damage, Pests and Diseases

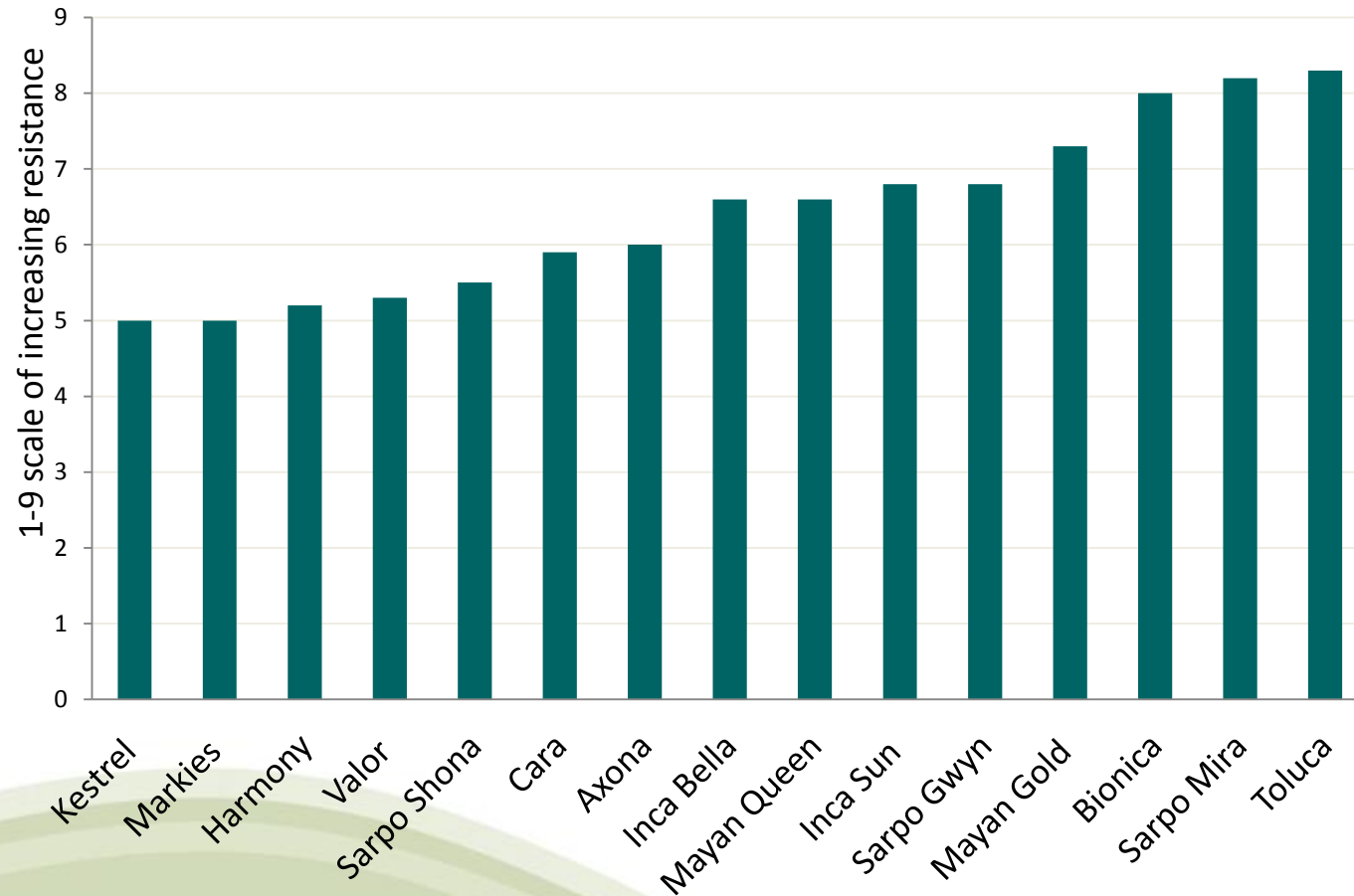
	Low	.	.	.	.	.	.	.	High
Black dot ( <i>Colletotrichum coccodes</i> )	.	.	3	.	.	.	.	.	.
Black scurf ( <i>Rhizoctonia solani</i> )	.	.	.	.	.	6	.	.	.
Dry rot ( <i>Fusarium coeruleum</i> )	.	.	.	.	.	6	.	.	.
Dry rot ( <i>Fusarium sulphureum</i> )	.	.	3	.	.	.	.	.	.
Late blight on foliage ( <i>Phytophthora infestans</i> )	.	.	.	4	.	.	.	.	.
Late blight on tubers ( <i>Phytophthora infestans</i> )	.	.	.	.	.	.	7	.	.
Powdery scab ( <i>Spongospora subterranea</i> )	.	.	.	.	.	.	.	8	.
Silver scurf ( <i>Helminthosporium solani</i> )	.	.	3	.	.	.	.	.	.
Skin spot ( <i>Polyscytalum pustulans</i> )	.	.	3	.	.	.	.	.	.
Blackleg ( <i>Pectobacterium atrosepticum</i> )	.	.	.	.	.	.	7	.	.
Common scab ( <i>Streptomyces scabiei</i> )	.	.	.	4	.	.	.	.	.
Potato Cyst Nematode ( <i>Globodera pallida</i> Pa 2/3, 1 )	.	.	.	4	.	.	.	.	.
Potato Cyst Nematode ( <i>Globodera rostochiensis</i> Ro1 )	.	.	.	4	.	.	.	.	.
Potato Leafroll Virus	.	.	3	.	.	.	.	.	.
Potato Virus Yo	.	.	.	.	.	.	.	.	9
Bruising	.	.	.	.	5	.	.	.	.
Splitting	.	.	.	.	.	6	.	.	.

Results of National List and Potato Council Independent Variety Trials

<http://varieties.potato.org.uk/>

<http://www.europotato.org/>

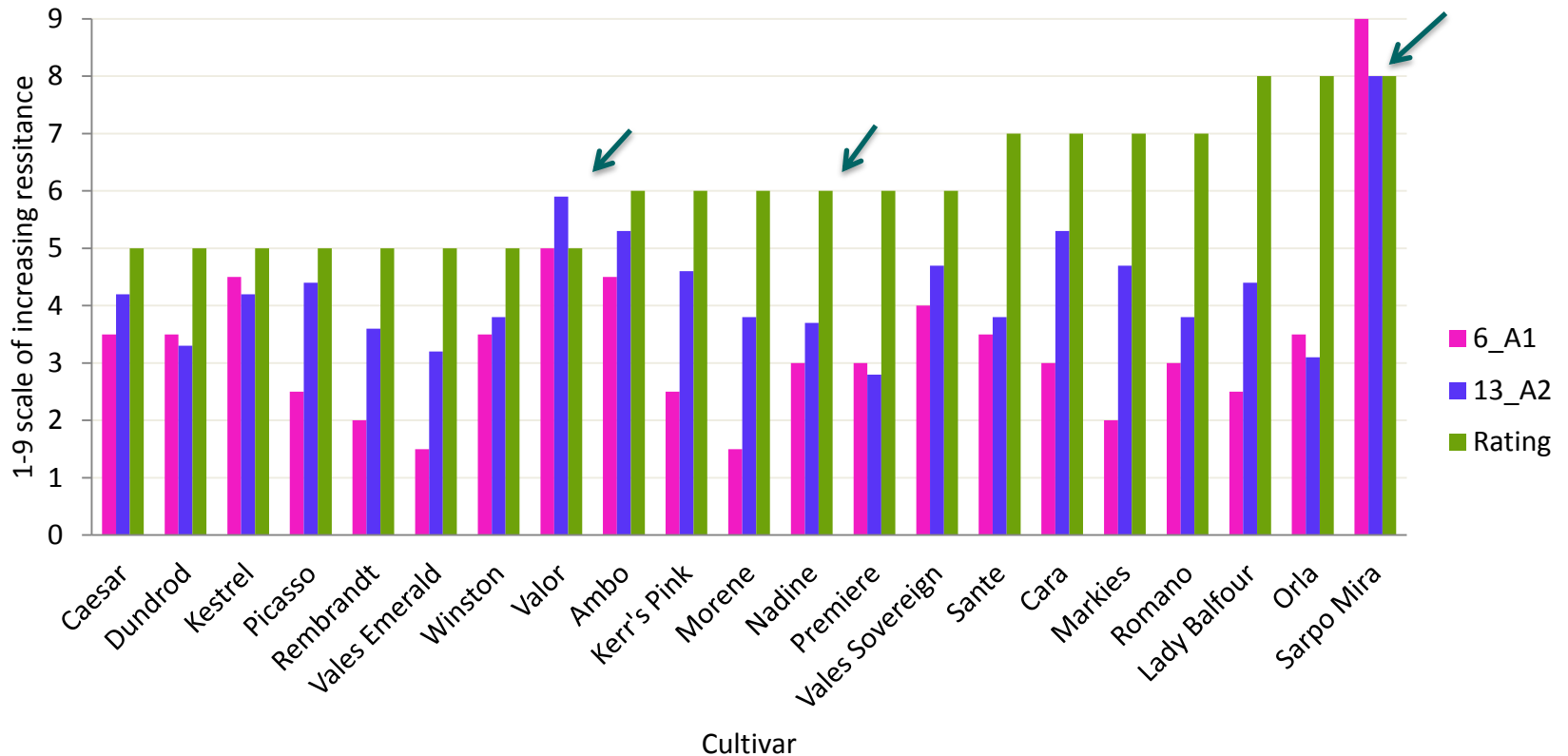
## 2011 – resistance rating $\geq 5$ against 13\_A2



Also *S. phureja* collections and *S. verrucosum* populations

# Is 13\_A2 the only story?

Mean resistance rating of each cultivar when tested with 13\_A2 and 6\_A1 (2010) compared with published resistance rating (in green)



Testing with 6\_A1 in 2010 showed similar effect on resistance rating as 13\_A2  
6\_A1 is also common in the population

13\_A2

ISOLINE 7  
2009-7654A  
CE/T/B  
s/7

Craig's Royal



Toluca



Bionica





6\_A1

ISO-ME 2  
2010-7822B  
CE/T/B  
5/7

Craigs Royal



Toluca



Bionica



# Conclusions

Change in the *P. infestans* population initiated a 3 year testing programme of commercial cultivars

Cultivar ratings were found to have changed – ratings amended in databases

‘New’ cultivars tested with 13\_A2

Not all cultivars and breeding material susceptible to 13\_A2

Other genotypes in the population should also be considered - especially with non-tuberosum sources of resistance?

Changes do not mean that there is no resistance or that cultivars with relatively higher levels of resistance cannot be used for integrated control