



Research Project Report

Independent Variety Trials 2009

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Report Authors: SF Carnegie, H Campbell, K Heaton (SASA), S Wale,
T Davey (SAC), A Roberts, M Kirkwood (BioSS), A Lees (SCRI)

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1. SUMMARY

1.1. Project Aims

In order to comply with both national and European Community legislation for the marketing of seed potatoes, all potato varieties must be placed on the official National List (NL) of a Member State. When this is achieved, a variety is automatically entered on to the Common Catalogue which is, in effect, an EC National List. Part of the NL testing involves assessing a new variety for Value for Cultivation and Use. In the UK, this testing is largely concentrated on assessing varietal performance for susceptibility to diseases, pests and some tuber quality characteristics considered to be of most importance in UK potato production. After a review of the Independent Variety Trials (IVT) programme, industry, through the British Potato Council (now Potato Council (PCL)), concluded that additional tests for some other diseases were also desirable in order to provide growers with the fullest information on the performance of new varieties before large scale production occurred. In addition, industry also concluded that potato varieties on the Common Catalogue which were being developed for GB production should also to be tested to provide independent data on these varieties for GB growers. It was also decided that IVT tests would be conducted over 2 years and not 3 years as previously, and that industry alone would be responsible for conducting field growing trials to assess varietal performance with respect to yield and usage quality.

The integration of the IVT test programme with that of UK National List Value for Cultivation and Use test programme was achieved in 2005 by the consortium of Scottish Agricultural Science Agency (SASA), SAC Commercial Ltd (SAC), Biomathematics & Statistics for Scotland (BioSS) and Scottish Crop Research Institute (SCRI) which was awarded a 3 year contract to conduct the IVT programme. The tests conducted for IVT purposes were to determine varietal susceptibility to foliage late blight in the field, black dot, black scurf, silver scurf and skin spot. This contract was extended for a further 3 years, starting in 2008, by PCL.

1.2. Work Undertaken and Findings

In 2009, tests were conducted on 12 varieties undergoing their 2nd year of UK NL testing, 12 varieties which had completed UK NL tests and 11 Common Catalogue varieties (Table 2). SASA conducted a test to determine susceptibility to foliage late blight at a site near Ayr which is operated in conjunction with SCRI. Pot tests for black dot and black scurf were conducted by SAC and tests for silver scurf and skin spot by SASA. The Common Catalogue varieties were also tested by SASA for susceptibility to tuber late blight, common scab, powdery scab, blackleg (*Pectobacterium atrosepticum*), dry rot (*Fusarium sulphureum* and *F. solani* var. *coeruleum*), potato cyst nematodes (pathotypes of *Globodera rostochiensis* and *G. pallida*), external damage (splitting) and internal damage (bruising). All tests were completed satisfactorily.

Susceptibility/resistance was rated on 1-9 scale. Tables 1a and b summarise the results for varieties being tested in 2009. Table 1a presents the final ratings for varieties completing the test programme. For varieties in the 1st year of IVT programme, Table 1b presents provisional ratings shown in italic font for one year's test results and final ratings from NL tests in bold.

	Piccolo Star	Sylvana	Lady Jo	Rudolph	Sofia	Blue Belle	Inca Bella (00.H.14.A3)	Chincha (00.Z.305.A2)	Tabitha (00.Z.306.A5)	Casablanca (95C215-049)	Bounty (97C166-055)	Rubesse (96C212-001)	Kitili (95-20-1)	Sarpo Shona (2000-30-220)	Blue Danube (80-2-7)	Sarpo Una (97-18-6)	Pink Gypsy (99C090-092)
	2E	EM	M	EM	2E	M	M	M	M	1E	EM	EM	M	M	M	2E	EM
Maturity																	
Foliage late blight (field)	4	4	4	5	2	4	6	5	4	4	5	4	4	6	5	5	4
Black dot	8	6	6	5	5	3	7	6	5	4	7	5	8	7	6	5	6
Black scurf	7	5	5	4	5	6	7	5	5	6	4	5	6	6	9	6	6
Silver scurf	8	2	8	4	9	5	4	7	6	3	6	6	7	5	3	6	6
Skin spot	6	3	7	7	7	5	7	8	7	2	5	6	4	5	8	7	8
Foliage late blight (lab)	-	-	-	-	-	4	5	4	4	3	3	3	4	7	3	6	3
Tuber late blight	2	3	4	2	2	3	2	4	3	3	5	2	4	3	3	5	3
Blackleg- Pectobacterium atrosepticum	7	7	2	4	5	3	6	6	7	8	6	5	7	3	7	5	6
Powdery scab	6	7	7	5	5	5	7	6	7	5	5	4	4	7	6	7	8
Common scab	7	7	5	3	4	4	7	6	6	6	5	6	4	4	3	5	7
Dry rot – Fusarium coeruleum	4	8	8	7	4	5	8	4	5	2	9	9	6	4	9	4	8
Dry rot – Fusarium sulphureum	4	8	4	2	1	1	1	2	4	3	4	9	2	1	1	5	4
PCN Ro-1	8	9	9	2	9	2	3	2	4	8	9	9	9	3	8	3	5
PCN Pa 2/3	2	2	3	2	2	2	2	2	2	2	2	2	2	2	3	2	4
External damage (splitting)	7	7	7	6	6	5	7	6	7	7	7	1	6	4	5	1	7
Internal damage (bruising)	5	4	7	6	8	3	7	2	2	4	7	5	7	4	5	5	7

nt = not tested

TABLE 1A. SUMMARY OF FINAL VARIETAL RATINGS (1=LOW, 9=HIGH) FOR RESISTANCE TO DISEASES, PESTS AND DEFECTS FOR VARIETIES COMPLETING IVT PROGRAMME BASED ON OVER YEARS ANALYSIS OF IVT 2005-2009 AND NL FROM 1981 EXCEPT FOR LATE BLIGHT FOR WHICH ANALYSIS COVERED ONLY PERIOD OF TESTING WITH A 13_A2 GENOTYPE.

	Emblem (12-04)	Crisps4All	Red Robin	Golden Nugget (47 C8R04)	Apache (150 PS 05)	Divaa (CA 99-1)	00Z302A8 (Trixie)	99H4B3 (Chaski)	99H5B2 (Paru)	Chicago (98C051-002)	Gervoline (G00TT260008)	96316A (Sarpo Gwyn)	Lanorma	Nectar	Tebina	Challenger	Amora	Victoria
	2E	EM	2E	M	EM	2E	M	M	M	M	2E	LM	M	EM	M	M	2E	EM
Maturity	5	4	4	2	6	4	5	6	7	6	4	7	5	3	5	3	5	3
Foliage late blight (field)	4	1	5	6	3	4	4	5	6	6	5	6	6	5	6	5	4	4
Black dot	9	1	6	7	3	3	4	1	6	1	5	3	2	6	9	4	4	2
Black scurf	8	9	4	2	6	9	9	8	9	6	1	9	9	9	9	9	9	9
Silver scurf	6	5	7	7	7	3	7	5	7	4	7	6	7	5	8	8	7	6
Skin spot	5	4	4	3	3	3	4	4	5	5	3	6	-	-	-	-	-	-
Foliage late blight (lab)	3	2	3	3	2	2	3	2	2	5	3	5	2	5	4	3	4	-
Tuber late blight	6	1	3	6	8	6	6	9	9	5	6	3	5	5	6	7	1	-
Blackleg- Pectobacterium atrosepticum	5	3	6	8	5	3	6	7	8	5	6	6	5	4	8	5	2	-
Powdery scab	6	4	5	6	5	5	7	8	8	6	6	6	9	2	3	7	1	-
Common scab	8	6	8	7	4	7	7	3	7	8	7	4	8	6	6	6	6	-
Dry rot – Fusarium coeruleum	4	4	4	9	9	1	1	1	1	7	1	1	1	1	1	7	2	-
Dry rot – <i>Fusarium sulphureum</i>	9	9	9	6	3	3	3	3	2	9	4	9	9	2	3	2	9	-
PCN Ro-1	2	6	2	5	2	5	2	3	2	4	4	2	5	1	3	2	2	-
PCN Pa 2/3	8	8	7	7	7	7	5	8	8	8	2	7	5	7	6	7	7	-
External damage (splitting)	4	7	7	6	7	6	5	5	5	6	7	6	9	9	8	6	2	-
Internal damage (bruising)	nt = not tested																	

nt = not tested

TABLE 1B. SUMMARY OF RATINGS (1=LOW, 9=HIGH) FOR RESISTANCE TO DISEASES, PESTS AND DEFECTS FOR POTATO VARIETIES COMPLETING ONE YEAR OF IVT PROGRAMME (PROVISIONAL RATINGS ARE SHOWN IN ITALICS, FINAL RATINGS ARE IN BOLD).

1.3. Conclusions

In summary, the main findings (Resistant = 7 or more; Susceptible = 3 or less) for the test varieties, with final ratings in bold were as follows:

Piccolo Star

Resistant to: **black dot, black scurf, silver scurf, blackleg, common scab, external damage and PCN Ro1**

Susceptible to: **tuber late blight and PCN Pa 2/3 and 1**

Sylvana

Resistant to: **blackleg, powdery scab, common scab, dry rot – *F. coeruleum* and *F. sulphureum*, external damage and PCN Ro1**

Susceptible to: **silver scurf, skin spot, tuber late blight and PCN Pa 2/3 and 1**

Lady Jo

Resistant to: **silver scurf, skin spot, powdery scab, dry rot – *F. coeruleum*, external damage, internal damage and PCN Ro1**

Susceptible to: **blackleg and PCN Pa 2/3 and 1**

Rudolph

Resistant to: **skin spot and dry rot – *F. coeruleum***

Susceptible to: **tuber late blight, common scab, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Sofia

Resistant to: **silver scurf, skin spot, internal damage and PCN Ro1**

Susceptible to: **foliage late blight, tuber late blight, dry rot – *F. sulphureum* and PCN Pa 2/3 and 1**

Blue Belle

Resistant to:

Susceptible to: **black dot, tuber late blight, blackleg, dry rot – *F. sulphureum*, internal damage, PCN Ro1 and PCN Pa 2/3 and 1**

Inca Bella (00.H.14.A3)

Resistant to: **black dot, black scurf, skin spot, powdery scab, common scab, external damage and internal damage**

Susceptible to: **tuber late blight, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Chincha (00.Z.305.A2)

Resistant to: **silver scurf and skin spot**

Susceptible to: **dry rot – *F. sulphureum*, internal damage, PCN Ro1 and PCN Pa 2/3 and 1**

Tabitha (00.Z.306.A5)

Resistant to: **skin spot, blackleg, powdery scab and external damage**

Susceptible to: **tuber late blight, internal damage and PCN Pa 2/3 and 1**

Casablanca (95C215-049)

Resistant to: **blackleg, external damage and PCN Ro1**

Susceptible to: **skin spot, silver scurf, tuber late blight, dry rot – *F. coeruleum*, dry rot – *F. sulphureum*, and PCN Pa 2/3 and 1**

Bounty (96C166-055)

Resistant to: **black dot, dry rot – *F. coeruleum*, external damage, internal damage and PCN Ro1**

Susceptible to: **PCN Pa 2/3 and 1**

Rubesse (97C212-001)

Resistant to: **dry rot – *F. coeruleum*, dry rot – *F. sulphureum* and PCN Ro1**

Susceptible to: **tuber late blight, external damage and PCN Pa 2/3 and 1**

Kifli (95-20-1)

Resistant to: **black dot, silver scurf, blackleg, internal damage and PCN Ro1**

Susceptible to: **dry rot – *F. sulphureum* and PCN Pa 2/3 and 1**

Sarpo Shona (2000-30-20)

Resistant to: **black dot and powdery scab,**

Susceptible to: **tuber late blight, blackleg, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Blue Danube (80-2-7)

Resistant to: **tuber late blight, black scurf, skin spot, blackleg, dry rot – *F. coeruleum* and PCN Ro1**

Susceptible to: **silver scurf, common scab, dry rot – *F. sulphureum* and PCN Pa 2/3 and 1**

Sarpo Una (97-18-6)

Resistant to: **skin spot and powdery scab**

Susceptible to: **dry rot – *F. sulphureum*, external damage, PCN Ro1 and PCN Pa 2/3 and 1**

Pink Gypsy (99C090-092)

Resistant to: **skin spot, powdery scab, common scab, external damage and internal damage**

Susceptible to:

Emblem (12-04)

Resistant to: ***black scurf, silver scurf, dry rot – *F. coeruleum*, external damage and PCN Ro1***

Susceptible to: **tuber late blight and PCN Pa 2/3 and 1**

Crisps4All

Resistant to: ***silver scurf, external damage, internal damage and PCN Ro1***

Susceptible to: ***black dot, black scurf, tuber late blight, blackleg and powdery scab***

Red Robin

Resistant to: ***skin spot, dry rot – *F. coeruleum*, external damage, internal damage and PCN Ro1***

Susceptible to: **tuber late blight, blackleg and PCN Pa 2/3 and 1**

Golden Nugget

Resistant to: *black scurf*, *skin spot*, **powdery scab**, **dry rot** – *F. coeruleum* and *F. sulphureum* and **external damage**

Susceptible to: *foliage late blight*, *silver scurf* and **tuber late blight**

Apache

Resistant to: *skin spot*, **blackleg**, **dry rot** - *F. sulphureum*, **external damage** and **internal damage**

Susceptible to: *black dot*, *black scurf*, **tuber late blight**, **PCN Ro1** and **PCN Pa 2/3 and 1**

Divaa

Resistant to: *silver scurf*, **dry rot** – *F. coeruleum* and **external damage**

Susceptible to: *black scurf*, **tuber late blight**, **powdery scab**, **dry rot** - *F. sulphureum* and **PCN Ro1**

Trixie (00Z302A8)

Resistant to: *silver scurf*, *skin spot*, **common scab** and **dry rot** – *F. coeruleum*

Susceptible to: **tuber late blight**, **dry rot** - *F. sulphureum*, **PCN Ro1** and **PCN Pa 2/3 and 1**

Chaski (99H44B3)

Resistant to: *silver scurf*, **blackleg**, **powdery scab**, **common scab** and **external damage**

Susceptible to: *black scurf*, **tuber late blight**, **dry rot** – *F. coeruleum* and *F. sulphureum* and **PCN Pa 2/3 and 1**

Paru (99H56B2)

Resistant to: *foliage late blight*, *silver scurf*, *skin spot*, **blackleg**, **powdery scab**, **common scab**, **dry rot** – *F. coeruleum* and **external damage**

Susceptible to: **tuber late blight**, **dry rot** - *F. sulphureum*, **PCN Ro1** and **PCN Pa 2/3 and 1**

Chicago (98C051-002)

Resistant to: **dry rot** – *F. coeruleum* and *F. sulphureum*, **external damage** and **PCN Ro1**

Susceptible to: *black scurf*

Gervoline (G00TT260008)

Resistant to: *skin spot*, **dry rot** – *F. coeruleum* and **internal damage**

Susceptible to: *silver scurf*, **tuber late blight**, **dry rot** - *F. sulphureum* and **external damage**

Sarpo Gwyn (9613A)

Resistant to: *foliage late blight*, *silver scurf*, **external damage** and **PCN Ro1**

Susceptible to: *black scurf*, **blackleg**, **dry rot** - *F. sulphureum* and **PCN Pa 2/3 and 1**

Lanorma

Resistant to: *silver scurf*, *skin spot*, *common scab*, *dry rot* – *F. coeruleum*, **internal damage** and **PCN Ro1**

Susceptible to: *black scurf*, *tuber late blight*, *dry rot* - *F. sulphureum*

Nectar

Resistant to: *silver scurf*, *external damage* and *internal damage*

Susceptible to: *foliage late blight*, *common scab*, *dry rot - F. sulphureum*, **PCN Ro1** and **PCN Pa 2/3 and 1**

Tebina

Resistant to: *black scurf*, *silver scurf*, *skin spot*, *powdery scab* and *internal damage*

Susceptible to: *common scab*, *dry rot - F. sulphureum*, **PCN Ro1** and **PCN Pa 2/3 and 1**

Challenger

Resistant to: *silver scurf*, *skin spot*, *blackleg*, *common scab*, *dry rot - F. sulphureum* and *external damage*

Susceptible to: *foliage late blight*, *tuber late blight*, **PCN Ro1** and **PCN Pa 2/3 and 1**

Amora

Resistant to: *silver scurf*, *skin spot*, *external damage* and **PCN Ro1**

Susceptible to: *blackleg*, *powdery scab*, *common scab*, *dry rot - F. sulphureum*, *internal damage* and **PCN Pa 2/3 and 1**

Victoria

Resistant to: *silver scurf*

Susceptible to: *foliage late blight* and *black scurf*

2. INTRODUCTION

A review of the UK National List programme was concluded in 2004 and the various varietal characteristics were prioritised according to national importance and to industry. In consultation with industry stakeholders, it was also agreed that closer co-operation with IVT funded by BPC would be advantageous in minimising duplication of testing and in ensuring that the decision making process for the official listing of new varieties could utilise all available, good quality independent data such as that generated in IVT tests.

For National List purposes, the diseases and pests prioritised as being of national importance were foliage late blight, tuber late blight, blackleg (*Pectobacterium atrosepticum* syn. *Erwinia carotovora* var. *atroseptica*) and potato cyst nematodes (*Globodera rostochiensis* pathotype Ro1 and *Globodera pallida* pathotypes Pa2/3 and Pa1). The characters agreed as being of less significance nationally but important to industry were powdery scab, common scab, dry rot - *Fusarium solani* var. *coeruleum*, dry rot - *F.sulphureum*, potato virus Y^o, potato leafroll virus, external damage (splitting) and internal damage (bruising). In addition, unreplicated assessments of tuber yield, and external and internal tuber defects were to be made in order to comply with the requirements of the EU Directive 72/180/EEC and 02/8/EC. The consultation also agreed that varieties entered for IVT testing could be incorporated into NL tests.

In 2005, a 3 year contract to conduct a revised IVT programme was awarded to a consortium of SASA, SAC, BioSS and SCRI. The tests to be conducted for IVT purposes were foliage late blight in the field (SASA), black scurf (SAC), black dot (SAC), silver scurf (SASA) and skin spot (SASA). In addition, SASA would test Common Catalogue varieties entered for IVT for all NL characters, except PVY and leafroll. Tests were to be conducted over 2 years instead of 3 years. The contract was extended for a further 3 years to cover the growing seasons 2008-2010. This report summarises the testing conducted over the 2009-2010 season.

3. MATERIALS AND METHODS

3.1. Standard Varieties

The standard varieties used in 2008 were reviewed and retained for the 2009 test programme. The varieties used in each test are listed below with, in brackets, their foliage maturity and the susceptibility rating as published in NIAB Pocket Guide to Varieties of Potatoes, 2006:

Foliage late blight:	Home Guard [1E, 4], Orla [1E, 8], Bintje [M, 2], Russet Burbank [M, 3], Valor [M, 5], Cara [M, 6], Sarpo Mira [M, 9]
Black scurf:	Sante [M, 3], Duke of York [1E, 5], Saxon [2E, 5], King Edward [M, 6], Cara [M, 7], Lady Christl [1E, 8]
Black dot:	Lady Christl [1E, 2], Pentland Squire [M, 3], Fianna [M, 5] Cara [M, 6], Saxon [2E, 7]
Silver scurf:	Lady Christl [1E, 2], Pentland Squire [M, 3], Romano [2E, 4], Fianna [M, 5], Saxon [2E, 5], Cara [M, 7]
Skin spot:	Pentland Squire [M, 2], King Edward [M, 3], Sante [M, 3], Saxon [2E, 6], Romano [2E, 7], Fianna [M, 8]

3.2. Varieties in Trial (Table 2)

In line with the policy established by PCL, for the varieties submitted for UK National List Trials, only those varieties entering the 2nd year of testing or those that had completed NL testing were considered for entry to the IVT programme. In addition, 6 new Common Catalogue varieties were identified for inclusion in the test programme although testing of Victoria was restricted to dry rot and pathogens in IVT programme. As a plant health precaution to prevent the introduction of non-indigenous bacterial pathogens, all seed potatoes from non-UK sources were tested for brown rot (*Ralstonia solanacearum*, ring rot (*Clavibacter michiganensis* subsp. *sepedonicus*) and *Dickeya* spp. bacteria.

Variety	Breeder/Agent	Maturity	Stage of testing in 2008	
			NL	IVT
UK National List				
Blue Belle	Germicopa/ Branston	Maincrop	Completed	2
Inca Bella (00.H.14.A3)	SCRI/MRS Ltd	Maincrop	Completed	2
Chincha (00.Z.305.A2)	SCRI/MRS Ltd	Maincrop	Completed	2
Tabitha (00.Z.306.A5)	SCRI/MRS Ltd	Maincrop	Completed	2
Casablanca (95C215-049)	Cygnets PB	1st Early	Completed	2
Bounty (96C166-055)	Cygnets PB	E. Maincrop	Completed	2
Rubesse (97C212-001)	Cygnets PB	E. Maincrop	Completed	2
Kifli (95-20-1)	Sarvari Research Trust	Maincrop	Completed	2
Sarpo Shona (2000-30-220)	Sarvari Research Trust	Maincrop	Completed	2
Blue Danube (80-2-7)	Sarvari Research Trust	Maincrop	Completed	2
Sarpo Una (97-18-6)	Sarvari Research Trust	2nd Early	Completed	2
Pink Gypsy (99C090-092)	Cygnets PB	E. Maincrop	Completed	2
Emblem (12-04)	Caithness Varieties Ltd	2nd Early	2	1
Crisps4All	HZPC	E. Maincrop	2	1
Red Robin	Jalving Potatoes UK Ltd	2nd Early	2	1
Golden Nugget (47 C8R 04)	Zella Doig	Maincrop	2	1
Apache (150 PS 05)	Zella Doig	E. Maincrop	2	1
CA 99-1 (Divaa)	Caithness Potatoes Ltd	Maincrop	2	1
00Z302A8 (Trixie)	SCRI/MRS Ltd	Maincrop	2	1
99H44B3 (Chaski)	SCRI/MRS Ltd	Maincrop	2	1
99H56B2 (Paru)	SCRI/MRS Ltd	Maincrop	2	1
Chicago (98C051-002)	Cygnets PB	Maincrop	2	1
Gervioline (G00TT260008)	Germicopa UK	2nd Early	2	1
96316A (Sarpo Gwyn)	Sarvari Research Trust	L. Maincrop	2	1
Common Catalogue				
Piccolo Star	Van Rijn/ Branston	2nd Early	-	2
Sylvana	HZPC/Greenvale	E Maincrop	-	2
Lady Jo	Meijer/Potato Innovations	Maincrop	-	2
Rudolph	Agrico	E. Maincrop	-	2
Sofia	Greenvale/Agrico	2nd Early	-	2
Lanorma	Branston/Van Rijn	Maincrop		1
Nectar	IPM	E. Maincrop		1
Tebina	Branston/Van Rijn	Maincrop		1
Challenger	HZPC	Maincrop		1
Amora	Meijer/Potato Innovations	2nd Early		1
Victoria	HZPC	E. Maincrop		1*

* IVT tests and dry rot only`

TABLE 2. VARIETIES IN IVT IN 2009

3.3. IVT Test Methods

The test methods used were those agreed and set out in the standard protocols prepared for the 2008 programme. Details of the tests are provided below:

3.3.1. Foliage late blight in the field, 2009

At the end of 2007 field test at Ayr, an isolate was taken from a late blight lesion on a plant of the R5 differential. Testing at SASA determined that the isolate was virulent to R1, 2, 3, 4, 5, 6, 7, 10 and 11 and SCRI confirmed the isolate as being of 13-A2 genotype. The isolate was maintained and used as the test isolate in 2009 in NL and IVT tests. The test tubers were planted on 26 May in plots of 2 tubers at Dalrymple, by Ayr. The 1st Early experiment was planted at the same time as 2nd Early/Maincrop experiment because planting had been delayed beyond normal date. The layout was a randomised block design with 4 replications, each of 2 tubers. Plants of King Edward, in small pots, infected by the 13_A2 isolate of *P. infestans* were laid out along the adjacent rows of King Edward on 13 July. On 23, 27, 31 July and 5 August, the % foliage affected by late blight was assessed using the diagrammatic key of Cruickshank *et al.* (1982). The % Area Under the Disease Progress Curve (AUDPC) was calculated according to the formulae of Fry (1978), after applying the angular transformation to the percentage values on each date.

3.3.2. Skin spot, 2009

Test tubers were dipped for 0.5 min in a suspension of spores and mycelia (Carnegie & Cameron, 1983) and planted in pots containing a 1:1 mix of Bulrush compost and John Innes No 2 compost on 7 May. Pots were placed outdoors in peat beds on 11 May and watered by drip irrigation into each pot. The layout was randomised block with 6 replications. The haulm was killed by applying diquat dibromide (Reglone) on 18 August at the half the manufacturer's recommended rate. The tubers were harvested into separate plastic boxes on 13 and 14 October and then stored at 5-8^oC until the second week in February. The % surface area affected by skin spot was recorded in 5 categories and a surface infection index calculated (Boyd, 1957).

3.3.3. Silver scurf, 2009

Test tubers were dipped for 0.5 min in a suspension of macerated spores and mycelia and planted in pots containing Bulrush compost. Pots were placed in a polytunnel on 18 May. The layout was a randomised block design with 6 replications. Haulms were allowed to senesce naturally. Tubers were harvested on 1 and 2 October into separate plastic boxes and incubated at 12-15^oC and high humidity until silver scurf lesions had developed sufficiently on the susceptible standard varieties. In the last week of January, the % surface area affected by silver scurf on each tuber was assessed using 6 categories. A mean silver scurf index was calculated for each plot by multiplying the number of tubers in each category by the mid-point value and dividing the sum of these values by the total number of tubers assessed.

3.3.4. Black dot, 2009

Petri dishes containing potato dextrose agar (PDA) were inoculated with three isolates of *C. coccodes*. When the colonies had reached the edge of the dishes, the cultures were macerated using a liquidiser. The suspension was added to Bulrush compost at the rate of 1 Petri dish of *C. coccodes* per 8 kg compost in a cement mixer and mixed for 10 minutes. Test tubers were planted on 20 May in 25 cm diameter pots filled with amended compost which were set in individual watering saucers and then placed in a polytunnel in a randomised block design with 6 replications. Pots were watered every 2 days so that the compost was kept damp but not over-watered. Haulms were allowed to senesce naturally. Tubers were harvested on 24 October, after symptoms of black dot had been seen on the daughter tubers of the susceptible reference varieties. The tubers were placed into paper bags and kept over night in a cold store. The % surface area affected by black dot was then assessed on the 7 January 2010.

3.3.5. Black scurf, 2009

Petri dishes containing PDA was inoculated with three isolates of *R. solani* AG-3. When the colonies had reached the edge of the agar plate, the cultures were macerated in a liquidiser and added to compost in a cement mixer at a rate of 1 dish per 8 kg of Bulrush compost. On 18 May, a single seed tuber of each variety was planted in a 25 cm diameter pot which was placed in an individual watering saucer. Pots were laid out in a polytunnel in a randomised block design with 6 replicates. Plants were grown and maintained as in Section 2.2.3.4. All daughter tubers from each pot were harvested on 26 October, after symptoms of black scurf were seen on the susceptible reference varieties. The tubers were placed into paper bags and kept in a cold store. The % surface area covered by black scurf was assessed on 12 January 2010.

3.4. NL Tests

These were conducted on Common Catalogue varieties in accordance with the document "United Kingdom National List Trials: Trials Procedures for the Official Examination of value for Cultivation and Use (VCU) – Potato 2009". The methods are summarised below:

Tuber late blight: the rose-end of field-grown tubers is sprayed with the 13_A2 isolate of *P. infestans*. The number of tubers affected by late blight is counted after 10-14 days incubation.

Common Scab: test tubers are planted in pots in artificially infested compost kept dry during tuber initiation. Severity of common scab is assessed on daughter tubers.

Powdery scab: test tubers are planted in compost infected with scab peelings and kept wet during tuber initiation. Severity of powdery scab is assessed on daughter tubers.

Blackleg: test tubers are inoculated at the heel end with *Pectobacterium atrosepticum* and planted in an irrigated field trial. Incidence of blackleg is assessed 3 times during the growing season.

Dry rot (separate test for *Fusarium solani* var. *coeruleum* and *F.sulphureum*): test tubers are wounded and inoculated with a suspension of spores and incubated at 12-15°C. The degree of internal rotting is assessed.

Potato Cyst Nematode (*Globodera* spp.): tubers are planted in pots in compost infected with a standard concentration of PCN eggs. Cyst multiplication on roots is assessed.

Damage, external (splitting) and internal (bruising): a standard force is applied to the heel end of field grown tubers. Tubers for the splitting test are stored at 4-6°C and the incidence of splitting at the point of impact is recorded. Tubers for the bruising test are stored at 9-11°C and the depth of damage at point of impact measured.

3.5. Statistical analysis

Most of the data was recorded as percentages and was angularly transformed before conducting an individual trial analysis of variance. For PCN, log transformations were used. Over-year trial means were calculated using REML from transformed trial means; for IVT the test years from 2005 (the year when the consortium took over the trialling) were used, giving five years for this report, and for NL tests, all years from 1981 were used where data was available. This data was used to calculate the provisional and final ratings presented in Tables 1a and 1b. However, in the individual test reports, ratings presented are based on the analysis for 2 years only and have been presented to one decimal point to provide greater clarity. All ratings of 1-9 were derived by linear transformation (or according to a multiplication index for PCN) using varieties with known consistent susceptible and resistant reactions as fixed reference points.

4. RESULTS

Ring rot, brown rot and *Dickeya* bacteria were not found in tested seed potatoes.

In order to conduct some of the tests for Common Catalogue varieties e.g. dry rot, tubers are planted in plots in the field to produce test tubers. On 2 July, symptoms of wilt were observed on one plant of cv. Tebina and one of cv. Red Robin and plants including mother tuber harvested into new bags for testing. Laboratory tests confirmed that the pathogen was "*Dickeya solani*" which is the aggressive strain found in Europe and Israel. Seed potatoes of Red Robin were from the Netherlands and those of Tebina from Belgium. The pathogen was recovered from a further three suspect plants of Red Robin and was also detected in daughter tubers of one plant of Piccolo Star but not in the stem. Seed potatoes of Piccolo Star were from the Netherlands. On 22 July, two suspect plants of Red Robin, each with a symptomatic stem, were identified and *D. solani* was recovered from both stems. On 4 August, the pathogen was isolated from a further three plants of Red Robin. Subsequent testing also revealed that symptomless infection had occurred in the plants of Red Robin.

Following the initial finding, measures were put in place to limit the risk of spread to other material at SASA and for harvesting, handling and disposal of the all plant material derived from these seed tubers of non UK origin. SAC were also informed and advised of appropriate procedures. All tests were completed with these measures in place.

Seed potatoes of Victoria were found to be heavily contaminated by another variety when planted in the field so the dry rot tests could not be conducted. However, SASA-derived seed tubers were used to conduct IVT tests.

4.1. IVT Tests

4.1.1. Foliage late blight (field)

4.1.1.1. Summary of 2008/2009 Trials (Table 3)

Late blight was recorded on some varieties at a very low severity on 23 July with slow progress by 27 July. However, by 31 July, late blight on susceptible varieties had progressed from <10% to >90% and foliage of all but the most resistant varieties was dead by 5 August. The AUDPC values on the reference varieties in 2009 were similar to those in 2008. Unfortunately, no plants of R9 differential grew from planted tubers. Foliage of the differentials R1, R2, R3, R4, R5, R6, R7, R10 and R11 was killed by late blight. No growing lesions developed on plants of R8 differential. This confirmed the results of detached leaflet tests that the virulence of isolate was 1.2.3.4.5.6.7.10.11.

Casablanca was as susceptible as the susceptible control, Home Guard. Orla which was formerly considered to be resistant to foliar late blight reacted with high susceptibility to 13_A2 strain in both years. The replacement resistant maincrop reference varieties, Sarpo Mira and Valor, were scored provisionally as 7.9 and 6.0 respectively. The reaction of Sarpo Mira is in agreement with its performance in previous years in the additional testing conducted on existing varieties for PCL. None of the varieties completing 2 years of IVT testing were as resistant as Sarpo Mira. The most resistant candidates were Inca Bella, Sarpo Shona, Bounty and Blue Danube scoring 6.2, 5.9, 5.1 and 5.1 respectively. The remaining varieties were relatively susceptible, with Sofia being most susceptible, scoring 2.4.

4.1.1.2. 2009 Trial (Table 3)

99H56B2 (Paru) and 96316A (Sarpò Gwyn) were the most resistant of the first year varieties from NL programme with provisional scores of 6.8 and 6.6 respectively. 99H44B3 (Chaski) and Chicago (98C051-002) each scored 6.3. Golden Nugget was the most susceptible of the NL candidates scoring 2. None of the Common Catalogue varieties, other than Tebina, showed meaningful resistance with Nectar, Victoria and Challenger being most susceptible. Tebina which was claimed to have very high resistance only scored 5.2 in this test.

Variety	Test Year		1-9 rating
	2008	2009	
1st Early			
Home Guard	31.9	42.1	4.5
Orla	36.9	43.8	4.0
Casablanca (95C215-049)	37.3	39.3	4.3
LSD (P0.05)	5.4	6.9	
2nd Early/Maincrop			
Bintje	50.3	43.9	3.0
Russet Burbank	48.9	43.2	3.2
Cara	24.9	29.5	6.0
Sarpò Mira	-	14.0	7.9
Valor	-	26.7	6.0
Piccolo Star	42.6	41.6	3.8
Sylvana	42.6	45.6	3.5
Lady Jo	41.6	37.5	4.1
Rudolph	36.4	36.7	4.6
Sofia	52.4	49.9	2.4
Blue Belle	41.3	34.3	4.4
Inca Bella (00.H.14.A3)	27.5	24.7	6.2
Chincha (00.Z.305.A2)	39.5	32.7	4.7
Tabitha (00.Z.306.A5)	38.7	36.9	4.4
Bounty (96C166-055)	32.2	34.2	5.1
Rubesse (97C212-001)	43.0	38.4	4.0
Kifli (95-20-1)	39.3	46.6	3.6
Sarpò Shona (2000-30-220)	25.3	31.2	5.9
Blue Danube (80-2-7)	34.1	32.6	5.1
Sarpò Una (97-18-6)	36.2	38.5	4.5
Pink Gypsy (99C090-092)	45.4	42.5	3.5
Lanorma	-	36.4	4.6
Nectar	-	44.0	3.0
Tebina	-	33.5	5.2
Challenger	-	42.1	3.4
Amora	-	36.1	4.6
Victoria	-	42.5	3.3
Emblem (12-04)	-	32.5	5.4
Crisps4All	-	40.5	3.7
Red Robin	-	37.7	4.3
Golden Nugget (47 C8R 04)	-	48.9	2.0
Apache (150 PS 05)	-	31.9	5.5
CA 99-1 (Divaa)	-	40.2	3.8
00Z302A8 (Trixie)	-	36.1	4.6
99H44B3 (Chaski)	-	28.3	6.3
99H56B2 (Paru)	-	25.6	6.8
Chicago (98C051-002)	-	27.9	6.3
Gervoline (G00TT260008)	-	41.5	3.5
96316A (Sarpò Gwyn)	-	26.4	6.6
LSD (P0.05)	5.4	3.9	1.4

TABLE 3. MEAN % (ANGULAR TRANSFORMATION) AREA UNDER DISEASE PROGRESS IN FOLIAGE LATE BLIGHT FIELD TEST FOR 1ST EARLY, 2ND EARLY AND MAINCROP VARIETIES IN 2008 & 2009 (TWO YEAR RATING IN BOLD).

4.1.2. Black scurf

4.1.2.1. Summary of 2008/2009 Trials (Table 4)

The severity of black scurf on reference varieties was generally less in 2009 than in 2008. The severity ranged from 2.6 to 10.5 in 2009 compared with 3.1 to 18.6 in 2008. The most resistant variety was Blue Danube scoring 9, followed by Inca Bella and Piccolo Star scoring 7.1 and 6.9 respectively. Blue Danube showed very high resistance in both years and has been adopted as a resistant reference variety in this test in 2010. None of the candidate varieties were very susceptible. Bounty was least resistant scoring 4.5.

Variety	Test Year		1-9 rating
	2008	2009	
Sante (3)*	18.6	8.1	3.0
Duke of York (5)	14.0	10.3	3.7
Saxon (5)	14.0	7.4	4.6
King Edward (6)	10.2	7.2	5.8
Cara (7)	11.0	8.6	5.1
Lady Christ (8)	11.1	7.2	5.5
Piccolo Star	11.1	2.6	6.9
Sylvana	10.2	9.0	5.2
Lady Jo	12.0	7.3	5.2
Rudolph	10.2	10.5	4.8
Sofia	12.0	7.3	5.2
Blue Belle	10.9	6.2	5.8
Inca Bella (00.H.14.A3)	8.8	3.9	7.1
Chincha (00.Z.305.A2)	11.9	6.5	5.5
Tabitha (00.Z.306.A5)	10.4	8.0	5.5
Casablanca (95C215-049)	10.5	5.8	6.1
Bounty (96C166-055)	11.3	10.4	4.5
Rubesse (97C212-001)	10.5	8.1	5.4
Kifli (95-20-1)	9.5	7.1	6.0
Sarpo Shona (2000-30-220)	10.5	5.5	6.2
Blue Danube (80-2-7)	3.1	3.4	9.0
Sarpo Una (97-18-6)	8.5	8.3	5.9
Pink Gypsy (99C090-092)	10.8	4.5	6.4
Lanorma	-	8.8	2.1
Nectar	-	5.6	6.2
Tebina	-	3.5	8.9
Challenger	-	7.5	3.8
Amora	-	7.3	4.0
Victoria	-	9.1	1.7
Emblem (12-04)	-	3.5	8.9
Crisps4All	-	9.5	1.2
Red Robin	-	5.5	6.3
Crisps4All	-	9.5	1.2
Golden Nugget (47 C8R 04)	-	4.8	7.2
Apache (150 PS 05)	-	8.2	2.9
CA 99-1 (Divaa)	-	8.2	2.9
00Z302A8 (Trixie)	-	7.5	3.7
99H44B3 (Chaski)	-	9.7	1.0
99H56B2 (Paru)	-	6.2	5.5
Chicago (98C051-002)	-	9.9	0.7
Gervioline (G00TT260008)	-	6.3	5.2
96316A (Sarpo Gwyn)	-	8.4	2.6
LSD (P0.05)	3.3	4.3	2.3

* rating as published in NIAB Pocket Guide of Varieties of potato, 2006

TABLE 4. MEAN % (ANGULAR TRANSFORMATION) SURFACE AREA AFFECTED BY BLACK SCURF

4.1.2.2. 2009 Trial (Table 4)

By contrast with the varieties completing testing, six varieties provisionally appeared to be relatively susceptible, scoring between 0.7 (Chicago) and 2.1 (Lanorma). Two varieties, Tebina and Emblem, appeared to be very resistant scoring 8.9.

4.1.3. Black dot

4.1.3.1. Summary of 2008/09 Trials (Table 5)

Disease severity on the susceptible reference varieties was much less in 2009 than in 2008. Most varieties were moderately resistant. However, Piccolo Star and Kifli showed high resistance scoring 8.1 and 7.4 respectively. Blue Belle was the most susceptible variety scoring 2.9.

4.1.3.2. 2009 Test (Table 5)

Most of the 1st year varieties showed some resistance to black dot with Golden Nugget, Lanorma, Tebina and 99H56B2 (Paru) being most resistant, scoring between 6.2 and 6.0. Crisps4All was the most susceptible candidate scoring 1.4, with the next most susceptible variety being Apache scoring 3.1.

Variety	Test Year		1-9 rating
	2008	2009	
Lady Christl (2)	36.1	15.7	4.7
Pentland Squire (3)	46.5	22.6	3.0
Fianna (5)	34.7	12.9	5.1
Cara (6)	33.8	5.2	6.0
Saxon (7)	32.4	6.3	6.0
Piccolo Star	9.9	8.0	8.1
Sylvana	33.2	10.3	5.5
Lady Jo	35.5	7.3	5.6
Rudolph	31.3	18.1	4.9
Sofia	33.8	13.1	5.2
Blue Belle	43.5	26.8	2.9
Inca Bella (00.H.14.A3)	30.1	6.0	6.3
Chincha (00.Z.305.A2)	33.6	10.8	5.4
Tabitha (00.Z.306.A5)	41.7	12.4	4.5
Casablanca (95C215-049)	42.2	15.5	4.1
Bounty (96C166-055)	31.4	3.6	6.4
Rubesse (97C212-001)	32.9	13.8	5.2
Kifli (95-20-1)	20.6	4.3	7.4
Sarpo Shona (2000-30-220)	26.4	5.3	6.7
Blue Danube (80-2-7)	31.7	12.5	5.5
Sarpo Una (97-18-6)	39.9	13.3	4.6
Pink Gypsy (99C090-092)	24.3	13.2	6.1
Lanorma	-	5.9	6.1
Nectar	-	10.5	5.2
Tebina	-	6.6	6.0
Challenger	-	13.4	4.7
Amora	-	15.4	4.3
Victoria	-	20.0	3.5
Emblem (12-04)	-	14.9	4.4
Crisps4All	-	31.1	1.4
Red Robin	-	14.1	4.6
Golden Nugget (47 C8R 04)	-	5.5	6.2
Apache (150 PS 05)	-	22.1	3.1
CA 99-1 (Divaa)	-	18.1	3.8
00Z302A8 (Trixie)	-	15.8	4.2
99H44B3 (Chaski)	-	13.1	4.8
99H56B2 (Paru)	-	6.5	6.0
Chicago (98C051-002)	-	8.6	5.6
Gervioline (G00TT260008)	-	13.6	4.7
96316A (Sarpo Gwyn)	-	7.8	5.7
LSD (P=0.05)	10.6	6.2	1.9

* rating of the variety as published in NIAB Pocket Guide to Varieties of Potatoes, 2006

TABLE 5. MEAN % (ANGULAR TRANSFORMATION) SURFACE AREA AFFECTED BY BLACK DOT

4.1.4. Silver scurf

4.1.4.1. Summary of 2008/2009 Trials (Table 6)

Silver scurf on the reference varieties was more severe in 2009 than in 2008 and differences amongst the varieties were much smaller. In particular, Cara appeared to be much less resistant in 2009 than in 2008. The most resistant candidate varieties were Sofia, Piccolo Star and Lady Jo scoring 9, 8.9 and 8.4 respectively. The most susceptible varieties were Sylvana and Blue Danube scoring 2.4 and 3.1 respectively. Nine out of the 12 remaining varieties scored 5.0 or greater.

Variety	Test Year		1-9 rating
	2008	2009	
Lady Christl (2)	36.2	44.9	2.0
Pentland Squire (3)	19.7	42.3	5.7
Romano (4)	23.0	35.5	6.4
Fianna (5)	20.5	36.4	6.7
Saxon (5)	19.6	43.1	5.6
Cara (7)	14.7	40.9	7.0
Piccolo Star	14.9	30.9	8.9
Sylvana	30.8	48.1	2.4
Lady Jo	10.8	37.6	8.4
Rudolph	29.0	37.6	4.8
Sofia	16.1	25.4	9.0
Blue Belle	22.2	38.5	6.0
Inca Bella (00.H.14.A3)	26.6	44.1	4.0
Chincha (00.Z.305.A2)	15.1	36.7	7.7
Tabitha (00.Z.306.A5)	24.2	35.4	6.2
Casablanca (95C215-049)	27.9	44.6	3.7
Bounty (96C166-055)	15.6	42.8	6.4
Rubesse (97C212-001)	21.9	37.7	6.2
Kifli (95-20-1)	21.5	31.3	7.5
Sarpo Shona (2000-30-220)	20.0	45.6	5.0
Blue Danube (80-2-7)	27.8	47.5	3.1
Sarpo Una (97-18-6)	16.1	39.1	7.1
Pink Gypsy (99C090-092)	19.2	37.8	6.7
Lanorma	-	25.3	9.0
Nectar	-	39.6	8.7
Tebina	-	15.1	9.0
Challenger	-	24.7	9.0
Amora	-	35.7	9.0
Victoria	-	37.2	9.0
Emblem (12-04)	-	40.5	7.5
Crisps4All	-	33.9	9.0
Red Robin	-	43.5	3.7
Golden Nugget (47 C8R 04)	-	45.0	1.8
Apache (150 PS 05)	-	41.8	5.8
CA 99-1 (Divaa)	-	39.2	9.0
00Z302A8 (Trixie)	-	33.4	9.0
99H44B3 (Chaski)	-	40.1	7.9
99H56B2 (Paru)	-	31.4	9.0
Chicago (98C051-002)	-	41.4	6.4
Gervioline (G00TT260008)	-	50.1	1.0
96316A (Sarpo Gwyn)	-	39.0	9.0
LSD (P0.05)	9.4	10.8	3.4

rating of the variety as published in NIAB Pocket Guide to Varieties of Potatoes, 2006

TABLE 6. MEAN % (ANGULAR TRANSFORMATION) SURFACE ARE AFFECTED BY SILVER SCURF

4.1.4.2. 2009 test (Table 6)

The relative performance of Cara which is the resistant anchor for calculating variety scores, affected the calculation of one year scores by reducing the amount of discrimination amongst resistant candidate varieties. Consequently, many varieties received a score of 9 even although their mean severities differed statistically, as measured by the LSD e.g. Challenger v Amora. The varieties which were least affected by silver scurf were Tebina, Challenger and Lanorma in that order. Gervioline (G00TT260008) and Golden Nugget were most susceptible varieties scoring 1.0 and 1.8 respectively.

4.1.5. Skin spot

An experiment conducted in 2009 to evaluate the current skin spot methodology is reported in Appendix 2.

4.1.5.1. Summary of 2008/2009 Trials (Table 7)

The severity of skin spot was considerably greater in 2009 than in 2008 and large differences were recorded between the susceptible and the resistant reference varieties. Most of the varieties completing IVT testing were moderately or very resistant to skin spot. Chinchá, Blue Danube and Pink Gypsy were the most resistant, scoring 7.7, 7.6 and 7.4 respectively. However, Casablanca and Sylvana were susceptible, scoring 1.0 and 1.8 respectively.

4.1.5.2. 2009 Test (Table 7)

Of the 1st year candidate varieties, only two appeared to be susceptible although neither was as susceptible as King Edward or Pentland Squire. CA 99-1 (Divaa) scored 3.3 and Chicago scored 3.6. Fourteen out of the remaining 16 varieties scored more than 5.0 with five scoring more than 7.0. The latter varieties were Tebina, Challenger, Red Robin, 00Z302A8 (Trixie) and 99H44B3 (Paru).

Variety	Test Year		1-9 rating
	2008	2009	
Pentland Squire (2)*	8.9	24.0	2.0
King Edward (3)	6.2	31.4	1.0
Sante (3)	7.5	32.8	1.0
Saxon (6)	7.5	8.7	5.4
Romano (7)	3.1	5.2	7.0
Fianna (8)	0.8	9.8	6.5
Piccolo Star	2.3	11.9	5.8
Sylvana	6.0	27.7	1.8
Lady Jo	1.5	8.3	6.7
Rudolph	1.1	9.6	6.5
Sofia	2.4	8.3	6.5
Blue Belle	5.1	15.8	4.4
Inca Bella (00.H.14.A3)	8.2	3.9	6.2
Chincha (00.Z.305.A2)	0.4	4.5	7.7
Tabitha (00.Z.306.A5)	1.9	7.3	6.8
Casablanca (95C215-049)	11.5	28.1	1.0
Bounty (96C166-055)	2.3	19.6	4.2
Rubesse (97C212-001)	2.7	13.0	5.5
Kifli (95-20-1)	5.5	22.4	3.0
Sarpo Shona (2000-30-220)	6.5	14.2	4.5
Blue Danube (80-2-7)	0	5.5	7.6
Sarpo Una (97-18-6)	0.3	8.3	6.9
Pink Gypsy (99C090-092)	0.6	5.9	7.4
Lanorma	-	6.0	6.8
Nectar	-	13.1	4.9
Tebina	-	2.7	7.7
Challenger	-	3.4	7.5
Amora	-	5.5	6.9
Victoria	-	9.6	5.8
Emblem (12-04)	-	8.5	6.1
Crisps4All	-	14.0	4.7
Red Robin	-	4.7	7.1
Golden Nugget (47 C8R 04)	-	5.9	6.8
Apache (150 PS 05)	-	6.4	6.7
CA 99-1 (Divaa)	-	19.2	3.3
00Z302A8 (Trixie)	-	4.9	7.1
99H44B3 (Chaski)	-	11.1	5.4
99H56B2 (Paru)	-	4.9	7.1
Chicago (98C051-002)	-	18.0	3.6
Gervioline (G00TT260008)	-	5.9	6.8
96316A (Sarpo Gwyn)	-	9.0	6.0
LSD (P0.05)	3.7	7.5	4.5

* rating of the variety as published in NIAB Pocket Guide to Varieties of Potatoes, 2006

TABLE 7. MEAN % (ANGULAR TRANSFORMATION) SURFACE AREA AFFECTED BY SKIN SPOT.

4.2. NL Tests

4.2.1. Tuber late blight (Table 8)

A separate test for 1st Early varieties was not required because there were no candidates for this maturity category. Of the candidate Common Catalogue varieties completing IVT testing, all were very susceptible except for Lady Jo which scored 4.2. Lanorma and Challenger were very susceptible of the 1st year varieties. Nectar was the most resistant of the remaining three varieties with a score of 4.8.

Variety	Test Year		1-9 rating
	2008	2009	
Bintje	90	90	2.0
Cara	55.9	45.3	6.0
Sarpo Mira	-	78.5	3.3
Valor	-	35.0	7.7
Piccolo Star	90	90	2.0
Sylvana	87.1	77.9	2.8
Lady Jo	62.3	74.8	4.2
Rudolph	87.0	86.8	2.3
Sofia	90	90	2.0
Lanorma	-	90	2.0
Nectar	-	58.4	4.8
Tebina	-	65.6	4.2
Challenger	-	84.3	2.5
Amora	-	65.8	4.2
LSD (P0.05)	13.1	13.7	2.2

- = not tested

TABLE 8. MEAN % (ANGULAR TRANSFORMATION) TUBERS AFFECTED BY LATE BLIGHT

4.2.2. Blackleg (*Pectobacterium atrosepticum*) (Table 9)

The incidence of plants of Concurrent affected by blackleg was greater in 2009 than in 2008 whereas the reverse occurred with the other reference varieties. This is the opposite of the yearly reactions in 2007 and 2008 when the incidence of blackleg was greater on the susceptible control varieties in 2008 than in 2007 with the exception of Concurrent. However, there were clear differences between the susceptible and resistant reference varieties. Of the varieties completing testing, Piccolo Star and Sylvana were as resistant as Ailsa while Sofia was moderately resistant, scoring 4.5. After 1 year of testing, Challenger and Tebina appeared to be resistant but Amora appeared to be very susceptible, scoring 1.

Variety	Test Year		1-9 rating
	2008	2009	
Concurrent	31.7	37.1	3.0
Estima	32.5	16.4	5.2
Morene	57.5	26.1	3.9
Cultra	19.6	9.2	7.7
Ailsa	0	0	8.0
Piccolo Star	0	21.5	7.7
Sylvana	9.2	12.3	7.7
Lady Jo	68.9	35.5	1.9
Rudolph	49.4	25.7	3.9
Sofia	48.7	18.1	4.5
Lanorma	-	27.7	5.4
Nectar	-	33.2	4.6
Tebina	-	23.6	6.0
Challenger	-	16.4	7.0
Amora	-	63.3	1.0
LSD (P0.05)	18.1	14.4	2.7

- = not tested

TABLE 9. MEAN % (ANGULAR TRANSFORMATION) PLANTS AFFECTED BY BLACKLEG (*PECTOBACTERIUM ATROSEPTICUM*)

4.2.3. Common Scab (Table 10)

The severity of common scab was very high in 2009. In order to improve the discrimination amongst the varieties, the severity class, >50-100% surface covered by scab, was sub-divided into two classes, >50-75% and >75-100%. Maris Piper was the most susceptible of the reference varieties, scoring 2, closely followed by Desiree scoring 2.4. Of the varieties completing testing, Sylvana and Piccolo Star were at least as resistant as Pentland Crown. Rudolph was the most susceptible scoring 2.1. Of the varieties in 1st year of testing, Lanorma was more resistant than Pentland Crown while Challenger was similar to Pentland Crown. Amora and Nectar appeared to be very susceptible.

Variety	Test Year		1-9 rating
	2008	2009	
Maris Peer	18.6	54.1	3.6
Estima	16.1	37.0	6.3
Maris Bard	19.5	63.7	3.6
Home Guard	12.1	57.4	3.2
Maris Piper	20.7	59.0	2.0
Desiree	27.8	50.4	2.4
Pentland Crown	14.2	42.9	7.0
Piccolo Star	10.0	42.6	7.1
Sylvana	9.5	37.0	8.1
Lady Jo	13.1	52.3	4.7
Rudolph	30.1	49.6	2.1
Sofia	25.7	46.2	3.5
Lanorma	-	34.8	8.7
Nectar	-	55.3	2.3
Tebina	-	52.1	3.3
Challenger	-	39.6	7.2
Amora	-	58.5	1.4
LSD (P0.05)	7.9	14.0	4.1

TABLE 10. MEAN % (ANGULAR TRANSFORMATION) SURFACE AREA AFFECTED BY COMMON SCAB

4.2.4. Powdery Scab (Table 11)

Overall, the severity of powdery scab was broadly similar in both years. Estima continued to be clearly more susceptible than any of the other reference varieties. None of the candidate varieties showed susceptibility to powdery scab with Lady Jo and Sylvana being the most resistant, scoring 7.8 and 7.5 respectively. However, Sofia showed some susceptibility to cankerous powdery scab being as susceptible as Estima and Pentland Crown (data not shown). Tebina was the most resistant of the 1st year varieties, scoring 7.8. Amora was most susceptible scoring 2.3. While Lanorma scored 5.3 for susceptibility to surface scabs, it appeared to very susceptible to cankerous powdery scab

Variety	Test Year		1-9 rating
	2008	2009	
Accent	13.4	21.7	6.6
Estima	37.9	35.1	3.0
Cara	14.6	17.8	6.8
Pentland Crown	14.6	15.2	7.1
Sante	10.0	10.1	8.0
Piccolo Star	15.0	25.6	6.1
Sylvana	8.4	16.8	7.5
Lady Jo	11.7	10.1	7.8
Rudolph	21.5	24.8	5.5
Sofia	23.6	28.5	5.0
Lanorma	-	23.4	5.3
Nectar	-	31.6	3.7
Tebina	-	11.4	7.8
Challenger	-	27.2	4.6
Amora	-	38.4	2.3
LSD (P0.05)	5.1	8.0	1.4

TABLE 11. MEAN % (ANGULAR TRANSFORMATION) SURFACE AREA AFFECTED BY POWDERY SCAB

4.2.5. Dry rot (*Fusarium* spp.)

4.2.5.1. *F. solani* var. *coeruleum* (Table 12)

The amount of internal rotting was greater in 2009 than in 2008. Catriona and Pentland Squire were the most susceptible of the reference varieties and Nadine and Sante were the most resistant. Of the varieties completing testing, Sofia and Piccolo Star showed some susceptibility to *F. coeruleum* dry rot but the other three varieties showed strong resistance scoring 6.6 to 7.6. All of the 1st year varieties appeared to be relatively resistant with Lanorma being most resistant scoring 7.9.

Variety	Test Year		1-9 rating
	2008	2009	
Pentland Squire	32.1	52.8	3.0
Catriona	40.4	51.8	2.5
Estima	17.4	35.2	5.3
Nadine	15.6	15.2	6.8
Sante	7.2	7.0	8.0
Piccolo Star	26.2	34.2	4.7
Sylvana	12.5	10.7	7.4
Lady Jo	8.0	12.2	7.6
Rudolph	11.7	22.2	6.6
Sofia	30.6	32.0	4.6
Lanorma	-	7.7	7.9
Nectar	-	30.1	5.5
Tebina	-	25.5	6.0
Challenger	-	25.4	6.0
Amora	-	21.5	6.4
LSD (P0.05)	5.7	8.0	1.5

TABLE 12. MEAN % (ANGULAR TRANSFORMATION) INTERNAL AREA AFFECTED BY *FUSARIUM COERULEUM*

4.2.5.2. *F. sulphureum* (Table 13)

The severity of rotting on reference varieties was broadly similar in the two years although slightly greater on the resistant varieties, Saxon and Sante. Of the varieties completing tests, Sylvana was very resistant to *F. sulphureum*, scoring 9. However, the remaining four varieties were susceptible with Rudolph and Sofia both scoring 1. Similarly four of the 1st year varieties were susceptible with Lanorma, Nectar and Tebina, each scoring 1. However, Challenger was relatively resistant scoring 7.3.

Variety	Test Year		1-9 rating
	2008	2009	
Maris Piper	30.1	29.9	3.0
Atlantic	24.3	24.4	4.8
Nadine	22.6	30.1	4.2
Saxon	11.1	16.2	8.4
Sante	11.3	18.2	8.0
Piccolo Star	24.6	30.3	3.8
Sylvana	8.9	11.8	9.0
Lady Jo	22.6	35.3	3.3
Rudolph	35.4	37.2	1.0
Sofia	46.3	52.0	1.0
Lanorma	-	51.3	1.0
Nectar	-	38.9	1.0
Tebina	-	44.3	1.0
Challenger	-	19.7	7.3
Amora	-	31.7	2.2
LSD (P0.05)	6.7		3.3

TABLE 13. MEAN % (ANGULAR TRANSFORMATION) INTERNAL AREA AFFECTED BY FUSARIUM SULPHUREUM

4.2.6. External Damage (splitting) (Table 14)

There were no candidate 1st early varieties in 2009 so a test was not conducted on 1st early reference varieties. The incidence of splitting was fairly similar in 2008 and 2009. Russet Burbank (2.6) was the most susceptible of the maincrop reference varieties and Maris Piper was the most resistant (6.2). All of the varieties completing 2nd year testing showed strong resistance to external damage and scored between 6.2 and 7.0. None of the 1st year candidate varieties appeared to be susceptible. Nectar, Challenger and Amora all scored more than 7.0.

Variety	Test Year		1-9 rating
	2008	2009	
Ulster Sceptre	80.9	-	
Home Guard	3.2	-	
Red Craigs Royal	73.2	54.9	3.4
Russet Burbank	66.0	87.8	2.6
Maris Peer	34.6	41.1	5.1
Record	18.0	31.3	6.0
Maris Piper	22.2	22.0	6.2
Piccolo Star	7.8	10.0	7.0
Sylvana	2.0	15.4	7.0
Lady Jo	9.1	26.0	6.5
Rudolph	14.3	27.5	6.2
Sofia	21.0	22.0	6.2
Lanorma	-	44.0	5.0
Nectar	-	16.0	7.1
Tebina	-	30.8	6.0
Challenger	-	13.7	7.3
Amora	-	14.6	7.3
LSD (P0.05)			1.2

TABLE 14. MEAN % (ANGULAR TRANSFORMATION) TUBERS AFFECTED BY SPLITTING AFTER APPLYING STANDARD FORCE

4.2.6.1. Internal Damage (bruising) (Table 15)

The depth of bruising was similar in both years. Sofia was the most resistant of the 2nd year varieties, scoring 8.1. Sylvana appeared to be moderately susceptible, scoring 4.3. Of the 1st year varieties, Lanorma and Nectar appeared to be very resistant, both scoring 9. Amora appeared to be very susceptible, scoring 1.8. However, one year results need to be treated with some caution as there is no replication in the yearly test.

Variety	Test Year		1-9 rating
	2008	2009	
Ulster Sceptre	3.5	-	
Home Guard	2.6	-	
Red Craigs Royal	3.7	2.2	5.9
Maris Peer	2.2	3.0	6.2
Record	3.3	3.2	5.5
Russet Burbank	4.9	4.6	4.0
Maris Piper	2.1	3.6	6.0
Piccolo Star	2.5	4.3	5.4
Sylvana	4.8	4.1	4.3
Lady Jo	3.0	0.5	7.2
Rudolph	4.3	1.3	6.0
Sofia	0.7	1.0	8.1
Lanorma	-	0.9	9.0
Nectar	-	1.9	9.0
Tebina	-	2.7	7.7
Challenger	-	3.8	5.5
Amora	-	5.7	1.8
LSD (P0.05)			2.9

TABLE 15. MEAN DEPTH (MM) OF BRUISE AT POINT OF IMPACT OF STANDARD FORCE

4.2.7. Potato Cyst Nematode (Table 16)

Resistance to PCN (*G. rostochiensis* Ro1) is normally conferred by the major gene H1 and results in no, or minimal, multiplication of cysts on the potato. Varieties expressing this type of resistance to Ro1 were Piccolo Star, Sylvana, Lady Jo, Sofia, Lanorma and Amora. Lanorma also appeared to have a degree of resistance to *G. pallida*.

Variety	Ro1	Pa 2/3	Pa1
Estima	2 (S) [†]		1
Desiree	2 (S)	2 (S)	1
Maris Piper	9 (R)	2 (S)	
Piccolo Star	9 (R)	2 (S)	
Sylvana	9 (R)	2 (S)	
Lady Jo	9 (R)	3 (S)	
Rudolph	2 (S)	2 (S)	
Sofia	9 (R)	2 (S)	
Lanorma	9 (R)	5	
Nectar	2 (S)	1 (S)	
Tebina	3 (S)	3 (S)	
Challenger	2 (S)	2 (S)	
Amora	9 (R)	2 (S)	

[†] R denotes full resistance and S denotes full susceptibility

TABLE 16. MULTIPLICATION OF CYSTS OF 3 PATHOTYPES OF POTATO CYST NEMATODE (*GLOBODERA ROSTOCHIENSIS*) PATHOTYPE 1, *G. PALLIDA* PATHOTYPES 2/3) ON TEST VARIETIES, EXPRESSED AS 1-9 RATING.

5. DISCUSSION AND CONCLUSIONS

The full range of disease tests was completed on time with reasonable disease development in all tests. In some tests e.g. black dot, black scurf, disease severity was less in 2009 than in 2008 whereas the reverse occurred with silver scurf and skin spot. As in previous years, some differences in the relative reactions of varieties were found between test years. For example, Sofia was much less susceptible to black scurf in 2009 than in 2008 when compared with the susceptible reference varieties. In contrast, Cara appeared to be more resistant to silver scurf in 2008 than in 2009 when the differences amongst the reference varieties were smaller. Such yearly variation appears to be an inherent part of this type of testing and may be a consequence of differing disease pressures and environmental conditions in the test year. Conditions in a polytunnel will, for example, be affected by outside temperature, amount of sunshine and humidity and this could impact on disease pressure. The amount of disease pressure to which a variety is exposed can affect its reaction as reported by Hilton *et al.* (2000) for silver scurf. The potential for variability in a variety's reaction needs to be recognised when considering ratings, particularly those based on one test in one year. In addition, it is always necessary to review methodology to try to obtain more uniform repeatable results. SASA has been examining the methodology for silver scurf for two years and the results indicate that infesting compost will give greater and earlier development of silver scurf than dipping seed tubers in macerated suspension of spores and mycelia (Appendix 1). This method has been adopted for 2010 testing.

The testing has also identified some varieties that have a greater degree of resistance than the existing reference varieties. For example, Blue Danube was consistently much more resistant to black scurf than the resistant reference variety Lady Christl, scoring 9 compared with 5.5. Blue Danube has been adopted as the resistant reference variety for IVT testing in 2010. Similarly, Piccolo Star (8.1) was more resistant to black dot than Saxon (6.0) in both years and consideration may need to be given on its inclusion as a resistant reference variety.

2008 saw the first year of foliage late blight testing with an isolate of 13_A2 genotype which had been recovered from an R-gene differential plant at Ayr in 2007. This confirmed the change in the reaction of Stirling observed in 2007 with the ingress of this isolate into the test and resulted in the replacement of Stirling as the resistant reference variety by Valor and Sarpo Mira. The reaction of both varieties was consistent with their previous reactions in other tests e.g. additional IVT testing in 2008. Sarpo Mira was the more resistant of the two. However, in the tuber late blight test, Sarpo Mira was more susceptible than either Cara or Valor. Such differences in reaction between foliage and tuber have been recorded in previous testing and confirm the necessity to ensure that more than one resistant variety is included in the test programme.

In the National List and IVT testing programmes, the resistance of a candidate variety to a range of diseases is evaluated in a series of standardised tests which each include a set of standard reference varieties whose reactions are known. For each disease, the resistance rating of a candidate variety is determined by comparing the amount of disease developing on the candidate variety with that on the standard varieties over at least two years of testing. The process of calculating variety scores is subject to regular review. As part of a review of NL decision making, statistical advice was that over-year means should be calculated from data for as many years as possible rather than two test years. This proposal has been adopted for NL analysis

using data since 1981 and has been applied to IVT data for last five years. This has meant that small changes in some of the historic ratings ascribed to a variety have occurred, sometimes exacerbated by the process of rounding up or down to a whole number. For example, a variety scoring 3.7 for a character is recorded as 4, same as a variety scoring 4.4. Small shifts in the calculations may move these values up or down. Another factor which can affect ratings over time is a change to the rating for a reference variety because of evidence that varietal reaction operates on a wider scale than previously thought e.g. black scurf. Users of this data should bear in mind that the final rating of a variety should, therefore, be treated as a broad guide as to how a variety might perform in practice rather being an absolute value. Disease resistance ratings are recorded on a 1 to 9 scale where 1 is highly susceptible and 9 very resistant. Thus the higher the value, the more resistant a variety is to a disease. Typically, varieties with a score of 1, 2 or 3 would be considered highly susceptible, those with a score 4 or 5 considered susceptible, those with a score 6 or 7 moderately resistant and those with scores 8 or 9 highly resistant. A high resistance score should not be taken as indicating that a disease will be absent but that there is less risk of the disease developing on these varieties. With most other diseases and faults, all varieties can be affected to a greater or lesser extent. In consequence, the need for other control measures such as fungicide application should be evaluated, based on other factors such as the level of inoculum likely to be present and whether environmental conditions favour the pathogen.

The British Potato Variety Database was launched on the web in July, 2007 and formally presented to industry at the Potatoes in Practice event in August, 2007. This is now the mechanism for publication of both NL and IVT data and brings this data together with breeder's information formerly presented in publications such as "Scotland - The Natural Home of Potatoes". This database allows SASA to publish variety information immediately from various trials as soon as it is finalised. To date, the database has been accessed 75,085 times which is an increase of 81% on the number up to June 2009. The total number of GB users is 2,586 making 65,839 visits. There are 767 users from USA and 187 from Canada. Other main visitors are from Australia, France, Spain, Germany, Netherlands, Spain, Ireland, China and Italy.

The 17 varieties which completed IVT in 2009 were Piccolo Star, Sylvana, Lady Jo, Rudolph, Sofia, Blue Belle, Inca Bella, Chinchu, Tabitha, Casablanca, Bounty, Rubesse, Kifli, Sarpo Shona, Blue Danube, Sarpo Una and Pink Gypsy. In summary, the key findings for these varieties are as follows:

Piccolo Star

Resistant to: **black dot, black scurf, silver scurf, blackleg, common scab, external damage and PCN Ro1**

Susceptible to: **tuber late blight and PCN Pa 2/3 and 1**

Sylvana

Resistant to: **blackleg, powdery scab, common scab, dry rot – *F. coeruleum* and *F. sulphureum*, external damage and PCN Ro1**

Susceptible to: **silver scurf, skin spot, tuber late blight and PCN Pa 2/3 and 1**

Lady Jo

Resistant to: **silver scurf, skin spot, powdery scab, dry rot – *F. coeruleum*, external damage, internal damage and PCN Ro1**

Susceptible to: **blackleg and PCN Pa 2/3 and 1**

Rudolph

Resistant to: **skin spot** and **dry rot – *F. coeruleum***

Susceptible to: **tuber late blight, common scab, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Sofia

Resistant to: **silver scurf, skin spot, internal damage** and **PCN Ro1**

Susceptible to: **foliage late blight, tuber late blight, dry rot – *F. sulphureum* and PCN Pa 2/3 and 1**

Blue Belle

Resistant to:

Susceptible to: **black dot, tuber late blight, blackleg, dry rot – *F. sulphureum*, internal damage, PCN Ro1 and PCN Pa 2/3 and 1**

Inca Bella (00.H.14.A3)

Resistant to: **black dot, black scurf, skin spot, powdery scab, common scab, external damage** and **internal damage**

Susceptible to: **tuber late blight, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Chincha (00.Z.305.A2)

Resistant to: **silver scurf and skin spot**

Susceptible to: **dry rot – *F. sulphureum*, internal damage, PCN Ro1 and PCN Pa 2/3 and 1**

Tabitha (00.Z.306.A5)

Resistant to: **skin spot, blackleg, powdery scab** and **external damage**

Susceptible to: **tuber late blight, internal damage** and **PCN Pa 2/3 and 1**

Casablanca (95C215-049)

Resistant to: **blackleg, external damage** and **PCN Ro1**

Susceptible to: **skin spot, silver scurf, tuber late blight, dry rot – *F. coeruleum*, dry rot – *F. sulphureum*, and PCN Pa 2/3 and 1**

Bounty (96C166-055)

Resistant to: **black dot, dry rot – *F. coeruleum*, external damage, internal damage** and **PCN Ro1**

Susceptible to: **PCN Pa 2/3 and 1**

Rubesse (97C212-001)

Resistant to: **dry rot – *F. coeruleum*, dry rot – *F. sulphureum* and PCN Ro1**

Susceptible to: **tuber late blight, external damage** and **PCN Pa 2/3 and 1**

Kifli (95-20-1)

Resistant to: **black dot, silver scurf, blackleg, internal damage** and **PCN Ro1**

Susceptible to: **dry rot – *F. sulphureum* and PCN Pa 2/3 and 1**

Sarpo Shona (2000-30-20)

Resistant to: **black dot** and **powdery scab**,

Susceptible to: **tuber late blight, blackleg, dry rot – *F. sulphureum*, PCN Ro1 and PCN Pa 2/3 and 1**

Blue Danube (80-2-7)

Resistant to: **tuber late blight, black scurf, skin spot, blackleg, dry rot – *F. coeruleum*** and **PCN Ro1**

Susceptible to: **silver scurf, common scab, dry rot – *F. sulphureum*** and **PCN Pa 2/3 and 1**

Sarpo Una (97-18-6)

Resistant to: **skin spot** and **powdery scab**

Susceptible to: **dry rot – *F. sulphureum*, external damage, PCN Ro1 and PCN Pa 2/3 and 1**

Pink Gypsy (99C090-092)

Resistant to: **skin spot, powdery scab, common scab, external damage and internal damage**

Susceptible to:

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7. APPENDIX

7.1. Evaluation of effect of test method on development of silver scurf and ranking of varieties

SF Carnegie¹, H Campbell¹ and A Roberts²

¹SASA (Science and Advice for Scottish Agriculture), Roddinglaw Road, Edinburgh EH12 9FJ, ², BioSS, Kings Buildings, Edinburgh EH9 3JZ

7.1.1. Materials and Methods

7.1.1.1. Summary of test methods

7.1.1.1.1. 2008

Method 1 – 4 weeks before planting, test tubers were dipped according to IVT protocol and stored at 10-12°C and >99% relative humidity in boxes lined with damp capillary matting

Method 2 – seed tubers were dipped in inoculum as per IVT protocol

Method 3 – tubers were placed in pots at planting depth and sprayed with c. 5ml of inoculum prepared as in IVT protocol and promptly covered with compost

Method 4 –compost was infested with a suspension of spores and mycelia of *Helminthosporium solani* prepared by macerating 6 Petri dish cultures L⁻¹ water and mixing with 42 L of compost in a cement mixer prior to planting

Experiment was laid out in an unreplicated split plot design with each treatment being blocked. There were 6 blocks for each treatment. Treatments were applied on 27 and 28 May. Two weeks after harvest tubers were incubated at 12-15°C until assessment of the severity of silver scurf in November and January as according to IVT protocol.

7.1.1.1.2. 2009

An experiment to examine the effect of method of inoculation and various watering regimes on the development of silver scurf was conducted using 4 varieties: Lady Christl, Pentland Squire, Cara and Bonnie. These two methods of inoculation were dipping seed tubers in macerated suspension of agar and planting tubers in compost infested with standardised macerated suspension of mycelia and spores. Half of pots were kept dry after emergence by providing water from seep hosing at base of pots and half were kept moist by providing water into each pot. In addition, for 2 weeks before harvest, compost was either watered to keep it moist or left dry. The experiment was laid out as split plot for method of irrigation with other treatments fully randomised. There were 6 replications for each treatment. Storage and assessment were as in 2008.

7.1.1.1.3. Statistical Analysis

The % surface area covered was angularly transformed before conducting the analysis. In 2009, the two methods of watering were treated as sub-experiments and the remaining treatments were laid in a randomised block design with 6 replications in each sub-experiment

7.1.1.2. Results

7.1.1.2.1. 2008

Variety	Dip seed tuber	Spray seed tuber	Infested compost	Seed dip 4 week pre-planting
Lady Christl	5.9 / 11.9	11.3 / 14.6	47.2 / 58.9	7.2 / 14.9
Pentland Squire	5.9 / 8.8	4.2 / 10.2	22.8 / 25.8	3.8 / 10.3
Cara	3.3 / 4.7	1.5 / 8.6	5.5 / 9.8	0.7 / 3.0
Bonnie	3.4 / 13.2	5.4 / 16.4	13.9 / 37.0	2.9 / 6.7
Daisy	3.1 / 5.2	5.4 / 15.1	12.4 / 29.0	4.1 / 5.3
Sunray	4.7 / 6.7	5.1 / 12.5	21.5 / 29.5	2.5 / 1.9
Mean	4.4 / 8.4	5.5 / 12.9	20.6 / 31.7	3.5 / 7.0
LSD (P<0.05)	5.47 NS / 7.98 NS	6.48 NS / 11.41 NS	13.98 *** / 43.67 ***	3.25* / 6.52**

TABLE A1.1. SEVERITY (% INDEX) OF SILVER SCURF AT TWO TIMES OF ASSESSMENT (NOVEMBER 2008/JANUARY 2009)

1. Mean severity of silver scurf in November and January was at least twice as great with infested compost as with any of the various methods of inoculating seed tuber. This difference amongst the treatments was even greater with the susceptible varieties.

2. Significant differences amongst varieties were found for methods involving infesting the compost and dipping seed tuber 4 weeks before planting but not with the other methods at both times of assessment. Cara was the most resistant variety in all tests and at both times of assessment and Lady Christl was the most susceptible variety on 6 out of 8 comparisons.

The varietal rankings were compared by correlation analysis but only for those methods for which significant differences were detected amongst the varieties. In general, the relative performances of the varieties were correlated (P<0.05) in the test involving dipping seed tuber 4 weeks before planting and that with infested compost (Table A1.2). With the infested soil test, Lady Christl was most susceptible variety and Cara was the most resistant at both times of assessment. However, the performance of other varieties was less consistent at the two times of assessment; for example, Pentland Squire was significantly more susceptible than Bonnie at the November assessment but, at January assessment, there was no difference between the two varieties. A similar increase in the amount of silver scurf developing on tubers of var. Bonnie between November and January was detected with methods involving dipping or spraying the seed tuber.

	Pre-planting Nov	Infested compost Jan	Pre-planting Jan
Infested compost Nov	0.89*	0.98*	0.82*
Pre-planting inoculated Nov	-	0.91*	0.87*
Infest compost Jan	0.91*	-	0.87*
Pre-planting inoculated Jan	0.87*	0.76	-

*P<0.05

TABLE A1.2. CORRELATION CO-EFFICIENT (R) FOR RANKING OF VARIETIES BY TEST METHOD

7.1.1.2.2. 2009

The severity of silver scurf was similar at the two times of assessment. Overall, the severity of silver scurf was only slightly greater for compost irrigated by seep hosing (dry) than for compost where irrigation was applied into compost (moist) but the difference did not appear to be practically significant. The watering regime in 2 weeks prior to harvest had no effect of the severity of silver scurf. The severity of silver scurf on tubers produced in infested compost was twice as great as that for daughter tubers produced from inoculated seed tubers. There was a significant interaction between inoculation method and variety ($P < 0.01$) (Table A1.3). The infested compost method of inoculation provided greater discrimination amongst the varieties with Lady Christl being clearly more susceptible than the other varieties. Similarly Cara was more resistant than the other varieties. In general, the rankings by this method were in line with published ratings.

Variety	Inoculated seed tuber	Infested compost	Moist compost	Dry compost
Lady Christl	35.1/32.8	59.9/59.5	47.0/46.4	48.0/45.9
Pentland Squire	26.6/24.7	48.9/44.0	33.4/33.5	42.2/35.2
Bonnie	26.8/28.2	41.1/42.0	31.8/36.2	36.1/34.0
Cara	21.1/26.0	33.0/36.2	20.6/29.2	33.5/32.9
LSD ($P < 0.05$)	4.05/4.78		4.05/4.78	4.05/4.78

TABLE A1.3. SEVERITY (ANGULAR TRANSFORMATION) OF SILVER SCURF ON TUBERS OF 4 VARIETIES GROWN FROM INOCULATED SEED TUBER OR IN INFESTED COMPOST AND IN MOIST OR DRY COMPOST (NOVEMBER 2009/JANUARY 2010)

7.1.1.3. Conclusions

1. Infesting soil prior to planting resulted in earlier and greater development of silver scurf than methods involving inoculation of seed tubers.
2. Varietal rankings achieved by infesting soil were similar to those achieved by inoculating seed tuber suggesting that resistance is primarily influenced by skin resistance and not by spread on the plant.
3. Some limited evidence that varietal rankings could differ at different times of assessment so incubation in store should also be conducted to allow for any varietal differences in this aspect.

7.2. Evaluation of methodology for testing for varietal susceptibility to skin spot

SF Carnegie¹, H Campbell¹ and I Nevison²

¹SASA (Science and Advice for Scottish Agriculture), Roddinglaw Road, Edinburgh EH12 9FJ, ²BioSS, Kings Buildings, Edinburgh EH9 3JZ

In 2009 an experiment was conducted to evaluate the effect of inoculum concentration on skin spot development on the six reference varieties used in IVT testing. A comparison was also made of the effect on varietal rankings for susceptibility to skin spot of growing plants in pots in peat beds (current IVT method) or in screen house on hard standing, and of growing plants in the field.

7.2.1. Materials and Methods

Tests were conducted as per IVT protocol. Three concentrations of inoculum were used for inoculating the test seed tubers by dipping. These were: Normal (N) – 1½ plates l⁻¹, 2N – 3 plates l⁻¹ and 4N - 6 plates l⁻¹. At each growing site, the experiment was laid out in a randomised block design of 4 replications. In the field, tubers were planted immediately after dipping and covered with soil. Each plot in the field experiment consisted of 2 plants and in the pot experiments, each plot was two pots.

Skin spot severity index was transformed using natural log + 0.02 for statistical analysis by ANOVA for each growing site. Varieties were compared using Tukey's multiple comparison test.

7.2.2. Results

The severity of skin spot was lower on field grown tubers than on pot-grown tubers (Table A2.1). Overall, skin spot was slightly more severe on tubers produced in peat bed than in screen house. The amount of inoculum did not significantly affect the severity of skin spot on tubers. The rankings of the six varieties were broadly similar in tests conducted in each of the growing sites.

Growing site	N	2N	4N	SED (50df)
Field	-1.36	-0.81	-1.64	0.991
Pots in Peat bed	2.10	1.96	2.03	0.225
Pots in screen house	1.19	1.58	1.60	0.261

N – 1½ plates l⁻¹, 2N – 3 plates l⁻¹; 4N - 6 plates l⁻¹

TABLE A2.1. MEAN SEVERITY (NATURAL LOG + 0.02) OF SKIN SPOT ON TUBERS PRODUCED IN FIELD OR IN POTS IN PEAT BED OR SCREEN HOUSE AS AFFECTED BY CONCENTRATION OF INOCULUM IN WHICH TEST SEED TUBERS WERE DIPPED AT PLANTING.

Variety	Peat bed	Screen house	Field
Pentland Squire	3.21 a [†]	2.66 a	1.11 a
King Edward	2.94 a	2.36 ba	-0.42 ba
Sante	2.85 a	2.39 ba	-0.69 b
Saxon	1.73 b	1.31 b	-2.06 bc
Fianna	1.26 b	0.17 ac	-2.44 c
Romano	0.19 c	-0.14 c	- 3.09 c

[†] varieties compared by Turkey LSDs; varieties with different letters differ significantly ($P < 0.05$) from each other

TABLE A2.2. MEAN SEVERITY (NATURAL LOG + 0.02) OF SKIN SPOT ON SIX POTATO VARIETIES AS AFFECTED BY PRODUCTION IN POTS IN PEAT BEDS OR SCREEN HOUSES, AND IN THE FIELD.

7.2.3. Conclusion

The results indicate that increasing the concentration of inoculum or growing plants in a screen house or in field will not improve discrimination amongst varieties in testing for susceptibility to skin spot