Potatoes in Practice 2007

Gourdie Farm
Invergowrie, Dundee

Supported by

Field Trials & Demonstrations Results Summary

SCRI, SAC, CSC PotatoCare and the Potato Council hosted the 2007 'Potatoes in Practice' event in Dundee. This is now the largest annual potato knowledge transfer event in Britain, with over 500 visitors. The event is a unique opportunity for farmers, advisors and others to view government and industry-supported research and new developments at a single site.

This guide has been produced to ensure visitors to the event are able to find out further information on trials and demonstrations that were at the 2007 Potatoes in Practice event.

How to use this guide

In order to maintain consistency, we have kept the format the same as the event guide that was provided to visitors on the day. Below the explanatory text describing each trial or demonstration, we have added the results.

Please note some of the results may not be from fully replicated trials over a number of years and sites.

If you have any questions regarding a specific trial or demonstration, please contact the relevant person responsible for the trial or demonstration.

Date for your Diary. Potatoes in Practice 2008 will again be at SCRI, Gourdie Farm, Dundee on Thursday 7th August. We look forward to seeing you there. For details of this year's event, visit www.scri.ac.uk/events/forthcomingevents/pip2008

Principal Organisers:

SCRI: Sarah Stephens (Information Services Manager), Euan Caldwell (Farm Manager), Dr. John Bradshaw (Research Scientist) and Dr. Finlay Dale (Research Scientist).

SAC: Dr. Stuart Wale (Head of Crop Services)

Potato Council: Val Crowder (Executive, Seed & Export)

CSC: Jim Rennie (Technical Director) and Colin Rennie (Agronomist).

Disclaimer

The views stated in individual sections of this booklet are not necessarily the views held by all partners.

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Scottish Crop Research Institute (SCRI)

SCRI

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Introduction

Last year's cultivar demonstration from SCRI was a brief history of breeding for disease and pest resistance. The oldest variety on display was King Edward, dating back to 1902. It came from the age of hybridisers and hobby breeders, namely the 19th century. Like all varieties bred during the 19th century, it came from a narrow genetic base and lacked genes for resistance to pests and diseases that became major problems in Britain. King Edward is thus susceptible to PVY (Potato virus Y), to late blight in both its foliage and tubers (*Phytophthora infestans*), and to both the golden potato cyst nematode (*Globodera rostochiensis*) and the white potato cyst nematode (*G. pallida*). These pests and diseases are still actual or potential problems for today's potato growers.

Scientific Breeding

The rediscovery in 1900 of Mendel's published work of 1865 marked the birth of modern genetics, and opened the way to crop improvement by scientific breeding methods based on a sound knowledge of the inheritance of economically important traits. The development of such methods for potatoes was one of the challenges which faced the Scottish Plant Breeding Station (SPBS) on its foundation in 1920, and one which still faces potato breeders at SCRI today. Virus and late blight resistance have been priorities since the 1930s and cyst nematode resistance since the 1950s.

The wild and cultivated potato species of Central and South America are the ultimate raw materials for potato breeding and the sources of genes for disease and pest resistance lacking in our European potato.

The Commonwealth Potato Collection (CPC) is maintained at SCRI and dates back to an expedition to Mexico in 1938 and another more extensive one to South America in 1939. Today it comprises about 1500 accessions of which two-thirds are wild and one-third is cultivated species. The collection includes 83 of the 228 wild tuber-bearing *Solanum* species recognised by Hawkes in his 1990 taxonomy.

Virus resistance

Major genes for resistance to PVY and PVX (Potato virus X), and simply inherited resistance to PLRV (Potato leafroll virus), have been found and ultilised in potato breeding. They can provide high levels of durable resistance. Of the varieties on display last year, Cara, Lady Balfour and Vales Everest have good PVY resistance.

Pentland Dell and Lady Balfour

Late blight was meant to be a disease of the past. In the 1930s breeders at SPBS started using the major genes for near-immunity found in wild Mexican species *Solanum demissum*, but by the 1960s it was clear that the resistance was not durable. Pentland Dell, with three such resistance genes, was released in 1960, grown commercially in 1963, and succumbed to blight in 1967. It has been protected with fungicide ever since, as have all of the other widely grown but susceptible cultivars. Breeding strategy switched to selecting for high levels of quantitative field resistance and this was achieved in cultivar Lady Balfour in 2001. Such resistance, combined with high yield, helped it to become established as the number one organic variety in Britain. However, in 2007 it proved susceptible to the new strain of late blight known as genotype blue_13 which became widespread throughout Great Britain. Hence there is no guarantee that field resistance is more durable than major-gene resistance. Blight resistance therefore remains a difficult goal for breeders and in the meantime conventional growers will need to continue to apply fungicide sprays to their crops each growing season to control late blight.

Maris Piper, Cara and Vales Sovereign

Cyst nematodes started to become a serious problem in Britain in the early 1950s. A simply inherited major gene (H1) for resistance to the golden potato cyst nematode was found in CPC accession 1673 of Andigena potatoes. Starting with a cross in 1952, Maris Piper was released by the Plant Breeding Institute (PBI) in Cambridge in 1966, the first of a long line of varieties with the H1 gene including Cara (1976) and now Vales Sovereign from SCRI (2003), to name but three. The resistance has proved durable. However, growers need to be aware that some popular varieties are susceptible, for example, King Edward and Pentland Dell.

Vales Everest and Lady Balfour

In contrast, an equivalent gene to H1 has not been found for resistance to the white potato cyst nematode and none of the varieties on display had complete resistance, despite 40 years of effort. Some progress has been made in selecting for quantitative resistance. Partial resistance, derived from the wild South American species *S. vernei*, has been achieved in Lady Balfour. Good partial resistance, derived from CPC accession 2802 of Andigena potatoes, has recently been achieved in cultivar Vales Everest (an SCRI breeding programme that took from 1969 to 2005).

Other diseases

Over the past 87 years at SPBS/SCRI, new and durable forms of resistance have been sought for the major pests and diseases of potatoes, whilst for those considered less important, potential cultivars have simply been screened to avoid extreme susceptibility. This is what has happened for powdery and common scab, black dot and black scurf, and spraing. Hence high levels of resistance have occurred largely by chance and susceptibility has been accepted if the variety has other desirable traits, e.g. Pentland Dell is susceptible to spraing and Maris Piper is susceptible to common scab.

Future prospects

Despite much breeding effort, the majority of today's most popular cultivars are susceptible to a range of pests and diseases which have to be controlled by the widespread use of chemicals, such as fungicides for late blight, nematicides for cyst nematodes and insecticides for aphid-transmitted virus diseases. However, chemical control is expensive, not always effective, and raises environmental and food safety concerns, particularly over large-scale insecticide use and pesticide residues in tubers for human consumption. Hence, cultivars with higher levels of disease and pest resistance are highly desirable. The challenge for breeders remains that of combining such resistance with the marketable yield and quality required for commercial success.

CSC CROP PROTECTION

Contact details

Jim Rennie – CSC Crop protection, Glenearn Road, Perth, PH2 0NL

TRIAL 1 – HERBICIDE TRIAL

Introduction

Demonstration plots looking at different herbicide mixes applied pre and post weed emergence – no harvested assessments made.

	Treatment (l/ha or kg/ha)	Timing of application
1	Untreated	
2	Claymore 3lt/ha + Lexone 0.35kg/ha	Pre weed emergence
3	Claymore 3lt/ha + Lexone 0.35kg/ha + Status 0.4lt/ha	Pre weed emergence
4	Defy 4lt/ha + Lexone 0.35kg/ha	Pre weed emergence
5	Defy 4lt/ha + Lexone 0.35kg/ha + Status 0.4lt/ha	Pre weed emergence
6	Gamit 0.25lt/ha + Linuron 1.5lt/ha + Lexone 0.5kg/ha	Pre weed emergence
7	Defy 4lt/ha + Linuron 1lt/ha + PDQ 3lt/ha	Post weed emergence
8	Defy 3lt/ha + Lexone 0.35kg/ha + PDQ 3lt/ha	Post weed emergence
9	PDQ 3lt/ha + Linuron 1lt/ha	Post weed emergence
10	PDQ 3lt/ha + Lexone 0.5kg/ha	Post weed emergence
11	Gamit 0.25lt/ha + Lexone 0.5kg/ha + Shark 0.33lt/ha	Post weed emergence

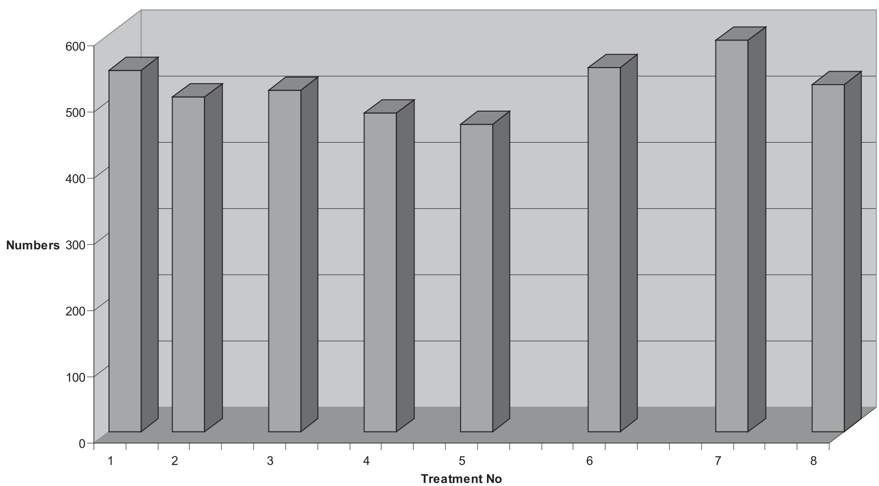
TRIAL 2 – NITROGEN DEMONSTRATION

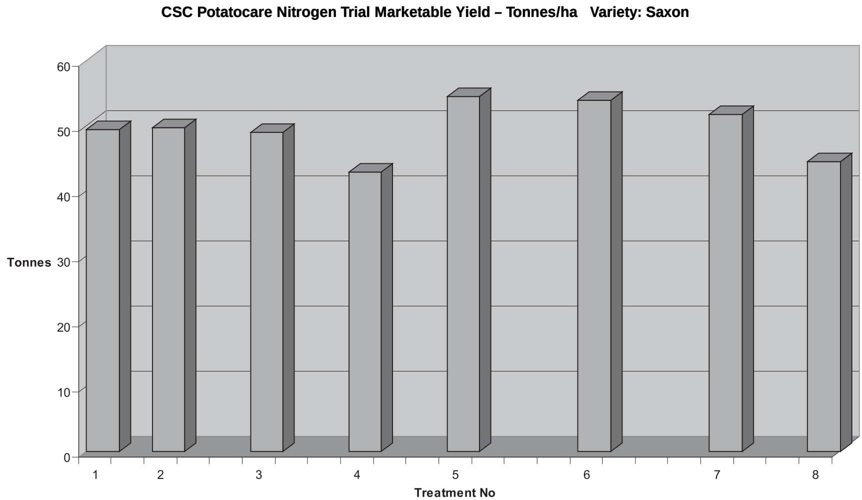
Introduction

Aim of this trial was to demonstrate different Nitrogen fertiliser regimes to assess yield and quality benefits over industry standard – we also looked at adding extra quantities of Sulphur and assessed differences – below are bar charts showing tuber number and marketable yields.

	Treatment (l/ha or kg/ha)
1	Ammonium Nitrate 180kg N/ha
2	Ammonium Nitrate 60kg N/ha Ammonium Sulphate 120kg N/ha
3	Ammonium Nitrate 100kg N/ha Ammonium Sulphate 80kg N/ha
4	Ammonium Sulphate 120kg N/ha Foliar N 3 x 20kg N/ha
5	Ammonium Sulphate 120kg N/ha Ammonium Nitrate 60kg N/ha Elemental Sulphur 50kg/ha
6	Ammonium Sulphate 120kg N/ha Ammonium Nitrate 60kg N/ha Elemental Sulphur 100kg/ha
7	Ammonium Nitrate 180kg N/ha Elemental Sulphur 200kg/ha
8	Ammonium Nitrate 180kg N/ha Elemental Sulphur 250kg/ha

CSC Potatocare Nitrogen Trial Tuber – Numbers Variety: Saxon





Results

Treatment 1 (control) had Ammonium Nitrate 180 kg/ha N applied with no Sulphur. Treatment 5 which was Ammonium Nitrate 60 kg/ha N + Ammonium Sulphate 120 kg/ha N + 50 kg/ha elemental Sulphur gave a 10% increase in marketable yield with a 22% increase in bakers. Treatment 6 which was Ammonium Nitrate 60 kg/ha N + Ammonium Sulphate 120 kg/ha N + 100 kg/ha elemental Sulphur gave a 9% increase in marketable yield with a 3% increase in bakers. Treatment 7 which was Ammonium Nitrate 180kg/ha N + 200 kg/ha elemental Sulphur gave an increase in marketable yield by 5% with the tuber numbers also increased by 5%.

TRIAL 3 – FOLIAR NUTRITION TRIAL – Maris Piper

TRIAL 4 – FOLIAR NUTRITION TRIAL – Saxon

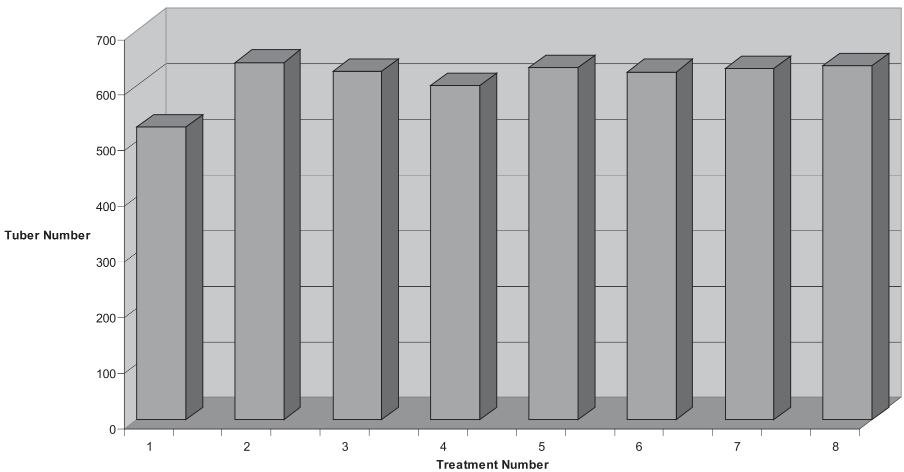
Introduction

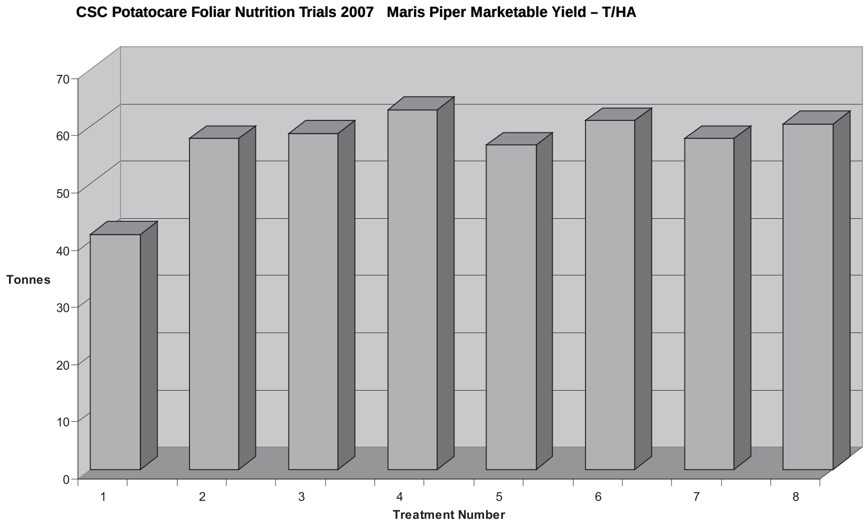
Aim of trial was to demonstrate performances of various crop stimulants within a prolific variety (Maris Piper) and on a non prolific variety (Saxon). Below are bar charts showing tuber numbers and marketable yields.

	Treatment (l/ha or kg/ha)	Timing of application
1	Untreated	
2	3 Tier Technologies Establish 5-16-12 3.75lt/ha Huma-balance XL 3.75lt/ha Soil Restore 0.148lt/ha	Post Planting
3	3 Tier Technologies 8-16-8 3lt/ha	TI, TB
4	New-Trition High-Cal 100kg/ha Nut-triset 2.5lt/ha	Post Planting TI, TB, TB + 7 days
5	Nu-trel Nutrifast Carboman 3lt/ha	TI, TB, TB + 7 days
6	Nu-trel Fast Mix K - Microbooster 3kg/ha	TI, TB, TB + 7 days
7	PlantSyence Nutri-phite 2lt/ha Take Off 0.35lt/ha Nutri-phite 1lt/ha Take Off 0.35lt/h	TI TB
8	CSC Cropcare Bittersalz 3kg/ha ATS 3.5lt/ha Croplift 2.5kg/ha TTL Plus 2lt/ha	TI, TB, TB + 7 days

Variety: Maris Piper

CSC Potatocare Foliar Nutrition Trials 2007 Maris Piper Tuber – Numbers





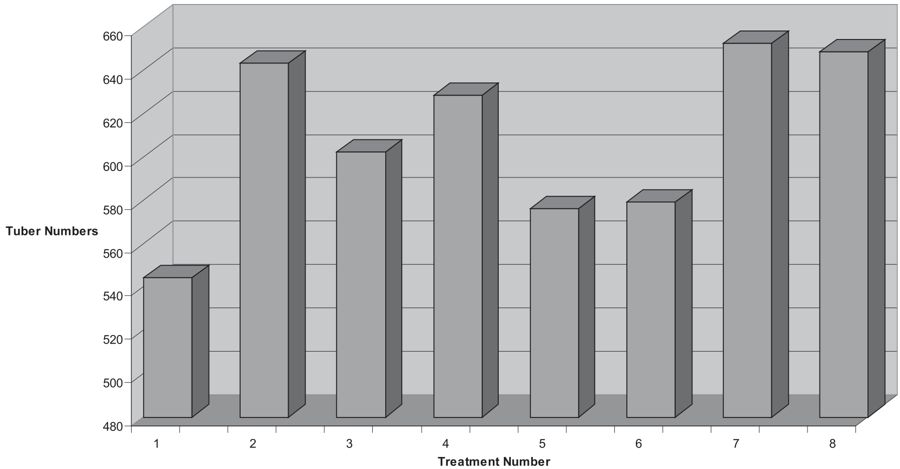
Results

Treatment 1 was untreated.

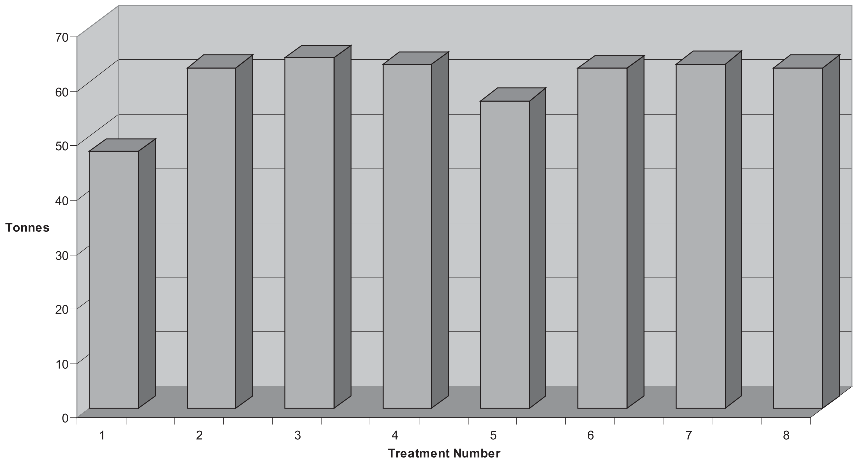
In the Maris Piper trials Programme 4 produced an increase in tuber numbers of 14% but a significant increase in total yield of 52% – this programme consisted of Calcium granules applied pre planting and 3 applications of crop stimulant Nutriset. Programme 6 in the Maris Piper trial produced an 18% increase in tuber numbers with a 48% increase in total yield – this programme consisted of 3 applications of the crop stimulant Fast Mix-K Microbooster.

Variety: Saxon

CSC Potatocare Foliar Nutrition Trials 2007 Saxon Tuber – Numbers



CSC Potatocare Foliar Nutrition Trials 2007 Saxon Marketable Yield – Tonnes/ha



Results

In the Saxon trials Programme 7 produced a 20% increase in tuber numbers and a 33% increase in total yield – this programme consisted of 2 applications of the crop stimulants Nutri-phite + Take Off. Programme 8 produced a 19% increase in tuber numbers and a 32% increase in total yield – this programme consisted of the CSC Potatocare 3 spray programme.

TRIALS 5 & 6

Radish & Mustard Biological Benefits

The aim of these trials was to demonstrate the use of green manure crops as biological control systems of pests and diseases.

Chinese Mustard

A type of chinese mustard was selected with very high glucosinolate levels to be grown in the rotation between potato crops. The incorporation of green material “in the ground causes the release of isothiocyanate gas within the soil, a good” natural soil sterilant for the control of pests and diseases.

Radish

A specific variety of radish was selected which has shown reduction levels of up to 80% in nematode numbers.

No results were available. For more information contact
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DEFY – A new residual herbicide for potatoes

Contact: Mark Ballingall (SAC) & Jason Tatnell (Syngenta Crop Protection)
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Introduction

Defy EC800 is a new residual herbicide for potatoes from Syngenta. It is based on prosulfocarb, a new active ingredient to the UK, and is recommended for pre-/post – emergence use in seed and ware crops. With the potential loss of linuron or, at best, dose restrictions to 1.9 l/ha, the approval for Defy at the beginning of the season is timely. Although Defy, a residual product, can be used as a stand alone herbicide, it is best used in combination with linuron or Sencorex to broaden its spectrum. Sencorex combinations with Defy are important alternatives should linuron be banned altogether.

This trial, sponsored by Syngenta Crop Protection, looks at different rates of Defy in combination with different tank-mix partners both pre-crop and weed emergence and early post emergence. The treatment list is shown below.

	Treatment (l/ha or kg/ha)	Timing of application
1	Untreated	
2	DEFY 5l/ha	Pre crop emergence
3	Linuron N 1.9l/ha	Pre crop emergence
4	Sencorex N	Pre crop emergence
5	DEFY 4l/ha + Linuron 1l/ha	Pre crop emergence
6	DEFY 3l/ha + Linuron 1l/ha	Pre crop emergence
7	DEFY 3l/ha + Linuron 1.9l/ha	Pre crop emergence
8	DEFY 4l/ha + Sencorex 0.5l/ha	Pre crop emergence
9	DEFY 3 l/ha + Sencorex 0.5l/ha	Pre crop emergence
10	Linuron 1.9l/ha + Sencorex 0.5l/ha	Pre crop emergence
11	DEFY 4l/ha + PDQ 2l/ha	20% crop emergence
12	DEFY 3l/ha + PDQ 2l/ha	20% crop emergence
13	Linuron 1.9l/ha + PDQ 2l/ha	20% crop emergence
14	DEFY 3l/ha + Linuron 1 l/ha + PDQ 2l/ha	20% crop emergence
15	DEFY 2l/ha + Linuron 1l/ha + PDQ 2l/ha	20% crop emergence
16	Defy 2 l/ha + Linuron 1l/ha	20% crop emergence
17	Defy 2 l/ha + Linuron 0.9 l/ha + PDQ 2 l/ha	20% crop emergence

Figure 1

Results

The Defy trial at the PIP site was one of three with a second in Aberdeenshire and a third in Yorkshire contracted on behalf of Syngenta. This gave a contrasting data set on different weed spectrum and soil types on which to give the industry advice in different cropping situations.

The pre-emergence treatments were applied in May to weed free moist ridges. This was in contrast to many April planted potatoes within the locality where many herbicides had been applied to dry ridges and as a result had poor weed control from the pre-emergence herbicide. The treatment list for the Potatoes in Practice site is shown in the table above. The trial was planted with Maris Piper.

The site had a broad spectrum of broad leaved weeds excluding cleavers. Unusually all treatments, even the stand alone linuron and Sencorex, gave exceptionally good control of weeds (100%) with the exception of the treatment 2, Defy as a single treatment. By the last assessment, on the 22nd of August, it was showing unacceptable levels of Chickweed, Fathen, Meadow Grass, Fumitory, Mayweed and Knotgrass. All other treatments were at or near 100% weed control helped by a very competitive crop. This was much the same at the Aberdeenshire site where Defy as a stand alone treatment showed weaknesses in Pansy, Fumitory, Black Bindweed and Knotgrass control. Both sites support the advice to use Defy with a partner product. The PIP site did not have cleavers. Our experience at the SACAPP Agronomy site in Yorkshire in 2007 was that if Cleavers are an issue then a mix with Sencorex is essential and the rate of Defy must be a minimum of 4.0lt/ha

Best practice in the use of Variety Disease Resistance

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Success through Knowledge

Introduction

As part of its Success through Knowledge programme of Knowledge Transfer for Scottish Government, SAC has emphasised different aspects of best practice for potato production at PIP. In 2007, this related to Best Practice in the use of Variety Disease Resistance. For each variety, disease resistance ratings are determined through the National List Testing programme and, usually, through the Potato Council funded IVT programme. A knowledge of disease resistance ratings, together with a knowledge of disease levels on seed and contamination in the soil can form the basis of rational use of control measures, especially agrochemical use.

In this demonstration, three popular varieties were being grown and three differing crop protection programmes applied. The published resistance ratings of the varieties and the crop protection programmes adopted are shown in the tables below. The programmes for each variety were designed to determine how much fungicide use is justified based on the knowledge available to a grower.

	Maris Peer	Maris Piper	King Edward
Common scab	5	1	7
Powdery scab	6	3	7
Foliage blight	4	4	3
Tuber blight	4	5	4
PVY	3	2	2
Black dot	-	4	6
Black scurf	-	6	6
Skin spot	-	4	3
Silver scurf	-	4	3
Dry rot (coeruleum)	-	3	-
Dry rot (sambucinum)	-	2	-

Figure 2

	Maris Peer	Maris Piper	King Edward
	Untreated	Untreated	Untreated
2	Storite super seed treatment (120 ml/t) Monceren DS at planting (1.0 kg/t)	Storite Super seed treatment (120 ml/t) Zinc oxide incorporated into soil prior to planting (17.5 kg/ha Zinc oxide product) Monceren DS tuber treatment at planting (1.0 kg/t) Amistar in furrow treatment (3.0 l/ha)	Storite Super seed treatment (120 ml/t) Monceren DS at planting (1.0 kg/t)
3	Celest seed treatment (250 ml/t)	Celest seed treatment (250 ml/t) Amistar in furrow treatment (3.0 l/ha)	Storite Super seed treatment (120 ml/t) Amistar in furrow treatment (3.0 l/ha)

Figure 3 – Programmes demonstrated

Variety Profiling

Contact: Mark Ballingall
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Introduction

When new varieties are introduced to the market the best agronomic practice for them is not known. This trial looks at variable seed rates and the effect of additional nitrogen on three contrasting new varieties to maximise saleable yields.

Orla, bred by Teagasc and courtesy of IPM is classed as an early maincrop. Orla has good blight resistance suitable for organic production and is relatively prolific, tentatively classed as a group 2 for seed rate purposes. Harmony, classed as early maincrop is courtesy of J & E Smillie (Growers) Ltd and is a general purpose "white" . Bred by Jack Dunnet, Harmony has gained success as a baker by the supermarkets. Agronomically Harmony has good resistance to common scab and partial resistantance to both PCN species. For seed rate purposes it would be classed as group 3.

Variety	Tuber Count/ 50kg	Seed rate group	Seed rate T/Ha "Normal"	Population/ha @ "Normal" Spacing	Spacing in cm		
					–15%	N	+15%
Harmony	1111	3	2.3	50, 500	19	22	25
Orla	543	2	2.8	34, 700	27	32	37

Figure 4 – Treatments

Results

In both varieties reducing the seed rate by 15% from the recommended rate significantly increased total tuber numbers (fig 4). This was reflected in a greater total yield when using the narrower spacing for Harmony but not Orla.

Yield and tuber number also differed within individual size fractions. In Orla the majority of tubers (65%) fell into the 45-65mm fraction. In this fraction the reduced seed rate showed a significant increase in numbers compared with the wider spacing. In contrast an increase in tubers was seen in the 65-85mm fraction with the wider spacing compared with the reduced seed rate. Increasing the rate of nitrogen on the crop by an extra 35 kg/ha had no effect on yield or tuber number. These results suggest that the classification and recommended seed rate of Orla is optimal, although slightly wider spacing can be used to increase the baker content.

High yields were experienced with Harmony, with over 100 t/ha being produced in plots with the reduced seed rate. This compares with 76 t/ha where additional nitrogen was applied and normal spacing was used (fig 6). This increase was due to greater yield and tuber numbers in the 45-65mm fraction with the reduced seed rate compared with the other treatments (fig 5 & 6). The reduced seed rate also increased marketable yield (45-85mm) by over 15%. Harmony has proven to be a high yielding variety which responds well to reductions in seed rates around the recommended spacing.

Other major influences on seed rate are market, length of growing season, manipulation of seed, yield potential and to some extent cost of seed. With all these variables it may take several seasons and sites to class varieties.

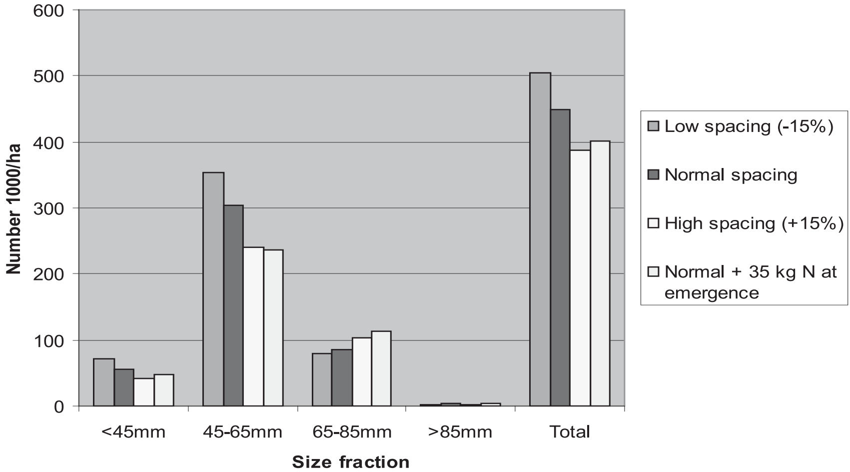

Figure 5 – Orla – Tuber number

Significance + L.S.D – <45mm – 13.3**, 45-65mm – 46.5**, 65-85mm – 29.6, >85mm – 3.6, Total – 51.2* (* P<0.05, ** P<0.01)

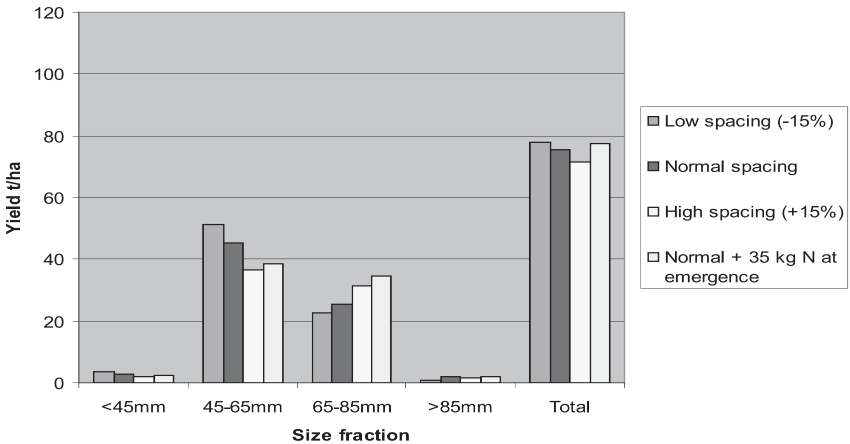

Figure 6 – Orla – Yield

Significance + L.S.D – <45mm – 0.6**, 45-65mm – 5.3**, 65-85mm – 8.2*, >85mm – 2.1, Total – 9.2 (* P<0.05, ** P<0.01)

Interpreting results of the diagnostic test for soil-borne black dot

Contact: Stuart Wale
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Introduction

As part of a recent Potato Council funded project, a robust DNA diagnostic test to measure soil-borne inoculum of black dot has been developed. The associated field trials and crop monitoring exercise have produced robust information with which to interpret the diagnostic test and provide advice on control measures. Although a good relationship between soil contamination and risk of disease has been found, other factors including environmental conditions, crop duration, soil type and variety grown all have an impact.

In a one year extension of the project, 20 small scale field trials (10 in England and 10 in Scotland) reflecting a range of soil types and degrees of soil contamination were planted. At each trial site the same 6 varieties (figure 7) from the same seed sources were planted so that resistance under different situations could be examined.

One of the sites chosen was the field used for PIP2007. At this site the soil type was a sandy loam with an intermediate risk of black dot. The trial was planted on 24 May and harvested on 17 October.

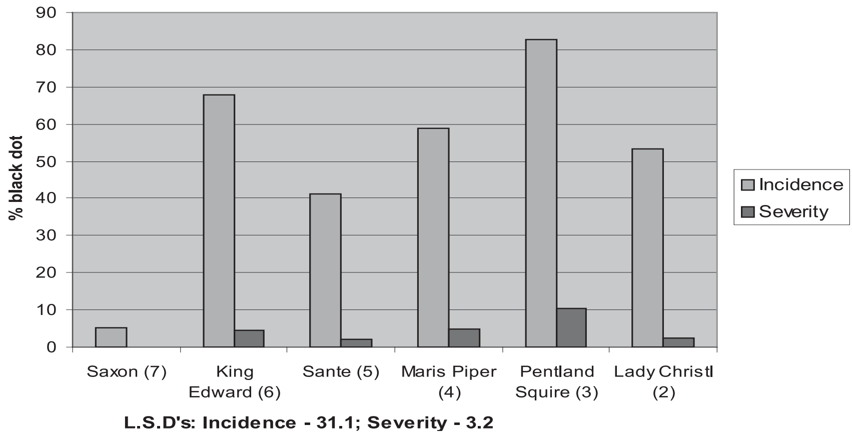

Figure 7 – Incidence and severity of black dot found on daughter tubers at harvest. The resistance rating of individual varieties is shown in brackets.

Results

Although this site was deemed to have an intermediate risk of black dot, the risk of the disease developing was increased due to late harvest (c. 125 days from emergence to harvest). Less disease occurred at earlier harvested trial sites with similar level of soil contamination.

The risk of black dot is also dependent on the variety grown. The varieties Pentland Squire, Maris Piper, Sante and Saxon developed black dot in accordance with their disease rating. However, the highly susceptible variety Lady Christl did not develop black dot to the expected extent but King Edward developed more than expected.

This trial was funded by the Potato Council as part of a research project involving SCRI, Sutton Bridge Experimental Unit, ADAS and SAC.

Integrated control of blight: making the most of cultivar resistance

Contact: Ruaridh Bain
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Introduction

Previous work has shown that for more resistant cultivars there may be scope to use a less effective blight fungicide product, lengthen spray intervals or reduce fungicide dose. Robust data from trials are required to provide the industry with the confidence to optimise fungicide inputs on more resistant varieties. Potato Council-funded research at SAC and ADAS in 2007 evaluated the control of blight using combinations of three cultivars, three fungicides, two spray intervals and three fungicide doses. The cultivars tested were Lady Balfour (foliar resistance rating of 7), Maris Piper (rating of 4) and Shepody (rating of 2). The fungicides were Dithane NT, Infinito and Shirlan. At Potatoes in Practice results from preliminary work in 2006 were presented together with full details of the 2007 trials. There was an opportunity to discuss the advantages and disadvantages of matching fungicide inputs to cultivar resistance and what opportunities there are to reduce the cost of blight control without jeopardising the level of crop protection.

Results

Conclusions from the 2007 trials are preliminary because they are based on one year's results. Also, the extreme foliar blight pressure must be borne in mind when interpreting the results. For example there were 17 Smith periods at the SAC site. At both sites the 13_A2 genotype of P. infestans dominated, as it did in the GB population.

Under the 2007 conditions, spraying more often using reduced fungicide doses in general gave better control than spraying every 10 days with higher doses. At Auchincruive, lower doses of the same fungicide applied every 7 days were generally more effective than higher doses at 10-day intervals, and frequently significantly so. In the ADAS trial neither approach was consistently more effective. However, the short interval, low dose approach was significantly more effective three times more so than significantly less effective. At this site, the efficacy of many of the 7-day programmes were very probably adversely affected by the 45 mm of rain that fell 1 day after the first 7-day application.

The main conclusion from 2007 is that even under very high risk conditions, the combination of a more resistant cultivar (for example with a foliar resistance rating of 4) and less fungicide input frequently provided better control of foliar blight than higher fungicide inputs on a more susceptible variety (with a foliar rating of 2). At the SAC site, compared with the benchmark combination of Shepody and the highest rate of fungicide at 7-day intervals, the combination of more resistant cultivar and less of the same fungicide generally resulted in better foliar blight control, frequently significantly so. The benefits over the Infinito benchmark were less clear cut for a more resistant cultivar with lower doses of the less effective fungicides. At the ADAS site, compared with the same benchmark the combination of more resistant cultivar and less of the same fungicide more often resulted in better foliar blight control but the effect of product was marked. The combination of more resistant cultivar with lower doses of the less effective fungicides was more often worse than the Infinito benchmark.

Differences in blight control by the different cultivars depended on fungicide input (interval and dose) and were generally substantially greater where inputs were higher. The extreme nature of the disease challenge in 2007 is illustrated by differences between inputs (dose and interval) for individual fungicides in the trial in Scotland being substantially greater on the more resistant variety, Lady Balfour, than on the more susceptible variety Shepody.

A presentation, prepared for the 2007 Blight Forum, summarising the main results from these two trials can be viewed at www.potato.org.uk/blight.

Control of common scab with and without the use of water

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Introduction

Common scab is a ubiquitous pathogen, caused by soil-borne bacteria belonging to Streptomyces spp. In the past, common scab was believed to be caused mainly by S. scabiei. However, investigations in a LINK research project have indicated that a number of other Streptomyces species may be involved in the UK, including ones that prefer more acidic soil conditions. Using DNA diagnostics the soil at PIP and the seed used in the trial were tested for Streptomyces spp by CSL. The changes in populations of pathogenic Streptomyces spp. and antagonists were determined during tuber development.

Following a review carried out by SAC and CSL for the Potato Council, there was a need to evaluate non-water control measures of this ubiquitous disease. Results from PIP in 2005 showed that rapeseed meal reduced common scab at harvest but this was not the case in 2006. There are also reports that sulphur could reduce common scab. In 2007, these treatments were examined more closely. All the treatments listed below were applied prior to or at planting the common scab susceptible variety, Maris Piper, with and without water from trickle tape irrigation.

Treat.	Active ingredient	Product	Product dose
1	Untreated control	-	-
2	Sulphur	Sulphur pastiles Tiger 90	250 kg/ha applied in-furrow at planting
3	Sulphur	Sulphur pastiles Tiger 90	150 kg/ha applied in-furrow at planting
4	Rapeseed meal		1 t/ha applied to beds and incorporated

Figure 8

The wet soil conditions during the summer meant that the incidence of common scab (number of tubers with disease) was low (30%), compared with the dry summers of 2005 and 2006 (~80%). Due to the lack of water applied to the plots, no differences in common scab were seen between irrigation and unirrigated plots. The low level of common scab also meant that differences between non-water control measures were minimal (figure 1). Although numerical reductions in common scab were observed with rapeseed meal compared with the untreated control these differences are small and not significant.

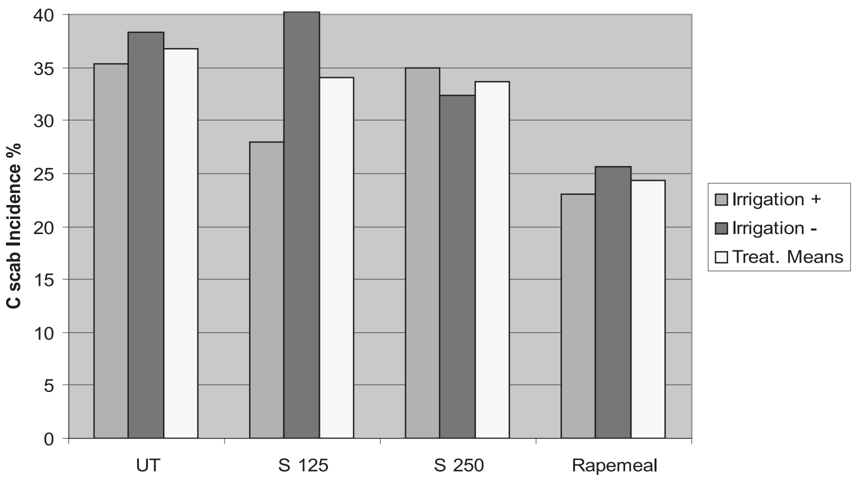

Figure 9 – Incidence of common scab found on daughter tubers at harvest on 11th October 2007

Results

Regular sampling during the course of the trial meant that changes in populations of pathogenic Streptomyces spp. and antagonists were determined during tuber development. This work has highlighted that developing tubers are most susceptible to infection at the early stages of tuber development.

This trial is part of a research project involving CSL, CUF and SAC. It is sponsored by Defra through the Sustainable Arable LINK programme with funding from Potato Council, Cobrey Farms, Branston Ltd, QV Foods Ltd and Wroot Water Systems.