



Summary of Plant & Food Research potato  
breeding activities, 2008-09

Genet R, Braam F, Anderson J, Jeram M

November 2009

A report prepared for

HortNZ

Genet R, Braam F, Anderson J, Jeram M  
Plant & Food Research, Lincoln

SPTS No.	3084
PFR Client Report No.	--
PFR Contract No.	--

## **DISCLAIMER**

Unless agreed otherwise, The New Zealand Institute for Plant & Food Research Limited does not give any prediction, warranty or assurance in relation to the accuracy of or fitness for any particular use or application of, any information or scientific or other result contained in this report. Neither Plant & Food Research nor any of its employees shall be liable for any cost (including legal costs), claim, liability, loss, damage, injury or the like, which may be suffered or incurred as a direct or indirect result of the reliance by any person on any information contained in this report.

This report has been prepared by The New Zealand Institute for Plant & Food Research Limited (Plant & Food Research), which has its Head Office at 120 Mt Albert Rd, Mt Albert, Auckland.

This report has been approved by:

Russell Genet

Scientist, Breeding and Genomics

Date: 30 November 2009

Ron Beatson

Science Group Leader, Breeding and Genomics

Date: 30 November 2009

# Contents

<b>Executive summary</b>	<b>i</b>
<b>1 Regional Trials</b>	<b>1</b>
<b>2 New releases</b>	<b>1</b>
<b>3 Commercial evaluation</b>	<b>1</b>
<b>4 Advanced selections</b>	<b>2</b>
<b>5 Other activities</b>	<b>2</b>
5.1 Morocco:	2
5.2 Australia:	2
5.3 Commercial partner breeding in New Zealand:	3
5.4 Argentina	3
5.5 Psyllid:	3
5.6 World Potato Congress	3
<b>6 New Staff</b>	<b>3</b>
<b>7 References</b>	<b>3</b>
<b>8 Trial summaries</b>	<b>4</b>
<b>9 Conclusions</b>	<b>5</b>



# Executive summary

Summary of Plant & Food Research potato breeding activities, 2008-09.

Genet R, Braam F, Anderson J, Jeram M, November 2009, SPTS No. 3084

This report provides the documentation to support the potato breeding programme underway at Crop & Food Research/Plant & Food Research (PFR) with financial assistance from HortNZ.

A summary of results from all trials conducted during the 2008 -09season is presented with contacts for further information.

- The breeding programme is making good progress with four lines released to industry last year and another, 'Crop39', being distributed to interested commercial parties for their evaluation and four lines being released to a commercial partner. Other promising less advanced lines are being further evaluated both at Plant and Food sites and on farmers properties.
- Breeding and evaluation of material is continuing off-shore in Australia, Argentina, USA and Morocco and UK
- The Potato/tomato Psyllid is a serious problem to the breeding programme and to the rest of the New Zealand potato industry. Chemical control has only been partially effective and in the coming year we plan to evaluate resistance to the psyllid and associated zebra chip

(The potato breeding programme is running smoothly with a pipeline of promising material and a number of recent releases undergoing commercial development. The psyllid and associated organisms is causing difficulties by adding expense and logistical problems A sudden change to yellow fleshed cultivars in Australia has meant changing our crossing emphasis and selection criteria. However we have the experience, germplasm and resolve to overcome these changes. For further information please contact:

Russell Genet  
The New Zealand Institute for Plant & Food Research Ltd  
Plant & Food Research Lincoln  
Canterbury Agricultural and Science Centre  
Private Bag 4704  
Christchurch 8140  
NEW ZEALAND  
Tel: +64-3-325 6400  
Fax: +64-3-325 2074  
Email: [russell.genet@plantandfood.co.nz](mailto:russell.genet@plantandfood.co.nz)



# 1 Regional Trials

Potato trials were conducted at 14 sites during the 2008–09 season (Table 1).

Performance and general tuber quality was satisfactory in all South Island trials. In the North Island trials, tuber quality was generally good in the Pukekohe first early and early trials, and at Ohakune. After the disastrous performance of last year's Pukekohe early main and main crop trials due to the Potato/Tomato Psyllid (PTP) and the associated *Liberibacter* bacterium, a much more intensive insecticide spray programme was used at Pukekohe. The yield levels in these trials were generally satisfactory this season, but there were significant zebra chip (ZC) quality problems still associated with these trials. Lower levels of ZC were also seen in all Waikato trials. The Manawatu trials, which had only moderate levels of insecticide, were the worst they had been for many years and had a low yield and a high level of quality problems due to PTP and ZC.

As a result of the PTP control problems, a more intensive insecticide programme will be used in all North Island trials this coming season. and a spray programme will be introduced at Lincoln. Coupled with a better insecticide programme, a significant effort will be put into specific PTP and ZC screening trials at Pukekohe. An investment has been made into fry test laboratory facilities at Pukekohe to assist with this work.

Full details of individual trials are available from John Anderson or Russell Genet.

Some of these trials were conducted on grower's properties and we acknowledge the assistance of the following

Hira Bhana	Pukekohe first early Trial
Michael Bayley	Birdlings Flat Early Trial
Raymond Bowen	South Canterbury Crisp and French fry Trials
COEL	Waikato Late Trial
Balle Bros	Ohakune Trial
COEL	Waikato ground Store
A S Wilcox	Waikato Early Trial

## 2 New releases

Four new potato lines were advertised for tender the previous year and allocated to Merchant or grower groups. Two are mainstream cultivars while two may help expand the potato range; one purple fleshed and another suitable for salad use. This season has seen limited development as stocks are increased Details on these lines were provided in last years (2008) report.

## 3 Commercial evaluation

4353-3 (Crop 39): This line has shown fresh market promise again in this season's trials. It produced very good yields of bright, attractive tubers and should wash well. Tubers from ground stored trials in the Waikato still looked good at harvest in August. Approximately 400 kg were distributed for trial by interested parties over the 2009–2010 season.

## 4 Advanced selections

The programme has a pipeline of new material which is showing promise:

4271-1, This selection matures mid-season and is a main crop French fry line: The skin is red and flesh is yellow. After-cooking greying is rare and sugar levels are low in all tubers but those from immature harvests. This selection stores well and has some cold-induced sweetening resistance.

4355-5: This line matures mid-season and is suitable for French fry and fresh, brushed market sectors. This selection has an oval-long tuber shape with yellow flesh.

4355-6: This line is main crop maturing and suitable for fresh, brushed and French fry production. Tubers are oval shaped, the skin is pink and the flesh pale yellow.

4355-7: This line is main crop maturity suitable for the fresh market and, since it has long dormancy and low sugars, could be suitable for French fry production. The skin is purple and the flesh pale yellow.

## 5 Other activities

### 5.1 Morocco:

The second set of lines were sent to Morocco for planting in November. From the first set a number of lines were identified, and plans for commercialising one are being made. These trials are an opportunity for us to evaluate tuber material and screen potential lines for importation to Europe, a much more expensive process. After two years of promising trial results in Morocco and Spain, an application has been made for PVR for Crop17 in Europe in association with our evaluation partners, Potato Partners of Northern Ireland, and their associated Dutch partners, van Rijn and KWS. If all goes to plan, this will lead to the first commercialisation of Plant & Food Research (PFR) material in the Northern Hemisphere.

### 5.2 Australia:

PFR potato lines in Australia continue to do well with Crop 17 (marketed as 'Golden Cream') and Crop 32 ('Purple Passion') now named and being commercialised alongside the originals " 'Red Rascal' and 'Golden Delight' (which is either 'Driver' or 'Moonlight'). The breeding programme to find material adapted to hot/dry conditions commenced with over 4000 seedlings, and over two selection cycles is now down to 80 lines, which will be evaluated in yield trials and for salt tolerance this season.

Last season also saw the first significant French fry returns in Australia with 'Bondi' being processed for French fries and 'Moonlight' being processed mainly for wedges by Simplot Australia at Ulverstone., Tasmania Significant increases in plantings of both lines are planned for the coming season.

Our total royalty return on potatoes in Australia is now substantially ahead of returns from New Zealand.



### 5.3 Commercial partner breeding in New Zealand:

In recent years advanced selection material has been in trials as part of an exclusive agreement with Bluebird Foods (now Frito-Lay). Three lines (1273/24, 1273/71 and 1277/24) were selected last year for heat treatment and are now in minituber production and advanced trials in New Zealand. They have also been sent to Australia where they are in minituber production for advanced evaluation. A further line (1273/4) has now been selected to enter heat treatment based on this year's performance.

### 5.4 Argentina

After a visit by Ivan Lawrie and Peter Neilson an opportunity to evaluate French fry material in Argentina was identified. Two lines, 'Bondi' and 'Crop 31', have been sent to Argentina under a trialling agreement with McCains.

### 5.5 Psyllid:

The PTP and its associated bacterium/phytoplasma, has resulted in extra activity within New Zealand. John Anderson gave a presentation focusing on the effect of psyllids on the breeding programme at a workshop run at the World Potato Congress. He was a co-author of the paper in *Plant Disease* which identified *Candidatus Liberibacter* in potatoes and associated it with PTP. Russell Genet was involved with transmission studies which demonstrated that *Liberibacter* could be transmitted from the mother tuber to both foliage and progeny tubers resulting in symptomatic and asymptomatic plants. This work was published in *Phytopathology*.

### 5.6 World Potato Congress

The World Potato Congress held in Christchurch, March 22-25 2009 and display at the South Island Field days resulted in potentially valuable international contacts and exposure for the breeding programme and for PFR soon after its establishment.

## 6 New Staff

In March Mark Paget joined PFR as an understudy potato breeder. He will undertake PhD studies over the next three years and then commence full time in the potato breeding project.

## 7 References

Liefting L W, Perez-Egusquiza Z C, Clover G R C, Anderson J A D 2008. A new 'Candidatus liberibacter' species in *Solanum tuberosum* in New Zealand. *Plant Disease* 92 (10); 1474

Pitman A R, Drayton G M, Kraberger S J, Genet R A, Scott I A W 2009 Tuber transmission of 'candidatus *Liberibacter solanacearum*' and its association with zebra chip in potato. *Phytopathology*

## 8 Trial summaries

Site	No. lines	Control cultivars	Planting date	Harvest date	Yield of control T/ha	Promising lines
Pukekoe first early	20	Ilam Hardy	13 June	10 Nov	54	1274/8 1287/6 4266-2 4271-1
Birdlings flat early	24	Rocket	7 August	11 Dec	46	Crop39 4498-3
Lincoln early	350	Ilam Hardy	19 Sept	7 Jan	19	Crop39 4402-1 4437-1 4498-3
Pukekohe early	440	Ilam Hardy Driver	1 Sept	19 Dec	53 36	Crop 39 1287/6
Pukekohe early-main	100	Moonlight Rua	1 Oct	3 Mar	58 46	Crop 39 4355-6 1290/11 1287/6
Waikato early	20	Moonlight Rua	15 Oct	18 Mar	50 42	4355-5 4477-2 Crop 39
Lincoln main	390	Red Rascal	15 Oct	6 Apr	71	4402-13 Crop 39 1273/59 1274/8
Palmerston North main	210	Moonlight Rua	6 Nov	5 May	32 19	Crop 39 4457-7 Crop 34
Pukekohe main	500	Rua Moonlight	23 Oct	4 Jun	46 51	Crop 39 4402-13
South Canterbury crisp	20	Crop20 Golden Miracle	19 Nov	16 May	80 98	1273/59 4546-3 1273/4
South Canterbury French fry	20	Ranger Bondi	19 Nov	17 May	57 63	1277/3 4355-6 4355-7 1290/11
Waikato late	20	Fianna Moonlight	13 Nov	10 Aug	49 51	4508-2 4355-6 4457-7 4355-6 Crop 39
Ohakune	16	Nadine	20 Nov	8 June	40	Crop 39 4355-6 4355-7
Waikato ground store	20	Moonlight	13 Nov	7 Sept	59	1275/23

## 9 Conclusions

The potato breeding programme's main aim is to provide improved cultivars for the New Zealand potato industry, We have been reasonably successful in this. Moonlight is a good example. New material is showing commercial promise. Bondi is an example.

The programme relies heavily on royalties for funding and a large proportion of this now comes from off-shore.

Recent pest and disease incursions have added extra work and expense which may slow progress while systems are developed to deal with them however the long term prospects remain good.