

PT204

**Introduction of French Fry Potato
Cultivars to Australia**

John Fennell

**Department of Primary Industries and
Fisheries, Tasmania**



Know-how for Horticulture™

PT204

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**INTRODUCTION OF FRENCH FRY POTATO CULTIVARS
TO AUSTRALIA (1989-1993)**

**PT204
(was P/007/RI)**

FINAL REPORT

*Funded by
Horticultural Research & Development Corporation (HRDC)*

**John Fennell
Principal Horticulturist**

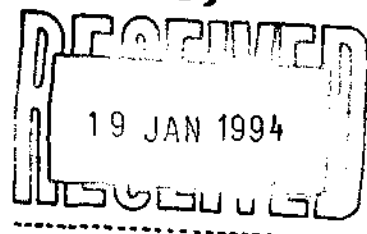
Department of Primary Industry and Fisheries, Tasmania



**REPORT TO THE HORTICULTURAL RESEARCH
AND DEVELOPMENT CORPORATION**

**INTRODUCTION OF FRENCH FRY POTATO
CULTIVARS TO AUSTRALIA (1989-1993)**

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SUMMARY

This project started in 1989 initially as a three year project funded by voluntary contributions from Edgell-Birds Eye and McCain Australia with matching HRDC support. Funding was mainly for quarantine and micropropagation costs.

However, only two years of voluntary contributions were requested as time was needed to efficiently evaluate the first two seasons introductions prior to continued importation. At this time, the potato industry established a levy system for R D & E funding. Voluntary contributions were suspended.

Thirty cultivars have been imported and evaluated and three are in the introduction stage. Several of the more promising introductions are in grower trials and all accessions have been provided to the National Breeding Program.

INTRODUCTION

The French fry processing industry of Australia is based around factories at Ulverstone, Scottsdale and Smithton in Tasmania, Ballarat in Victoria, Penola in South Australia and Manjimup in Western Australia. The major companies are Edgell-Birds Eye (Tasmania and WA) and McCain Australia (Tasmania, Victoria and South Australia).

In all regions of production Russet Burbank is the main cultivar used with lesser quantities of Shepody (increasing) and Kennebec (decreasing) for early processing and minor use of Nooksack at one factory.

Russet Burbank has excellent processing quality (specific gravity, sugar content, tuber shape, etc.) but is not an easy cultivar to grow profitably. Irregular tuber shape can occur with erratic irrigation, the tubers can be affected by hollow-heart, brown centre and stem-end necrosis under certain environmental stresses and the cultivar is susceptible to a wide range of diseases. Although reported to be resistant to common scab (*Streptomyces scabies*) in the USA it is highly susceptible in Tasmania.

Up to the commencement of this project, very little breeding of French fry types had been done in Australia. It was therefore decided that liaisons should be formed with breeders overseas to source advanced lines for evaluation in Australia.

New accessions would be provided to Dr Roger Kirkham for inclusion in his breeding program at Toolangi which was expanding to include French fry types.

Funding for the project was initially provided by voluntary contributions from Edgell-Birds Eye and McCain Australia (\$3,000 each) with matching HRDC support. The voluntary contributions were received in 1989/90 and 1990/91 to cover the costs of quarantine clearance and subsequent micropropagation of accessions.

In 1991/92 no funding was requested as time was needed to complete the evaluation of the first two years accessions prior to continuation.

In 1992/93 funds were received from the newly introduced levy sources but were delayed in receipt. Consequently a carryover was requested and has been used to continue funding into 1993/94.

LIAISONS DEVELOPED

Contact was made with several potato breeders around the world to establish where useful French fry types could be sourced.

In addition, reports in overseas publications were reviewed to select breeding lines of good performance (in their country of origin) to introduce for trial in Australia.

Major Contacts:

Dr J Pavek	Idaho, USA
Prof. F Lauer	Minnesota, USA
Mr M McCullough	Washington, USA
Dr M Martin	Washington USA
Prof. A Reeves	Maine, USA
Dr R Webb	Maryland, USA
Prof R Johansen	N Dakota, USA
Dr D Holm	Colorado, USA
Prof. S Peloquin	Wisconsin, USA
Mr R Mould	S Africa
Dr N Wright	British Columbia, Canada
Dr D Lynch	Alberta, Canada
Dr R Tarn	New Brunswick, Canada
Dr R Genet	New Zealand
Wolf and Wolf bv	Netherlands (through Lefroy Valley)
Hettema bv. and Agrico bv.	Netherlands (through Eurogrow NZ)
Dr G Mackay	Scotland

Introductions to date have been made from all of the USA states listed above but mainly from Idaho which has a major French fry breeding program. Limited introductions have been made from Canada, New Zealand and the Netherlands.

QUARANTINE REQUIREMENTS

Potatoes can be introduced either as tubers or pathogen tested tissue cultures. However, whatever their declared status, they require full quarantine testing prior to release.

Applications for introduction are made on a QP36 form and consignments are despatched from origin directly into the quarantine station.

The accessions are visually inspected for insect, fungal or bacterial contamination. Viruses and bacteria are tested using serological, electron microscope and herbaceous indicator plant tests and spindle tuber viroid tests are done by DNA probe.

Prior to 1989 most potato introductions were done through Burnley in Victoria which had limited capacity for expansion. An early imperative of this project was to expand capacity by establishing Kingston in Tasmania as a quarantine station for potatoes. An efficient screening procedure was developed by Dr David Graddon (Quarantine Plant Pathologist) with the serological and DNA probe tests sub-contracted to DPIF New Town laboratories (TASAG services).

Co-ordination of introductions and favourable charges from TASAG reduced the costs of quarantine clearance. Charges ranged from \$250 to \$453 per accession, depending on number in each consignment.

ACCESSIONS

Accessions made since 1989 are listed below under date of their subsequent field evaluation.

1990/91

B0220-14	Maine, USA
B0045-6	Maine, USA
Krantz	Minnesota, USA
Tolaas	Minnesota, USA
Russet Burbank, (Idaho E)	Canada
Russet Burbank, (British Columbia R)	Canada

1991/92

Russet Nugget	Colorado, USA
HiLite Russet	Washington, USA
Frontier Russet	Idaho, USA
Ranger Russet	Idaho, USA
A8602-1	Idaho, USA
A8602-2	Idaho, USA

A8602-3	Idaho, USA
A8670-1	Idaho, USA
A8670-4	Idaho, USA
A8670-6	Idaho, USA
A8670-7	Idaho, USA
A8519-6	Idaho, USA
A8519-7	Idaho, USA
Russet Burbank, [Manitoba]	Canada

1992/93

A76147-2	Idaho, USA
A8601-4	Idaho, USA
A8519-5	Idaho, USA
Gladiator	New Zealand

1993/94

A81473-2	Idaho, USA
AO82611-7	Idaho, USA
A7961-1	Idaho, USA
CO083008-1	Colorado, USA
Goldrush	N Dakota, USA
Crop 9	New Zealand

Requested

A82119-3	Idaho, USA
A84118-3	Idaho, USA
A84180-8	Idaho, USA

After release from quarantine, each accession has been maintained in tissue culture at Devonport, Tasmania with samples also sent to Burnley, Victoria for use in the National Breeding Program.

Each accession has been multiplied by tissue culture to provide minitubers which have been planted at Tewkesbury Potato Station to produce seed tubers.

EVALUATION TRIALS

Seed tubers have been used in evaluation trials at Forthside Vegetable Research Station in 1990/91, 1991/92 and 1992/93 and at Forthside and Cressy in 1993/94.

Forthside Vegetable Research Station has krasnozem soil typical of most of Tasmania's potato production areas. Cressy is a relatively new area for potato production with sandy soils.

The results of trials for the first three seasons have been published in "Potato cultivar trials in Australia" as per the following Tables 1-3.

The 1993/94 trials will be harvested and recorded in April 1994 and will be similarly reported.

Recording has been done in close consultation with the processors, with all processing tests done by the factory quality control laboratories. As a result a number of the new accessions have been evaluated in grower trials (Table 4) to provide larger samples for commercial processing test runs.

Ranger Russet and Gladiator are in the most advanced stage of testing and are likely to become commercial in the near future. PVR is being sought for Gladiator on behalf of the breeders.

TABLE 1: FORTHSIDE 1990/91
 Planted: 18.10.90 Harvested: 15.04.91

CULTIVAR	Yield (t/ha)					Rank by No. 1 grade	Tuber No. per plant	Quality	
	Chats			No. 1 Grd	Over size			% D.M.	Fry Col *
	0-80g	80-250g	250-450g	80-450g	>450g				
Russet Burbank	3.1	35.4	13.4	48.8	2.1	11	7.9	22.7	5.5
Kennebec	2.1	28.3	30.8	59.1	2.4	2	5.1	20.0	2.6
86-11-1	1.9	26.3	34.1	60.4	10.5	1	8.0	20.0	6.0
White Burbank (1)	5.9	36.6	9.2	45.8	0.7	12	13.0	22.1	3.3
F73008	1.6	13.5	29.8	43.3	16.2	14	5.9	21.3	3.8
86-12-17	2.5	28.1	22.8	50.9	3.2	9	7.6	18.6	3.3
86-70-3	3.1	28.7	21.3	50.0	3.5	10	7.0	18.8	4.3
B0045-6	5.6	34.4	4.9	39.3	0.0	21	9.0	21.1	3.3
Russet Norkotah	2.8	30.6	9.5	40.1	0.0	19	7.2	20.8	4.3
B0220-14	1.1	12.8	7.8	20.7	0.0	35	3.8	20.2	1.7
Nemarus	1.8	22.1	10.6	32.7	0.4	27	5.4	19.6	2.7
R.B. Brit Col. R	4.3	38.6	17.3	55.9	0.6	4	8.8	24.0	5.0
R.B. Idaho E	4.4	43.4	14.4	57.8	0.7	3	9.8	24.0	4.3
Krantz	1.5	19.1	12.2	31.4	2.5	29	4.4	21.3	3.3
86-18-3	3.9	38.3	15.8	54.0	0.3	6	9.2	24.2	3.3
86-33-6	1.9	21.7	20.3	41.9	4.9	16	6.1	23.2	1.7
86-43-3	1.2	9.7	22.0	31.7	23.9	28	5.1	24.1	6.7
88-36	1.6	18.9	22.1	41.0	14.6	17	6.0	22.0	5.0
White Burbank (2)	5.0	33.9	8.6	42.5	0.3	15	13.6	23.6	5.0
87-30-7	2.6	33.9	18.0	52.0	1.5	8	8.5	24.9	3.3
87-31-2	8.1	46.2	9.6	55.8	0.3	5	12.3	23.9	6.0
87-34-2	1.5	16.0	15.0	31.0	4.7	30	5.2	18.9	4.3
87-34-6	1.5	21.5	17.4	38.9	7.2	22	6.4	18.6	6.0
87-38-27	1.2	16.6	18.5	35.1	1.8	25	5.1	22.4	2.2
87-51-11	1.8	15.2	22.1	37.3	21.0	24	6.1	21.8	2.2
87-52-2	0.7	9.7	11.9	21.6	3.2	34	3.6	19.4	2.8
87-52-3	1.3	19.5	25.4	44.9	7.2	13	5.9	22.0	3.3
87-56-3	1.5	11.5	26.3	37.8	30.6	23	6.5	19.2	7.7
87-59-48	2.4	31.1	26.1	52.2	2.9	7	8.4	22.4	2.3
87-62-14	3.3	25.6	15.3	40.9	0.7	18	8.1	23.9	3.3
87-63-6	0.5	7.4	8.0	15.4	2.9	36	4.4	20.2	3.3
87-69-14	1.8	13.9	20.6	34.6	23.9	26	6.9	19.0	6.2
87-73-11	2.8	16.7	5.9	22.6	0.4	33	5.5	24.4	3.3
87-73-12	1.1	16.9	23.1	40.0	11.9	20	6.2	23.9	3.8
87-73-19	1.8	18.0	9.2	27.3	2.9	32	5.3	21.7	3.3
87-73-30	1.5	24.1	5.8	29.9	0.3	31	5.3	23.3	6.7

* Samples assessed visually, scale 1-10, 6 = borderline, >6 = too dark

(1) = 400mm set spacing

(2) = 450mm set spacing

NB: cultivars in bold type are new introductions

TABLE 2: FORTHSIDE 1991/92

Planted: 18.10.91

CULTIVAR	Yield (t/ha)					Rank by No. 1 grade	Tuber No. per plant	Quality	
	Chats			No. 1 Grd	Over size			% D.M.	Fry Col *
	0-80g	80-250g	250-450g	80-450g	>450g				
87-52-2	1.6	24.4	28.7	4.2	53.1	17	6.4	20.6	a
87-34-6	4.1	44.2	29.0	2.6	73.2	6	10.3	18.4	a
86-18-3	3.5	44.2	26.9	7.3	71.1	7	10.4	23.5	a
88-36	1.3	15.8	37.7	16.3	53.6	19	6.3	19.7	a
87-52-3	1.4	24.4	32.2	19.1	56.6	16	7.5	20.5	a
87-58-48	4.1	28.8	41.2	5.6	79.9	2	10.1	19.0	u
87-73-11	6.6	38.0	10.1	0.0	48.1	24	9.5	24.5	a
Diamant	5.0	43.1	46.6	10.1	89.7	1	11.2	23.5	a
Premier	2.9	39.4	23.4	2.0	62.8	13	8.5	24.1	a
Russet Nugget	5.8	58.7	15.1	0.3	73.8	4	12.3	19.6	a
Frontier Russet	4.7	23.8	24.8	6.5	48.6	23	6.9	22.6	a
Ranger Russet	5.7	45.3	28.2	5.6	73.5	5	10.8	24.3	a
A8602-1	1.8	19.5	18.6	1.9	38.1	26	4.7	18.4	u
A8602-3	1.1	18.8	19.8	10.2	38.7	25	4.8	20.9	a
RB Manitoba	9.5	45.6	20.6	1.6	66.3	10	12.8	25.0	a
A8670-4	3.1	37.6	24.2	3.9	61.8	14	8.4	22.1	a
A8670-1	6.5	35.1	24.0	0.3	59.1	15	10	23.2	a
A8602-2	4.0	39.4	25.6	9.9	65.0	11	9.1	22.4	u
Hi-Lite-1	5.5	41.2	13.2	1.4	54.4	18	9.9	22.6	a
Hi-Lite-2	6.4	33.6	15.7	0.0	49.4	22	8.5	22.1	a
A8519-5	2.3	37.3	31.9	9.5	69.2	9	8.5	23.6	a
A8670-7	1.9	30.9	32.2	11.8	63.2	12	8.1	19.7	a
A8519-6	4.1	37.3	15.7	2.2	53.0	20	8.4	22.1	u
R Burbank	7.0	49.7	20.5	3.8	70.2	87	12.1	24.0	a
Kennebec	4.8	47.7	27.0	8.0	74.6	3	6.8	21.7	a
A8670-6	5.0	34.2	17.2	0.8	51.4	21	7.6	22.7	a
LSD (P=.05)	3.9	11.0	10.8	9.0	11.2		1.9		

* Colour test: a = acceptable
u = unacceptable

NB: Cultivars in bold type are new introductions

TABLE 3: FORTHSIDE 1992/93

Planted: 7.10.92
Harvested: 29.3.93

CULTIVAR	Yield (t/ha)					Rank by No. 1 grade	Tuber No. per plant	Quality	
	Chats			No. 1 Grd	Over size			% D.M.	Fry Col *
	0- 80g	80- 250g	250- 450g	80- 450g	>450g				
A76147-2	0.7	14.1	40.6	6.7	54.7	7	5.5	20.6	A?
A8601-4	2.5	40.3	18.2	1.3	58.5	4	8.4	21.9	A?
Gladiator	2.6	38.9	24	2.4	62.9	2	8.6	24.3	A
RB Manitoba	4.4	41.3	3.8	0.0	45.0	13	9.3	24.6	A
A8602-2	2.8	40.5	6.8	0.0	47.3	11	7.8	23.1	A?
A8670-6	3.1	30.6	2.5	0.0	33.1	18	6.2	20.6	A
A8519-5	1.3	31.5	21.5	3.2	53.1	8	7.5	23.9	A
Hi-Lite-1	5.7	35.1	3.4	0.5	38.5	15	8.9	21.9	A?
Hi-Lite-2	3.1	30.3	5.4	0.2	35.6	17	6.7	21.5	A?
A8602-3	1.9	22.9	7.4	0.4	30.2	19	5.0	21.9	A?
A8670-7	1.9	32.6	20.2	1.2	52.9	10	7.4	21.7	A
Diamant	4.6	51.4	18.1	0.7	69.4	1	10.5	22.7	U
A8670-1	5.0	38.7	3.6	0.0	42.3	14	8.7	21.5	A
Ranger Russet	1.3	31.1	24.0	0.4	55.0	6	6.7	24.1	A
Frontier Russet	4.0	31.2	7.3	0.0	38.4	15	6.8	23.1	A
Russet Nugget	2.5	48.9	13.1	0.5	62.1	3	9.5	25.9	A
Kennebec #	2.1	38.2	19.6	1.3	57.7	5	5.4	23.1	A
Russet Burbank	2.0	45.6	7.4	0.2	53.0	9	8.6	24.6	A
Shepody #	1.3	31.3	16.0	1.1	47.3	11	4.4	21.3	A
P =	***	***	***	-	***				
LSD = 5%	1.1	5.8	5.9	-	8.0				

* A = Acceptable U = Unacceptable A? = Confirmation Required

200mm set spacing. All others at 300mm set spacing

NB: Cultivars in bold type are new introductions

TABLE 4: CULTIVARS IN TRIAL 1993/94**FORTHSIDE AND CRESSY**

A76147-2	Russet Nugget
A8601-4	Kennebec
Gladiator	Russet Burbank
A8602-2	Shepody
A8519-5	Morene
A8670-7	Spunta
Ranger Russet	

GROWER TRIALS (Scotchtown, Stowport or Jetsonville)

A8519-5
A8670-7
A76147-2
A8601-4
HiLite
Gladiator
Ranger Russet
Russet Nugget

NB: Cultivars in bold type are new introductions.

RECOMMENDATIONS

1. The project has been successful in obtaining advanced material from many of the major French fry breeding programs. New lines should continue to be sourced from these programs as they are released over the coming years.
2. New liaisons should be developed with other breeding programs in particular those in Canada and the UK.
3. There should be greater involvement of researchers in other states to guide selection of potential imports and in particular to view the accessions at harvest. In future, funding proposals will include travel for collaborators in SA, WA and Victoria.
4. Consideration should be given to accreditation of some sources of germplasm that have good track records with regard to material certified as pathogen free. Such accreditation would greatly reduce the cost and speed the introduction of new lines.
5. Funding of \$15,000 allocated through NaPIES for introduction of French fry cultivars was provided to Toolangi. This has not been spent on introductions and could be carried over to 1994/95.