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Evaluation and development of new potato genotypes in South Australia

Dr Chris Williams
SA Research &
Development Institute

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Evaluation and development of new potato genotypes in South Australia

Dr Chris Williams and
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Final Report HAL Project

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Purpose of Report: This report provides the final report on this project in which new potato cultivars and lines have been evaluated in 2 regions of SA (from 1998-2003). Under the new model, industry will manage the evaluation of material from the breeding program (from generation 4 on) and the commercialisation process.

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Media Summary

Evaluation and identification of new cultivars with improved market and agronomic characteristics adapted to different production regions of Australia is essential for the Potato Industry to remain competitive, profitable and sustainable.

These new varieties need to have the yield and quality parameters sought by the specific market sectors; for example, fresh, French fry or crisp end uses. This means selecting for improved specific quality parameters and for stable high yields with efficient or reduced use of inputs (eg chemicals) to have minimum impacts on the environment, reduce costs and enhance sustainability.

SARDI (in partnership with the Department of Primary Industries, Victoria in a project funded by HAL and industry) has just released results of evaluation trials on new potato genotypes in South Australia (SA). These regional trials (on generation 4 material from DPI Vic) have tested potential new potato lines for the fresh and processing sectors in the Murray Mallee of South Australia and for French fry production in the South East of South Australia (SE of SA).

This project (with similar projects interstate) has evaluated and identified new varieties for washing and processing markets. Releases resulting from these evaluation trials now being grown commercially include Ruby Lou (which is now a major washed red skin variety), Shine, Lustre, Winter Gem (white skin, washing varieties) and Riverina Russet (direct delivery early season French fry use), and Sonic and Crispa (crisp use).

A new line 92-37-1 (Fergifry) has shown high and stable yields (significantly greater than the standard varieties Russet Burbank and/or Shepody in 12 out of 16 trials) and similar acceptable fry qualities, for French fry processing in trials in the Mallee and SE of SA. This line also appears to have some partial resistance to Target spot and Tomato Spotted wilt virus. Growers may wish to trial small amounts of these new varieties and lines once seed supplies are available.

Further evaluation of newly bred promising lines across production environments is needed to determine their potential for commerce. The potato industry, from July 2003, has taken on responsibility for the further evaluation of these lines (and all material from the Breeding Program based in Victoria), to assess their commercial value and manage their commercialisation.

Technical Summary

Potato genotypes introduced from the Potato Breeding program at Toolangi or from overseas were evaluated in field experiments in 2 major potato growing regions of SA. New cultivars and lines were grown in randomised block experiments (with 3 replicates per entry) located within commercial crops and compared against major commercial cultivars.

The project identified new varieties with potential for washing and processing markets. Recent releases include: Lustre, Shine, Winter Gem (white skin-washing lines), Ruby Lou (red skin washing type), Riverina Russet (French fry use for direct harvest delivery) and Sonic and Crispa (crisp use). Promising newly bred lines were also identified which require further evaluation before possible commercial release. These include; 95-97-9, 97-9-10 and 99-79-1 (fresh use), 97-59-16, 98-20-42 and 99-34-12 (crisp use from cold soils) and 92-37-1 (Fergifry), 98-102-10, 98-102-20 and 99-4-9 (French fry types).

In future, multi-environment trials (METs) biometric analyses should be conducted on historical data from potato evaluation trials to define genotype by environment interactions. It is then possible to estimate the number of locations and crop years that it is appropriate to use in the evaluation system. It is also desirable to develop agronomy profiles to ensure and aid commercialisation of new varieties.

Incremental Gains Expected from Project and Gains Achieved

New cultivars adapted to changes in production times/new planting areas in SA have allowed for substantial production increases over the past ten years. Total production has increased in SA by 83.4% from 161,257 to 295,729 tonnes over the 10 year period from 1989/90 to 1999/2000 (Australian Bureau of Statistics). Average yields increased from 31.7 to 34.9 tonnes per hectare in SA (a 10.1% increase or 1% per year increase) over this same period. The gross value of potatoes increased from $60.6 to $91.8 million, over this same 10 year period, equivalent to $3.12 million per year (Williams 1993; Walters 2002).

Use of an expanded suite of improved varieties, grown under new management systems at different times in different regions has contributed to these achievements.

The promising new varieties and lines in this project are either not yet in commerce or are new to commerce so that it is not possible to accurately estimate the improved financial gain, estimate market share, costs of growing new lines, reduced chemical inputs and financial gains at present. However, the high yields and reduced input cost of new varieties will result in future in substantial financial gains.

Introduction

New potato varieties with improved characteristics are required to help maintain and increase the competitive position of the SA and Australian potato industries. Such improved varieties are needed to better meet market needs and grower demands for high marketability, yield and quality potatoes in different growing regions.

Existing varieties are not ideally suited to certain Australian markets, and or production areas and systems. Common problems with present varieties include: susceptibility to physiological disorders such as misshapen tubers, secondary growth or hollow heart (for example Russet Burbank, Atlantic in certain situations), susceptibility to diseases (Target Spot, Common scab, Black Dot, Common Scab, Powdery Scab) or poor appearance after washing and/or poor processing qualities or unstable yields. Other problems include lack of adaptability to winter cropping systems or ability of tubers from cold soils to process with acceptable fry colour and yield.

One recent trend has been the development of improved varieties bred and selected for specific markets and cooking end uses, such as the fresh washed trade or for frozen French fry production. The main markets supplied by SA are the fresh market washed, French fry trade and crisp processing. When the National Potato Improvement and Evaluation Scheme was conceived in 1992 potato cultivar improvement was identified as a key industry focus and this has continued to the present. In SA the focus has been to evaluate cultivars that have specific market and cooking end uses and ideally suited for either fresh, French fry or crisp markets and to certain growing regions (environments). The SA program and comparable programs interstate have seen the development (Sully 1993) and evaluation of all major commercial varieties and several new varieties, including the first commercial release in Australia of Crystal - a direct result of the previous project on cultivar evaluation in SA, expanded use of Coliban, Desiree, Nooksack and Atlantic (Williams 1996; Williams et al. 1997). Other major commercial cultivars have been selected in past projects; including Nadine, Shepody and Ranger Russet (French fry use), Trent and Simco (for crisps).

The present project aimed to evaluate and identify promising new breeding lines or cultivars which have improved characteristics to increase either/or; market acceptance, profits (greater yield, or quality or less costs of production) and/or sustainability benefits (eg less chemical inputs). This report describes research findings on potato varietal evaluation in SA, for the period 1998 to 2003, including results for newly released varieties and new lines with potential for commerce or further evaluation in SA.

Methods

Experimental design

Crossbred lines and new or check varieties used in this project have been either bred in Australia or introduced under the National Potato Improvement and Evaluation Scheme. The breeding of new lines was carried out by Potato Geneticist, Dr Roger Kirkham at the Department of Primary Industries, Potato Research Station, Toolangi, Victoria. Each of these new lines was grown from botanical seed in a glasshouse and, after 3 field generations, clones (seed tubers) were sent to SA for evaluation. All trials were planted with seed produced, harvested and stored under the same conditions (to obtain seed of the same physiological age for valid genotype comparison), unless there was also a seed age treatment as in 2002.

Field experiments were conducted using a randomised block design with varieties and lines replicated in each of 3 blocks. Experiments were grown (generation 4) within commercial crops on growers properties and included common commercial cultivars used as standard controls. Individual plots were 5 metres long with 1 or 2 rows per plot. Coloured marker plants (varieties such as Ruby Lou or Toolangi Delight) were planted at the start and end of each plot in a one metre strip to prevent mixing of varieties at planting and harvest. At harvest, samples were assessed for yield graded by sizes, Number 1 grade yield, tubers per plant, quality (specific gravity, skin colour or fry colour), and observations recorded on tuber shape, skin and growth habits and seasonal conditions (Kirkham et al. 1998a, 1999; Williams et al. 1999a, 2000).

Field experiments were conducted in the SA Mallee region (near Peebinga) each year to evaluate mainly fresh market genotypes (16-28 per trial site) and processing lines (6 to 8 per trial site) for component 1 of this project. These experiments were planted in January to February each year and harvested in winter (June to August). For component 2, two experiments with replicated plots were conducted each year in the South East of SA (near Mt Gambier) to evaluate 20 to 28 French fry entries per trial site. One trial was conducted on a sand and the other on a loam type soil each year.

Statistical analyses

Data were analysed by standard analyses of variance procedures (Williams et al. 2000a). Least significant differences (LSD) among treatment means were expressed at the probability of 5%. This means that the calculated LSD between treatment means is 95% due to the treatment per se (in this case the genotype) and only 5% due to chance or random effects (such as soil variations between plots).

Results and Discussion

Complete results and data for each entry tested for each trial site for fresh, crisp and French fry experiments for the SA Mallee are presented in Appendix 1 and data for the French fry trials in the South East of SA are given in Appendix 2.

SA Mallee trials (component 1)

Fresh market varieties

Table R1 presents the number 1 grade tuber yields for selected fresh market genotypes for the duration of their time in the SA evaluation program (from Appendix 1).

Table R1. Comparison of selected fresh market cultivars and lines from SA Mallee trials in terms of the No. 1 grade yields over various years.

Entry	Yield No. 1 grade [+](tonnes per hectare)					
	1998	1999	2000	2001	2002	2003[*]
White skin entries						
Coliban	24.3	28.4	28.0	29.3	24.5	27.1
Lustre	44.3	22.9	36.6	44.1	34.3	7.4[*]
Nadine			13.3	38.6	32.0	7.8[*]
Shine	25.9	27.8	35.0	34.7	35.0	
Winter Gem	44.7	37.2	33.0	25.2	27.4	
85-2-1	20.2	30.1	25.7	29.8		
95-95-13					53.2	16.9[*]
95-97-9			46.0	46.9	43.8	18.4[*]
96-32-19					40.0	27.1
97-9-10					36.4	28.2
97-24-6					33.7	
98-31-7						31.4
99-79-1						43.4
Red skin entries						
Desiree	28.6	29.6	26.8	31.8	33.5	
Fontenot	22.7		36.8	35.6	32.0	
Norland	27.6					
Pontiac	31.0	31.0	39.1			
Ruby Lou	36.6	32.6	34.0		33.5	
Symphonia	47.1			41.8		
LSD[ϕ] P=0.05	14.3	9.0	8.3	6.0	4.8	9.5

[*] Severe seed piece decay occurred in several entries. Adjacent grower's crop was replanted due to tuber seed decay.

[+] Number 1 grade yield was 80-450g tubers from 1998-2001 and thereafter 70-450g.

[ϕ] LSD = Least Significant Difference.

Coliban

The current work has confirmed that Coliban produced good yields and was a well adapted fresh market variety for the SA Mallee (Table R1). This plus the fact that it is the most widely used cultivar for washed potatoes means that it should be continued to be used as a check variety in fresh market trials. It was also one of the varieties most susceptible to Black dot disease (see section on disease susceptibility) in the 2002 Mallee trial.

Lustre (was 92-19-10)

Lustre was released in 2002 from a cross of Crystal with Coliban. It produced significantly higher yields than Coliban in 4 out of the 6 trials (Table R1) over the 6 years of testing in the current work when grown as a winter crop. Skin colour and texture of Lustre in these trials was equal or brighter when compared to the industry standard variety, Coliban (Appendix 1). Its tubers have short dormancy and the plants have early tuber bulking and high yield potential. Crops of Lustre, when managed for washed use, produce tubers with white, bright, smooth skins suitable for packouts.

Nadine

This variety, bred in Scotland was selected during a previous HAL project in SA. The variety has produced variable yields in the SA Mallee (Table R1) and tends to produce a light yellow skin colour and textured, crazed skin when grown as a winter crop on the medium textured sands of the SA Mallee near Peebinga. Dormancy of Nadine tubers is long. It is better suited to long season cropping situations, for example summer crops (Williams et al. 1997). It has resistance to Common Scab and Potato Cyst Nematode (Ro strain). However, of those tested, it was one of the most susceptible varieties to Black dot disease (see section on disease susceptibility) in the 2002 Mallee trial.

Shine (was 90-105-14)

Shine was from a cross of Wauseon with Wilwash. It has short dormancy with early tuber bulking and early maturity (Kirkham et al. 1998b). It has produced similar tuber yields to the check variety Coliban (Table R 1).

Winter Gem (was 90-105-16)
This variety produced significantly greater yields than Coliban in 1 out of 5 years (Table R1). It was released in 1998 and produces good yields of oval, smooth skinned, white fleshed tubers, but careful handling is needed to maintain the shiny skin until well after purchase by the end user. In trials in Western Australia, it has proven partly resistant to Powdery Scab and storm damage (Kirkham et al. 1998b).

Promising washed lines

The lines *95-95-13, 95-97-9, 96-32-19, 97-9-10 and 97-24-6* all produced significantly higher yields than Coliban in the 2002 trial (Table R 1) and similar skin colour at harvest. Further evaluation is needed to assess their potential for commerce. Seed piece decay (*Erwinia spp)* affected most entries in the 2003 SA Mallee trials (the adjacent grower's potato crop was replanted due to seed decay associated with high temperatures (over 35 degrees C) occurring soon after planting). However, one line *99-79-1* produced significantly higher yield (43.4 t/ha) compared to Coliban (27.1 t/ha) in 2003 (Table R 1). The promising lines *95-95-13, 96-32-19 and 97-9-10* have been sent by the breeder for virus indexing and tissue culture. Breeding line *95-95-13* was the only line that had no visible Silver scurf when 100 tubers per replicate of certain lines were assessed at harvest (R. Harding pers. comm.).

Red skin genotypes

Desiree

This is now a major variety and was selected and recommended for commerce by the previous HAL funded project in SA. It is suitable for the red skin washed market in Australia and was used as a check variety in this work. It is a widely adaptable variety and can produce high yields in most areas but at times it can produce a 'crazed' or 'finely cracked skin' (Williams et al. 1997; 1999a). It is also in the most susceptible category for Black dot (see section on disease susceptibility).

Ruby Lou

Ruby Lou has become a major red skin variety for washed packouts in SA and was selected from the previous HAL funded projects in SA (Williams et al. 2003) and elsewhere. Plants have vigorous growth and are resistant to Target spot and Common scab. Crops grown for winter harvest in the SA Mallee often have improved tuber shape, darker red and smoother skin texture than Desiree (Williams et al. 2003).

Crisp genotypes

The Number 1 grade yields and crisp colour scores are presented in Table R2 for selected crisp genotypes for the duration of their time in this project (Tables 7-12, Appendix 1).

Table R2. Comparison of selected crisp genotypes from SA Mallee trials in terms of crisp yield (t/ha) and crisp colour over various years.

Entry	Crisp grade yield[+] (t/ha) (crisp colour in parentheses)					
	1998	1999	2000	2001	2002	2003
Atlantic	19.9 (8.7)	24.0 (6.0)	24.5 (4.3)	33.7 (7.3)	30.0 (7.0)	35.7 (6.7)
Crispa	20.9 (6.7)	19.5 (5.3)				
Dawmor			37.8 (7.0)	21.4 (8.0)	20.3 (8.0)	
Sonic				19.9 (8.0)	11.6 (6.7)	
89-33-1		19.2 (5.7)		20.4 (6.0)		
93-6-3	24.2 (7.7)	32.4 (6.0)		28.3 (7.0)	25.1 (7.0)	
94-28-1	27.4 (6.3)		26.5 (4.3)	29.3 (7.3)		
95-11-25			27.1 (6.7)	33.5 (8.0)		
97-59-16					26.9 (3.7)	22.9 (4.0)
98-20-42						30.0 (2.7)
99-34-12						31.2 (2.7)
LSD[ϕ] P=0.05	8.4 (0.9)	13.8 (0.8)	7.3 (0.8)	7.7 (1.1)	5.2 (0.8)	7.2(2.3)

[*] Crisp colour samples assessed visually, scale 1-6 borderline, >6 = too dark.
[+] Crisp grade yield was 50-430g tubers in 1998, thereafter 45-85mm tubers.
[ϕ] LSD = Least significant difference.

Atlantic

This is the major crisp variety in Australia and was selected from previous HAL funded projects and recommended for commercial use (Williams 1996). It has high specific gravity and good crisp colour when dug and processed from warm soils. Atlantic does not store well. Its other limitations are susceptibility to black spot bruising, internal brown spot, hollow heart and Common scab. Tuber set is often limited to 5 tubers per plant in the hot growing areas of SA and also has uneven size tubers (Williams et al. 1997).

Promising new crisp lines for winter crops

The crisp line *97-56-16* was the only line to produce acceptable crisp colour and yield in the 2002 trial when dug 28/8/02 and fry tested a few days later. In the crisp trial grown in 2003 and harvested on 15/7/03, again the line *97-56-16* produced acceptable light crisp colour and yields as did the lines *98-20-42* and *99-34-12,* when fry tested a few days after winter harvest. The line *93-6-3* is being tested in commercial size plantings at present for summer harvest. The check variety Atlantic produced crisps too dark for commerce in both the above trials (Table R2). The above 3 crisp lines have very good potential for commerce to help overcome common problems of black fry colour and low yields for all traditional crisping varieties dug in winter from cold soils. Such promising new lines need further evaluation before commercial release.

French fry varieties

Yields and fry colour of selected French fry entries for the duration of their time in this project are given in Table R3 (full results in Tables 13-18 in Appendix 1).

Table R3. Comparison of selected French fry genotypes from the SA Mallee trials in terms of fry grade yield (t/ha) and fry colour over various years.

Entry	Fry grade yield[+] (t/ha) (fry colour in parentheses)					
	1998[∇]	1999[∇]	2000[∇]	2001	2002	2003
Bannock Russet		8.0 (6.7)	8.4 (8.3)			
Mac Russet	32.6 (9.3)	24.3 (7.3)				
Ranger Russet	26.3 (9.7)		33.4 (9.0)	23.4 (0d[χ])		33.8 (60d)
Riverina Russet	29.6 (8.7)	13.9 (7.7)		32.1 (100)	22.9 (97)	34.9 (100)
Riverina Russet c/s[α]					31.2 (100)	
Russet Burbank		5.3 (7.3)	5.0 (7.3)	9.3 (0d)	14.4 (50d)	
Russet Burbank c/s					27.2 (97)	
Shepody	31.0 (9.0)		27.8 (8.7)	28.3 (0d)	28.6 (67d)	31.6 (43d)
Shepody c/s					33.8 (60d)	
Stampede				25.6 (0d)		
92-37-1 (y)[β]	40.8 (8.3)	24.8 (7.0)	42.5 (7.3)	34.0 (13d)	36.1 (100)	34.5 (90)
92-37-1 c/s					30.4 (100)	
93-26-10		20.6 (8.0)		35.3 (3d)		
94-52-7						
LSD[ϕ] P=0.05	10.7 (0.7)	8.9 (0.9)	8.8 (0.9)	7.7 (na)	5.0 (na)	16.3 (na)

[∇] Up to 2000 fry colour was visually assessed, >7 too dark.
After 2000 fry colour was assessed by the USDA chip colour chart. The zero category % fry colour is shown in brackets. d is fry colour too dark, unacceptable for processing.

[+] Fry grade yield was >100g tubers from1998-2000 and then >75g.

[α] c/s is cool stored seed (9 months old).

[β] (y) is young seed (5 months old).

[ϕ] LSD = Least significant difference; na = not applicable.

Russet Burbank

Russet Burbank is the main French fry variety grown in Australia. It is a long season variety and requires the cool, temperate climate and daylength of higher latitudes to produce good yields of tubers and light fry colour after storage. When planted with young tuber seed in mid summer in the SA Mallee it produces uneconomic tuber yields when dug in early winter

(Table R3). Ranger Russet and Shepody also produced dark fries, unacceptable for processing when dug in mid winter (Table R3).

Ranger Russet

This variety was identified in previous projects (Dawson al. 2002) and is now a major commercial French fry variety for direct delivery. This was also used as a standard check variety in these trials (Table R3).

Riverina Russet (89-12-1)

This new variety produced good yields (similar to the highest yielding line, 92-37-1) in 2 of the last 3 trial years and light fry colour at winter harvest in the 3 years (Table R3). Riverina Russet is becoming increasingly used on sandy soils along the River Murray and adjacent areas for direct delivery during the mid and the late summer supply period to French fry processing factories (Williams et al. 2003). In the past this has been a difficult period of supply as the main early variety Shepody can exhibit plant growth and tuber quality problems as temperatures increase from mid summer.

92-37-1 (Fergifry)

This line produced the top yield in 4 of the 6 French fry trials in the SA Mallee and good fry color (very acceptable for processing) at winter harvest in 2002 and 2003 (Table R3). 92-37-1 has good potential use to help overcome common problems of black fry colour and low yields for most traditional varieties dug in early winter in SA from cold soils (Williams et al. 2003). Fergifry is being tested in large commercial plantings in 2003/04 for direct delivery for French fry processing.

Cultivar susceptibility to Black dot disease

Results for 14 cultivars from the 2002 SA Mallee trials for resistance to Black dot disease are presented in Table R4.

Table R4. Incidence and severity* of black dot on 14 potato cultivars (from Harding and Wicks, 2003) in the SA Mallee trials of 2002 (Appendix 1).

Variety	% of infected tubers	Average disease severity$^{\phi}$	End use
Riverina Russet	30_a	1.8_a	Fry
Shepody	30_a	2.2_a	Fry
Russet Burbank	32_a	2.0_a	Fry
Sonic	34_a	2.5_a	Crisp
Atlantic	36_a	2.1_a	Crisp
Winter Gem	45_b	2.1_a	Fresh
Dawmor	55_c	2.5_a	Crisp
Ida Rose	59_c	2.8_a	Fresh
Shine	59_c	2.6_a	Fresh
Ruby Lou	68_c	3.6_b	Fresh
Fontenot	69_c	3.2_b	Fresh
Desiree	76_d	3.7_b	Fresh
Coliban	76_d	3.3_b	Fresh
Nadine	79_d	3.1_{ab}	Fresh

$^{\phi}$ **Severity rating scale 0 to 4:** where **0** = no disease, **1** = <2%, **2** = 3 to 10%, **3** =11 to 30%, and **4** = >30% of tuber surface affected.
Note: These results are based on one trial per entry in 2002.
* Means with different subscripts are significantly different at P= 0.05.

Riverina Russet, Russet Burbank, Shepody and Sonic were in the group with the least Black dot and the check varieties Coliban, Nadine and Desiree were grouped as most susceptible (Table R4).

South East of SA French fry trials (component 2)

The number 1 grade yields and fry colour for selected French fry genotypes for the duration of the time in the SA evaluation program are presented in Tables R5 for (a) sand and (b) loam sites, respectively.

Table R5. Comparison of selected French fry lines in terms of fry grade yield (t/ha) and fry colour in the SE of SA for summer crops over various years, (a) sand and (b) loam sites.

Entry (a) sand sites	Fry grade yield (t/ha) (fry colour in parentheses)					
	1997/98[∇]	1998/99[∇]	1999/00[∇]	2000/01	2001/02	2002/03
Nooksack	72.2 (6.7)					
Ranger Russet	78.7 (7.7)					
Russet Burbank (Ruen)	62.2 (6.7)	74.5 (6.7)	43.1 (5.3)	58.6 (97)	54.1 (100)	43.1 (100)
Stampede			64.4 (7.0)	69.3 (100)	67.0 (80)	47.7 (100)
Spey		95.2 (5.0)	52.8 (5.0)			
Umatilla	83.5 (7.3)	82.4 (6.7)				
92-37-1	95.0 (6.3)	87.8(5.3)	58.0 (4.7)	90.7 (93)	71.7 (100)	
97-100-1				58.2 (100)	66.6 (100)	44.1 (100)
98-102-10					73.8 (100)	62.0 (100)
99-48-2						52.5 (100)
LSD[ϕ] P=0.05	15.1 (0.8)	14.2 (0.8)	10.9 (1.2)	10.2 (na)	18.2 (na)	13.0 (na)

Entry (b) loam sites	Fry grade yield (t/ha) (fry colour in parentheses)					
	1997/98[∇]	1998/99[∇]	1999/00[∇]	2000/01	2001/02	2002/03
Mac Russet	83.5 (7.0)					
Russet Burbank (Ruen)	62.4 (6.7)	55.0 (7.0)	60.1 (5.7)	53.2 (100)	67.3 (100)	66.3 (100)
Stampede			61.1 (6.0)	67.2 (93)	81.8 (97)	59.6 (93)
Spey		74.2 (5.7)	77.1 (6.0)			
Umatilla	86.2 (7.0)	72.8 (7.3)				
92-37-1	95.7 (6.3)	66.4 (6.0)	99.5 (6.0)	68.5 (100)	98.6 (97)	
97-100-1				62.8 (100)	68.6 (100)	49.7 (100)
98-96-31					93.4 (100)	69.8 (97)
98-102-10					94.9 (100)	73.2 (100)
98-102-20					80.8 (100)	66.2 (100)
99-4-9						68.0 (100)
LSD[ϕ] P=0.05	9.3 (0.8)	13.2 (1.0)	15.5 (1.1)	12.4 (na)	11.5 (na)	16.0 (na)

[∇] Up to 2000 fry colour was visually assessed, above 7 too dark.
After 2000 fry colour assessed by USDA chip colour chart, (zero category in brackets).

[ϕ] LSD = Least Significant Difference; na = not applicable.

Russet Burbank was the check cultivar as it is the main French fry variety grown for summer crops in Australia.

92-37-1 (Fergifry)

The line 92-37-1 has potential for commerce as it produced significantly greater yields compared to Russet Burbank in 3 out of 5 trials on sand and in 5 out of 5 on loam and similar fry colour at harvest (Tables 5a, b) and specific gravity (Appendix 2) in all trials. Plants of 92-37-1 have partial resistance to Target Spot –the major disease of summer crop potatoes in SA (Dawson et al. 2002; Williams et al. 2003). In a trial at Berrigan, NSW, harvested in January, 2003, line 92-37-1 was ranked third for fry grade yield and had no necrosis caused by Tomato Spotted Wilt Virus while all other lines in the trial were affected (from Sully 2003). Line 92-37-1 also had significantly higher specific gravity (1.085) than any of the check varieties (Sully 2003). 92-37-1 has good potential for commercial use in SA.

Recently tested promising French fry lines

Line 98-102-10 had significantly higher fry grade yields compared to Russet Burbank and most test lines when evaluated in the 2 trials on sand, (2002 and 2003, Table R5a) and equal top fry colour at harvest.

Lines 98-96-31, 98-102-10 and 98-102-20 produced significantly higher fry grade yields than Russet Burbank in the 2001/02 trial on the loam site and fry colour was very acceptable (Table R5b) and specific gravity was comparable with the check varieties (Appendix 2). These lines were in the highest yield category in the loam trial in 2002/03, but not significantly higher than check varieties and specific gravity was similar to the check varieties and fry colour was acceptable. Line 98-102-20 had significantly higher specific gravity (1.093) than all the other lines apart from the check variety Stampede.

One trial is insufficient to assess a genotype for commerce. The variability in performance of the genotypes across the different years is likely to be caused by factors such as, sites, seasonal conditions, management differences and soil types within a region and across the 2 regions (environments). This indicates that while there was a degree of adaptation to specific sites or regions, some lines appear to have more general adaptation by performing reasonably well over a range of conditions (eg 92-37-1).

Recommendations

Further development of new varieties to meet market needs is crucial for the potato industry to remain competitive (profitable and sustainable).

The potato industry from July 2003 has responsibility for further evaluation of lines after the generation 3 stage and for the commercialization of lines and this may ensure that industry completes the commercialization of newly released varieties. This should allow industry to have more inputs into focused selection and performance criteria to identify varieties suitable for specific markets and agronomic conditions.

Scientifically designed experiments should be conducted at most stages of the future evaluation and commercialisation programs to obtain unbiased results when comparing varieties. These methods include the use of:

- the randomized block design (or equivalent) for trials,
- valid, replicated plots, one per block (minimum of 3 blocks) of each entry,
- check varieties and new 'winners' as well as new entries,
- all seed from a common source and the same physiological age,
- assessments of performance characters from each replicate plot,
- statistical analyses of results to calculate true significant differences.

Otherwise, if one test strip per entry is used this is most likely to give a biased result as such factors as soil variation, different disease pressures cannot be taken into account (as no true replicates exist to measure such variation).

Potato genotype by environment interactions (that is, how the overall performance of genotypes varies across different environments) for yield, quality and disease reactions need to be determined more accurately. There is a large data base of single trial site data that needs to be integrated and re-assessed. Consideration should be given to funding the conduct of multi-environment trials (METs) statistical analyses on historical data from potato genotype evaluation trials. Cases of positive specific adaptation can be defined from such analyses. These are then exploited by targeted selection strategies (as Basford and Cooper 1998 described for wheat). McLaughlin et al. (1994) used such methods to select potato varieties with low tuber cadmium across all sites. Furthermore, information can be obtained on the probability of a genotype performing better overall, on average, than the check variety, for example, Russet Burbank (for each trait: yield, quality). It is also possible to estimate the number of locations and crop years that are likely to be appropriate in the evaluation system.

Agronomy profiles for promising new varieties need to be developed (including reduced chemical inputs, reduced cost strategies in the target environments, nutrient profiles, Williams et al. 1999b; 2000b) to aid and ensure successful commercialisation of new varieties.

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Financial Analysis of Project

The Financial Analysis of the Project is given in the following table.

		Life of Project		
		Actual $	**Budget $**	**Variance $**
A	Funding Received From HAL	$159,900	$163,800	-$
	Fund To Date From HAL	$159,900	$159,900	
	Final Report payment *	$0	$3,900	-$3,900
	Expenditure on Project			
B	Capital		$0	$0
C	Operating	$162,055	$163,800	$1,745
D	Total Expenditure	$162,055	$163,800	$1,745
E	Net Surplus/(Deficit)	($1,745)	$0	$1,745

Comments on variance

* Final payment of $3,900 is due within 30 days of acceptance of final report by HAL.

Appendix 1.

SA Mallee potato cultivar trials 1998 to 2003 (fresh, crisp and French fry).
(Comparisons of yield and quality parameters for entries in trials grown in the Peebinga district , planted in January/February with whole tuber seed and harvested in winter).

(a) Fresh market trials

Table 1. SA Mallee fresh trial harvested in winter 1998, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare						Rank by No 1 Grade	Tuber No. Per Plant	Quality	
	Chats 0-80g	Small 80-200g	Medium 200-350g	Large 350-450g	No 1 Grade 80-450g	Over Size >450g			% Dry Matter	Skin* Colour
Centurion	3.0	27.7	21.5	4.3	53.4	0.0	1	5.1	na	8.7
Coliban	8.2	20.2	2.3	1.8	24.3	0.0	13	6.7	na	9.0
Crystal	5.8	30.7	3.5	0.0	34.2	0.0	7	5.4	na	8.3
Desiree	5.2	22.1	6.6	0.0	28.6	0.0	9	5.0	na	8.3
Norland	3.7	22.3	4.3	0.9	27.6	0.0	10	5.2	na	4.7
Pontiac	3.3	17.3	11.6	2.1	31.0	2.0	8	4.2	na	4.7
Ruby Lou	4.8	29.6	6.8	0.2	36.6	0.3	6	5.8	na	9.0
Shine	10.7	24.8	1.1	0.0	25.9	0.0	11	7.9	na	8.0
Symphonia	3.0	16.7	27.1	3.3	47.1	0.0	2	5.6	na	7.7
Winter Gem	5.9	34.9	9.0	0.8	44.7	0.0	3	2.9	na	8.3
85-2-1	2.9	13.9	5.8	0.5	20.2	0.0	14	8.0	na	6.7
87-13-3	10.9	11.9	0.6	0.0	12.5	0.0	15	9.0	na	8.0
92-19-10$^{\Psi}$	12.5	38.9	4.8	0.6	44.3	0.0	4	11.7	na	8.7
93-24-2	4.2	32.1	4.8	0.9	37.8	0.0	5	6.0	na	7.7
94-26-1	5.8	20.7	3.0	1.4	25.1	0.6	12	6.2	na	7.7
94-94-9	1.7	1.9	0.5	0.0	2.3	0.0	16	1.1	na	6.7
LSD^{+} P=0.05	5.2	12.3	6.8	3.1	14.3	1.3		3.4	na	1.3
LSD^{+} P=0.01	6.9	16.6	9.2	4.1	19.2	1.7		4.6	na	1.7

***** Skin colour assessed visually, scale 1-10, 1= dullest, 10= brightest red or white colour.
$^{+}$ LSD is the least significant difference between treatment means; na = not applicable
$^{\Psi}$ 92-19-10 has since been released as Lustre.

Table 2. SA Mallee fresh trial harvested in winter 1999, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare						Rank by No.1 Grade	Tuber No. Per Plant	Quality	
		Chats 0-80g	Small 80-200g	Medium 200-350g	Large 350-450g	No.1 Grade 80-450g	Over Size >450g			Specific Gravity[+]	Skin* Colour
Coliban	20	2.3	19.6	7.2	1.6	28.4	0	=7	3.1	1.050	8.7
Desiree	20	4.9	27.1	2.5	0	29.6	0	6	4.6	1.056	7.7
Dynamite	20	4.4	21.2	0.9	0	22.0	0	14	3.7	1.056	7.3
Fontenot	20	4.4	18.6	4.0	0	22.7	0	13	3.5	1.064	8.3
Pontiac	20	1.8	18.1	11.8	1.1	31.0	0	3	3.4	1.039	3.7
Red Ruby	20	5.8	14.4	0	0	14.4	0	15	3.5	1.043	8.3
Ruby Lou	20	3.2	25.5	7.2	0	32.6	0	2	4.3	1.052	8.0
Shine	20	4.6	24.2	2.5	1.1	27.8	0	10	4.1	1.051	8.3
White Rhino	20	3.3	21.2	5.6	1.1	27.9	0	9	3.6	1.049	7.0
Winter Gem	20	3.6	26.7	9.8	0.7	37.2	0	1	4.0	1.051	8.3
85-2-1	20	1.9	22.1	7.0	1.1	30.1	0	5	3.3	1.057	8.3
87-13-3	20	3.4	2.0	0	0	2.0	0	16	1.4	1.038	6.7
92-19-10[Ψ]	20	5.5	18.6	3.9	0.4	22.9	0	12	3.8	1.051	8.7
95-10-2	20	3.1	24.1	5.8	0.9	30.7	0	4	3.9	1.049	8.0
95-12-3	20	6.5	26.1	2.4	0	28.4	0	=7	4.8	1.058	8.3
95-90-2	20	2.8	19.9	3.6	0.7	24.1	0	11	3.1	1.053	8.7
LSD P=0.05		2.9	6.8	4.9	1.6	9.0	n.a.		1.5	0.008	1.3

***** Skin colour assessed visually , scale 1 = dullest, 10 = brightest white or red colour.

[+] Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

[Ψ] 92-19-10 has since been released as Lustre.

Table 3. SA Mallee fresh trial harvested in winter 2000, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare							Rank No. Per Plant	Tuber Specific Gravity[+]	Quality Skin Colour*
	Chats 0-80g	Small 80-200g	No. Per Plant	Large 350-450g	No.1 Grade 80-450g	Over Size >450g	by No.1 Grade			
Coliban	2.5	3.1	20.8	4.0	28.0	0	13	3.0	1.076	7.0
Desiree	2.8	3.5	21.9	1	26.8	0	14	3.2	1.082	6.5
Fontenot	2.5	4.4	30.8	2	36.8	0	6	4.0	1.091	8.3
Nadine	4.3	4.4	8.9	0	13.3	0	16	2.5	1.058	6.0
Pontiac	2.5	2.4	17.0	19.7	39.1	11	4	3.4	1.068	3.3
Ruby Lou	2.2	4.1	30	0	34.0	0	10	3.9	1.080	7.0
Sebago	2.4	3.3	28.6	3	34.9	1	9	3.8	1.068	5.7
Shine	5.0	7.6	26.5	0.9	35.0	0	8	5.0	1.075	7.0
WinterGem	3.1	4.0	28.1	0.9	33.0	0	11	4.0	1.073	7.3
85-2-1	2.0	3.0	16.8	5.8	25.7	2	15	2.9	1.083	7.3
92-19-10[Ψ]	4.8	7.5	27.6	1.6	36.6	0	7	5.0	1.069	7.3
95-12-2	2.7	5.5	34	5	43.7	0	3	4.8	1.087	6.7
95-97-9	1.9	2.6	38.3	5.1	46.0	0	2	4.2	1.076	7.0
96-27-5	4.4	5.5	30.2	2.3	38.0	0	5	4.7	1.069	6.3
96-32-8	2.6	3.3	41.8	3	47.7	0	1	4.3	1.068	6.0
96-85-5	1.6	2.5	25.9	1.9	30.3	0	12	3.1	1.088	6.3
LSD P=0.05	1.9	3.3	6.2	4.3	8.3	1.6		0.7	0.004	0.9

***** Skin colour assessed visually , scale 1 = dullest, 10 = brightest white or red colour.
[+] Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)
[Ψ] 92-19-10 has since been released as Lustre.

Table 4. SA Mallee fresh trial harvested in winter 2001, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield. Tonnes Per Hectare						Rank by No. 1 Grade	Tuber No. Per Plant	Quality	
	Chats 0-70g	Small 70-120g	Medium 120-350g	Large 350-450g	No.1 Grade 70-450g	Over Size >450g			Specific Gravity+	Skin* Colour
Coliban	4.2	7.6	21.2	0.2	29.3	0.0	13	5.0	1.060	8.5
Desiree	0.2	7.6	23.9	0.2	31.8	0.0	10	4.7	1.065	6.5
Fontenot	0.5	10.1	23.9	0.0	35.6	0.0	7	5.6	1.069	7.0
Nadine	4.4	1.2	26.3	0.0	38.6	0.0	5	6.5	1.052	7.3
Shine	4.4	9.6	25.1	0.0	34.7	0.0	8	5.9	1.065	8.5
Symfonia	0.2	3.9	33.2	4.7	41.8	0.5	4	5.1	1.066	8.5
Winter Gem	8.6	9.1	16.0	0.0	25.2	0.0	14	7.1	1.060	8.7
85-2-1	3.7	9.9	17.9	2.0	29.8	0.0	12	4.7	1.067	8.8
87-13-3	5.4	6.6	2.5	0.0	9.1	0.0	15	4.0	1.059	5.3
92-19-10Ψ	6.4	12.5	30.8	1.0	44.1	0.0	3	6.3	1.059	8.8
95-55-4	3.4	10.1	26.6	1.0	37.6	0.0	6	5.2	1.049	8.2
95-97-9	3.9	6.9	35.9	3.9	46.9	0.4	2	6.0	1.060	9.0
96-109-2	3.7	6.9	22.9	1.0	30.7	0.5	11	4.4	1.064	8.3
96-30-4	3.2	7.1	37.6	3.2	48.1	0.0	1	6.0	1.057	8.0
97-77-2	3.0	10.6	22.4	0.0	32.8	0.0	9	5.8	1.061	8.2
LSD P=0.05	3.2	3.7	3.1	3.9	6.0	0.3		1.2	0.003	0.8

***** Skin colour assessed visually, scale 1 = dullest, 10 = brightest white or red colour.

+ Specific Gravity = Wt.Air/(Wt.Air - Wt.Water)

Ψ 92-19-10 has since been released as Lustre.

Table 5. SA Mallee fresh trial harvested in winter 2002, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare						Rank by No.1 Grade	Tuber No. Per Plant	Quality	
		Chats 0-70g	Small 70-120g	Medium 120-350g	Large 350-450g	No.1 Grade 70-450g	Over Size >450g			Specific Gravity+	Crisp * Colour
Coliban	25.0	2.6	4.8	18.7	1.0	24.5	0.0	15	4.0	1.066	9.0
Desiree	25.0	4.6	13.6	19.5	0.4	33.5	0.0	9	7.4	1.072	8.0
Nadine	25.0	4.2	8.8	22.3	0.9	32.0	0.0	11	6.2	1.053	10.0
Ida Rose	25.0	3.9	9.3	13.1	0.1	22.6	0.0	16	5.6	1.064	9.0
Shine	25.0	6.0	12.6	22.4	0.0	35.0	0.0	5	8.1	1.072	9.0
Fontenot	25.0	4.8	8.4	23.4	0.1	32.0	0.0	11	6.8	1.080	8.0
Winter Gem	25.0	3.6	9.1	17.7	0.6	27.4	0.0	14	6.0	1.066	8.0
Ruby Lou	25.0	2.4	8.6	23.0	1.9	33.5	0.0	9	5.6	1.070	7.0
92-19-10Ψ	25.0	6.4	12.8	21.4	0.1	34.3	0.0	6	8.2	1.067	9.0
93-37-3	25.0	3.5	12.9	21.2	0.0	34.1	0.0	7	6.7	1.063	9.0
95-55-4	25.0	4.9	12.7	16.6	0.3	29.6	0.0	13	6.2	1.058	8.0
95-95-13	25.0	2.4	8.2	39.1	5.9	53.2	0.0	1	7.0	1.063	9.0
95-97-9	25.0	2.8	9.4	31.3	3.1	43.8	0.0	2	7.1	1.068	7.0
96-32-19	25.0	4.8	17.1	23.0	0.0	40.0	0.0	3	8.8	1.067	8.0
97-9-10	25.0	4.6	14.1	21.7	0.6	36.4	0.0	4	8.0	1.067	7.7
97-24-6	25.0	3.8	10.5	22.5	0.6	33.7	0.0	8	6.4	1.066	7.3
LSD P=0.05		1.9	3.9	5.0	1.7	4.8	0.0		1.3	0.003	
LSD P=0.01		2.6	5.2	6.7	2.2	6.5	0.0		1.8	0.004	

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

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Ψ 92-19-10 has since been released as Lustre.

Table 6. SA Mallee fresh trial harvested in winter 2003, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare						Rank by No.1 Grade	Quality	
	Chats 0-70g	Small 70-120g	Medium 120-350g	Large 350-450g	No.1 Grade 70-450g	Over Size >450g		Specific Gravity+	Crisp* Colour
Coliban	2.0	7.0	15.9	4.2	27.1	0.2	5	1.064	7.7
Lustre	2.3	4.4	3.0	0.0	7.4	0.0	22	1.063	8.0
Nadine	5.4	6.0	1.8	0.0	7.8	0.0	20	1.058	9.7
93-37-3	1.0	3.4	11.7	1.1	16.2	0.0	13	1.058	8.7
95-90-2	2.0	6.5	11.9	1.0	19.4	0.0	8	1.064	7.0
95-95-13	1.3	4.4	11.6	0.9	16.9	0.2	12	1.059	7.3
95-97-9	1.1	2.7	11.3	4.3	18.4	0.7	9	1.064	8.0
96-30-9	1.8	2.7	2.2	0.0	4.9	0.0	24	1.061	8.3
96-32-19	3.4	9.6	15.6	1.8	27.1	0.0	4	1.062	7.0
96-87-1	0.8	4.7	3.9	0.0	8.6	0.0	19	1.065	7.0
96-109-2	1.5	2.9	1.9	0.0	4.8	0.0	25	1.061	8.0
97-9-10	2.5	8.1	17.1	3.0	28.2	0.4	3	1.059	7.3
97-19-4	2.5	6.5	7.5	0.1	14.1	0.0	14	1.058	6.7
98-29-2	3.6	5.2	2.5	0.0	7.7	0.2	21	1.063	6.0
98-31-7	2.5	9.7	19.3	2.4	31.4	0.6	2	1.062	6.3
98-33-22	0.6	1.5	11.4	5.0	18.0	1.5	10	1.058	8.3
98-33-57	1.3	3.3	17.9	5.7	26.9	1.5	6	1.060	8.0
98-54-31	2.2	4.8	4.0	0.0	8.9	0.0	18	1.058	8.3
99-10-8	2.0	6.5	14.3	0.0	20.9	0.0	7	1.058	7.3
99-20-11	0.9	2.7	2.6	0.0	5.3	0.0	23	1.055	8.7
99-31-2	5.4	2.4	0.2	0.0	2.6	0.0	26	1.053	3.0
99-31-3	1.9	5.3	7.9	0.0	13.2	0.0	16	1.058	7.0
99-32-13	5.4	10.5	3.5	0.0	14.0	0.0	15	1.061	3.7
99-32-18	0.1	0.8	1.1	0.0	1.9	0.0	28	1.068	6.0
99-36-8	2.0	4.5	4.4	0.1	9.0	0.0	17	1.054	8.0
99-66-15	1.3	2.4	0.1	0.0	2.5	0.0	27	1.067	7.3
99-74-27	1.0	4.4	12.9	0.4	17.6	0.0	11	1.057	7.7
99-79-1	3.5	15.1	25.5	2.8	43.4	0.7	1	1.063	7.7
LSD (P=0.05)	1.7	3.7	6.4	2.1	9.5	**		0.003	2.0
LSD P=0.01)	2.3	5.0	8.5	2.9	12.7	**		0.004	2.7

∗ Samples assessed visually , scale 1 - 10, 6 = borderline, > 6 = too dark
** Does not apply
+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

(b) Crisp trials

Table 7. SA Mallee crisp trial harvested in winter 1998, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare						Rank by Crisp Grade	Tuber No. Per Plant	Quality	
	Under 0-50g	Chats 50-80g	Small 80-300g	Large 300-430g	Crisp Grade 50-430g	Over Size >430g			% Dry Matter	Crisp* Colour
Atlantic	0.9	2.1	17.7	0.0	19.9	0.0	8	1.8	18.8	8.7
90-7-17 = (Crispa)	2.7	4.9	16.0	0.0	20.9	0.0	7	3.0	20.5	6.7
92-13-8	2.3	4.6	30.0	1.1	35.6	0.0	1	7.4	19.1	6.7
93-6-3	1.5	2.5	21.2	0.5	24.2	0.0	4	3.6	17.2	7.7
93-94-1	3.2	6.8	25.7	0.0	32.5	0.0	2	6.5	19.0	7.0
93-97-9	2.1	3.2	21.0	0.0	24.2	0.0	5	3.7	20.1	8.7
94-2-3	1.5	2.3	20.0	0.0	22.2	0.0	6	3.1	20.4	6.3
94-28-1	1.3	3.3	24.2	0.0	27.4	0.0	3	3.8	21.1	6.3
LSD P=0.05	0.9	2.1	7.2	1.2	8.4	na		2.6	1.1	0.9
LSD P=0.01	1.3	2.9	10.0	1.6	11.7	na		3.6	1.5	1.2

***** Crisp samples assessed visually, scale 1-10, 6 = borderline, >6 = too dark.

Table 8. SA Mallee crisp trial harvested in winter 1999, comparison of potato lines for different tuber yield size grades, tubers per plant and quality parameters.

Entry	Spacing in rows	Yield. Tonnes Per Hectare						Rank by Crisp	Tuber No. Per	Quality	
			Crisp Grade			Crisp Grade	Over Size				
		Under	Chats	Small	Large					Specific	Crisp*
	cm.	>45mm	45-50mm	50-85mm	85-95mm	45-85mm	>95mm	Grade	Plant	Gravity+	Colour
Atlantic	20	0.3	1.1	22.6	0.4	24.0	0	4	2.5	1.082	6.0
Crispa	20	1.7	3.6	16.0	0	19.5	0	6	3.9	1.085	5.3
89-33-1	20	0.9	1.5	17.7	0	19.2	0	7	3.0	1.094	5.7
93-6-3	20	1.5	2.4	30.0	0	32.4	0	1	5.1	1.078	6.0
94-2-9	20	1.3	3	26.3	0	29.2	0	3	4.9	1.079	6.7
94-28-1	20	0.8	2.2	28.5	0	30.7	0	2	4.2	1.090	7.0
94-28-3	20	0.6	3.1	26.1	0	29.2	0	3	4.1	1.090	6.7
95-73-18	20	0.5	2.0	18.4	0	20.4	0	5	3.1	1.089	6.7
LSDΨ P=0.05		0.8	1.8	13.0	0.4	13.8	na		1.9	0.002	0.8

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

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Ψ LSD is the least significant difference between treatment means; na = not applicable

Table 9. SA Mallee crisp trial harvested in winter 2000, comparison of potato lines for different tuber yield size grades, tubers per plant and quality parameters.

Entry	Spacing in rows	Yield. Tonnes Per Hectare						Rank by Crisp	Tuber No. Per Plant	Quality	
			Crisp Grade			Crisp Grade	Over Size				
		Under	Chats	Small	Large					Specific Gravity[+]	Crisp* Colour
	cm.	0-45mm	45-50mm	50-85mm	85-95mm	45-85mm	>95mm	Grade	Plant		
Atlantic	20	1.5	0.8	23.7	1.2	24.5	0	7	3.2	1.090	4.3
Dawmor	20	2.0	1.7	36.1	1	37.8	0	1	5.2	1.084	7.0
94-28-1	20	1.4	0.7	25.8	2	26.5	0	8	3.4	1.096	4.3
95-4-14	20	1.6	2.1	24.3	1	26.4	0	6	3.8	1.080	7.7
95-11-25	20	1.3	1	26.1	2	27.1	3	5	3.2	1.087	6.7
95-73-18	20	1.1	1.1	26.2	1	27.2	1	4	3.6	1.097	6.7
95-102-20	20	10.1	2.1	29.5	0	31.7	0	2	5.2	1.085	7.3
96-114-7	20	2.7	1.5	26.8	1	30.7	0	3	4.2	1.092	6.0
LSD[Ψ] P=0.05		5.5	1.1	6.9	na	7.3	1.2		0.9	0.003	0.8

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

[+] Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

[Ψ] LSD is the least significant difference between treatment means; na = not applicable

Table 10. SA Mallee crisp trial harvested in winter 2001, comparison of potato lines for different tuber yield size grades, tubers per plant and quality parameters.

Entry	Yield. Tonnes Per Hectare					Rank by Crisp Grade	Tuber No. Per Plant	Quality	
	Under 0-45mm	Crisp Grade 45-65mm	Crisp Grade 65-80mm	Crisp Grade 45-80mm	Over Size >80mm			Specific Gravity+	Crisp* Colour
Atlantic	3.0	33.0	0.7	33.7	2.0	1	5.5	1.074	7.3
Dawmor	6.2	21.4	0.0	21.4	0.0	5	5.9	1.064	8.0
Sonic	6.9	19.9	0.0	19.9	0.2	7	5.5	1.070	8.0
89-33-1	3.4	20.4	0.0	20.4	0.7	6	4.4	1.079	6.0
91-1-5	9.3	8.9	0.0	8.9	0.0	8	5.2	1.076	6.3
93-6-3	4.7	28.3	0.0	28.3	8.1	4	6.1	1.071	7.0
94-28-1	5.2	26.3	3.0	29.3	0.2	3	6.0	1.084	7.3
95-11-25	3.7	30.5	3.0	33.5	0.0	2	5.6	1.073	8.0
LSD P=0.05	2.9	7.4	1.6	7.7	2.9		1.4	0.003	1.1

* Crisp samples assessed visually, scale 1 - 10, 6 = borderline, > 6 too dark, soon after harvest (16/7/01).
+ Specific Gravity = Wt.Air/(Wt.Air - Wt.Water)

Table 11. SA Mallee crisp trial harvested in winter 2002, comparison of potato lines for different tuber yield size grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm.	Yield, Tonnes Per Hectare					Rank by Crisp Grade	Tuber No. Per Plant	Quality	
		Under <45mm	Small 45-65mm	Large 65-85mm	Crisp Grade 45-85mm	Over Size >85mm			Specific Gravity+	Crisp * Colour
Atlantic	22.7	1.7	23.5	6.4	30.0	0.0	1	5.2	1.079	7.0
Dawmor	31.2	2.1	19.2	1.1	20.3	0.0	4	6.3	1.071	8.0
Sonic	28.0	1.8	10.3	1.3	11.6	0.0	8	3.6	1.076	6.7
93-6-3	28.0	2.8	19.6	5.4	25.1	0.0	3	6.0	1.073	7.0
96-47-5	28.0	3.2	12.3	0.0	12.3	0.0	7	5.8	1.070	9.0
97-24-1	33.4	2.4	14.6	0.1	14.8	0.0	5	5.9	1.078	9.0
97-59-16	33.4	2.4	19.8	7.1	26.9	0.0	2	7.7	1.082	3.7
97-59-21	31.2	2.2	12.0	0.4	12.4	0.0	6	4.5	1.073	5.3
LSD P=0.05		1.0	4.2	4.6	5.2	0.0		1.0	0.003	0.6
LSD P=0.01		1.4	5.8	6.3	7.2	0.0		1.3	0.004	0.8

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

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 12. SA Mallee crisp trial harvested in winter 2003, comparison of potato lines for different tuber yield size grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm.	Yield. Tonnes Per Hectare					Rank by Crisp Grade	Tuber No. Per Plant	Quality	
		Under <45mm	Small 45-65mm	Large 65-85mm	Crisp Grade 45-85mm	Over Size >85mm			Specific Gravity+	Crisp * Colour
Atlantic	46.1	1.0	16.8	18.9	35.7	1.9	1	4.5	1.068	6.7
97-59-16	30.0	1.6	14.0	8.9	22.9	0.1	5	5.6	1.074	4.0
98-20-42	31.9	2.9	23.2	6.8	30.0	0.1	3	8.8	1.067	2.7
99-34-12	37.7	1.2	15.3	15.8	31.2	0.1	2	5.3	1.066	2.7
99-35-14	42.0	4.6	26.3	2.5	28.8	0.0	4	8.4	1.069	6.0
99-78-52	37.7	2.9	19.8	0.7	20.5	0.0	6	6.6	1.070	3.7
LSD P=0.05		1.4	5.0	4.2	7.2	0.9		2.2	0.004	2.3
LSD P=0.01		2.0	7.2	5.9	10.2	1.3		3.2	0.006	3.3

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

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

(c) French fry trials

Table 13. SA Mallee French fry trial harvested in winter 1998, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
	Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			% Dry Matter	Fry Colour*
Ranger Russet	5.5	26.3	0.0	0.0	32.6	4	4.4	18.5	9.7
Shepody	5.8	29.6	1.4	0.0	27.7	6	3.4	19.6	9.0
88-59-12	5.2	34.2	0.0	0.0	13.4	8	2.9	17.9	9.0
Riverina Russet	8.5	13.4	0.0	0.0	29.6	5	4.9	18.9	8.7
MacRusset	11.8	32.6	0.0	0.0	34.2	2	6.7	18.5	9.3
92-37-1	6.9	38.5	2.3	0.0	40.8	1	5.1	19.0	8.3
93-56-44	5.8	20.5	0.3	0.0	20.8	7	4	17.9	10.0
94-52-7	5.9	34.4	0.0	0.0	34.1	3	5	18.3	10.1
LSD P=0.05	3.7	10.0	1.5		10.7		1.8	0.5	0.7
LSD P=0.01	5.2	14.0	2.1		14.9		2.5	0.7	1.0

***** Samples assessed visually, scale 1-10, 7 = borderline, >7 = too dark.

Table 14. SA Mallee French fry trial harvested in winter 1999, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry Colour*
Bannock Russet A81473-2	20	7.2	5.2	0.0	0	5.2	8	3.9	1.076	6.7
Mac Russet	20	10.9	23.3	1.1	0	24.3	2	7.6	1.080	7.3
Riverina Russet	20	1.7	12.0	1.9	0	13.9	6	2.3	1.079	7.7
Russet Burbank	20	7.5	5.3	0	0	5.3	7	4.3	1.080	7.3
92-37-1	20	4.4	21.0	3.8	0	24.8	1	4.5	1.082	7.0
93-26-10	20	3.7	11.7	8.9	0.9	20.6	3	2.8	1.072	8.0
94-52-7	20	4.4	15.3	0.5	0	15.8	5	3.6	1.077	8.3
94-113-31	20	3.4	17.1	1.9	0	19	4	4.1	1.074	7.7
LSD P=0.05		6.3	7.7	2.8	0.5	8.9		1.9	0.003	0.9

***** Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 15. SA Mallee French fry trial harvested in winter 2000, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry Colour*
Bannock Russet A81473-2	30	4.4	8.1	0.3	0	8.4	7	2.8	1.082	8.3
Ranger Russet	30	3.9	20.4	13.0	0	33.4	3	5.0	1.087	9.0
Russet Burbank	30	7.7	4.7	0.0	0	5.0	8	3.7	1.083	7.3
Shepody	30	4.1	21.2	6	0	27.8	4	4.6	1.086	8.7
Umatilla	30	9.7	13.2	1.2	0	14.4	6	5.4	1.083	8.3
92-37-1	30	6.1	29.9	11.6	0.0	42.5	1	6.8	1.086	7.3
94-44-5	30	5.7	17.6	1.0	0	18.6	5	4.4	1.086	8.7
94-117-2	30	3.6	22.2	11.7	3	37.5	2	4.3	1.091	7.0
LSD P=0.05		1.8	8.2	4.8	2.4	8.8		2.1	0.003	0.9

***** Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 16. SA Mallee French fry trial harvested in winter 2001, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Yield, Tonnes per Hectare					Tuber	Quality						
	Chats 0-75g	Small 75-280g	Large 280-450g	Over Size >450g	Fry Grade >75g	No. Per Plant	Specific Gravity	% Fry Colour at Harvest (USDA chart) 0	1	2	3	4	E
Ranger Russet	8.6	23.4	0.0	0.0	23.4	5.4	1.064	0	0	0	0	100	0
Riverina Russet	7.4	29.3	2.2	0.5	32.1	5.9	1.069	100	0	0	0		0
Russett	3.9	9.3	0.0	0.0	9.3	6.3	1.064	0	70	23	0	7	0
Shepody	3.0	27.1	0.7	0.5	28.1	5.9	1.063	0	23	37	40	0	0
Spey	3.0	19.2	0.0	0.0	19.3	5.0	1.062	0	0	87	13	0	0
Stamped	2.7	25.1	0.5	0.0	25.6	6.0	1.063	0	0	0	17	83	0
92-37-1	2.2	25.6	6.4	2.0	33.9	4.9	1.064	13	44	13	30	0	0
93-26-10	1.7	18.5	14.0	2.7	35.3	4.8	1.059	3	7	0	43	47	0
LSD P=0.05	6.9	8.0	3.8	2.1	7.7	1.8	0.002						

***** Specific Gravity = Wt.Air/(Wt.Air – Wt.Water)

Table 17. SA Mallee French fry trial harvested in winter 2002, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality						
		Chats 0-75g	Small 75-280g	Large 280-450g	Over Size >450g	Fry Grade >75g			Specific Gravity+	% Fry Colour at Harvest (USDA chart) 0	1	2	3	4	E
Russet Burbank	38.4	2.7	14.4	0.0	0.0	14.4	8	6.2	1.078	50	50				
Riverina Russet	33.4	5.2	22.4	0.4	0.0	22.9	7	7.7	1.073	97	3				
Shepody	31.2	1.4	20.7	7.0	1.0	28.6	5	4.7	1.074	67	30		3		
92-37-1	33.4	3.9	35.0	1.1	0.0	36.1	1	9.4	1.075	100					
92-37-1 (C/S*)	33.4	13.1	30.4	0.0	0.0	30.4	4	15.9	1.072	100					
Riverina Russet (C/S*)	33.4	6.2	31.2	0.0	0.0	31.2	3	10.9	1.071	100					
Russet Burbank (C/S*)	38.4	8.9	27.2	0.0	0.0	27.2	6	14.5	1.075	97			3		
Shepody (C/S*)	31.2	4.1	31.9	1.9	0.0	33.8	2	8.9	1.072	60	3	33	3		
LSD P=0.05		4.5	4.5	1.7	0.7	5.0		2.6	0.003						
LSD P=0.01		6.2	6.3	2.3	1.0	6.9		3.6	0.004						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

* C/S is cool stored seed tubers harvested in winter 2001 and sown in this trial in February 2002.

Table 18. SA Mallee French fry trial harvested in winter 2003, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-75g	Small 75-280g	Large 280-450g	Over Size >450g	Fry Grade >75g			Specific Gravity[+]	0	1	2	3	4	E
Ranger Russet	28.0	3.4	28.3	5.5	0.0	33.8	4	7.6	1.064	60	30	10			
Riverina Russet	28.0	2.8	26.4	8.6	0.5	34.9	1	7.3	1.065	100					
Shepody	31.9	3.5	19.9	11.7	0.8	31.6	5	6.3	1.065	43	43	13			
92-37-1	28.0	6.3	30.6	3.9	0.2	34.5	3	6.4	1.065	90	10				3
95-109-6	25.9	4.4	29.9	4.7	0.4	34.6	2	12.2	1.068	97	3				
97-100-1	31.9	6.2	28.7	1.5	0.0	30.2	6	7.4	1.071	100					3
LSD P=0.05		2.8	17.6	3.8	1.2	16.3		4.5	0.002						
LSD P=0.01		4.0	25.1	5.4	1.6	23.1		6.4	0.003						

[+] Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Appendix 2.

South East of South Australia French fry trials from 1997/98 to 2002/03.
(Comparisons of yield and quality parameters for entries in trials grown on sand and loam sites planted in spring in the Mt Gambier area and harvested in autumn (March/April)).
(Entries with the best shape for French fry processing are marked in bold).

Table 19. SE of SA French fry trial grown on a sand site in 1997/98, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing		Yield, Tonnes per Hectare		Rank		Tuber		Quality	
	in rows cm	Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g	Rank by Fry Grade	No. Per Plant	% Dry Matter	Fry * Colour
A7961-1	31.2	7.7	49.8	6.6	0.5	56.8	20	11.0	18.6	7.0
A81473-2	28.0	6.0	34.4	28.1	10.8	73.3	9	8.8	19.8	7.0
A84118-3	28.0	5.0	41.7	28.3	19.3	89.3	3	9.3	19.1	7.3
A84180-8	28.0	8.5	58.3	5.5	0.0	63.9	15	12.1	17.7	7.3
Hilite A	28.0	9.9	51.0	3.2	0.3	54.5	21	11.1	16.6	8.0
Legend	33.4	3.7	38.9	22.1	7.2	68.2	11	8.9	21.4	5.0
Nooksack	25.0	3.7	33.5	30.1	8.5	72.2	10	7.0	22.4	6.7
Ranger Russet										
Amisk	25.0	8.4	52.5	21.2	5.0	78.7	7	10.4	20.4	7.7
Russet Burbank Ruen	38.4	11.0	56.2	5.5	0.6	62.2	16	15.7	19.9	6.7
Umatilla	33.4	9.0	55.2	24.3	3.9	83.5	5	13.8	17.7	7.3
89-42-6	41.6	7.1	57.5	8.2	0.8	66.5	13	16.6	19.3	7.3
91-35-21	28.0	5.9	59.4	18.6	1.8	79.7	6	10.1	20.6	5.3
92-27-3	33.4	9.0	52.0	6.8	0.7	59.5	18	13.3	18.8	6.3
92-37-1	31.2	5.5	46.5	32.6	15.9	95.0	1	11.6	20.4	6.3
93-26-10	22.7	4.9	40.1	23.5	12.6	76.2	8	7.1	19.8	7.3
93-56-44	22.7	8.8	42.6	6.8	0.2	49.5	24	7.8	19.6	7.0
93-113-9	22.7	8.5	47.2	10.3	2.2	59.6	17	8.2	20.2	6.3
94-30-3	28.0	9.4	58.2	7.9	0.6	66.7	12	12.4	21.9	5.7
94-32-7	31.2	7.8	55.3	9.0	0.2	64.5	14	12.0	20.0	6.3
94-35-3	31.2	8.5	46.7	1.5	0.0	48.2	26	10.9	19.8	7.3
94-52-7	25.0	8.7	45.3	7.5	0.6	53.4	23	9.4	21.2	6.3
94-78-4	33.4	10.0	50.1	3.5	0.2	53.8	22	13.5	21.0	6.7
94-109-72	28.0	7.3	43.1	4.3	0.2	47.5	27	9.2	18.1	5.0
94-113-31	22.7	10.5	67.2	15.0	5.0	87.1	4	11.4	19.1	6.0
94-117-2	22.7	4.8	60.4	24.6	7.9	93.0	2	8.8	21.4	6.7
94-119-11	35.7	9.1	46.5	2.3	0.2	49.0	25	13.2	19.2	7.3
94-119-14	25.0	8.2	51.9	5.0	0.8	57.7	19	10.1	20.2	6.3
LSD^{+} P=0.05		2.2	10.4	7.6	5.8	15.1		1.6	1.1	0.8
LSD^{+} P=0.01		2.9	13.9	10.2	7.7	20.1		2.2	1.5	1.1

* Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark
$^{+}$ LSD is the least significant difference between treatment means

Table 20. SE of SA French fry trial grown on a loam site in 1997/98, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			% Dry Matter	Fry * Colour
A7961-1	31.2	3.9	37.8	25.7	6.2	69.7	18	9.3	18.0	7.3
A81473-2	28.0	5.9	41.8	26.3	4.0	72.0	15	9.7	18.5	6.3
A84118-3	28.0	5.1	45.9	24.8	6.9	77.5	7	9.3	18.5	7.0
A84180-8	28.0	5.4	49.0	13.6	0.8	63.5	19	9.5	17.4	7.3
Hilite A	28.0	6.2	43.8	5.3	0.0	49.0	26	8.6	17.3	7.3
Legend	33.4	3.3	31.6	33.9	6.8	72.4	14	8.8	19.2	6.7
MacRusset	35.7	4.4	40.0	35.0	8.4	83.5	4	12.0	20.0	7.0
Ranger Russet Amisk	25.0	3.9	34.4	31.9	9.4	75.6	8	7.3	19.1	7.3
Russet Burbank Ruen	38.4	5.5	48.4	13.1	1.0	62.4	20	12.6	19.9	6.7
Umatilla	33.4	4.5	39.4	33.2	13.6	86.2	3	11.3	18.3	7.0
89-42-6	41.6	6.0	48.8	28.3	4.2	81.3	5	15.8	19.9	7.0
91-161-3	28.0	5.5	37.9	13.4	4.2	55.5	24	7.8	18.9	6.7
92-27-3	33.4	4.3	45.7	24.0	5.6	75.3	9	11.0	19.2	6.3
92-37-1	31.2	4.6	47.8	35.4	12.5	95.7	2	11.9	20.1	6.3
93-26-10	22.7	4.2	33.9	33.5	10.5	78.0	6	6.9	18.4	7.0
93-56-44	22.7	4.5	40.4	25.7	8.1	74.2	12	7.4	18.9	7.7
93-113-9	22.7	4.9	43.0	23.9	3.8	70.7	17	7.2	20.4	6.7
94-30-3	28.0	4.2	55.5	19.1	0.2	74.8	10	10.4	22.0	6.0
94-32-7	31.2	4.4	42.9	24.7	3.1	70.8	16	10.3	19.2	6.3
94-35-3	31.2	5.8	38.6	10.7	1.3	50.6	25	9.0	20.3	6.7
94-52-7	25.0	5.5	50.6	23.0	1.1	74.6	11	9.7	20.0	6.3
94-78-4	33.4	7.6	52.2	7.5	0.2	59.9	22	12.3	21.3	6.7
94-109-72	28.0	5.2	46.3	9.6	1.1	57.0	23	9.3	18.5	5.0
94-113-31	22.7	7.8	62.2	39.9	8.2	110.3	1	11.2	18.1	7.0
94-117-2	22.7	3.7	41.2	24.3	8.4	73.9	13	7.4	19.8	7.0
94-119-11	35.7	8.1	41.0	3.8	0.4	45.3	27	11.4	18.9	7.0
94-119-14	25.0	3.5	43.7	17.1	1.1	61.9	21	7.9	20.0	6.3
LSD[+] P=0.05		2.1	7.5	6.7	4.5	9.3		1.4	0.6	0.8
LSD P=0.01		2.7	9.9	9.0	6.1	12.4		1.9	0.8	1.1

* Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

[+] LSD is the least significant difference between treatment means

Table 21. SE of SA French fry trial grown on a sand site in 1998/99, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry * Colour
Gem Russet	31.2	9.3	41.0	9.7	1.9	52.6	23	10.8	1.072	6.0
Kiwitea	28.0	9.4	52.5	28.5	22.7	103.7	1	13.4	1.080	7.0
Russet Burbank	41.6	5.1	37.6	24.9	12.0	74.5	15	12.5	1.078	6.7
Spey	28.0	10.8	59.6	29.1	6.5	95.2	2	13.8	1.083	5.0
Umatilla	35.7	8.3	41.9	26.4	14.1	82.4	9	13.4	1.077	6.7
A0821-2	28.0	10.3	48.3	17.9	5.4	71.6	17	11.2	1.070	6.7
A81473-2	31.2	7.3	36.8	18.9	9.8	65.5	18	9.5	1.074	5.3
A86107-51	22.7	9.3	46.6	24.5	14.3	85.4	6	9.6	1.071	6.0
AC66107-51	28.0	12.4	51.8	24.6	8.6	85.0	7	14.2	1.068	6.7
AC78069-17	25.0	5.2	39.6	30.7	10.6	80.9	11	8.3	1.070	6.0
W1005RUS	28.0	15.8	69.4	10.7	0.0	80.1	12	17.2	1.076	6.0
92-27-3	35.7	8.0	44.6	25.9	10.4	80.9	10	13.7	1.074	6.3
92-37-1	33.4	8.7	36.3	30.3	21.2	87.8	4	12.8	1.086	5.3
94-42-10	28.0	7.7	31.3	20.2	23.7	75.2	14	8.8	1.090	5.0
94-44-5	28.0	7.5	37.4	26.2	12.1	75.7	13	9.5	1.081	5.0
94-109-18	31.2	11.7	44.0	5.1	0.0	49.1	25	12.5	1.077	5.3
94-109-72	31.2	8.6	33.0	9.2	1.4	43.6	28	9.4	1.074	4.3
94-111-13	28.0	12.5	41.5	7.5	0.0	49.0	26	11.9	1.085	5.0
94-117-2	25.0	6.9	40.9	28.2	15.2	84.3	8	8.9	1.086	5.3
95-19-4	33.4	18.6	49.2	9.3	2.0	60.5	20	18.4	1.080	5.7
95-37-12	33.4	8.5	42.7	14.5	3.6	60.8	19	11.6	1.074	5.0
95-52-5	33.4	10.4	50.4	15.7	8.0	74.1	16	14.7	1.073	5.3
95-81-11	33.4	10.8	38.7	8.5	0.4	47.6	27	13.8	1.074	5.0
95-82-31	28.0	9.4	44.1	8.4	0.9	53.4	22	10.6	1.072	5.7
95-102-22	35.7	12.0	40.6	9.9	1.1	51.6	24	13.9	1.076	5.0
95-109-2	33.4	16.9	52.7	6.6	0.0	59.3	21	18.0	1.082	6.0
95-109-6	31.2	11.2	62.8	23.6	2.8	89.2	3	16.5	1.098	4.7
95-110-8	25.0	7.8	36.2	24.2	26.0	86.4	5	8.4	1.073	6.0
LSD P=0.05		3.7	9.6	10.0	9.2	14.2		2.2	0.006	1.1
LSD P=0.01		4.9	12.7	13.3	12.3	18.9		2.9	0.008	1.5

***** Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 22. SE of SA French fry trial grown on a loam site in 1998/99, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry * Colour
Gem Russet	31.2	6.6	35.2	10.1	0.0	45.3	24	9.2	1.066	6.3
Kiwitea	28.0	6.9	58.2	28.4	4.5	91.1	1	11.3	1.079	6.3
Russet Burbank	41.6	5.4	38.6	15.4	1.0	55.0	18	10.9	1.077	7.0
Spey	28.0	6.6	55.6	18.0	0.6	74.2	3	11.9	1.076	5.7
Umatilla	35.7	8.1	52.6	19.6	0.6	72.8	4	13.9	1.070	7.3
A0821-2	28.0	9.3	50.6	5.3	1.1	57.0	15	10.6	1.069	6.3
A81473-2	31.2	6.2	31.4	22.8	6.5	60.7	12	8.7	1.072	6.7
A86107-51	22.7	9.1	59.2	14.7	1.1	75.0	2	9.8	1.067	8.0
AC66107-51	28.0	14.4	57.2	10.4	0.0	67.6	8	13.2	1.066	7.7
AC78069-17	25.0	3.6	44.3	20.1	3.5	67.9	7	7.5	1.068	6.7
W1005RUS	28.0	15.1	50.9	2.0	0.0	52.9	19	13.2	1.076	6.3
92-27-3	35.7	5.5	40.1	18.7	1.5	60.3	13	10.2	1.072	5.7
92-37-1	33.4	6.7	46.4	17.4	2.6	66.4	9	12.0	1.081	6.0
94-42-10	28.0	5.7	42.9	23.1	4.0	70.0	6	9.3	1.084	6.3
94-44-5	28.0	4.7	36.8	20.0	1.8	58.6	14	7.8	1.083	6.7
94-109-18	31.2	8.4	41.7	1.9	0.0	43.6	26	10.6	1.071	6.0
94-109-72	31.2	6.9	41.8	6.4	0.0	48.2	21	9.8	1.074	5.3
94-111-13	28.0	11.6	40.7	1.0	0.0	41.7	28	11.5	1.078	6.3
94-117-2	25.0	4.1	38.3	19.9	2.6	60.8	11	7.0	1.078	5.7
95-19-4	33.4	17.1	43.8	1.2	0.0	45.0	25	16.2	1.078	6.3
95-37-12	33.4	10.9	53.5	3.3	0.0	56.8	16	13.8	1.071	6.0
95-52-5	33.4	13.9	51.7	3.8	0.0	55.5	17	16.4	1.066	6.3
95-81-11	33.4	11.4	44.6	2.1	0.0	46.7	22	12.3	1.074	5.3
95-82-31	28.0	7.6	34.5	7.7	0.2	42.4	27	9.1	1.071	6.3
95-102-22	35.7	8.5	41.7	3.9	0.0	45.6	23	12.7	1.070	5.3
95-109-2	33.4	15.2	47.4	1.0	0.0	48.4	20	17.3	1.076	6.0
95-109-6	31.2	10.5	60.9	3.8	0.0	64.7	10	14.1	1.085	5.7
95-110-8	25.0	4.0	32.1	27.3	12.0	71.4	5	6.7	1.073	6.0
LSD P=0.05		3.5	9.8	6.9	4.4	13.2		2.2	0.003	1.0
LSD P=0.01		4.7	13.0	9.2	5.9	17.5		3.0	0.004	1.3

* Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 23. SE of SA French fry trial grown on a sand site in 1999/2000, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry * Colour
Russet Burbank Ruen	38.4	6.5	35.0	7.6	0.5	43.1	22	11.1	1.078	5.3
Spey	31.2	7.8	49.3	3.5	0.0	52.8	8	11.8	1.075	5.0
Stampede	31.2	6.0	37.2	22.1	5.1	64.4	1	10.0	1.072	7.0
A82119-3	31.2	8.1	39.5	8.6	1.1	49.2	11	10.0	1.070	5.0
A82360-7	31.2	11.3	39.1	4.4	0.5	44.0	21	11.6	1.073	6.7
A86102-6	31.2	6.1	42.9	4.9	0.2	48.0	16	9.5	1.065	6.0
A8792-1	28.0	7.3	38.9	8.6	0.2	47.7	17	9.0	1.073	3.7
92-27-3	35.7	5.9	48.3	12.0	0.8	61.1	2	12.8	1.078	5.3
92-37-1	31.2	7.3	49.1	8.3	0.6	58.0	4	12.0	1.087	4.7
94-42-10	31.2	3.7	39.8	14.5	1.5	55.8	6	8.1	1.090	5.0
94-44-5	28.0	4.8	32.1	17.1	4.4	53.6	7	7.6	1.079	4.3
94-117-2	31.2	4.5	27.9	11.1	5.5	44.5	20	7.0	1.075	4.3
95-109-6	38.1	9.3	41.4	4.6	1.3	47.3	18	14.5	1.084	5.7
95-110-8	25.0	4.4	36.2	10.9	1.5	48.6	14	7.0	1.075	4.0
96-33-1	31.2	6.6	36.1	12.3	0.9	49.3	10	9.6	1.089	5.0
96-33-25	38.1	10.7	32.1	2.3	0.0	34.4	28	13.7	1.085	5.7
96-58-2	28.0	6.7	41.9	6.2	1.1	49.2	11	8.7	1.068	4.7
96-58-5	28.0	3.3	25.9	16.0	5.3	47.2	19	5.8	1.061	6.0
96-113-2	38.4	14.7	34.3	0.9	0.0	35.2	27	14.7	1.079	4.0
96-113-6	25.0	7.0	45.1	11.3	1.9	58.3	3	8.6	1.082	4.7
96-125-46	33.4	12.2	38.9	3.6	0.4	42.9	23	12.6	1.081	4.0
96-128-13	31.2	4.7	33.0	4.9	0.0	37.9	24	7.7	1.084	3.7
96-131-40	33.4	5.8	43.4	4.5	0.2	48.1	15	10.6	1.077	6.3
96-139-14	28.0	8.6	44.4	4.6	0.1	49.1	13	10.2	1.075	3.0
96-139-22	41.6	15.3	36.2	0.2	0.0	36.4	26	18.3	1.087	5.3
96-139-28	31.2	9.8	46.5	8.9	1.5	56.9	5	13.0	1.079	6.7
96-141-12	31.2	7.7	44.8	6.4	0.3	51.5	9	10.5	1.076	5.0
96-145-13	35.7	11.6	36.3	0.5	0.0	36.8	25	14.8	1.074	4.0
LSD P=0.05		2.4	9.7	4.1	2.3	10.9		1.8	0.003	1.2
LSD P=0.01		3.2	12.9	5.5	3.0	14.5		2.4	0.005	1.6

***** Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 24. SE of SA French fry trial grown on a loam site in 1999/2000, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	Fry * Colour
Russet Burbank Ruen	38.4	6.7	36.1	17.4	6.6	60.1	16	11.9	1.083	5.7
Spey	31.2	9.0	52.1	23.3	1.7	77.1	9	13.3	1.076	6.0
Stampede	31.2	5.8	27.1	21.2	12.8	61.1	15	8.3	1.083	6.0
A82360-7	31.2	7.9	46.5	33.3	9.6	89.4	2	12.9	1.080	5.7
A86102-6	31.2	5.1	25.0	21.5	11.0	57.5	21	7.8	1.074	6.7
A8792-1	28.0	4.4	33.5	28.5	10.8	72.8	12	8.2	1.080	6.7
92-27-3	35.7	4.5	29.9	25.0	13.7	68.6	13	9.6	1.071	5.0
92-37-1	31.2	6.1	33.7	37.5	28.3	99.5	1	11.2	1.082	6.0
94-42-10	31.2	4.2	30.2	30.1	25.1	85.4	3	9.0	1.091	6.0
94-44-5	28.0	4.6	29.3	21.3	7.8	58.4	18	7.5	1.080	6.7
94-117-2	31.2	4.0	23.3	28.7	27.1	79.1	6	8.0	1.081	6.0
95-109-6	38.1	6.8	39.6	27.5	7.8	74.9	11	13.1	1.087	5.3
95-110-8	25.0	4.2	31.6	33.8	19.4	84.8	4	7.8	1.085	6.0
96-33-1	31.2	5.3	31.0	34.2	18.2	83.4	5	9.5	1.084	6.7
96-33-25	38.1	6.5	33.4	14.7	4.3	52.4	25	11.7	1.092	6.0
96-58-2	28.0	5.4	37.7	20.0	3.4	61.1	14	8.4	1.074	6.7
96-58-5	28.0	3.5	23.2	20.9	8.8	52.9	24	5.9	1.072	6.3
96-113-2	38.4	9.0	38.8	12.1	8.6	59.5	17	12.4	1.089	5.3
96-113-6	25.0	5.1	31.4	31.3	16.3	79.0	7	7.6	1.082	5.7
96-125-46	33.4	6.0	40.6	10.9	0.8	52.3	26	10.4	1.071	5.0
96-126-11	35.7	11.6	47.1	9.8	1.4	58.3	19	14.4	1.076	6.0
96-128-13	31.2	5.9	31.1	17.4	7.8	56.3	23	8.6	1.088	6.0
96-131-40	33.4	7.8	41.7	6.0	0.2	47.9	27	10.9	1.082	5.3
96-139-14	28.0	9.3	38.3	14.1	4.7	57.1	22	10.0	1.079	5.0
96-139-22	41.6	15.3	36.3	4.6	1.3	42.2	28	16.3	1.094	6.7
96-139-28	31.2	5.8	37.0	29.3	11.0	77.3	8	10.7	1.085	6.7
96-141-12	31.2	7.4	44.5	26.2	5.5	76.2	10	12.1	1.080	6.0
96-145-13	35.7	7.3	38.9	15.5	3.3	57.7	20	12.4	1.074	6.3
LSD P=0.05		2.6	9.2	10.2	8.6	15.5		2.2	0.004	1.1
LSD P=0.01		3.5	12.3	13.7	11.4	20.6		3.0	0.005	1.4

***** Samples assessed visually , scale 1 - 10, 7 = borderline, > 7 = too dark

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 25. SE of SA French fry trial grown on a sand site in 2000/2001, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Russett Burbank	38.4	12.2	47.5	7.6	3.5	58.6	17	15.0	1.081	97	3				
Stampede	31.2	8.1	54.3	13.4	1.6	69.3	7	12.1	1.080	100					
A82119-3	35.7	4.5	47.1	26.4	6.7	80.2	4	11.2	1.076	100					
A8602-1	31.2	5.1	21.4	2.2	0.0	23.6	28	5.6	1.064		100				
A8792-1	28.0	10.8	54.6	26.8	5.4	86.9	3	11.9	1.080	100					
AC83039-6	31.2	9.8	46.2	13.1	1.0	60.4	16	11.3	1.071	100					
92-37-1	33.4	9.5	55.1	28.0	7.6	90.7	2	14.5	1.085	93	7				
94-44-5	28.0	13.2	50.6	15.9	1.4	68.0	9	11.8	1.086	97	3				
94-117-2	33.4	12.2	45.9	9.4	2.5	57.7	19	13.1	1.084	100					
95-109-6	41.6	12.6	55.6	13.5	1.1	70.1	6	18.2	1.084	100					
95-110-8	28.0	9.1	59.3	27.8	7.4	94.6	1	13.0	1.087	100					
96-113-2	41.6	13.2	41.6	2.7	1.1	45.3	27	15.8	1.085	100					
96-126-11	41.6	12.2	49.9	5.2	0.4	55.5	22	17.7	1.076	100					
96-131-40	38.4	8.4	41.9	5.3	0.4	47.5	25	12.1	1.078	100					
96-139-14	31.2	9.4	41.9	16.5	2.2	60.7	15	10.3	1.082	100					
96-141-12	33.4	10.5	54.1	19.2	3.9	77.3	5	14.5	1.082	97	3				
97-15-4	31.2	5.8	32.8	11.9	2.0	46.7	26	7.9	1.074	77	23				
97-20-3	35.7	9.5	45.5	7.5	1.1	54.0	23	12.9	1.076	83	17				
97-25-8	31.2	11.4	50.0	5.8	0.0	55.7	21	10.8	1.076	100					3
97-43-11	41.6	15.6	55.1	9.4	1.4	66.0	11	20.1	1.086	100					
97-43-21	28.0	7.7	57.3	11.2	0.2	68.7	8	11.3	1.077	100					
97-45-2	33.4	8.2	55.0	7.4	0.6	63.0	14	13.4	1.084	100					
97-83-10	31.2	14.7	51.0	11.6	1.2	63.7	13	14.0	1.085	90	10				
97-88-12	38.4	10.0	42.9	9.2	1.6	53.7	24	13.3	1.088	100					
97-89-5	41.6	13.6	62.2	3.4	0.2	65.7	12	20.7	1.084	100					
97-90-2	31.2	6.7	42.0	13.5	1.0	56.5	20	9.6	1.079	100					
97-92-5	28.0	20.6	60.8	6.2	0.5	67.5	10	15.8	1.074	100					
97-100-1	28.0	8.1	47.9	9.8	0.6	58.2	18	10.0	1.083	100					
LSD P=0.05		2.9	9.2	8.0	3.9	10.2		2.0	0.004						
LSD P=0.01		3.9	12.3	10.6	5.1	13.6		2.6	0.005						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 26. SE of SA French fry trial grown on a loam site in 2000/2001, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Russet Burbank	38.4	10.2	35.9	13.9	3.4	53.2	20	12.5	1.079	100					17
Stampede	31.2	6.7	42.2	20.8	4.2	67.2	6	10.2	1.077	93	7				3
A82119-3	35.7	7.9	43.5	16.6	2.8	62.9	11	11.8	1.070	100					3
A8602-1	31.2	5.7	21.7	11.2	0.2	33.0	28	6.1	1.061			10	63	27	
A8792-1	28.0	2.6	30.1	35.4	11.5	77.0	2	7.2	1.076	97	3				
AC83039-6	31.2	7.5	29.4	21.0	1.6	52.0	21	8.0	1.068	100					7
92-37-1	33.4	9.3	43.3	18.1	7.1	68.5	5	12.2	1.077	100					13
94-44-5	28.0	10.3	42.2	15.0	1.5	58.7	13	9.3	1.078	93	7				16
94-117-2	33.4	4.1	42.3	27.3	6.3	75.9	3	10.0	1.078	100					7
95-109-6	41.6	12.8	41.8	11.1	1.7	54.6	18	16.0	1.082	97	3				10
95-110-8	28.0	7.8	46.7	24.0	11.8	82.4	1	10.3	1.079		84	13	3		7
96-113-2	41.6	11.1	38.4	9.1	0.7	48.2	24	15.0	1.092	100					
96-126-11	41.6	11.2	40.5	8.7	0.2	49.4	23	13.8	1.080	100					10
96-131-40	38.4	6.6	39.6	10.9	0.9	51.4	22	11.4	1.076	100					
96-139-14	31.2	9.4	37.1	13.7	3.4	54.2	19	10.0	1.083	100					
96-141-12	33.4	4.6	35.5	25.9	7.8	69.2	4	9.4	1.079	100					3
97-15-4	31.2	4.8	25.3	11.1	1.2	37.6	27	5.7	1.093	100					7
97-20-3	35.7	8.4	35.9	7.5	1.2	44.6	26	10.6	1.081		100				3
97-25-8	31.2	7.3	42.2	21.1	2.2	65.6	7	10.4	1.074	97	3				13
97-43-11	41.6	9.2	45.2	18.0	2.0	65.2	8	14.7	1.078	100					
97-43-21	28.0	4.7	36.2	17.9	3.1	57.2	15	7.3	1.078	100					
97-45-2	33.4	6.2	40.6	15.8	2.0	58.4	14	9.9	1.083	100					
97-83-10	31.2	10.5	42.8	18.1	3.5	64.4	10	12.1	1.076	97	3				3
97-88-12	38.4	11.6	36.8	9.2	1.4	47.4	25	13.5	1.081	100					3
97-89-5	41.6	10.0	47.3	15.8	1.5	64.6	9	16.4	1.079	100					
97-90-2	31.2	3.9	25.9	25.1	6.0	57.0	16	7.0	1.073	100					3
97-92-5	28.0	8.4	42.1	12.9	1.5	56.5	17	9.7	1.070	83	17				
97-100-1	28.0	14.0	53.2	8.6	1.0	62.8	12	13.0	1.077	100					
LSD P=0.05		3.2	8.4	7.2	4.4	12.4		2.3	0.005						
LSD P=0.01		4.7	12.2	10.5	6.5	18.2		3.4	0.007						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 27. SE of SA French fry trial grown on a sand site in 2001/2002, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Innovator	31.2	3.5	37.7	6.5	1.1	45.4	23	8.4	1.074	100					
Stampede	31.2	9.0	54.2	11.3	1.5	67.0	7	13.4	1.078	80	20				
Russet Burbank	38.4	7.1	48.6	5.1	0.4	54.1	17	13.8	1.086	100					30
92-37-1	33.4	5.2	49.4	16.7	5.7	71.7	3	12.7	1.080	100					
94-44-5	31.2	3.3	36.5	11.4	7.2	55.2	14	8.5	1.080	93	7				
94-117-2	33.4	5.2	48.3	11.3	5.0	64.6	9	11.8	1.086	100					
95-109-6	41.6	7.4	56.1	10.6	3.2	69.9	5	17.3	1.091	100					
96-139-14	35.7	7.2	44.3	3.7	0.0	48.0	21	12.6	1.077	100					
97-43-11	38.4	9.2	59.7	3.0	0.3	63.0	10	18.6	1.086	100					
97-45-2 (2 reps)	33.4	8.3	60.4	1.4	0.0	61.8	11	14.5	1.086	100					
97-58-6	28.0	5.4	44.3	9.3	1.1	54.7	16	9.7	1.072	93	7				
97-83-10	31.2	11.8	49.6	6.2	1.8	57.6	12	13.8	1.089	93	7				
97-89-5	41.6	7.3	48.8	5.3	0.8	54.9	15	15.6	1.087	100					
97-100-1	28.0	8.1	54.2	11.2	1.1	66.6	8	12.1	1.082	100					
98-6-2	33.4	4.4	56.2	17.3	3.2	76.6	1	12.8	1.084	100					
98-21-8	35.7	4.5	31.3	2.6	0.0	33.8	27	8.8	1.080	100					
98-33-24	33.4	5.8	47.5	3.4	1.7	52.6	19	12.1	1.086	100					
98-35-2	38.4	10.4	45.8	0.7	0.0	46.5	22	16.7	1.078	100					
98-35-23	33.4	7.2	40.2	1.8	0.0	42.0	24	11.5	1.074	100					
98-35-26	28.0	13.8	37.3	0.9	0.0	38.2	25	12.1	1.080	100					

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Table 27 Continued from previous page

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
98-66-7	33.4	6.9	46.3	5.7	1.0	53.0	18	12.8	1.081	100					
98-96-15	31.2	16.3	33.8	0.1	0.0	33.9	26	14.6	1.078	100					
98-96-31	28.0	4.8	49.7	17.6	2.4	69.7	6	10.4	1.086	100					
98-96-53 (2 reps)	31.2	9.8	32.0	0.7	0.0	32.7	28	11.5	1.079	90	10				
98-102-10	28.0	3.4	39.4	23.7	10.7	73.8	2	8.3	1.075	100					
98-102-20	28.0	4.6	48.4	16.8	5.3	70.6	4	9.8	1.078	100					
98-107-12	33.4	12.1	47.4	1.0	0.0	48.3	20	15.0	1.081	100					
98-109-1	33.4	7.8	51.9	4.0	1.2	57.2	13	13.5	1.087	100					
LSD P=0.05		3.4	14.9	5.8	3.1	16.3		3.8	0.003						
LSD P=0.01		4.5	19.9	7.7	4.1	21.7		5.1	0.004						
2rep LSD P=0.05		3.8	16.7	6.5	3.4	18.2		4.2	0.004						
2rep LSD P=0.01		5.0	22.2	8.7	4.6	24.3		5.6	0.005						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 28. SE of SA French fry trial grown on a loam site in 2001/2002, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Stampede	31.2	3.9	34.1	33.2	14.5	81.8	5	9.4	1.083	97	3				
Russet Burbank	38.4	3.7	26.6	26.3	14.4	67.3	17	9.7	1.080	100					
92-37-1	33.4	3.7	29.8	34.8	34.0	98.6	1	10.5	1.083	97	3				
94-44-5	31.2	2.8	27.5	27.1	17.9	72.5	13	7.9	1.084	97			3		
94-117-2	33.4	4.2	25.4	29.9	24.0	79.3	7	9.4	1.081	100					
95-109-6	41.6	5.9	33.7	26.7	13.2	73.5	10	13.1	1.094	100					
96-139-14	35.7	3.8	33.2	25.3	3.8	62.3	19	9.6	1.088	100					
97-43-11	38.4	5.6	52.9	24.1	0.8	77.8	8	14.5	1.082	100					
97-45-2	33.4	5.4	39.9	33.5	11.0	84.4	4	11.8	1.082	100					
97-58-6	28.0	3.3	26.5	24.4	7.3	58.3	23	7.2	1.072	100					
97-83-10	31.2	7.7	39.5	27.0	2.5	69.0	15	12.3	1.090	100					
97-89-5	41.6	5.7	39.6	25.2	8.0	72.7	12	14.1	1.090	100					
97-100-1	28.0	7.6	41.8	22.9	3.9	68.6	16	10.7	1.080	100					
98-6-2	33.4	2.3	35.5	32.5	8.8	76.8	9	8.8	1.086	100					
98-21-8	35.7	4.5	31.8	11.8	1.4	45.1	27	8.5	1.080	100					
98-33-24	33.4	4.5	30.8	24.6	3.4	58.8	22	9.5	1.079	100					
98-35-2	38.4	7.3	43.5	8.7	0.3	52.6	25	13.3	1.076	100					

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Table 28 – continued from previous page

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
98-35-23	33.4	5.1	38.5	20.7	1.9	61.1	20	10.4	1.076	100					
98-35-26	28.0	9.0	50.8	20.1	1.9	72.8	11	12.2	1.080	100					
98-66-7	33.4	7.7	40.6	15.9	1.3	57.7	24	12.2	1.079	100					
98-88-4	28.0	3.3	35.8	25.2	3.3	64.3	18	8.1	1.078	100					
98-96-15	31.2	11.7	49.5	8.9	1.5	59.9	21	14.2	1.075	100					
98-96-31	28.0	1.6	27.5	39.7	26.2	93.4	3	7.7	1.083	100					
98-96-53	31.2	9.8	40.2	4.0	0.4	44.6	28	11.7	1.081	100					
98-102-10	28.0	1.8	28.5	38.2	28.2	94.9	2	8.1	1.075	100					
98-102-20	28.0	2.2	33.1	31.4	16.3	80.8	6	8.1	1.080	97	3				
98-107-12	33.4	10.0	46.0	3.8	0.4	50.1	26	13.5	1.079	100					
98-109-1	33.4	6.2	50.1	19.6	1.3	71.0	14	12.3	1.084	100					
LSD P=.05		2.3	7.4	8.2	7.2	11.5		1.6	0.006						
LSD P=.01		3.1	9.8	11.0	9.6	15.3		2.1	0.007						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 29. SE of SA French fry trial grown on a sand site in 2002/2003, comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Russet Burbank	38.4	8.3	38.4	4.7	0.0	43.1	17	11.2	1.073	100					3
Stampede	31.2	13.6	37.7	9.4	0.7	47.7	9	11.6	1.075	100					
ATX 84706-2RY	31.2	5.5	29.1	17.7	1.8	48.6	7	7.5	1.068	97	3				
TX 1385-12RU	31.2	11.1	37.6	9.6	1.4	48.6	8	10.8	1.063	100					3
94-117-2	33.4	7.5	40.8	13.8	1.3	55.9	2	10.7	1.073	100					3
95-109-6	41.6	16.2	39.2	0.4	0.0	39.6	22	16.8	1.084	100					
96-139-14	38.4	11.7	35.9	5.2	0.0	41.0	19	12.0	1.072	97	3				3
97-45-2	33.4	13.4	37.1	1.1	0.0	38.2	23	11.3	1.081	100					
97-100-1	31.2	14.5	38.7	5.2	0.2	44.1	15	11.9	1.075	100					
98-33-24	35.7	9.6	36.3	4.3	0.5	41.1	18	11.3	1.069	97	3				17
98-66-7	35.7	15.0	42.4	4.8	0.0	47.2	10	15.3	1.067	100					
98-96-11	35.7	7.1	31.4	12.9	2.5	46.8	11	9.7	1.086	97	3				3
98-96-31	35.7	6.1	37.2	15.2	2.3	54.6	3	10.1	1.078	100					
98-102-10	28.0	6.0	42.7	17.2	2.2	62.0	1	8.5	1.072	100					3
98-102-20	28.0	9.1	40.2	12.5	1.3	54.0	4	9.7	1.073	100					7
98-109-1	35.7	13.2	41.2	5.1	0.0	46.3	12	13.3	1.076	100					

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Table 29. Continued from previous page

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
99-2-13	35.7	12.4	40.3	0.6	0.0	40.9	20	12.8	1.077	100					
99-3-4	31.2	28.1	22.8	0.1	0.0	22.9	28	17.3	1.076	100					
99-4-3	38.4	19.2	31.8	0.5	0.0	32.3	25	16.6	1.076	100					
99-4-9	25.0	10.7	45.4	5.2	0.0	50.6	6	8.8	1.073	100					
99-4-12	31.2	18.9	45.2	0.3	0.0	45.5	13	14.5	1.078	100					
99-9-13	33.4	15.8	23.5	0.4	0.2	24.2	27	11.6	1.082	100					
99-9-25	28.0	21.0	43.6	0.4	0.0	44.1	15	14.5	1.072	100					
99-33-46	31.2	12.1	27.6	0.0	0.0	27.6	26	10.0	1.081	100					
99-48-2	31.2	8.3	44.0	8.5	0.0	52.5	5	10.7	1.076	100					
99-49-13	28.0	18.5	35.5	4.4	0.2	40.0	21	11.9	1.081	100					
99-67-7	31.2	16.3	44.8	0.2	0.0	45.0	14	14.0	1.071	100					
99-71-6	33.4	23.7	33.1	2.0	0.0	35.2	24	16.2	1.070	100					
LSD P=0.05		4.8	8.6	9.4	2.0	13.0		2.5	0.014						
LSD P=0.01		6.4	11.5	12.6	2.7	17.3		3.3	0.019						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)

Table 30. SE of SA French fry trial grown on a loam site in 2002/2003,
comparison of potato lines for different tuber yield weight grades, tubers per plant and quality parameters.

Entry	Spacing in rows cm	Yield, Tonnes per Hectare					Rank by Fry Grade	Tuber No. Per Plant	Quality	% Fry Colour at Harvest (USDA chart)					
		Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g			Specific Gravity+	0	1	2	3	4	E
Russet Burbank	38.4	8.5	46.5	17.3	2.6	66.3	6	13.7	1.086	100					7
Stampede	31.2	8.5	36.9	16.9	5.8	59.6	10	10.1	1.087	93	7				3
ATX 84706-2RY	31.2	2.1	26.3	23.4	13.1	62.8	8	6.3	1.070	100					
TX 1385-12RU	31.2	4.6	30.8	19.1	4.7	54.7	17	7.6	1.075	100					
94-117-2	33.4	5.8	33.7	23.7	10.3	67.7	5	9.1	1.084	100					
95-109-6	41.6	10.1	47.2	13.0	1.6	61.7	9	15.3	1.096	97	3				
96-139-14	38.4	4.7	37.5	12.0	4.2	53.6	20	9.5	1.091	100					13
97-45-2	33.4	6.4	39.6	18.2	1.5	59.3	11	10.2	1.088	100					
97-100-1	31.2	6.3	35.6	12.8	1.3	49.7	23	8.9	1.083	100					
98-33-24	35.7	5.3	35.6	17.5	1.4	54.5	18	10.0	1.078	100					3
98-66-7	35.7	11.0	34.7	7.3	2.1	44.1	25	11.9	1.083	100					
98-96-11	35.7	5.9	41.6	19.4	7.5	68.6	3	11.4	1.093	93	7				
98-96-31	35.7	3.4	28.3	23.4	18.2	69.8	2	8.7	1.093	97	3				
98-102-10	28.0	3.8	29.9	32.9	10.5	73.2	1	7.5	1.079	100					
98-102-20	28.0	4.8	33.9	24.4	8.0	66.2	7	7.9	1.085	100					
98-109-1	35.7	5.7	42.3	14.4	2.0	58.8	13	11.0	1.089	100					
99-2-13	35.7	8.6	45.9	11.4	0.3	57.6	14	12.2	1.089	100					3

Continued on next page

Table 30 Continuation of table from previous page

Entry	Spacing in rows cm	Chats 0-100g	Small 100-280g	Large 280-450g	Over Size >450g	Fry Grade >100g	Rank by Fry Grade	Tuber No. Per Plant	Quality Specific Gravity+	% Fry Colour at Harvest (USDA chart) 0	1	2	3	4	E
99-3-4	31.2	21.2	34.2	1.4	0.0	35.6	28	14.8	1.095	100					
99-4-3	38.4	15.9	39.2	6.7	0.0	45.9	24	16.2	1.083	100					
99-4-9	25.0	5.1	33.2	23.5	11.3	68.0	4	7.1	1.082	100					
99-4-12	31.2	14.5	47.6	4.4	0.0	52.0	21	12.7	1.090	97	3				
99-9-13	33.4	8.6	34.8	7.4	0.4	42.5	26	9.7	1.088	100					
99-9-25	28.0	6.9	33.3	6.9	1.8	42.0	27	7.5	1.080	87	13				
99-33-46	31.2	10.8	51.0	6.9	1.2	59.0	12	12.1	1.097	100					
99-48-2	31.2	7.0	44.4	10.4	0.5	55.3	16	9.7	1.080	100					
99-49-13	28.0	7.5	38.7	11.6	0.0	50.3	22	9.3	1.098	97	3				
99-67-7	31.2	7.9	38.7	12.4	2.9	53.9	19	9.9	1.087	100					
99-71-6	33.4	12.0	47.5	9.0	0.0	56.5	15	13.7	1.087	100					
LSD P=.05		3.3	12.9	9.7	5.3	16.0		2.5	0.006						
LSD P=.01		4.4	17.2	12.9	7.1	21.3		3.3	0.009						

+ Specific Gravity = Wt.Air/(Wt.Air-Wt.Water)