Potato Australia

PUBLISHED BY THE AUSTRALIAN POTATO INDUSTRY COUNCIL

VOLUME 7 AUGUST 1996 ISSN 1036 – 8558

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Potato Australia

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Editorial

There are increasing signs that our industry is starting to make the transition from a production based commodity to one which is market driven.

Several stories in this issue stress the need to identify what the market wants and deliver exactly that.

Such an approach becomes vital as we begin to explore the potential of export markets. For instance Andrew Henderson mentions enquiries for potential exports of 600 000 tonnes. That's over half of Australia's current production! If we get the timing right, the varieties right, the quality right.....everything right then we can look forward to a bright future.

Another recurring theme in this issue is the increasing uptake by growers right around the nation of integrated pest management techniques rather than total reliance on chemical sprays. Many are experiencing reduced costs and other benefits as a result.

You will notice that many stories this year have a logo next to the acknowledgements section. This logo signifies that the project received funding from the Horticultural Research and Development Corporation and the potato levy.

The editorial panel thanks everyone who has contributed to *Potato Australia* this year and we look forward to your continued support in the future.

The editorial panel, L to R: John Fennell, Nathalie Jarosz and Bruce Beattie

INVITATION TO CONTRIBUTORS AND ADVERTISERS

This magazine will be published annually in August. Articles are welcome on any topic related to potatoes, please submit copy of articles and advertising by the end of May to: The Editor, Potato Australia. PO Box 303, Devonport, Tasmania, 7310. Phone: (004) 217 637 Fax: (004) 245 142

Contents

ACKNOWLEDGEMENT:

Front Cover: Processing French fries at Ulverstone, Tasmania.
Courtesy of Simplot Australia Pty Ltd, John Fennell Department of Primary Industry and Fisheries, Tasmania and Bob Iddon Photography.

From the Chairman's Desk

WAYNE CORNISH
is the Chairman of the
Australian Potato Industry Council

A year of fluctuating fortunes for all within the industry, certainly from a growers point of view.

Queensland's Lockyer Valley growers must really be wondering what they have to do to attract reasonable weather. From one extreme to another virtually over night throws all planning and management skills away.

Pricing on the fresh market has been violent to say the least, with near record pricing in the latter part of 1995 to devastatingly low prices by mid 1996. It is a fickle industry in which we choose to be.

APIC's agenda over the past twelve months has again been solid. The issues requiring attention have been adequately addressed by our constituents through Max Walker, our Secretary. Max has had to contend with health difficulties during the year, making me all the more appreciative of his efforts.

There is no doubt that the call on APIC's professionalism to represent industry on all types of issues is increasing.

Turning to issues which must be addressed by industry. Firstly, APIC's

WAYNE CORNISH

R&D Advisory Committee has agreed the need exists to examine or review the R&D five year plan. This requires consultation with industry as the levy payers. The task of consultation needs to be complete by September 1996. The evidence compiled through regional grower meetings, processor meetings and agent meetings will be collated and utilised by the APIC R&D Committee later this year.

To facilitate this consultancy process, Jonathon Eccles from HRDC will be developing presentation kits and travelling to various regions to present that information. Jonathon will be assisted by Craig Wilson in Queensland and NSW, I will assist in the remainder of grower meetings around Australia and Jeff Peterson will co-ordinate processor and agent contributions.

The five year plan is a very important component of proper management of R&D projects into the future. Researchers and others require general direction from industry so effort can be focused.

The strategy the R&D Committee has developed in areas where a number of submissions to undertake research work in a single area is to bring the interested parties together with the objective of achieving the best outcome through co-operation and co-ordination.

An example of this is the breeding and evaluation area. This research component of industry consumes vast amounts of budget. We have, I believe, effected real savings without jeopardising effective programs. Quality assurance and technology transfer have been identified as new areas requiring attention and two projects have been funded to accommodate these subjects.

Industry requires better completed project extension to occur, we believe these two new programs will assist.

Finally, I look forward to your input to industry matters as we consult with you.

My thanks once again to the editorial team producing this publication. The Potato Australia magazine is the flagship of industry and growing in stature annually. Well done and thank you.

All the best. ■

Variety trials in northeast Tasmania

Horticultural Research & Development Corporation

Potato R&D Projects for 1996-97

Project Title	Chief Investigator	Telephone
Crop management		
Sustainable potato production in highland areas of Australia	Ms Sandra Lanz, Robertson District Advancement & Landcare Association	048 83 6318
Sustainable crop management for potato farms on the Atherton Tableland	Mr Jim Gunton, QLD Department of Primary Industries	070 95 8229
Improved productivity of inland potato production	Mr Stephen Wade, NSW Agriculture	058 83 1644
Early production of French fry potatoes on the Swan coastal plain	Dr Ian McPharlin, Agriculture Western Australia	09 368 3671
A national strategy to reduce cadmium accumulation in potato crops	Dr Mike Mclaughlin. CSIRO Division of Soils	08 303 8433
Mechanisms of cadmium accumulation by potato tubers	Dr Mike Mclaughlin, CSIRO Division of Soils	08 303 8433
National Potato Improvement & Evaluation Scheme		
Breeding fresh market potato varieties-Stage 2	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Breeding French fry potato varieties-Stage 2	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Breeding crisp potato varieties-Stage 2	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Evaluation and development of new potato genotypes-South Australia	Dr Chris Williams, SA Research and Development Institute	08 389 8808
Potato cultivar accession and testing in Tasmania	Mr John Fennell, TAS Institute of Agricultural Research	03 6421 7633
Selection and evaluation of potato cultivars in Queensland	Dr Ken Jackson, QLD Department of Primary Industries	074 621122
Potato breeding & cultivar evaluation-Western Australia	Mr Peter Dawson. Agriculture Western Australia	097 25 5269
Potato cultivar evaluation in Victoria and New South Wales	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Potato breeding study tour	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Pest & Disease Management		
National strategy for the management of Western Flower Thrips	Dr David Cook(Coordinator), Agriculture Western Australia	09 368 3257
Development of biological control for potato wireworm	Dr Paul Horne, IPM Technologies	03 9210 9222
Integrated management with biofumigation to control soil pests and diseases in potatoes	Dr John Matthiessen, CSIRO Division of Entomology	09 387 0641
National IPM program for potato pests	Dr Paul Horne, IPM Technologies	03 9844 1635
Characterisation and detection of potato cyst nematode	Dr John Marshall, NZ Institute for Crop & Food Research	+64 3 325 6400
Integrated control of silver scurf and black dot of potato tubers	Mr Dolf de Boer, Agriculture Victoria	03 9844 1635
Potato early dying in Australia	Dr Trevor Wicks, SA Research & Development Institute	08 303 9563
Control of pink rot in field and storage	Dr Trevor Wicks, SA Research & Development Institute	08 303 9563
Investigation on common scab disease of potatoes and development of control methods	Dr Hoong Pung, Serv-Ag Pty Ltd	03 6427 0800
Influence of rotation and biofumigation on soil borne disease of potatoes	Dr Dolf de Boer. Agriculture Victoria	03 9210 9222
Biological control of powdery scab and common scab diseases of potatoes	Mr Frank McKenna, Bio-Genetic Laboratory Pty Ltd	09 298 9990
Postharvest		
Sprout suppression for the French fry potato industry	Mr Andrew Baker, Sunrise Agriculture Pty Ltd	03 6426 2874
Technology transfer		
Information packages and decision support software for improved nutrient management of potato crops	Mr Norbert Maier, Primary Industries SA	08 303 9423
Sabbatical of Dr Walt Stevenson, Potato Extension	Dr Trevor Wicks, SA Research and Development Institute	08 303 9563
Coordinating technology transfer in the Australian potato industry	Mr Michael Cain, SA Farmer's Federation	08 232 5555
Development of a quality assured production and marketing system for fresh potatoes	Dr Ken Jackson, QLD Department of Primary Industries	074 62 1122
Technology transfer of new potato cultivars	Dr Roger Kirkham, Agriculture Victoria	059 57 1200
Production & distribution of 'Potato Australia'	Mr Max Walker. Australian Potato Industry Council Inc	03 6427 9606

Bringing new varieties into Australia-legally!

LOIS RANSOM
is the Quarantine Plant Pathologist with the Department of Primary Industry and Fisheries, Tasmania

Potato growers, marketers and breeders, on their travels overseas, might come across a new potato variety that has all the great features they have been looking for.

The question is how can they bring it back to Australia without bringing insects or diseases as well?

The Australian Quarantine and Inspection Service (AQIS) has a set and standard process that safeguards Australia against exotic plant pests, but makes it easy to bring in new plant varieties.

The process is the same, whether it be a grower who wants to bring in new varieties, or whether the material is coming in under the National Potato Improvement and Evaluation Scheme.

Potatoes have many pests and diseases but most of the devastating ones are not found in Australia. These include ring rot *(Clavibacter),* black wart *(Synchytrium),* many of the viruses and the Colorado beetle. Distribution of the potato cyst nematode (PCN) in Australia is also very limited.

How to bring in new cultivars

To import a new variety, you first need to complete an import permit, obtainable from any AQIS office. A copy of the approved permit needs to be included with the imported plant material.

Most AQIS activities attract fees, so it is important to get material from clean sources to ensure that it will be released at the end of the quarantine process, otherwise there may be a lot of expense for no benefit. Material can be treated to eradicate diseases, but this is usually expensive and there is no guarantee that treatment will be successful.

Disease screening of imported potato propagating material is undertaken at the Kingston Quarantine Station, near Hobart, during post entry quarantine. The same screening can be done at any government quarantine station, but the station in Tasmania specialises in temperate crops. Most of the new potato varieties come in as tissue cultures, but a few may come as micro tubers. The material is generally released in the same form as it arrived.

Making sure it is disease-free

The material is planted out in a high security quarantine glasshouse and grown through one generation. During growth it is assessed for fungi and bacteria by visual inspection, and for viruses and other diseases by other means.

Potato viruses A, M, S, X and Y, potato leaf roll and potyviruses and the spindle tuber viroid are screened for by serological methods (eg. ELISA).

Others including potato viruses Y, T, M, X and A, Andean potato mottle. tobacco ring spot, tobacco necrosis, tomato black ring, tobacco mosaic, tobacco rattle, alfalfa mosaic, potato mop top and potato yellow dwarf are screened by using other plants which show characteristic symptoms when a particular virus is present.

These other plants are called herbaceous indicators, and seven are used to index potato material. Those used specifically for potato screening are: *Chenopodium quinoa, C. amaranticolor, Nicotiana tabacum, N. debneyi, N. rustica, Gomphrena globosa* and *Physalis floridana.*

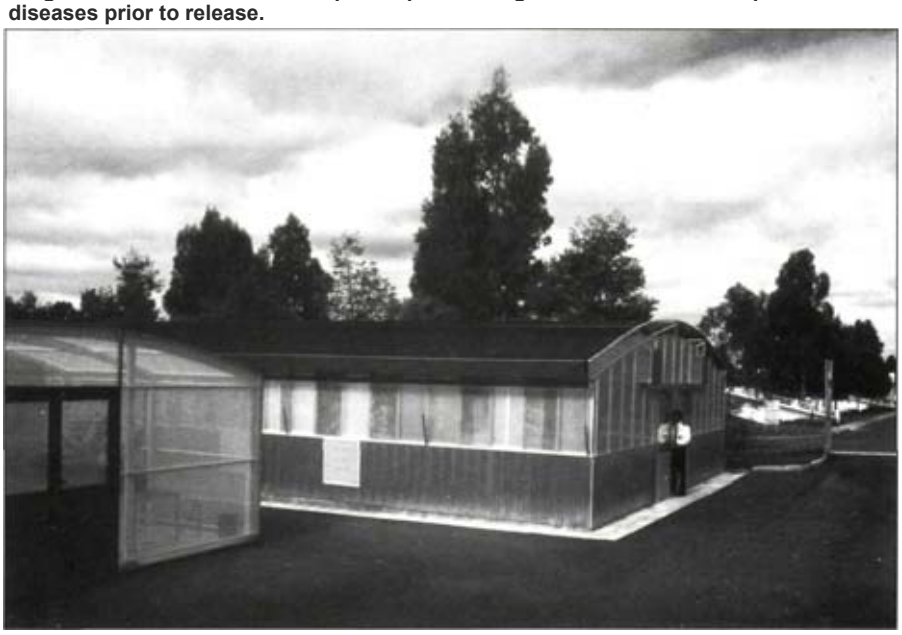
When the glasshouse plants have senesced, any tubers are harvested. If the material has been proven to be free from disease, all material is released, including any tubers. Any diseased material can either be 'cleaned up' or destroyed.

The rest is up to you!

For any queries about importing new varieties of any plant species, contact any AQIS office or the Kingston Quarantine Station, phone or fax (03) 6229 3777.

Quarantine - Protecting Our Way of Life ! ■

Kingston Quarantine Station. Imported plants are grown and checked for pests and diseases prior to release.



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Crop Care

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Integrated pest management makes economic sense

PAM STRANGE
is a consultant with Scholefield Robinson Horticultural Services, Netherby, SA, and
JULIAN MORISON
is the Director, Econsearch P/L, Netherby, SA

Crisping growers of South Australia, and other parts of Australia, have been progressive in their adoption of IPM philosophy and techniques.

Chemical usage has changed from routine sprays as insurance covers in conventional management to usage only when there is a threat of economic loss.

Adoption of IPM has had a positive impact on crisping crops in South Australia. There has been no discernible loss in terms of yield or quality of potatoes harvested, but there have been savings through reduced insecticide use. A representative of the Smiths Snackfood Company believes that supply from South Australia has improved in quality and the growers have become more professional in their management in the past few years.

In this analysis of conventional pest management and IPM, the benefits of IPM far out-weigh the costs to both the grower and to the wider community (see the table and graph).

Integrated pest management

Since the 1992-93 season growers of the Crisping Group of South Australia have adopted IPM techniques in their management practices.

They have been introduced to the concepts of beneficial insects, cultural management techniques as alternatives to chemicals, and hygiene and other practices, including weed control, that avoid pests.

Beneficial insects, such as wasps, spiders, lacewings and lady bugs, can actually kill and reduce insect pest populations. Chemical sprays kill beneficials as well as pests and sprays in young crops are most devastating as the population of beneficiaries may be eliminated. If this happens, pest control becomes solely reliant on chemicals, chemical resistance is more likely to occur and the cost of pest control becomes much greater.

Chemical resistance in insects is a reality in all horticultural production and when it happens the effect is devastating. Reduced and strategic chemical use reduces the risk of resistance build-up. Crop monitoring, together with an increased awareness of IPM, has been an important part of the transition from conventional to IPM crop management.

Crop monitoring provides accurate and up-to-date information on pest and disease incidence in the crop as well as additional information on growth and the environment for potential problems in the crop. Crop monitors have been employed by the Group.

The main pests of concern to these growers include thrips, potato tuber moth, aphids and the red legged earth mite.

Chemical use under IPM and conventional pest management

The number of sprays in Atlantic crisping crops in the Adelaide Hills of South Australia has fallen from an average of 4.5 sprays per crop (range 0-7) prior to the 1992-93 season to an average of 0.5 sprays in 1993-94 (range 0-2), 1.4 sprays in 1994-95 (range 0-3) and 1.5 sprays in the 1995-96 crop (range 0-6). Growers openly admit that they are now using much less insecticide as a result of the IPM training. Before they would have put on a spray "just in case" because "a drum was in the shed".

Economic analysis

There is only limited financial information available comparing IPM with traditional pest control. To date no local evaluation has been undertaken to assess the economic costs and benefits of IPM adoption. In this analysis a partial budgeting approach has been used, which involved developing gross margins for crisp potato production in the Adelaide Hills under conventional and IPM pest management.

Under IPM, most growers have reduced the number of sprays by 3 to 4 per crop. This translates to reduced production costs of $200-$300/hectare. Under average yield (40t/ha) and price ($250/t) conditions, this will increase the gross margin by a significant 5-6.5%. The graph indicates the net benefits of these changes. Under lower price and yield conditions, the percentage increase in gross margin would be even greater!

With a fall in insecticide usage (from 4.5 sprays to around 1-1.5 sprays/crop) and an increase in labour (up to 2 hours monitoring per hectare per season), the financial impacts have fallen exclusively on production costs.

Even if IPM resulted in only one less spray per crop, the costs of monitoring would be more than offset by the reduction in insecticide application costs. It is unlikely that the extreme saving of 7 sprays would be reached (as shown in the graph) as the average number of reduced sprays during the past three years is 3-4 in the Adelaide Hills.

Additional benefits

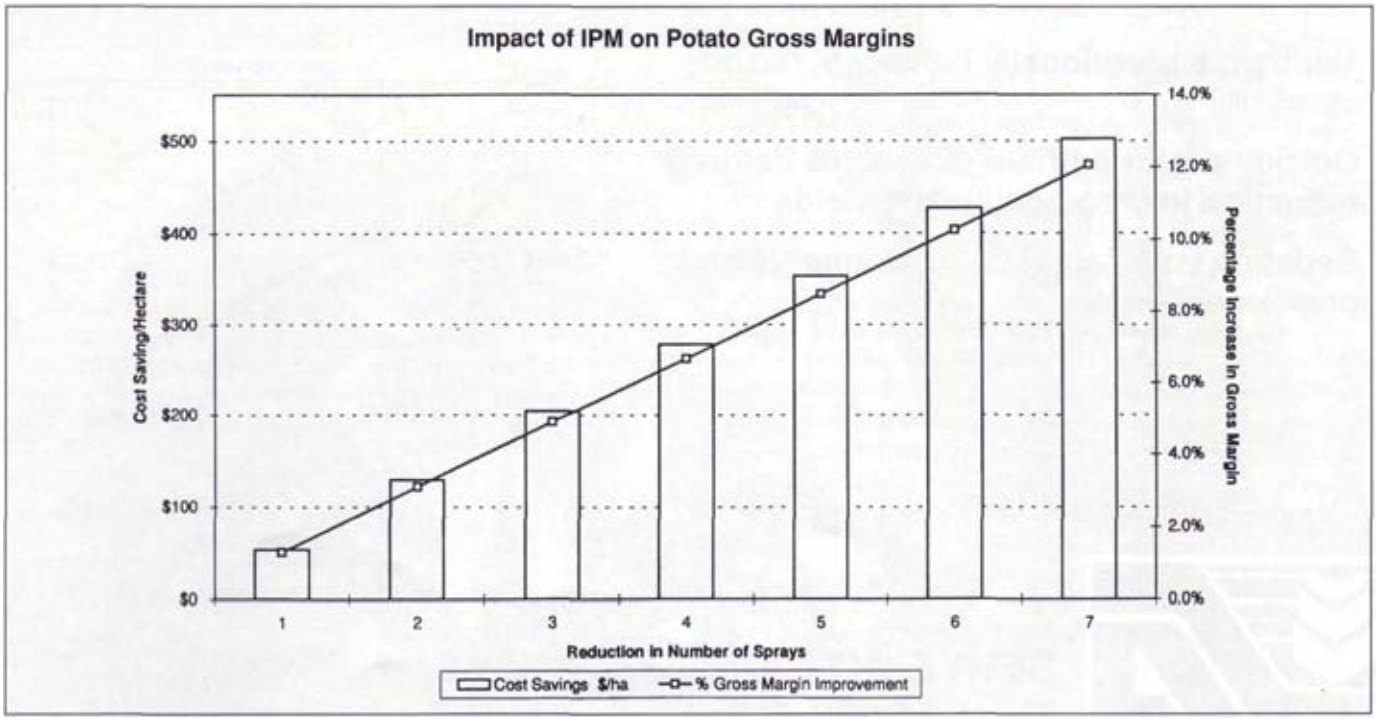
The implementation of IPM will involve "private" and "external" costs and benefits. Private costs and benefits are those directly felt by the grower, and most can be given dollar values, eg. reduced chemical usage, increased labour. External costs and benefits are those accruing to the grower's neighbours, the community and to the consumer, and are often more difficult to quantify, eg. reduced risk to human health and the environment.

The table details some of the costs and benefits that may arise from the adoption of IPM for potatoes. ■

Acknowledgements:

This analysis was funded by HRDC and the data was supplied by growers of the Crisping Group of South Australia as part of HRDC funded projects.

Table: Potential Costs and Benefits of IPM in Potatoes	
Potential Costs	**Comments**
Increased use of some inputs	Increase in labour usage for crop monitoring. Weed control (chemical or mowing) may be increased or replace spraying costs.
Emergence of new pests	Pests which have been incidentally controlled previously may become more prevalent with a change in the spraying regime for the targeted pests. Regular crop monitoring will identify any new pests.
Greater uncertainty about cost and benefits of pest control	Growers initially had some concerns about their capacity to control pests under IPM, but many crops have been grown successfully with zero insecticide usage.
Potential Benefits	**Comments**
Reduction in the use of some inputs	In this analysis, reduced insecticide usage has been the principal reason for the benefits generated by IPM. Savings in tractor time, fuel, etc have been associated benefits.
Reduced consumer concern about chemical residues	As IPM becomes more widely adopted and public awareness of its adoption increases then the benefits of reduced consumer concern will be realised.
Reduced risk of chemical resistance in insects	No evidence to date from the Crisping Group to suggest this has occurred but resistance is a common problem in vegetable crops with high chemical input.
Better established populations of beneficial insects	High populations of beneficiaries will aid control of pests without the need for insecticides, reducing the level of chemical input further.
Aggregate income benefits to consumers and producers	If cost reductions from IPM are confined to a relatively small number of growers then those producers are likely to be the main beneficiaries. As the technology becomes more widely adopted, competitive forces will push down product prices and the benefits of the new technology will be shared by processors and consumers, as well as producers. The extent to which the benefits are shared will be determined by market structure, i.e. the extent of market power of each sector along the producer-to-consumer marketing chain.
Reduced risk to human health and safety and the environment	In as much as insecticides used in potato production do pose a risk to human health and the environment, then IPM does generate benefits as insecticide usage has been significantly reduced.



Alternative sprout suppressants *update 1996*

ANDREW BAKER
is a consultant with Sunrise Agriculture, Tasmania

During the past 12 months trials of the natural sprout suppressant, carvone, have been completed with submission of a residue and efficacy study to the National Registration Authority.

The Dutch manufacturers, BV Luxan have decided to pursue registration during 1996-97. Concurrent with these studies, Dimethylnaphthalene (DMN), another alternative sprout suppressant, has been trialed.

DMN was identified in potatoes and in the atmosphere of potato stores by British researchers during the 198O's. The concentration of this substance decreased with time during storage and it was postulated that this could be the potato's own sprout suppressant. DMN was later shown to be a potent sprout inhibitor.

Various chemical forms of DMN occur as a by product of the petroleum industry. The most effective form for sprout suppression has recently been identified as 1-4 DMN and production or purification has commenced. This compound controls sprouting at low doses and leaves no flavour taints.

During 1995, 1-4 DMN was registered for use in the USA as 1-4 Sight. Trials in Tasmania found it to be an effective sprout inhibitor and superior to carvone. Preliminary residue data was collected at the end of the trial and will be used if further developments occur in Australia.

Like carvone, DMN is a reversible sprout inhibitor. In the USA, studies have shown DMN to enhance suberisation of cut or damaged potatoes at low temperatures. This factor could prove useful in the curing of stored potatoes and in the storage of pre-cut seed.

Tubers stored with DMN during 1995 were cut and planted out in a demonstration trial at Forthside Vegetable Research Station. The resulting yields were similar to untreated potatoes.

This project is funded by the HRDC and the national potato levy

Further residue and efficacy trials will be conducted during 1996-97 to provide sufficient data for registration in Australia. ■

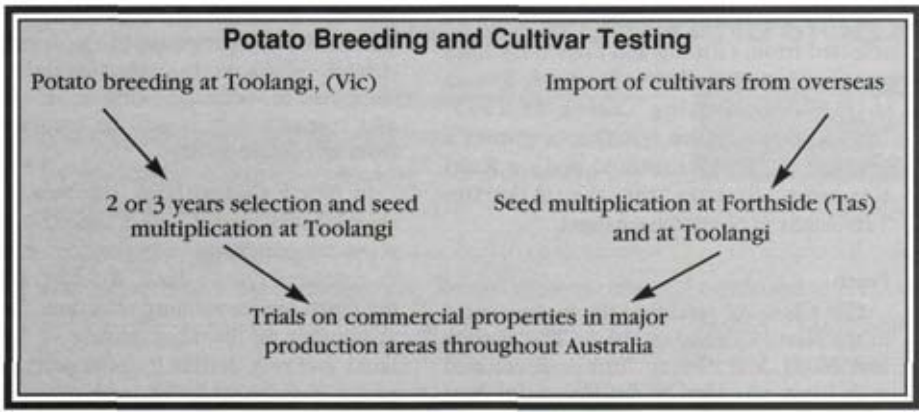
Potato variety trials

ROGER KIRKHAM & GRAEME WILSON, Agriculture Victoria
CLARRIE BECKINGHAM, New South Wales Agriculture
PETER DAWSON, Department of Agriculture, Western Australia
JOHN FENNELL, Department of Primary Industry & Fisheries, Tasmania
KEN JACKSON, Queensland Department of Primary Industries
CHRIS WILLIAMS, South Australian Research & Development Institute

New potato varieties are being tested in the main production areas across Australia under the NaPIES (the National Potato Improvement and Evaluation Scheme) program.

Most trials are located on private properties and new varieties are compared with commonly grown varieties when grown under commercial conditions.

These trials test varieties imported through quarantine from overseas and also test breeders lines from Australia's only potato breeding program which is based at Toolangi in Victoria.



Varieties released from this program during the past 3 years include *Snow Gem* and *Nadine* for the fresh market and *Dalmore* and *Catani* for the processing industry.

VICTORIA AND THE RIVERINA

Early generation breeding lines were grown in trials at Toolangi and best performing lines were selected for testing in main production areas. Variety trials were grown within commercial crops at Colac, Koroit, Koo Wee Rup, Ballarat and the Southern Riverina.

Fresh:

Trials were grown to select varieties for both the brushed and washed markets.

The breeders line *90-40-1* produced high yields of oblong shaped tubers with red skin colour and cream flesh similar to *Desiree*. *90-40-1* has short tuber dormancy, similar to *Sebago* and fast plant growth. The tuber skin is smooth and colour does not fade after plant senescence. *90-40-1* is resistant to skin scuffing and shatter crack tuber damage.

Comparison of *Wilwash* (left), *Delaware* (centre) and *Nadine* (right) showing how *Nadine* has better shape and shallower eyes than *Delaware*. *Nadine* is also markedly less affected by scurf than *Delaware* and *Wilwash*.

French fry:

Ranger Russet, a variety imported from the USA, is being grown in the Certified Seed Potato Scheme and is being assessed as a direct processing variety delivered between *Shepody* and *Russet Burbank*.

The Australian breeding line *89-27-33* has continued to out-perform *Russet Burbank* with higher yields, higher dry matter, less internal defects and more resistance to tuber damage. Final assess-ment next season will involve commercial plantings by contract growers and quality tests by processors.

Crisp:

A direct delivery trial was grown at Koroit and storage trials were grown at Koo Wee Rup. The breeders line *90-7-17* produced a very large number of small to medium sized, round-shaped tubers with the potential for high yield. Specific gravity was slightly higher than *Atlantic* and tubers were resistant to bruising. Crisp colour was light at harvest and after long term storage. *90-7-17* will be tested in a commercial sized planting next season at Koo Wee Rup.

OUTLOOK

A number of fresh and French fry varieties imported from overseas will be tested in trials next season. Two advanced lines from the Australian breeding program *90-40-1* (red skin, fresh market) and *89-27-33* (storage, French fry processing) are being tested in commercial sized plantings in production areas while seed is being multiplied in the Victorian Certified Seed Potato program.

SOUTH AUSTRALIA

Field trials were grown on the Northern Adelaide Plains, Mt Lofty Ranges and SA Murraylands, to test both fresh and processing varieties. French fry trials and some bulk strips of red skin lines have also been grown in the South East.

Fresh:

The white flesh lines *Snow Gem, 87-44-8, 85-2-1* and *Wilwash* have produced the highest yields and good skin colour at most sites.

The line *90-40-1* produced among the highest yields and quality in all regions. It has a smoother skin than *Desiree* and is being further bulk tested as a replacement for *Desiree.*

90-77-4 has a dark red skin compared to *Pontiac* and produced good yields and quality at the Murraylands site. Another red line, *87-13-3,* produced the highest yields and quality on the Northern Adelaide Plains (it has wind and metribuzin resistance). It is being further tested for possible release.

The red lines *90-40-1, 87-57-9* and *87-13-3* all produced far darker skin colours compared to *Pontiac,* in bulk strip trials in the South East.

Crisp:

91-106-1 was a top performer in the Murraylands and Northern Adelaide Plains. However, *88-36-7* produced the highest yields in the Mt Lofty Ranges.

French fry:

88-59-12 has been a top performer in the Mt Lofty Ranges, whereas *89-27-33* produced the highest yields at the Murraylands site. In the South East *89-27-33* produced yields and quality fry colour significantly above that of *Russet Burbank. 89-12-1* has also shown promise. These lines will be tested in larger commercial plantings in the 1996-97 season.

Terry Buckly, French fry potato grower Penola district, with the new variety *Ranger Russet.*

QUEENSLAND

Early generation clones as well as selected fresh, crisping and French fry lines were evaluated at Gatton Research Station in the winter/spring season of 1995. Advanced lines were tested on a grower's property in SE Queensland and on Kairi Research Station on the Atherton Tablelands in North Queensland.

Fresh:

CIP Clone 82 produced the highest yield in the North Queensland trial. This variety and *86-31-5* are being further developed with funds provided by the Heavy Produce Committee of the Queensland Fruit and Vegetable Growers as both have potential as multi-purpose varieties for export to SE Asia. At the Lockyer Valley site the selection *88-63-7* showed the most potential in terms of shape, skin appearance and yield compared to the *Sebago* control. However, this selection did not store well in either the North or SE sites and consequently it will be excluded from any future testing.

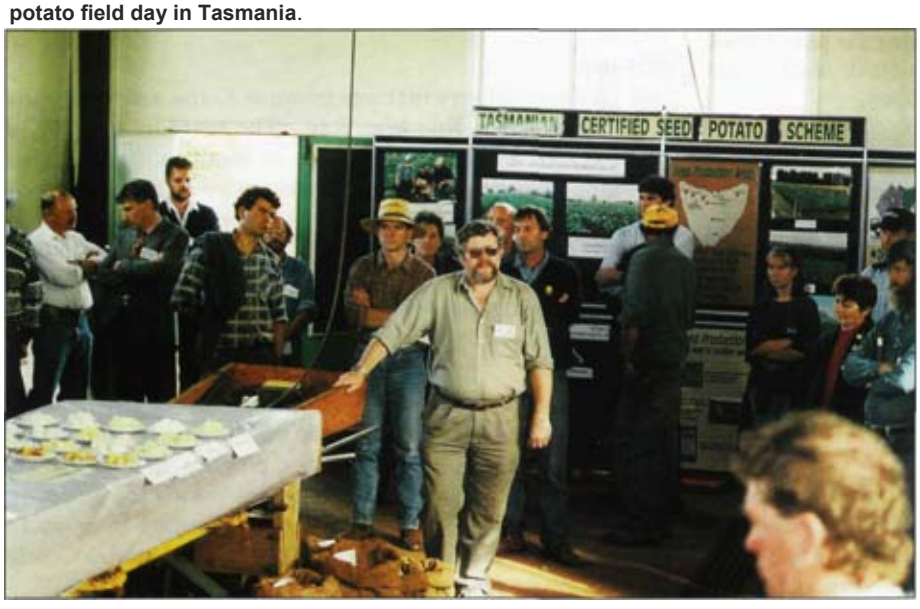
In North Queensland, the two red skinned selections *87-12-8* and *87-57-9* were compared and as in previous trials in southern Queensland, *87-12-8* was the much higher yielding selection. The variability in the skin texture of this latter line may detract from its potential as a variety suitable for washing. This aspect is being further investigated.

In both the North and SE Queensland trials the Jeffrey's *Sebago* strain out yielded the *New Brunswick* and *Sebago* control from Victoria. However, the very high proportion of small tubers (<200g) at harvest in the former strain compared to the other two strains is consistent with the performance of the Jeffrey's strain in other parts of Australia. There was no significant difference between the yields of the other two strains at either site.

Crisp:

Selections 86-2-70, *86-2-23, 86-67-5* and *87-5-7* produced similar yields (25 t/ha) to the control variety *Atlantic.* The first two of these lines produced similar quality crisps to *Atlantic* which produced the best quality crisps of all the lines tested. The best of the selections are being tested again in 1996.

John Fennell demonstrating the cooking aspects of the cultivar evaluation process at a potato field day in Tasmania.



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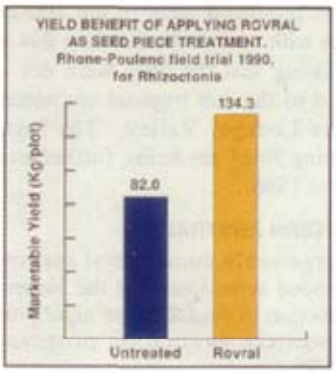

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Roger Kirkham demonstrating a potential new French fry potato variety — *89-27-33* to industry representatives at Warnambool

French fry:

A group of entries including *Ranger Russet, 88-102-12, 88-102-24, 89-27-33, 90-46-1* and *90-148-2* produced yields in the range of 28-31 t/ha compared to 36.6 t/ha for *Sebago.* Noticeably, most tubers produced were in the 100-280g range with very few exceeding this size, indicating that the lines were not well suited to the sub tropical environment of the Lockyer Valley. The highest yielding lines are being further evaluated in 1996.

WESTERN AUSTRALIA

Large scale commercial testing of advanced selections and the increased production of *Nadine* were highlights of the western evaluation program in 1995/96.

Fresh market:

Market share for *Nadine* has increased from <1% in 1992/93 to 18.5% in 1995/96 (year to March data). *Nadine* has better cosmetic quality, tuber uniformity, yield and disease resistance than the standard *Delaware. Nadine's* even tuber shape and size and its freedom from scurf are of especial benefit for the Manjimup area which is renowned for poor autumn samples of *Delaware.* The adoption of *Nadine* is an example of the benefits new varieties can offer. This summer *Nadine* (4,400 tonnes delivered) produced a better packout than *Delaware* with 10% more Premium grade and 15 t/ha more yield. The net result is an increased return of at least $5,000/ha.

The yellow fleshed *Mondial* was tested commercially last season in conjunction with the Potato Marketing Corporation. *Mondial* yields as well as *Spunta* but has better shape, size and is PCN resistant. *Mondial* produced attractive samples from autumn harvests at Manjimup. Half a tonne of seed was planted at five sites. Three sites have been harvested - growers, packers and the retailer are looking forward to larger quantities.

90-105-16 and *90-40-1* are two other fresh market varieties that will be tested commercially in 1996-97 when sufficient seed has been bulked.

French fry:

Large scale tests *of 88-31-5, 88-78-4, Ranger Russet* and *Shepody* were planted. *88-31-5* continues to show promise and a decision on release will be made after harvest next season. *88-31-5* has even, long shape with less internal disorders than *Russet Burbank. Shepody* had better yield and dry matter than *Kennebec.*

Crisp:

89-22-4 produced a more even sample than *Atlantic* with higher dry matter and lighter fry colour in a crisp demonstration harvested in April at Manjimup. Other promising lines are *90-2-6, 90-44-3* and *90-24-6.* Small commercial plantings will proceed next season.

Scope for improvement

Further refinement of large commercial tests involving all stakeholders will help to ensure maximum benefit is obtained from these tests. We look forward to further close work with the WA Potato Marketing Corporation and the processors during next seasons commercial tests.

TASMANIA:

Trials of early generation breeding lines and newly introduced cultivars were grown at Forthside Vegetable Research Station. Retrialling of lines selected from the previous seasons trials were done in large scale plots on commercial properties at Scottsdale, Cressy, Forest and Stowport representing a range of soil types and climates in the main potato production districts of northern Tasmania.

Most lines tested were for French fry processing or for the fresh market and

final selections were made in collaboration with representatives from these industries.

Fresh:

The Dutch cultivars *Mardonna* and *Morene* were selected for growers trials. *Morene* was considered to have potential to replace *Kennebec* in districts where powdery scab occurs. *Red Rascal* was trialled for NZ Crop & Food and is likely to be trialed throughout Australia next season. *88-82-5* and *90-40-1* are red skinned breeding lines from the national program that showed least scab and had excellent culinary qualities.

French fry:

Several of the breeding lines from the national program performed better than *Russet Burbank* and thirteen were selected to advance to regional trials. The line *89-27-33* was particularly good with a high yield of uniform tubers, acceptable processing quality and possible tolerance to common scab which needs verification. The US cultivar *C0093008-1* was also selected for regional trials.

The industry has adopted *Ranger Russet* for use on sandy soils and is continuing to evaluate *Gladiator*.

New Imports:

Two breeding lines were imported from Idaho USA, *Amisk* and a breeding line were imported from Alberta, Canada and one breeding line was imported from Scotland. These are currently in trials.

NEW SOUTH WALES

Autumn harvest trials were grown at Dorrigo and Robertson and a winter harvest trial at Berrigan in the Southern Riverina. The trials include new cultivars with distinctly different characteristics that are being assessed primarily for the fresh market. A range of Dutch, yellow fleshed varieties with PCN and other disease resistances are being tested.

Fresh:

Centurion was the highest yielder. It and *Symphonia,* another high yielding variety, have attractive red skins with yellow flesh, shallow eyes and good cooking qualities.

Kipfler is a low yielder but has good cooking qualities and gourmet market potential.

Sebago produced good yields and remains a popular fresh market potato. *Leonardo* also yielded well and has a cream flesh and good cooking qualities.

Cooking tests have highlighted the attractive yellow flesh colour and good cooking quality of some varieties. After cooking darkening was noted in a few varieties and was more evident in samples from the trial grown at Robertson.

Crisp:

Unsuitable (dark) colour after cooking was a problem in all varieties.

SUMMARY & OUTLOOK

A network of potato trials throughout Australia is releasing new improved cultivars for the potato industry. NaPIES was established in 1993 to better integrate existing state programs of potato improvement. Despite recent favourable reviews and strong support for this progam there has been some significant budget reductions for future work as a result of limited funds and recent changes in indusry priorities. This will reduce the number of national testing sites from 17 to 12 regions. ■

Acknowledgements:

We wish to thank the growers and other industry sectors who have helped with variety testing.

This project is funded by the HRDC and the national potato levy

Ron Chatfield, crisp potato grower Koo Wee Rup, and Greame Wilson, Agriculture Victoria, standing in a crop of the new processing variety, Cantani, released in 1995.

Now there's a sure way to score maximum potato yields and profits. SCORE has been proven in industry trials to give dramatically better protection against Target Spot than any other registered product. SCORE gives you up to 4 weeks extra green leaf duration, allowing the maximum yield of quality potatoes. It is compatible with most insecticides, fungicides and foliar fertilisers, rainfast within 2 hours and penetrates quickly through the leaf to give thorough, targeted protection. Back a winner. Insist on SCORE.

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Potato yields of 100 t/ha are possible

CHRIS WILLIAMS
is the Senior Research Officer (Potatoes)
South Australian Research and Development Institute, Lenswood, SA

Maintaining a live, green, closed potato canopy for 95 days is a key to high yields and acceptable quality.

The aim of this article is to identify certain site selection criteria and integrated crop management systems which help achieve 100 tonnes per hectare yields of acceptable quality tubers from sustainable production systems.

Average commercial yields of potatoes recorded in Australia range from 18.5 t/ha in Queensland to 43.5 t/ha in Tasmania.

The maximum potential attainable yield of the potato grown under ideal conditions has been estimated in the UK as 100 tonnes of fresh tubers per hectare. Commercial yields are less because of climatic restraints, unacceptable quality and/or sub optimum financial returns.

However the concept of maximum yield potential of acceptable quality tubers is a useful one, since it provides growers and industry planners with a target and allows assessment of the performance of crops from many potato growing regions.

100 tonnes/hectare achieved

Number 1 grade (ie tubers of 80 to 450 grams) yields of over 100 tonnes/hectare were produced by the 4 top performing cultivars *(Winlock, Kennebec, Patrones* and *Wilstore)* out of 31 tested in a replicated plot cultivar evaluation trial conducted in the Mt Lofty Ranges of South Australia.

Conditions associated with maximum yield

Favourable environmental conditions are required to achieve maximum potential yield. These include a frost free growing season, temperature regimes of warm days (above 18 C) and cool nights, periods of low humidity to facilitate control of leaf disease and well drained, friable soil types.

We selected the most appropriate cultivars, seed quality, seed piece size, moisture supply, mineral nutrients and days grown to achieve maximum yields of acceptable quality. These factors are under grower control.

Our work in South Australia also showed the need to keep the closed canopy alive, green and fully functional for about 95 days after the start of tuber initiation. This is regarded as a key crop management goal essential to have a chance of obtaining maximum yield potential. Individual growers must decide on the most economic and sustainable compromise in their own situations between yield, quality, costs and profits. ■

Score® powerful on target spot

Editorial provided by Ciba-Geigy Australia Limited

Score® is an exciting new systemic fungicide for target spot (*Alternaria solani*) control in potatoes.

In extensive field trials throughout the country Score treated plants have performed impressively, yielding up to 30 per cent more than untreated plants alongside.

Score belongs to the triazole group of fungicides and is absorbed within 2 hours of application. That ability will suit growers because unlike other products, when Score has become absorbed, it cannot be washed off by irrigation or rainfall.

One of the biggest benefits with Score is that it can achieve target spot control, even if the spray interval is extended to 14 days.

An extended spray interval will allow less damage to the crop resulting from less boom spray traffic. It also has the potential to lower application costs, reduce the fuel bill and diminish wear and tear on equipment. And an extended spray interval will also release more of the growers' time to do other equally important jobs.

Score has tremendous versatility. It has been registered for tank mixing with a wide range of other products so one pass spraying for a range of pests and diseases is possible.

Ciba emphasises that even with Score's powerful activity on target spot, growers' programs must be based on prevention and stopping the disease from building up in the crop. Even with the help of Score, growers need to adhere to common sense practice when dealing with the disease. The use of an integrated package for disease control remains important. ■

No sex please - we're genetic engineers!

JAMES HUTCHINSON, SARAH GUMLEY, ALMA KARIUKI, JANE MORAN and MARTIN BARLASS are with Agriculture Victoria, Institute for Horticultural Development,
SIMON ROBINSON is with CSIRO, Division of Horticulture
MICHAEL GRAHAM and PETER WATERHOUSE are with CSIRO, Division of Plant Industry

Over the last decade genetic engineering approaches have been developed to complement and improve the efficiency of breeding programmes.

It is becoming easier to isolate genes for specific characteristics and transfer them to plants. This is what genetic engineering is all about.

Genetic engineering has opened many new possibilities as breeders are no longer restricted to hybridising plants that are related and sexually compatible. One of the virtues of genetic engineering is that genes can be isolated from any organism and added to the existing genetic information of the plant.

The two principal things that genetic engineering can do, that conventional breeding finds difficult or impossible, is adding a new characteristic or altering an existing characteristic while maintaining the original genetic background of the plant.

Genetic engineering and potato improvement

Genes for a range of characteristics that are potentially useful for potato improvement have been isolated. These include genes to control some insect pests and virus diseases, genes that alter the starch and sugar composition of the tuber and genes associated with tuber bruising.

Presently our knowledge of genes associated with controlling bacteria, fungi and nematodes is limited, but we expect rapid advances now that some disease resistance genes have been isolated.

We are interested in introducing genes for virus resistance into a range of cultivars that are commonly used parents in the fresh market component of the National Potato Improvement and Evaluation Scheme (NaPIES).

Initially genes for resistance to potato leaf roll virus (PLRV) are being tested. PLRV is a major problem in many of the warmer parts of Australia and of increasing importance in the temperate regions.

There is another reason for the interest in engineering virus resistance into potato. An integrated pest management (IPM) program for potato moth is being developed which uses parasitoid wasps. Insecticides used to control aphids also kill the parasitoid wasps, causing the IPM program to break down. One solution to this dilemma is to reduce the impact of the aphids. As aphids are vectors of PLRV (and potato virus Y) an alternative approach is to engineer plants with resistance to the virus.

parasitoid wasps, causing the IPM program to break down. One solution to this dilemma is to reduce the impact of the aphids. As aphids are vectors of PLRV (and potato virus Y) an alternative approach is to engineer plants with resistance to the virus.

We have investigated factors that influence gene transfer to potato and have used that information to produce a population of plants engineered with genes for PLRV resistance.

To date we have engineered the cultivars *Crystal, Sebago D, 80-90-5* and *80-93-4* with the coat protein gene from PLRV.

The coat protein approach for making plants resistant to a virus was first shown to be effective nine years ago and since then has become one of the most advanced areas of plant biotechnology.

Why engineering a plant with the coat protein from a virus will protect it against infection isn't yet known, but the coat protein is thought to interfere with the way the virus reproduces itself in the plant.

If approved by the Genetic Manipulation Advisory Committee these transgenic plants will be grown in a field trial to test their agronomic performance.

Other types of genes are also being tested that could be useful for the control of PRLV. We are anxious to have a number of approaches available in case one is not particularly effective or breaks down.

One important aspect of this is the evaluation of different types of "genetic switches" or promoters that can express genes in the potato plant's "plumbing" or vascular system. As PLRV reproduces exclusively in phloem cells, targeting gene expression to this part of the plant will be beneficial. One promoter we are testing expresses genes in the vascular tissue. As plant biotechnology develops, the ability to precisely regulate gene expression will become increasingly important.

Other benefits from genetic engineering

There are a number of other characteristics that could be engineered into potatoes to improve their agronomic performance.

- **reduced bruising**

Recently, a gene associated with tuber bruising has been isolated which is responsible for tissue discolouration in bruised tissue of many plants. This gene has been prepared and transferred to the cultivar *Atlantic* in such a way that the enzyme causing discolouration in bruised tissue is inactivated. This has resulted in a reduction of bruising in damaged tubers.

Such a characteristic will be particularly useful to have in potato as it will help prevent bruising damage that can occur in all parts of the production chain.

- **disease and pest control**

One of the long term hopes of biotechnology is to develop plants that have resistance to bacterial and fungal diseases.

PLRV coat protein gene prevents symptom development in the glasshouse.

The two plants on the left are non-transgenic Kennebec potatoes, the severely stunted plant has been grown from a PLRV infected tuber. The two plants on the right are transgenic Kennebec potatoes expressing the PLRV coat protein gene, the plant on the extreme right was grown from a PLRV infected tuber, but is symptom free. Note also that the transgenic plants perform as well as the control (non-transformed), non-infected control.

Some promising developments have already occurred; transgenic tobacco plants have been produced which are tolerant to black scurf and bacterial wilt. Transgenic potatoes with tolerance to black leg have also been produced.

Aphids and potato moth are the major insect pests of potato in Australia. Presently aphids are difficult to control with genetic engineering approaches, but control of potato moth is well advanced. Use of the biological insecticide, *Bacillus thuringiensis* (BT) is increasing for the control of some insect pests. BTs have a number of advantages for insect control; most notably they are highly specific to particular groups of insects but are non-toxic to other animals and plants.

- **healthier French fries and crisps**

Potato tubers are an extremely rich source of starch and thus potato is a favoured plant for studying how starch is synthesised and moved around the plant. Recently a key enzyme in starch production, ADP-glucose pyrophosphorylase, was altered so that it was possible to dramatically increase the starch content of tubers by 20-60%.

This remarkable result is extremely important for the French fry and crisping industries as the specific gravity of the tuber is increased. More starch and less water in the tuber results in less fat being absorbed by the potato during frying. Everybody wins!

Conclusions

Genetic engineering is new and allows us to do things that were previously difficult or impossible. A wide range of characteristics are being engineered into potatoes and the precision with which this can be done is continually increasing.

One distinct advantage of applying genetic engineering to potatoes is that cultivars are vegetatively propagated. Therefore, once selected cultivars have been transformed and are expressing a new characteristic, it is very easy to micropropagate many plants for further study and ultimately for commercial release. Genetically engineering parental lines used in NaPIES allows sexual hybridisation to be used to move characteristics into other new lines.

Genetic engineering cannot operate in isolation of breeding programs and will not replace sexual hybridisation. It can be most effectively used for selected cases where breeding objectives are difficult. ■

Acknowledgements:

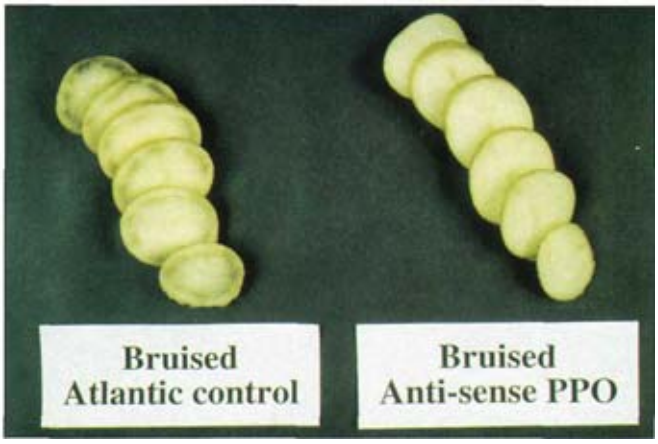
Continued support from the Smith's Snackfood Company is also acknowledged.

Michael Graham is a recipient of the Smith's Snackfood Company-CSIRO Plant Industry Fellowship.

This project is funded by the APDC and the national potato levy

Reduced black spot bruising in tubers.

The tuber on the left was bruised, left overnight then cut open to show damage. The tuber on the right has been treated the same way but is from a plant transformed with an "anti-sense" gene.



Breeding varieties resistant to Potato Cyst Nematode

ROGER KIRKHAM
is the Plant Breeder with Agriculture Victoria, Toolangi,
JOHN MARSHALL
is a Plant Pathologist with Crop & Food Research Christchurch, New Zealand

Resistant varieties are the most effective long term means of disease control for potato cyst nematode (PCN).

PCN was first detected in Australia in 1986 at Munster, south of Perth in Western Australia. In 1991 PCN was found in a market garden at Wandin, east of Melbourne and has since been found at 14 other sites in Victoria. Limited studies of the nematode outbreaks have found only the species *Globodera rostochiensis* pathotype RO1.

At every site where PCN has been found the area has been fumigated and quarantined in attempts to contain and eradicate the nematode.

PCN is a major pest of potatoes in many overseas countries. PCN is a soil-borne parasite with the capacity to remain viable for many years in the dormant encysted stage. Nematodes feed on plant roots and yield losses vary with nematode density. High densities cause economic crop failure.

Disease control

Existing control measures commonly used are soil fumigation and nematicides. These methods are expensive, involve

Mature *Globodera rostochiensis* PCN cysts on potato roots.

Advanced stage of crop damage by PCN (note movement of the pest along the row).

highly toxic compounds and there is an increasing resistance to their use from environmental quarters.

Crop rotation using non-host crops is an option but in Australia we do not have the essential figures for PCN rates of decline and build up to allow us to determine the minimum rotation. Overseas it is recommended that potatoes are grown one year in five but it is not acceptable to apply this information without research in Australia.

Resistant potato varieties are the best long term control option as the farmer gets extremely good control of PCN. A marketable crop is produced while at the same time the field population of PCN decreases. A resistant potato plant stimulates the hatching of the PCN larva in the same way as a susceptible variety. The larva penetrate the roots but in a resistant variety the nematodes are unable to develop good feeding sites and fail to reproduce.

Resistant varieties

In most overseas countries resistant varieties are the most common and effective means of controlling PCN. Before PCN was found in Australia the Australian potato breeding program had a contingency plan in case the pest was introduced into this country and had imported a number of PCN resistant varieties. These varieties were tested in trials in production areas throughout Australia to find if they were suitable for commercial production.

Varieties which are now being grown commercially in Australia and are resistant to PCN are *Atlantic* and *Nadine.*

Breeding resistant varieties

Some imported resistant varieties were crossed with other varieties in the Australian breeding program to produce hybrid breeders lines. If a breeders line has one resistant parent then it has a 50:50 chance of also being resistant. Because PCN is a quarantinable disease in Australia it is not possible to test for resistance using the pest in Australia.

In New Zealand, where PCN is an important and established pest, research and testing facilities are available. In 1992 Agriculture Victoria and New Zealand Crop and Food Research established a collaborative research project to test breeders lines from the Australian potato breeding program for resistance to PCN using facilities in New Zealand. This project has tested 15 lines over the past three years. Breeders lines tested and found to be resistant include;

- *85-51-1* (released and grown commercially as *Wontscab)*
- *86-2-23* (released and grown commercially as *Dalmore)*
- *89-12-1* (being tested for French fry processing)
- *90-105-14* (being tested for fresh market) ■

Acknowledgements:
Photos courtesy of R Lamberts, Crop & Food Research, Lincoln, NZ)

Spud Check - A crop guide for potato growers

STEPHEN WADE
is the District Horticulturist
with NSW Agriculture, Finley

Spud Check has been developed by NSW Agriculture to help potato growers in the Riverina produce higher yielding crops.

Spud Check identifies how the top growers are achieving their high yields, links together all the key factors needed for growing high yielding crops and determines what is reducing the yields in the poorer performing crops.

Higher yields

The aim of the Spud Check is to increase potato yields in the Riverina through grower adoption of the seven Spud Checks (see box) which are linked to high crop yields.

Obviously there are many factors involved in achieving high potato yields. However the greater the number of Spud Checks achieved by a grower - the higher the grower's potential crop yield (see Figure 1).

Crop management

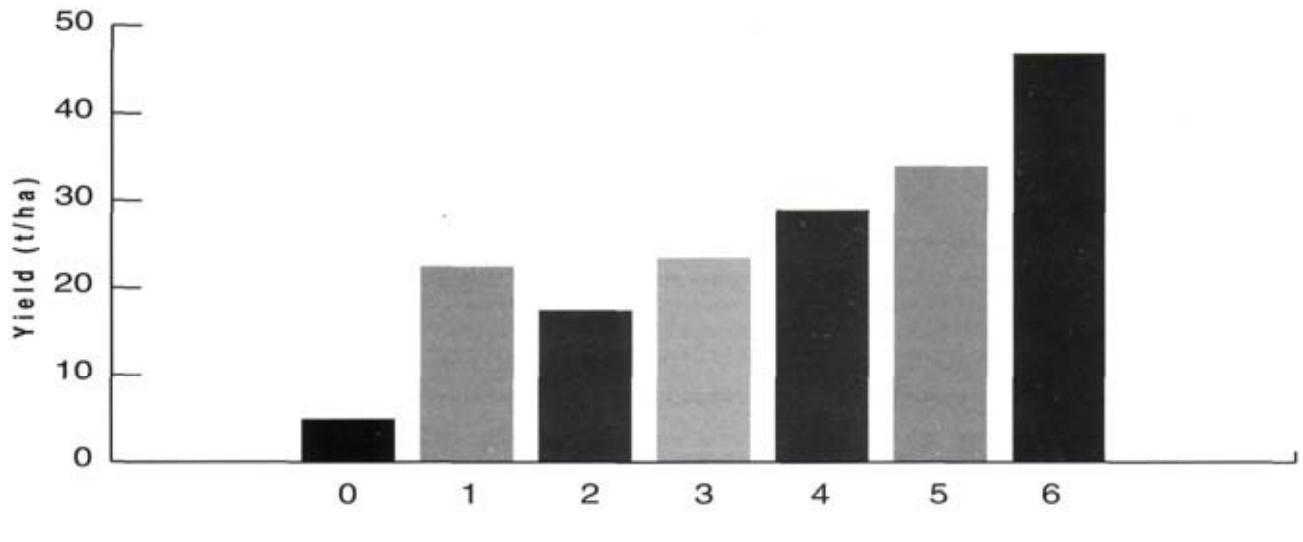
Spud Check encourages growers to manage their potato crops according to targets by measuring crop performance and analysing the results.

The 7 Spud Checks

Check 1	✔	"buy Certified seed"
Check 2	✔	"follow a grass rotation"
Check 3	✔	"sow early to mid-August"
Check 4	✔	"plant 81 cm (32") rows"
Check 5	✔	"spread 300-400 kg/ha nitrogen, 100-150 kg/ha phosphorus, and 200-300 kg/ha potassium"
Check 6	✔	"sidedress 80 kg/ha potassium"
Check 7	✔	"apply 3-4 Ml/ha of water"

- By observing, measuring and recording key crop factors, a crop's performance can be assessed.
- By analysing the crop records provided by growers, the strengths and weaknesses of a grower's present crop management can be identified.
- By understanding which crop factors can be improved, growers can then increase their future potato yields.

Figure 1. Yield Response to Spud Check Management



Target yield

A target yield of 31 t/ha was set for evaluation of the 1994 spring *Sebago* crop. This was the average yield harvested over the previous three years in the potato variety trials conducted by NSW Agriculture across the Riverina.

One third of the growers surveyed exceeded the target, with yields for the top 25% of crops ranging from 38 to 48 t/h. The average yield for all *Sebago* crops was 27 t/ha.

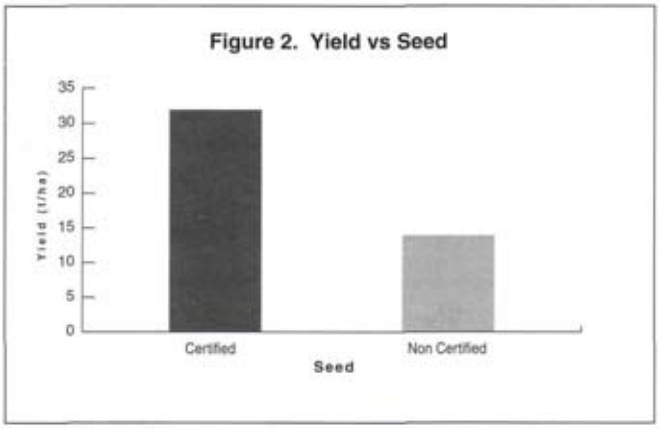
Spud Check results

The crop management factors which contributed to high crop yields in the 1994 spring crop were identified by analysing growers' Crop Reports.

☞ Spud Check 1 - "buy certified seed" ✔

Seventy three percent of growers purchased certified seed for the 1994 spring crop. Crops sown with certified seed averaged 18 t/ha more than those grown from non-certified seed (see Figure 2).

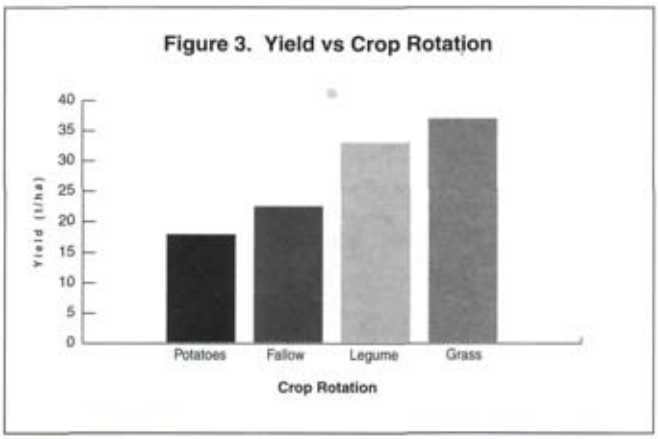
Sowing cut, certified seed pieces with an average seed weight of 56 to 71 grams (2-2½oz) produced the best results for growers.



☞ Spud Check 2 - "follow a grass rotation" ✔

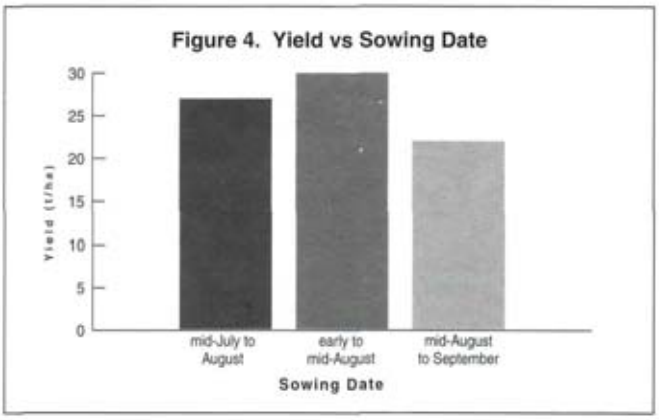
Grass rotations were only followed by 36 percent of growers. Potato crops planted after a grass rotation (either cereals, improved pasture or native grasses) produced 18 t/ha higher yield than those following a previous potato crop (see Figure 3).

A grass rotation also gave a better performance than both fallow or legume (either grain legumes, forage legumes or pasture legumes) rotations. For the highest yielding crops, a three year grass rotation produced the best results.



☞ Spud Check 3 - "sow early to mid-August" ✔

This Check was achieved by 45 percent of growers. Average yields for early to mid-August plantings (30 t/ha) were higher than both mid-July to August (27 t/ha) and mid-August to September (22 t/ha) sowings (see Figure 4).

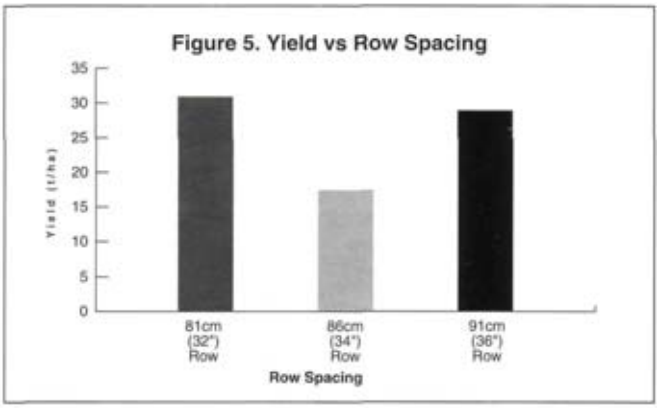


☞ Spud Check 4 - "plant 81 cm (32") rows" ✔

One third of growers planted on 81 cm (32 inch) row spacings. For *Sebago* crops, 81 cm row spacings produced the highest yields (see Figure 5).

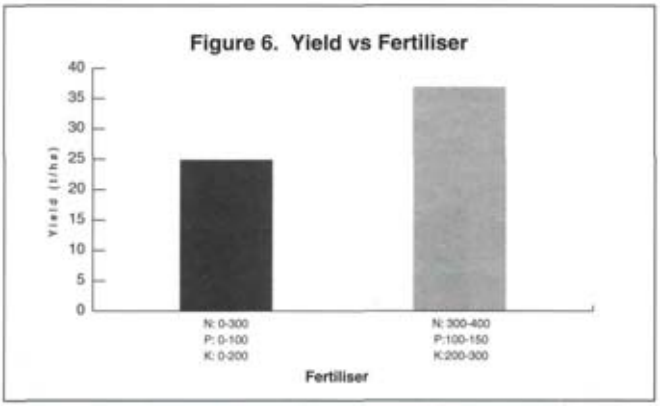
However across all varieties, both 81 cm and 91 cm row spacings produced equally high yields. Both 81 cm and 91 cm row spacings were used in the top 25% of *Sebago* crops.

Because of these results, further investigation will be needed to confirm this Spud Check.



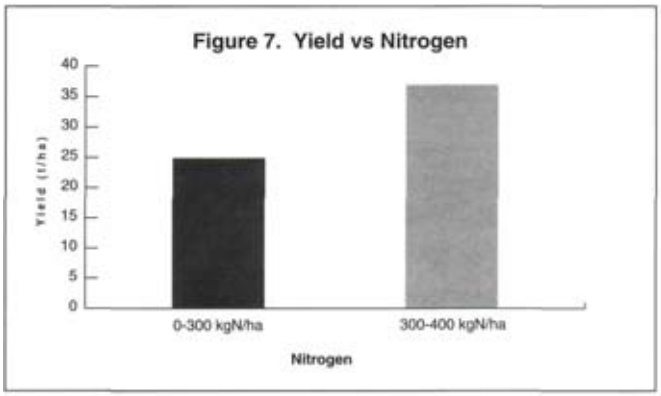
☞ Spud Check 5 - "spread 300-400 kg/ha nitrogen, 100-150 kg/ha phosphorus, and 200-300 kg/ha potassium" ✔

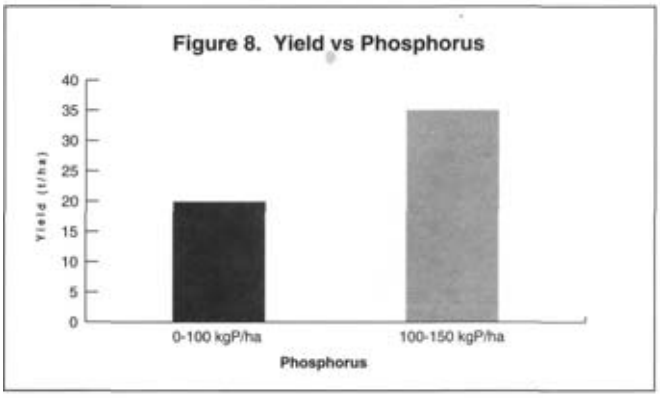
Only 18 percent of growers fully achieved this Check. However the average yields of crops fertilised at these rates were 12 t/ha higher than those fertilised at lower rates (see Figure 6).

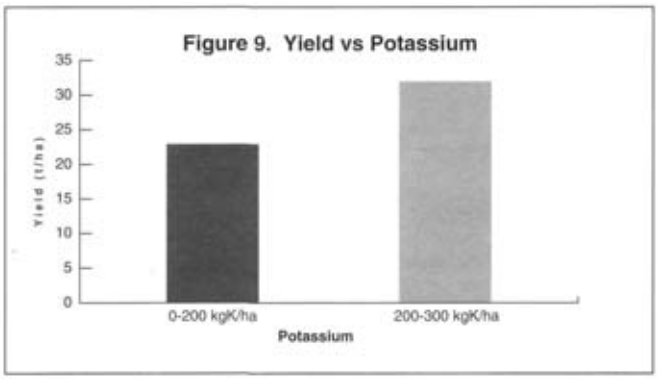


If each nutrient rate is examined separately, similar yield advantages are evident with nitrogen (12 t/ha), phosphorus (15 t/ha) and potassium (9 t/ha) (see Figures 7, 8 & 9).

The highest yields were obtained with pre-planting applications of 105-110 kg/ha of nitrogen, 100-150 kg/ha of phosphorus and 200-220 kg/ha of potassium.

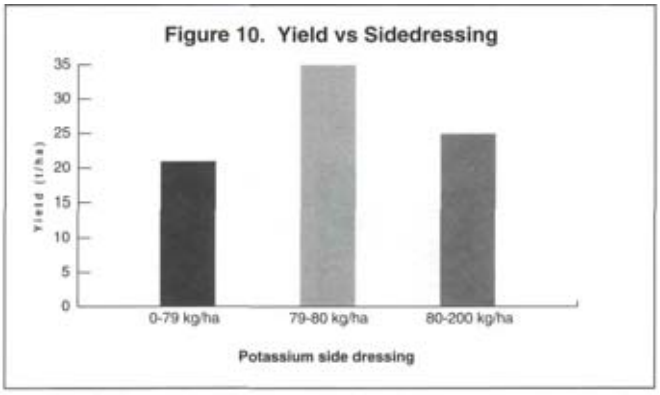






☞ Spud Check 6 - "sidedress 80 kg/ha potassium" ✔

Over half the growers surveyed sidedressed their crops with at least 80 kg/ha of potassium. There was a 10-14 t/ha yield advantage in sidedressing at these rates (see Figure 10).

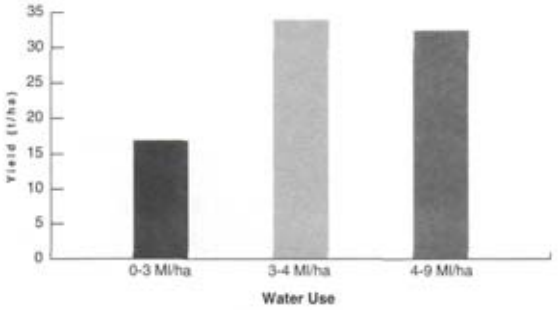


The highest yields were obtained with post-planting applications of 200-210 kg/ha of nitrogen and 80 kg/ha of potassium.

Spud Check 7 - "apply 3-4 Ml/ha of water" ✔

Sixty four percent of growers applied at least 3-4 Megalitres/ha (Ml/ha) of irrigation water onto their crops. Crops grown on less than 3 Ml/ha had 16 t/ha lower yields than those irrigated at the recommended rate (see Figure 11).

Figure 11. Yield vs Water Management



The average water use for all *Sebago* crops was 4.2 Ml/ha, with 6.2 Ml/ha the average water use for the top 25% of crops. Since the Riverina experienced drought conditions during the 1994 spring crop season, the higher irrigation water use is to be expected.

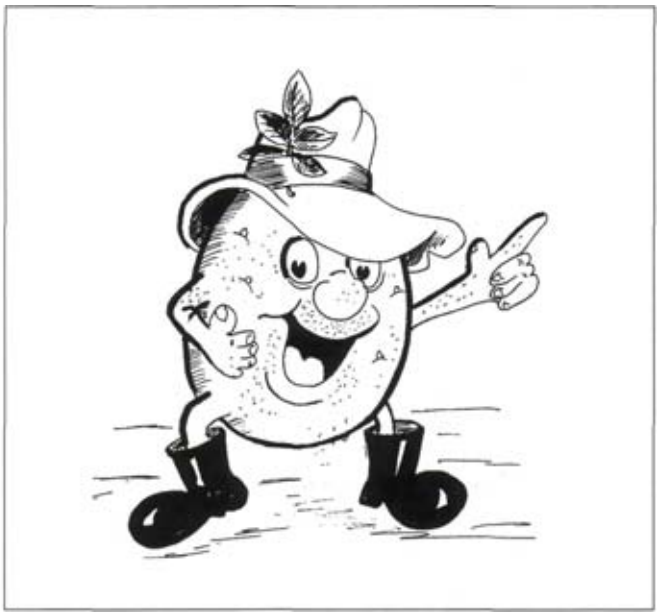
Check Adoption

On average three of the seven Spud Checks were achieved by all growers. Those growers who exceeded the target yield achieved between four and six Spud Checks per crop.

As the adoption of Spud Checks increases, so does the crop yields. The average yield for all Sebago crops was 27 t/ha, while the top 25% of crops averaged 43 t/ha. ■

Acknowledgements:

I would like to thank Joe Beazley, Phillip Boustead, John Doyle, Ray Mennegazzo, Geoff Moar, Robert Muratore, John Troy, Len Savage and Barry Sutton for their cooperation in establishing this project.



Setting R&D priorities for the Australian seed potato industry

JONATHAN ECCLES
is a Program Manager with the
Horticultural Research and Development Corporation

At the request of the APIC Research & Development Committee, HRDC held a two day workshop in February to identify the key national research priorities for the seed sector.

Participants at the workshop included seed growers, seed merchants, researchers, representatives from seed potato organisations and Department of Agriculture personnel.

The participants reviewed the strengths and weaknesses of the seed industry covering all major issues. The opportunities for the Australian seed potato industry were identified and written as the vision for the industry. Priorities for R&D will be fed into the Potato Industry R&D Strategic Plan which is being revised in 1996.

Research & Development Priorities

1. National certified seed standards
- to standardise Australian seed certification documentation
- to ensure all Australian certified seed potatoes meet appropriate minimum standards
- to ensure customers can clearly identify national certification standards
- to develop export credibility by providing uniform product with national branding

2. Technology adoption
- to establish the best way to extend data: central database or research directory
- to benchmark industry to establish international best practice
- to develop user friendly information systems to facilitate adoption of new technology

3. Pest, disease and weed control
- to improve grower awareness of problems
- to facilitate registration of new chemical treatments to provide a wider range of chemical control options
- to reduce field generations to minimise exposure to pests and diseases

4. Export market research
- to identify existing Australian varieties that meet the needs of overseas markets
- to source or develop new varieties to match the needs of overseas markets
- to develop cost effective production of small round seed
- to develop a total program to ensure acceptance of Australian cut seed in selected export markets
- to investigate new areas of seed production within Australia to meet the needs of export markets
- to evaluate new cultivars, particularly CIP clones
- to assist the development of Asian potato production with the use of Australian seed potatoes and technology packages

5. Total quality management - QA
- to facilitate the adoption of a standard national QA program in all seed producing states leading to the production of credible, consistent quality seed with lower certification costs

6. Small seed production
- to investigate and develop technology to produce profitable yields of whole round seed potatoes
- to identify and evaluate agronomic practices to ensure year round availability for varieties for local and export markets
- to develop uses for oversize seed so that they are not a waste product

7. Domestic market research
- in conjunction with the fresh sector, survey consumers to establish market requirements and emerging consumer needs and market trends
- to survey commercial growers to ascertain whether they are producing to meet consumer needs and establish their requirements for certified seed

8. Propagating material
- to establish a germplasm resource centre incorporating a system of regular clonal selection as well as the re-introduction of superior clones which also includes an ongoing field growing program

9. Postharvest
- to develop strategies to reduce postharvest and storage diseases and protocols to minimise bruising and damage
- to develop strategies to optimise physiological age to suit customer needs

10. Harvesting
- to supply growers with a cost effective harvesting package to optimise harvest of small seed
- to improve seed quality and minimise risk of disease
- to improve seed quality and promote small seed production

11. Transport and shipping
- to determine optimum container requirements
- to determine optimum packaging requirements
- to investigate use of sprout inhibitors, temperature control and physiological age ■

Our Vision for the Australian Seed Potato Industry

IT IS NOW FEBRUARY 2001

The seed potato industry has a national body in place within APIC, It has played a key role in introducing Australia-wide certification standards, developing a national Quality Assurance model and encouraging its adoption and coordinating export activity to the stage where it is a valuable revenue generator.

Markets

The industry now has an in depth understanding of customer needs for both the domestic and export markets and the focus is on growing customised varieties to meet the specific needs of these markets.

Accurate market information, including projections on annual tonnages, is provided by the processing and fresh sectors. The national export strategy incorporates a clearly identifiable Australian label and a technical backup service is in place to maximise performance.

The industry is now internationally competitive, Australia is recognised as a logical source for seed, a coordinated marketing program is in operation and members of the Seed Potato Exporters' Association are making sizeable inroads into overseas markets.

For export, strategic alliances have been established with the processing sector. The national body has linked with regional export associations to qualify for export grants and variety trials are now targeted to meet the needs of specific countries.

On the domestic market, commercial growers use 60% of certified seed, which is available all year round. A national register of certified seed growers has been established along with the varieties grown. The lead time for developing a new variety has been cut to three years and each new product is accompanied by an agronomic package plus a consumer testing program.

Seed production

Every certified grower meets the same national standards, a code of practice has been established and the QA system based on the national model is being widely adopted. Methods have been developed to produce higher yields of round seed.

A manual has been developed to improve planting techniques. Machinery is now available which is capable of handling multiple sizes and shapes and hygiene has been upgraded in automatic seed cutting operations.

For propagating material, the industry is funding a national germplasm bank to maintain a high level of genetic diversity, egular clonal selection and re-introduction are a feature of the program.

Because of good soil management and rotation practices, yields have been increased and diseases have been reduced. A Landcare code of practice has been established with community waste being effectively utilised by the industry.

A code of practice is in place for the management of soil borne diseases and hygiene and disinfestation protocols have been established. A technology package has been developed to manage powdery scab and common scab, a suite of fungicides is available to control seed diseases and genetically engineered cultivars with resistance to viral diseases have been released.

Effective irrigation and water management is improving farm efficiency. Technologies proven overseas have been evaluated and adapted for local soils and climates. The cost effectiveness of trickle irrigation has been assessed and water usage is designed to minimise leaching and nutrient loss.

An economically viable harvesting package has been developed to handle small seed and protocols have been established to minimise bruising and damage.

Physiological age issues are clear, the potential for growth regulators has been assessed and the efficacy of treatments to prevent postharvest diseases has been evaluated. Protocols for curing and storage are in place in relation to disease control, as well as a protocol to resolve disputes between the seed production and commercial sectors.

Transport and shipping

The industry has assessed the viability of adapting practices from the USA and Europe and protocols are in place to ensure that quality product is delivered. National links have been established with the shipping companies.

Effective storage and packaging is raising overall performance. An integrated system of supply has been established, the storage of seed along the chain, including shipping, continues to maintain quality standards and the Australian mark is widely recognised in export markets. Importantly, the national seed certification standard allows free movement of nucleus stock between states and there is universal acceptance of the independent inspectorial service.

Benchmarking studies have been carried out and the local industry has adopted world's best practice. The production of small round seed is now cost effective and tuber set has been maximised.

Quality Assurance

The QA model developed by the national body is accepted as the industry standard and the majority of production is covered by the program. TAFE accredited courses to train certification staff and growers are now available to the Industry.

Technology adoption

Effective technology adoption continues to be a constructive factor in both the growing and commercial sectors. The national body sources information from overseas and domestic markets and is maintained in a central data bank. Growers now accept the fact that the most effective way to update, is to access the data bank through personal computer technology and through audiovisual aids. A technology transfer coordinator is a role within the national seed potato body and the function is designed to facilitate the flow of information to both the seed production and commercial sectors.

Summary

The success of the national body in creating widespread acceptance for the Australia-wide certification standards, the unified QA program, the coordinated export activity all backed by an R&D program designed to provide the Industry with a competitive advantage,,, has all worked to raise both growth and efficiency. As a result over-all industry returns have been raised.

How an orderly marketing process has brought value to the W.A. potato industry

BRYAN MATTHEWS
is the Chief Executive Officer with the
Potato Marketing Corporation of Western Australia

The Potato Marketing Corporation of WA has clearly demonstrated that it is now customer focused and structured to operate with maximum efficiency and effectiveness.

By managing the industry in this way, the Corporation adds value for its stakeholders and is seen to act in the best interests of the community at large.

There is little doubt that the Western Australian potato industry has some structural advantages over the Eastern States by having a legislated marketing body.

The new legislation enacted in September 1995 has better enabled the Corporation to increase efficiency in the potato industry, providing customers with a wider choice of varieties, improved quality standards and minimising the extent of a blackmarket in potatoes.

Equally important has been an objective of encouraging a trading approach that will eventually generate sufficient financial return to all stakeholders to enable them to reinvest in the long term development of a soundly based domestic and export industry.

So what have we done that has seen sales turn around in WA and start to increase?

1. Control production

You cannot have growers in one year and out the next dependent on whether the returns look like being good or bad. We need growers who are committed to continuous product improvement, to stay in the industry year in, year out.

There is a stable demand for fresh potatoes as part of the staple diet. Sales have been allowed to shift to other products such as rice and pasta and to processed potatoes, the last mainly driven by lifestyle changes.

The steps we took were-

- Get rid of surplus product that adversely impacted quality. This meant cutting some licensed areas by as much as 30%.
- Stop "dumping" overseas.
- Plan quotas and delivery intents really tightly so that we run at 5-10% above our forecast domestic demand.

"What, no potato?" advertising billboard

2. Plan to build sales

We took the Harrison market research (commissioned by the South Australian Department of Primary Industries) and our own and acted on the picture they both clearly painted.

This has resulted in TV and press support starting in 1995 revamping the highly popular *"What, no potato?"* campaign. However, we also wanted consumers to use potatoes much more frequently, hence four commercials were produced featuring Mark Mitchell.

The first established a "smartened up Con" (no spitting in paper bags!) and his new specialist potatoes only shop. This also allowed us to firmly reintroduce the *"What, no potato?"* slogan and to indicate the range of potatoes available inWA.

The second emphasised the need for correct potato storage in the home by demonstrating our 5kg pantry box. This built on the success of the earlier 10kg pantry box. To date, some 55,000 pantry boxes have been sold at $2.95 each.

The third introduced a range of convenient easy to cook meal recipes with the emphasis on snacks. This involved us placing Con display stands instore. Because of our commitment and research based presentations to retailers, the recipe dispensers that form part of the display stands are now in wide distribution at point of sale.

And the final ad, introduced our innovative potato microwave capsule which retails at $3.95 and is of course designed to encourage potato usage particularly for snacks. Here I have to admit to getting egg well and truly on my face, having reduced our first sales estimates down to just 10,000 and now having to re-order for 50,000. At least it was a nice way to be wrong.

3. Meet the customer's needs

All our work in WA is now based on end user needs, be they in the home or food service. What appearance, what cooking attributes are consumers after? Having said that we also know that if the growers (both seed and ware), washpackers and retailers can't make acceptable returns then forget it. However, end users will pay to get what they want. So forget the old god of yield and go instead for profit produced as a result of meeting market needs.

4. Pricing

The toughest issue of the lot. All businesses must be capable of implementing the Competitions Principles Agreement in relation to competitive neutrality. We are already working with the Australian Competion and Consumer Association to find a sound resolution to this issue and find that they are very helpful.

The fact that the Corporation sets a price to the washpacker is acceptable so long as that price reflects market conditions and does not disadvantage individual stakeholders and above all, consumers.

The next move in developing a long term pricing strategy is to put much more pressure on getting rid of poor quality whilst rewarding consistent good quality and to introduce price differentials by variety where justified.

5. Set about obtaining relevant quality assurance

Too many people along the chain of distribution from farm to retailers believe they do it "good enough". Well, good enough is never good enough and never will be!

This year has seen us start working with our whole industry to develop a Code of Practice specifically for fresh potatoes.

6. Have an independent but committed management team in place to run the business

I am extremely fortunate to now have a small team of 17 people who know what they are doing, why they are doing it, who keep open minds, and who have no allegiance to any interest group, political or otherwise. We intend developing the industry and will do it by giving the end users what they want (which has to include value for money), and by ensuring decent returns for all those involved in making the product available.

The first judgement for Australian potato farmers should be **"what products will the market favour"** not what rules the government regulators should or should not press for. Unhappily, too few of our farmers or washpackers think this way, hence the need for a professional management body for potatoes in each state.

So what should the other states do?

- Each set up an independent management body representing growers and washpackers, under a general manager who has wide business experience.
- Establish a per tonne levy on fresh potatoes with a contri bution from growers and washpackers.
- That levy to meet the costs of the management body who should set about implementing a National Potato Council brief to determine the future of the potato industry Australia wide whilst simultaneously starting to action the recommendations of the Harrison study.
- As WA has a unique position the rest of Australia should use us as a case study to examine the art of the possible. ■

"What, no potato?" display in a WA supermarket

INTRODUCING THREE NEW POTATO VARIETIES

SYMFONIA

- Red skin with light yellow flesh
- Oval tubers with shallow eyes
- The superior skin finish makes this variety ideal for the washed prepack market
- Resistant to common scab and Potato Cyst Nematode (Race Ro1)

GOLDSTAR

- Yellow skin with light yellow flesh
- Oval tubers with very shallow eyes
- Suitable for the washed prepack market and French fries
- Resistant to Potato Cyst Nematode (Race Ro1)

ROYAL BLUE

- Dark bluish/purple skin with rich yellow flesh
- Long-oval tubers with shallow eyes
- Suitable for fresh market and French fries
- Resistant to Potato Cyst Nematode (Race Ro1)

HARVEST MOON

For information on these varieties contact:
DeZPC's Australian Agent:

Harvest Moon
Leith Road
Forth Tasmania, Australia 7310.
PHONE: 03 6428 2505 FAX: 03 6428 2952

Exciting new potato varieties from Harvest Moon

Market research commissioned by APIC has shown that there is a tremendous opportunity in Australia for marketing ware potatoes with good eating and cooking properties.

It is also clear that consumers are unsure of the various varieties of potatoes presented for sale around Australia.

Yellow fleshed potatoes are not well known in Australia although they are the mainstay of the ware potato market in Europe. The exceptions are *Bintje* in Tasmania and *Desiree* in other states which are becoming increasingly popular.

Yellow fleshed potatoes are regarded as having a superior flavour as well as better culinary potential than the majority of white fleshed potatoes.

Both *Desiree* and *Bintje* are from the famous Dutch breeder De ZPC which is a large cooperative with over 700 farmer associates and an annual export of 120,000 tonnes of seed and 145,000 tonnes of ware potatoes. Another De ZPC variety that is known in Australia is *Marijke.* The breeding station operated by De ZPC makes approximately 100,000 crosses annually in the search for new varieties.

The introduction of PBR (Plant Breeders Rights) into Australia now means that Australian growers and consumers can have access to high performing varieties from breeding programs around the world.

Over the past four years Harvest Moon, a leading marketer of potatoes and other fresh vegetables, has been importing and selecting a range of De ZPC potato varieties and has become the Australian agent for De ZPC. These varieties are being evaluated at locations around Australia.

De ZPC's Export Manager, Henk Barel (second left) assessing early growth of a new yellow fleshed variety

All are resistant to potato cyst nematode and have yellow flesh. Some of these varieties have greater tolerance or resistance to important diseases. Yield of marketable potatoes are comparable or superior to those obtained from current Australian varieties.

Eight varieties have undergone trials in Tasmania and are still being tested under a range of climates on the mainland to determine regional suitability.

Harvest Moon has confidence in the superior performance of these new varieties and is applying to have PBR granted on three which are generating excitement due to excellent results obtained from a number of trials.

Symfonia has both a red skin colour and superior shape to that of *Desiree.* The tubers are smooth, oval and can grow quite large without losing quality. The tubers wash well and are suitable for boiling and frying. Flesh colour is similar to that of *Desiree.* Yields are good. *Symfonia* has been shown to have very good resistance to common scab. De ZPC claim resistance to powdery scab, late blight, Verticillium and target spot. Harvest Moon is confident that this variety will out perform *Desiree.*

Royal Blue has a purple skin and yellow flesh. The tubers are oval to long oval, slightly flattened and are highly suited to French fry production. *Royal Blue* tubers have a strong yellow coloured flesh and the resulting French fries are a magnificent golden colour. The tubers are also very suitable for the fresh market. The variety provides exciting marketing oppotunities as the tubers, when washed and well presented, have a special appeal due to the contrast between flesh and skin colour as well as excellent culinary qualities for frying and boiling (very similar to *Bintje).*

Goldstar combines a yellow skin and pale yellow flesh. The tubers of *Goldstar* are oval and very smooth skinned with particularly shallow eyes. It is capable of growing quite large, without hollow heart problems, and maintaining an even shape. The boiling characteristics are very good and this variety also makes excellent French fries.

Of the other varieties in Harvest Moon's introduction program, several are giving good results in interstate trials and may be nominated for PBR during the coming year. Some newer introductions from the De ZPC breeding program are currently being bulked for trials or undergoing quarantine tests prior to release.

Varietal improvement is an ongoing program and Harvest Moon is committed to continuing to access new varieties for testing in Australia.

Furthermore, Harvest Moon recognises that consumer's quality standards for produce are increasing and that by gaining access to some of the best potato varieties in the world it will be possible to improve both the standard of the product and the return to the grower. ■

Editorial supplied by Harvest Moon

New certified seed scheme introduced in WA

MURRAY HEGNEY
is the Seed Development Manager with the Potato Marketing Corporation of WA

Seed potatoes have been produced in Western Australia under a unique scheme since 1922.

Initially, the scheme included two categories - "certified seed" and "approved seed". For both categories, seed crops were inspected on at least two occasions during their growth, with the disease tolerances being lower for certified than for approved seed.

In the mid 1970's the certified seed category was dropped leaving only the lower approved seed category in which the tolerance for virus diseases is *2%* for visibly infected plants. The scheme has changed little until now.

As in other Australian states, there is a growing demand from all sectors of the WA potato industry for improved potato quality and production efficiency, both of which are affected by seed quality.

The WA industry would also like to gain a share of the potentially large market for seed potatoes in South East Asia. The combination of these factors has resulted in the need to significantly upgrade the standard of the existing seed scheme.

In November 1995 a new Certified Seed Potato Scheme was initiated in WA. As with similar schemes operating in Victoria, NSW and Tasmania, the new WA scheme is based on the annual infusion of pathogen tested minitubers.

The minitubers (GO) can be multiplied over a maximum of 4 field generations to produce certified seed (G4) which is then sold to commercial growers and thus relegated out of the scheme.

There are strict crop rotation and isolation requirements, together with requirements for grading, packing and record keeping. All field generations must pass a minimum of two field inspections and a tuber inspection. The field tolerances for key diseases and foreign varieties increase with each successive field generation. For certified seed the tolerances are: virus disease - 1%, other disease - 2%, total diseased - 2% and foreign varieties 0.1%.

AGWEST Seed Quality, a business unit of Agriculture WA, is providing the independent inspection service for the new certified seed scheme. They will also continue to inspect crops grown under the existing approved seed scheme.

A small number of WA seed growers, who have the capacity for long crop rotations, have taken up the challenge of producing certified seed under the new scheme. Seed from the first field generation (Elite or Gl seed) was harvested in March this year.

In addition to assisting both existing and new growers start on the path to producing certified seed, Western Potatoes have also embarked on a project aimed at formulating and implementing a Code of Practice for all seed growers in WA.

Elements of the Victorian Certified Seed Quality Assurance Program are being used as the basis of the Code. The Code, which will be developed in close cooperation with seed growers, will comprise a reference manual detailing best management practices for seed production and handling, together with self imposed checks at critical stages. ■

Fresh potatoes in Victoria - threats and opportunities

ANDREW HENDERSON
is the Technology Transfer Officer, Potatoes, Institute for Horticultural Development Agriculture Victoria

During the past five years, two key issues have emerged for the Victorian fresh potato industry.

These are:

1. **Reduced demand for, and over supply of, fresh potatoes, due to**
   - competition from rice and pasta.
   - expansion of production into new areas.
2. **The need to become internationally competitive,**
   - to compete with potential imports of processed product and to capture expanding markets in south-east Asia.

To address these and other industry issues, a project entitled "A Fresh Approach: Potatoes for Quality and Profit" has been undertaken jointly between Agriculture Victoria (Department of Natural Resources and Environment) and the Victorian Farmers' Federation.

The main project activities completed to date are:

Quality audits

Market research conducted by Mr I. Lewis on behalf of the Horticultural Research and Development Corporation (1994) identified quality as a major problem for consumers of fresh potatoes. In response to this, quality audits were made in April-June 1995 to:

- measure the quality of fresh potatoes presented in retail stores (retail audit); and
- broadly identify where quality defects occur between harvest and retail store (handling chain audit).

Samples collected in both audits were assessed for mechanical damage, greening, size grades, skin blemishes, shape and boiling quality.

"A Fresh Approach" addresses industry issues from grower to consumer

Mechanical damage was found to be the major quality defect in both audits; each of the 98 samples taken in the retail audit contained potatoes with important mechanical damage. Similar amounts of mechanical damage were found to occur on the farm and post farm gate. Greening and boiling quality defects were also found to be widespread. Visual defects in particular are a major concern for a product facing strong competition from rice and pasta.

Industry forums

In October 1995, potato grower industry forums were held in the Gembrook, Ballarat and Colac areas. A further forum for post farm gate industry representatives (packers, merchants, wholesalers, retailers) was held at the Institute for Horticultural Development, Knoxfield. To set the scene for each forum, presentations were made on:

- Fresh market research results
- "A Fresh Approach" project overview
- Quality in the market place
- Trends and experience from overseas

The major aim of the forums was to promote discussion on what the future of the fresh potato industry in Victoria should be, and how it could be achieved. This in turn would provide indicators from industry as to which issues the project team should address next. In summary, a desire was expressed for a profitable, co-ordinated, competitive, sustainable and market-focussed industry. The main issues to be addressed in achieving this were quality, promotion and branding, packaging, industry structure and consumer education.

A total of 96 people attended the grower forums and 90% of Victoria's packers and supermarkets were represented at the post farm gate forum. About 80% of each group wanted to be involved in further action to address the key issues for the industry.

Financial performance study

Financial and physical data for the 1994-95 season were collected from thirty Victorian potato growers in four growing areas (Thorpdale, Ballarat, Gembrook and the south-west coast). The aim of the study was to identify the key factors in financial performance.

A good indicator of financial success is the net return received per tonne of potatoes. Participating growers were grouped on the basis of their net return (low, medium and high) and possible contributing factors (area, yield, sales outlets, waste, overheads and variable costs) were compared between groups.

The difference in average net return between the low and High groups was substantial. The main factors contributing to the difference were in area grown, overhead costs per tonne (particularly labour) and price received. Price was the main contributor to the difference between the medium and high groups.

It is apparent that some growers need to improve factors such as labour efficiency and market options if they are to maintain the viability of their fresh potato enterprise.

Production and marketing trends

The project team has examined recent production and marketing trends both in south-eastern Australia and overseas, to identify the likely effects on the Victorian industry.

South-eastern Australia

Over the past decade, there has been a shift in production to the sandy soil areas of south-east South Australia and along the Victoria-NSW border, often in large-scale operations. Discussions with growers in these areas and with wholesalers, packers and retailers in Victoria revealed differences in attitudes towards markets. In particular, South Australian growers seem to be more focussed on their customers' needs than many of their Victorian counterparts.

Overseas

In both the United States of America and the United Kingdom, there is a range of new value-added, fresh and semi-processed potato products appearing and the demand for processed products is increasing. This expanding market for potatoes could present new opportunities for Australian growers.

Farm sizes in the UK (currently comparable to Australia) are tending towards large-scale operations. The more efficient UK producers are willing to supply retailers with exactly what they want and to accept responsibility for their product up to the point of sale to the consumer.

A major opportunity for the Australian potato industry lies in the potential export of fresh potatoes, seed, processed products and fresh potatoes for processing. Over the past year, enquiries for a total of 600,000 tonnes of export potatoes have been received by Agriculture Victoria and AUSTRADE. The challenge is our ability to supply these large volumes on a continuous basis, before these opportunities are lost.

The next steps

At present, the Victorian fresh potato industry is undergoing rapid change and appears destined for either decline or massive expansion. To continue with "A Fresh Approach", the project team will be looking towards issues such as production and quality management, investment facilitation, retail handling and sustainable management. ■

The "A Fresh Approach" project team

Agriculture Victoria
Russell Sully, Manager, Ballarat District Office
Ralph Cadman, Regional Development
Richard Habgood, Manager Field Services, Ellinbank
Karen Freeman, Technology Transfer
Ross Sheppard, Food & Marketing
Bruce Fry, Technology Transfer
Kaye Aitken, Economist
Andrew Henderson, Technology Transfer

Victorian Farmers' Federation
David Lewien, Victorian Horticultural Growers' Council

Acknowledgement:

"A Fresh Approach: Potatoes for Quality and Profit" is funded by the Victorian State Government as part of its Agriculture and Food Initiative.

Assessing tubers for mechanical damage

Phosphonic acid does not control *Rhizoctonia* or powdery scab

TREVOR WICKS
is the Senior Plant Pathologist and
BARBARA HALL
is a Technical Officer
both are with the South Australian Research and Development Institute, Plant Research Centre, Urrbrae

South Australian research shows phosphonate based fungicides do not work on *Rhizoctonia* or powdery scab.

Phosphonic acid is the active ingredient of phosphonate based fungicides registered on some crops to control diseases such as downy mildews and root rots caused by the *Phytophthora* group of fungi.

These chemicals are highly systemic, moving rapidly within plants from sprayed leaves into the roots. Because of this, some growers have used these materials in the hope of controlling diseases such as *Rhizoctonia* (black scurf) and powdery scab in potatoes.

No data on how well phosphonic acid works on these two diseases has been available and consequently we undertook greenhouse and field studies to find out.

As a result of this work, **fungicides based on phosphonic acid cannot be recommended for the control of either *Rhizoctonia* or powdery scab.**

Another disease where phosphonate based fungicides have been evaluated on potatoes is in the control of Irish blight caused by *Phytophthora infestans*. Work in Australia and overseas has shown control of this disease to be unreliable with the fungicide being effective on some cultivars and not on others. Again further work in this area needs to be done before practicable control measures can be recommended.

Overall the phosphonate based fungicides may have a use in potato production as they are safe and easy to use. However because of their specificity they are likely to control only a few potato diseases. Correct diagnosis of the potato disease is therefore essential to prevent unnecessary applications of these fungicides. ■

Acknowledgement:

We wish to acknowledge UIM Agrochemicals for funding this work.

North coast sand dunes - a new frontier for Tasmanian potatoes

BILL CHILVERS
is a Soils Officer with the Department of Primary Industry and Fisheries, Tasmania
DAVID WATERHOUSE
is the Farm Operations Officer with Simplot Australia Pty. Ltd.

The coastal fringe of north east Tasmania will be growing some 1500ha of potatoes this season.

Growers at a field day highlighting potato production on sandy soils

This is major expansion from virtually nothing three years ago.

The attractions of this region are large areas of cheap sandy country and the potential to use centre pivot irrigation. However saline irrigation water, high watertables, non wetting sands, wind erosion and low fertility provide the would-be potato grower plenty of challenges to consider as the old tussocks and turf is ploughed under.

The red soils along the north west coast and near Scottsdale in the north east have been the traditional potato growing areas in Tasmania. But rising land prices, competition from other crops, poor economies of scale and the requirement for greater tonnage forced the major processing companies to look for new areas during the late 1980's.

This coincided with the wool price crash and many traditional graziers of the Midlands region leased ground to the major companies for around $300/acre. Tillage and agronomic practices used on the krasnozems were simply transferred to the Midland's deep sand and duplex soils. This often had dire consequences of wind erosion and waterlogging.

A lot has been learnt in the last decade about growing potatoes on fragile soils. This knowledge will be further tested in the move to the north east's coastal podzols which have the additional challenge of being water repellent.

In 1996-97 Simplot Australia Pty. Ltd. is planning 1000ha under joint venture projects involving land leasing and experienced contractors. About half this area will be in the north east and half in the Midlands. Last season 600ha were grown under joint venture with the pivot irrigation sites in the north east averaging 40-45 t/ha.

Some management practices being adopted by Simplot for potatoes on these sandy soils include

- **no mouldboard ploughing**
  Mouldboard ploughing maximises erosion risk. Not long ago these areas were sand dunes.
- **wider rows, shallower planting**
  Plantings will be on 850mm (34") rows rather than 800mm (32"). Shallower planting at 150mm (6") rather than 200mm (8") will allow quicker emergence, reduced risk of *Rhizoctonia,* and reduced losses to waterlogging in low lying areas.
- **broader, flatter moulds**
  A broad, flat mould is more stable over time, and there is less greening from exposed tubers. Water infiltration within the mould is improved as the traditionally steep, pointy moulds simply shed water causing waterlogging in the paddock hollows
- **irrigation applications at low rates (7-8mm), and short return periods**
  A wetting/drying irrigation regime allows the mould core to dry which then resists rewetting. The aim is to keep the core of the mould moist from the outset.

Paddock preparation will also be improved. Paddocks are generally coming out of long term pastures with a considerable turfy root mat which is difficult to break up without overworking and slow to rot down.

Turf lumps at harvest are difficult to separate from the potatoes, requiring additional labour on the harvesters. Lots of turf may also increase nematode pest problems.

The solution is a longer preparation phase, beginning with autumn desiccation, discing and sowing of green manure oats. This gives plenty of time for turf breakdown before ripping and roterra seedbed preparation in September. The turf remnants and green manure oats mixed throughout the mould should provide good erosion protection and minimise water repellence. ■

Some bare bones about LAPDOG.

JIM GUNTON
is an Extension Officer with Queensland Department of Primary Industry and based at Kairi Research Station

No, this isn't a stray from a pet owners manual but it is about the Lucky Atherton Potato Diggers Options Group, based in the Atherton Tablelands.

Seven growers got together in November 1994 to form a cooperative 'self-help' group to discuss and develop more sustainable ways of growing potatoes in their cropping systems.

Grower expectations

The growers expected that by forming the group they would learn from each other, carry out 'on farm' activities to improve the way they did things, pass this knowledge on, influence funding bodies and achieve greater profit from their fanning enterprises.

They also envisaged that their enterprise would become more sustainable, and said that seeing their research levy money coming back in a positive way from QFVG/HRDC was helpful in motivating their involvement.

How the group works

Initial meetings identified priority areas of investigation with the most important being;

- Seed quality and treatment
- Pests and diseases
- Plant nutrition and management
- Irrigation
- Planting

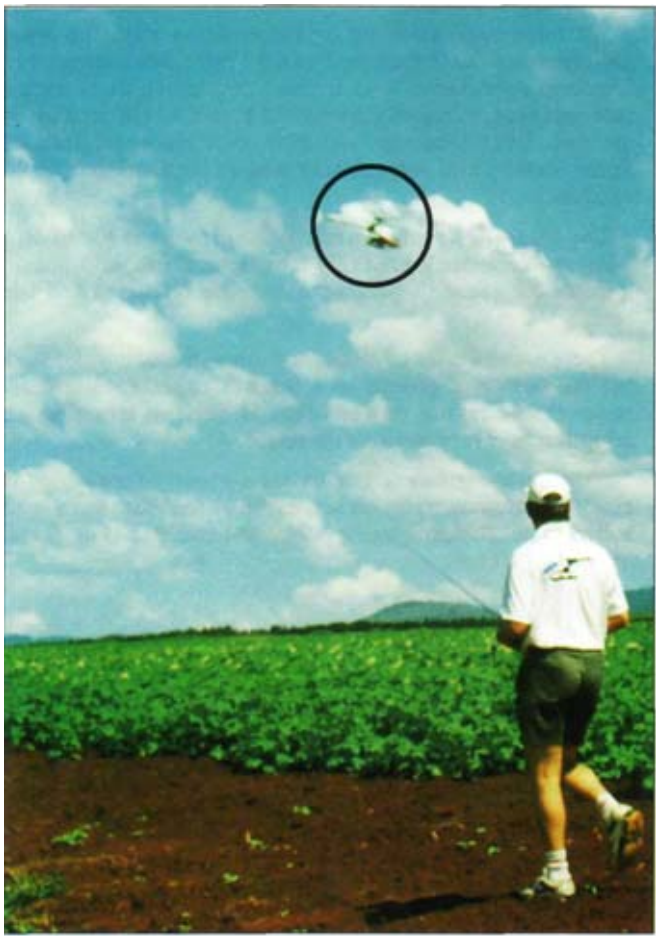
During the past year the group has met regularly every month to discuss and work out activities in these priority areas. It has had visits from people specialising in IPM, in disease management, irrigation, and chemical representatives.

LAPDOG members are taking on the role of educating themselves in these matters by purchasing books and reports, which they circulate and discuss. They are experiencing the way co-operating groups can help them learn more about potato cropping, and have held several farm walks.

Group members have also purchased a number of soil water tensiometers to monitor their watering practices. After discussions with those who use them and with irrigation specialists, monitoring of soil water has been carefully studied. One member has undertaken to collate this data.

IPM

LAPDOG became interested in IPM because a few crisping growers in the district had been to IPM training and crop scouting had reduced insect spraying on some *Atlantic* crops. One grower, Nino Quadrio, had employed a consultant to do a detailed crop monitoring of insect pests and associated beneficial insects. This information was generously shared.



John Quadrio and helicopter dispersing *Trichogramma* eggs over a potato crop

LAPDOG growers had heard of other IPM work in which predatory insects were released and were keen to follow this aspect. They hoped that reducing insecticide spraying would reduce costs and improve the district environment, including rivers and the Great Barrier Reef. As one thoughtful member put it **"We want to have FISH to go with our CHIPS".** (Got to be a bumper sticker slogan in there!)

Paul Horne in Victoria was contacted about releasing wasps to control potato moth and we sponsored him to visit. LAPDOG and the wider potato community had some very informed discussions of IPM principles and practices.

This led the group to hire the services of an insect monitor, to compare what happens in different situations.

The group has taken part in a release trial of beneficial insects, *Orgilus* wasps (see *Potato Australia 95)* and is planning for a bigger number of trials including release of lacewing and *Trichogramma* eggs, for this growing season.

One outcome of all this well publicised activity has been an expansion of crops scouted and a reduction in the amount of insect spraying across the district. So much so, that now it is hard to find a grower who is willing to act as a totally regular spray 'control' to compare with the newer IPM treatments!

Recently, member John Quadrio, has, with help from a friend, built a release box which he attaches to a radio-controlled helicopter and successfully released *Trichogramma*

and lacewing eggs into potato crops. This approach seems to have many advantages over other release methods and presents a further range of options now available to district growers.

Most of the group are convinced that reduced spraying for insect pests coupled with release of beneficial insects can go a long way to controlling insect damage and improving our environment.

Robinson group liaison

We have been exchanging information with the potato growers from the Robertson District Potato Advancement and Landcare Association who are also developing more sustainable practices. We partly sponsored a visit to our area by one member, Snow Donovan, and their coordinator, Sandra Lanz. Some worthwhile information was exchanged and further contacts made.

The group also plans to visit potato growers in the Charters Towers-Woodstock area to share information and provide impetus for expanding the options to be discussed and tried here.

There are still a lot of areas for further discussion and study, but the **power of groups as a pool of experience and as a support for trying newer ideas is driving learning and adoption in a very positive direction.**

More potato growers groups are currently forming in the area. If these groups are as successful as the first then sustainability of potato farms on the Atherton Tablelands will increase markedly. ■

Acknowledgements:

QFVG has provided funds from its research and development levy to help the growers purchase and try different technologies to achieve the above outcomes.

John Quadrio explains predator release as part of the LAPDOG IPM strategy to a local TV news crew on the Atherton Tableland

Sustainable potato production in highland Australia

SANDRA LANZ
is an Agricultural Consultant based at Bundanoon, NSW

Traditional farming practices in highland potato growing areas of NSW and Australia are being increasingly challenged.

Environmental groups, catchment authorities, Landcare groups, growers and industry leaders see ample evidence of soil degradation, particularly soil erosion, falling viability and down stream water quality.

These potato growing areas are vital industry contributors, producing ware and processing potatoes. Growers are keenly aware of the need to adopt more sustainable practices. However, lack of verified information from research and low levels of technical support due to the scattered nature of the industry has meant low levels of adoption of improved practices.

In 1990 growers in the Robertson district began to develop and adopt new approaches to soil conservation and land management. The adoption of these sustainable farm practices resulted in lost farming land of 15-20% due to earthworks.

To remain viable, growers have been working with NSW Agriculture, Land and Water Conservation and a local consultant to implement strategies to improve environmental sustainability while increasing yields.

Minimum tillage

The Robertson District Potato Advancement and Landcare Association (RDPA&LA) has been working with the Department of Land and Water Conservation in NSW comparing minimum tillage with conventional tillage methods.

The minimum tillage procedure begins with the application of glyphosate to the paddock. Three weeks later the grower makes up to two passes with a modified agro plough which has been developed to minimise clod formation. Once this is done, planting takes place. Ideally, there is no more soil cultivation, however growers may scuffle twice to control weeds. The use of pre and post emergent herbicides is being considered as an alternative.

Results show yield to be at least equal to conventional methods. Costs are decreased due to less fuel used, less wear and tear on tractors and implements, less time spent on the tractor and less soil structure damage.

Plant nutrient levels have not shown major differences between minimum and conventional tillage methods.

Nutrient monitoring

Soil testing before the season begins, followed by a program of plant testing during the season has illustrated the need to re-think fertiliser application rates. Nutrient testing has shown that differences in planting times can have major effects on nitrogen levels in the plant. Potassium has been highlighted as a nutrient to monitor during the season, as a side dressing may be necessary.

Growers now understand the importance of dolomite and, where needed, of applying it as early as possible for the plant to obtain full benefit.

Data collected over three consecutive seasons has created a very good picture of the district and is helping to develop appropriate fertiliser programs for individual paddocks and for different varieties.

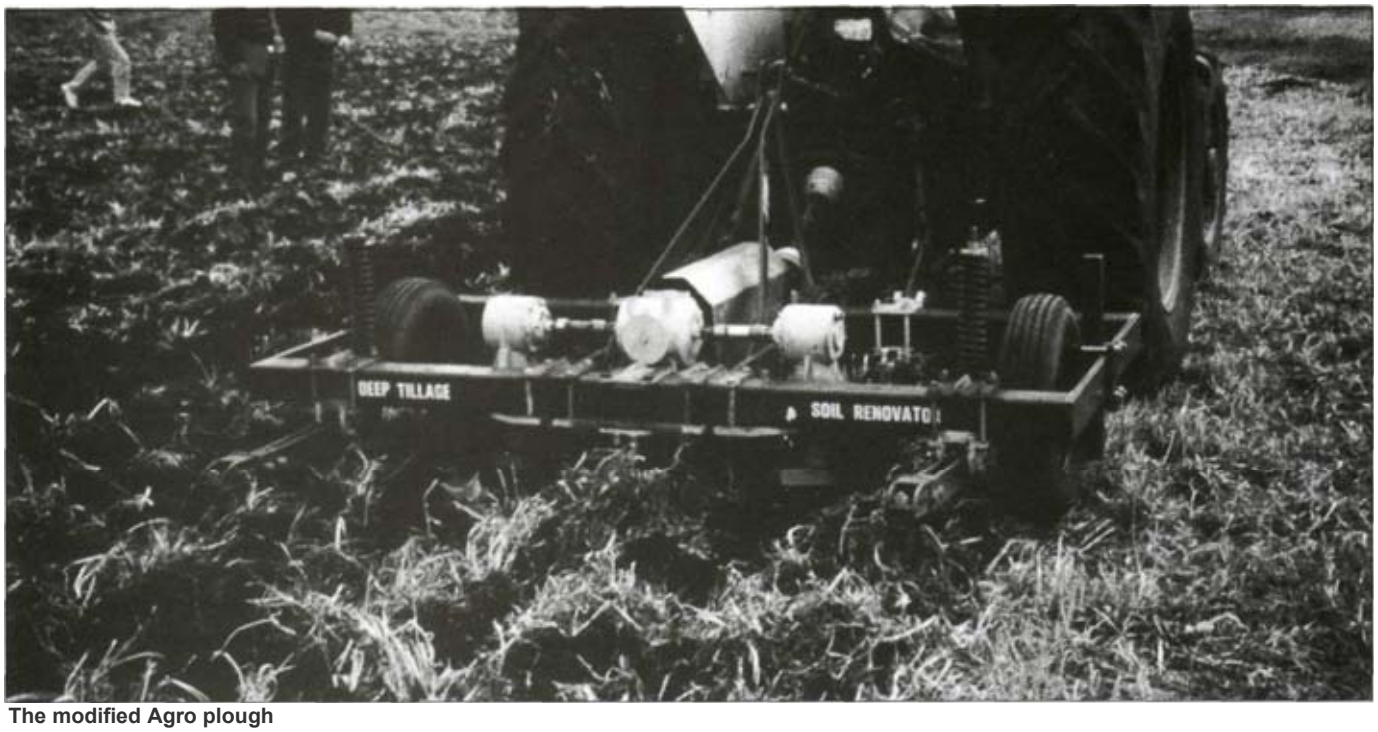
Irrigation monitoring

Tensiometers have become an integral part of the crop management program. They have demonstrated to growers how well drained the soils in the Robertson district are and how quickly crops can become water stressed. Crops irrigated according to tensiometer results gave consistently better yields (45t/ha) than those irrigated by guess work (30t/ha).

Pest and disease

The growers have worked very closely with a project to implement IPM in Northern Australia. They are now able to monitor for and recognise insects present and determine if they are pests or beneficials. Growers are also aware of biological control programs

Robertson grower Jon Hill downloading information from the Envirocaster



The modified Agro plough

and wish to implement one for the control of potato tuber moth. As a result of their increased awareness of insect pests and their control, growers decided to undertake the National Farm Chemical Users Course with all group participants gaining certification.

The use of an Envirocaster (provided by Horticultural Monitoring and Control Pty Ltd) during the 1995-96 season illustrated to growers the sort of technology available which can help make timely decisions regarding the control of target spot and Irish blight.

Investigatory trials

Nutrition has been the main focus of this project due to the high amounts of fertiliser applied and the sensitivity of waterways in the district to increased nutrient levels. High, low and normal rates of phosphorus and higher application rates for potassium at and before planting were looked at.

It was concluded that applications of phosphorus can be lowered depending on soil test results. High applications of potassium at or before planting do not improve yield or plant uptake over the season and side dressings may be more appropriate.

Networking

Monthly meetings have been organised where guest speakers are invited. Topics covered industry issues and research and included changes taking place at the Sydney Markets, a new Sandoz product for the control of target spot, Techni tubers, installation of tensiometers, potato diseases and salad potatoes.

A newsletter outlining the work being carried out by the growers in relation to the project has been sent to all participating growers, grower groups throughout NSW and support persons throughout Australia.

District visits have led to a better understanding of what is happening elsewhere and to let other districts know of the work and results in Robertson.

Handbook of best practice

All activities and outcomes of this project will be documented in a handbook of best practice. This handbook will also provide factsheets on areas of nutrition, pest, disease and irrigation. Listings of useful reference books and suppliers as well as current research within the potato industry will also be presented.

What have we achieved

Yield increases of 20% have been recorded over the three years of the project. Greater sustainability has been achieved through more appropriate use of chemicals and fertilisers.

Growers are aware of the latest technologies and products and the support specialists to talk to about implementing the technology successfully into their crop management program.

Very importantly this project clearly demonstrates the benefits of a group cooperating and working together. The Association has been able to negotiate a special rate for soil and plant testing. Research institutes identify the group as proactive and actively seek out the group for joint project work.

Strong links have been developed between the growers, local government and state agencies, demonstrating to the community that potato farmers are responsible primary producers.

The future

The work undertaken by the RDPA&LA has identified major inefficiencies in irrigation practices. There is also a desire to implement biological control measures for the management of the potato tuber moth.

To address these issues the RDPA&LA would like to implement a project with the following aims:

- Establish drip irrigation in potato crops to improve water use efficiency and minimise soil and nutrient run off
- Establish biological control techniques in the Robertson district for the management of potato moth in order to minimise pesticide applications
- Establish a strong forum through which growers are able to source information on technologies which will improve their economic viability and achieve land use sustainability. ■

Acknowledgements:

The project has also been funded by the Sydney Water, Wingecarribee Shire Council, and the Robertson District Potato Advancement and Landcare Association.

Support has also been received from Guy van Owen of DL&WC, Mike Robbins, Clarrie Beckingham and Bob Turnbull of NSW Agriculture.

Growers from Robertson and Crookwell help in the harvest and evaluation of fertiliser trials at Robertson.

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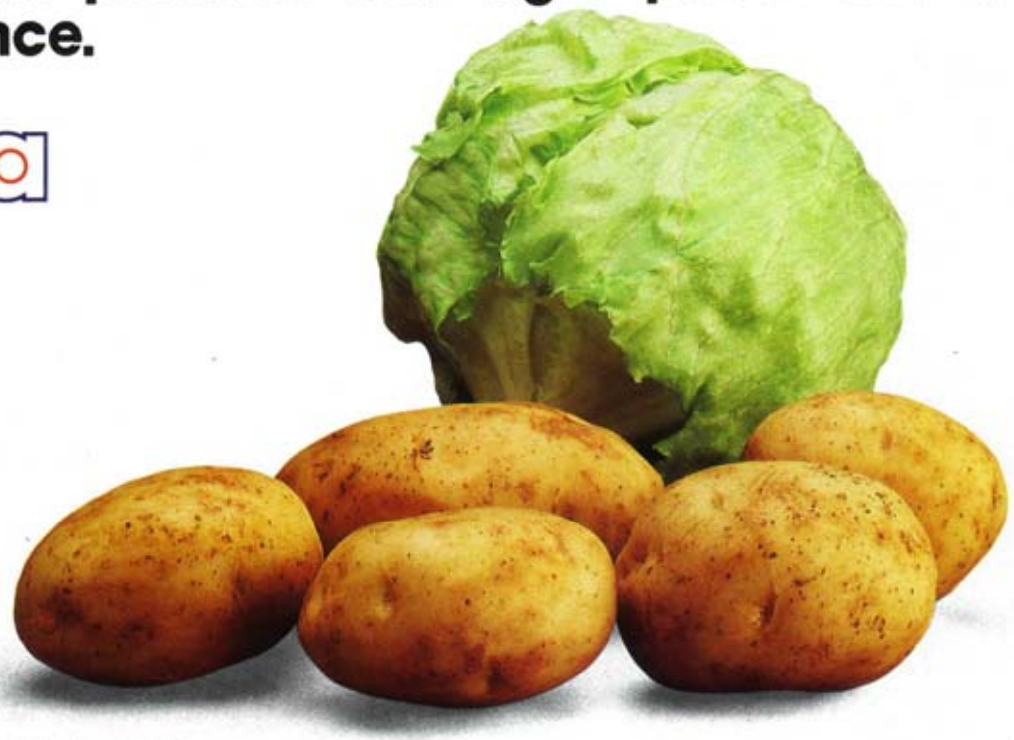

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AP2414/R2

Pink rot on potatoes

TREVOR WICKS is the Senior Plant Pathologist and ROBIN HARDING is a Technical Officer (potatoes) and both are with the South Australian esearch and Development Institute, Plant Research Centre, Urrbrae

Pink rot is now found in most potato growing areas of South Australia as well as in Tasmania and Victoria.

This soil borne disease appears to be spreading and is a serious problem in the lower south east of South Australia where yield losses of 30% have been reported on some properties. Further losses may occur in storage due to secondary bacterial infections.

Cause

This disease is caused by the soil borne fungus *Phytophthora erythroseptica* but other species of *Phytophthora* may also be involved.

Symptoms

The portion of a tuber attacked by *Phytophthora* turns pink and eventually black when the infected tuber is cut open and exposed to the air for at least 30 minutes. Another distinguishing feature of this disease is the development of a black line that usually delineates healthy and diseased tuber tissue and is obvious once adhering soil is washed or brushed from infected tubers.

The pink rot fungi attack potato roots, stems and stolons, often growing along the stolon into the tuber. Thus tuber infections usually start from the stem end. Infected tubers are initially spongy and rubbery, but break down in storage occurs with the development of secondary soft rot bacteria.

Above ground symptoms are less obvious, but most infected plants appear flat and limp compared to healthy plants. Because the roots of infected plants are often severely rotted, stems of these plants are easily pulled up and the base of these stems is coloured black to dark grey. Severely infected plants wilt, collapse and die, with the tubers rotting completely.

Conditions suitable for disease development

Little is known about this disease and how it survives in the soil. As with other diseases caused by this group of fungi, high soil moisture and temperatures between 15°C to 20°C are ideal for Phytophthora fungi to multiply and spread in the soil. This is reflected in the high incidence of pink rot in low lying water logged areas or in areas where irrigation pipes have burst causing areas of pooled water. However, this is not always the case and often pink rot develops in apparently well drained areas of a paddock.

Spread of the disease

Pink rot is introduced into a new area on infected seed tubers or in infested soil adhering to bins or other equipment used in potato production. Spread within a paddock is likely to occur with soil movement during cultivation and in run off water moving along rows during irrigation.

Varietal susceptibility

Pink rot has been recorded on *Atlantic, Coliban, Nooksack, Shepody, Russet Burbank,* and *Pontiac.* It appears that most cultivars are susceptible, however to confirm this further research is needed.

Control

Pink rot has been controlled in Tasmania by applying 20 to 30kg/ha of Ridomil® granules at planting followed by foliar application of Ridomil MZ720® 4-6 weeks after emergence.

Good control is achieved with this treatment, but it is expensive. The granules alone cost $300/ha and to be accurately applied specialised equipment must be used.

Sprays of neutralised phosphonic acid have also been evaluated in Tasmania and found to be effective against pink rot, however further work needs to be done to determine the most effective rate and time of application for different potato cultivars and different growing areas.

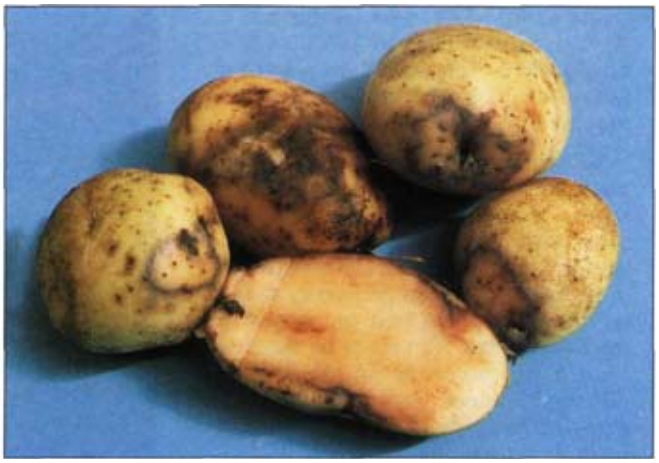
Soil fumigation with metham sodium probably controls the soil phase of *Phytophthora* however this aspect has not been critically evaluated

Future research

This disease has not been investigated thoroughly in Australia and few studies have been conducted on pink rot overseas. As this disease has the potential of inhibiting further development of potato growing in some areas, investigations into the disease should involve the following:

- determination of the main pathogens involved with the disease
- determination of the conditions that give rise to the disease
- evaluation of the level of susceptibility of the main potato cultivars
- determining the survival of the fungus in soil and on weed hosts
- evaluation of chemical and biological areas of control
- developing methods to detect the presence of the fungus in soil and to determine "problem" areas ■

Pink rot infected tubers. Note the black line surrounding infected portions of the tuber and the pink colour of the cut tubers



Potato early dying in the NSW Riverina

LEN TESORIERO
is a Plant Pathologist,
STEPHEN WADE
is a District Horticulturist and
ROD McLEOD
is a Nematologist:
all with NSW Agriculture, and
RUSSEL FOX
is a Crop Consultant with I.K. Caldwell Pty. Ltd.

Early dying diseases of potato crops occur in many production areas around Australia.

Yields of some autumn crops in the NSW Riverina have been nearly halved by premature death in recent years. Research to date suggests that these Riverina crops were affected by potato early dying (PED) which has been rated as the second most important constraint to potato production in the USA.

What causes PED?

PED is caused by an interaction of plant pathogens, primarily root lesion nematodes *(Pratylenchus* species) in combination with the wilt fungus, *Verticillium.* However, a number of other fungi, including *Rhizoctonia* and *Colletotrichum,* as well as the bacteria that cause black leg, have been found associated with PED in overseas studies.

PED discovered in Australia

Investigations of PED in the Riverina commenced with Russel Fox, from I.K. Caldwell Pty. Ltd., who established a demonstration trial in 1994 with a nematicide drench to half the area of a potato crop. Yields appeared to be improved by 30-40% in treated areas.

Subsequent isolations from affected plants revealed the root lesion nematode, *Pratylenchus coffeae,* in association with the other fungi and bacteria mentioned above. This species of nematode has been previously found on roots from stone fruit and grapes in the Riverina and appears to be the first record on potatoes in Australia, although there are reports of *Pratylenchus coffeae* on potatoes from India, Japan and South America.

What overseas research has shown

Yield losses are strongly influenced by environmental factors such as temperature and soil moisture levels. High temperatures at emergence and early tuber bulking will increase the severity of PED. Excess soil moisture early in the season has a similar effect. Dry soils in the latter half of the growing season also encourage the onset and development of PED. The *Verticillium* fungus also multiplies under conditions of soil wetting and drying. It is not hard to see why this disease is prevalent in autumn crops in the Riverina as these tend to be 'normal' growing conditions.

An integrated crop management approach is emerging as the most effective and economical disease control strategy for PED in North America. Rotating crops, using green manures and removing potato vines assists in disease control. While fumigants and nematicides are not economical as annual treatments, they can be used to clean up paddocks with large populations of nematodes and fungi.

Research in Australia

Collaboration has begun with a national research project, headed by Dr Trevor Wicks and Robin Harding with the South Australian Department of Primary Industries. This project is quantifying the incidence of the causal organisms in potato crops across several states with the aim of developing a rapid and reliable test that may determine threshold levels for occurrence of this disease.

Soil samples from the Riverina crops are being evaluated for nematode populations through this national project. Field trials conducted in the Riverina should help contribute to the broader understanding of PED in Australia.

An alternative management strategy for soil-borne pests and diseases using Brassica species as green manures has attracted much attention of researchers around the world. Rod Mcleod has been comparing different green manures (including Brassica cultivars) for the management of root knot nematodes in grapes.

A national research project headed by CSIRO scientists, Dr John Matthiessen and Dr John Kirkegaard, is endeavouring to determine the most effective Brassica cultivars that may be useful for growers. Biofumigation, a term they have coined for this process, releases fumigant chemicals that have similar activity to metham sodium. This approach may prove useful for the management of PED in the Riverina.

PED in Riverina autumn crop

Table: Nematode counts from potato roots just prior to flowering

Treatment		*Pratylenchus* numbers/300 g roots
Control:	fallow prior to sowing	150 a*
Crop rotation:	l00kg/ha *Bettong* oats	98 ab
Biofumigation:	2 kg/ha Ranji rapeseed green manure	52 b
Nematicide:	13 1/ha fenamiphos	45 b
Fumigation:	500 1/ha metham sodium	15 c

*numbers followed by a different letter are significant at p=0.05

A field trial has been established this season to compare a number of cultural and chemical management strategies on the property of John and Maree Doyle at Berrigan.

Results to date are promising with significant differences between treatments in nematode numbers extracted from potato roots prior to flowering (see Table.

These results will be compared with soil nematode numbers and yields.

It is anticipated that this field site will be maintained in the coming year to measure longer term effects of these soil treatments on PED and other diseases. This will help establish the cost effectiveness of these treatments and determine reasonable chemical use patterns. ■

Acknowledgements:

Thanks are also due to the Riverina Potato Growers Association for offering a voluntary contribution for this research,
John Doyle for managing the trial, and to I.K. Caldwell Pty. Ltd. for providing chemical treatments.

Wilting and collapse of plants affected by PED

Big changes in pest control in Tasmania

LIONEL HILL
is an entomologist, and
RACHEL ROBERTS
is a technical officer; both are with the Department of Primary Industries and Fisheries, Tasmania

A 1995 survey of Tasmanian potato growers found that they have largely abandoned insecticides in the fight against their one major pest, potato moth.

This survey confirms the trend found in a 1993 study that there has been a substantial reduction in insecticide use since 1991. The biggest change seems to have occurred around 1992-93 when the Department of Primary Industry and Fisheries (DPIF) first launched a **"no need to spray"** campaign. Since then a further one in five growers have changed their potato moth control strategy by spraying less, using irrigation or releasing biocontrol wasps.

In the 1994-95 season less than 30 of the 205 crops **were** sprayed for moth control. Only 7% of growers had sprayed against potato moth in all of the previous three seasons.

Potato moth is the only pest sprayed for to any degree. Over three seasons only 15 of 205 crops were sprayed for cutworm control, 9 for grasshopper and 4 for redlegged earth mite. Other pests mentioned were whitefringed weevil, slugs, green vegetable bug and corbie.

Growers familiar with the term IPM were more likely to believe that beneficial wasps occurred in their crop. The survey followed soon after a program to publicize and release beneficial biocontrol wasps in all potato districts of the state. The success of these releases has yet to be evaluated. ■

Acknowledgements:

McCain Foods and Simplot Australia assisted the survey by mailing questionnaires to each of their growers; 670 in total.

Case study - seed potatoes to Indonesia in 10 steps

DAVID HIGGINBOTTOM
is the General Manager of Competitive Edge (Asia) Pty Ltd
(marketing consultancy)

Trial of Australian seed potatoes at Pangalangan, Java

Step 1 - The opportunity and the promise

When the seed potato grower network from Crookwell, with support funding by the Department of Primary Industry and Energy, (DPIE), visited Indonesia and Thailand in November 1994, very little was known about Australian seed potatoes and varieties in both markets. However the increasing importance of potatoes in Indonesia to meet western food demands, and apparent Dutch neglect of this market resulted in a major co-operative seed technology exchange and export program with Indonesia.

The network promised to supply 14 tonnes of mixed seed varieties for trial in Indonesia during 1995 involving the Agribusiness Club of Indonesia with whom appointments and field visits had been undertaken. They also included the Lembang Research Station (LEHRI) at Bandung in the program.

Step 2 - The network expands

DPIE respond to a funding request by the Ballarat potato industry, and allocate further funds to the Thorpdale (Gippsland) potato industry to market their fresh and seed product overseas. This meant that three potato networks were active in export marketing and shared communication became the focus.

Step 3 - The "net to net"

The Ballarat network, following visits to Japan and Korea respond to the opportunities presented in Indonesia, and contributes to the trial shipment.

Step 4 - The Australian visit

Agribusiness Club members visiting the ABARE Outlook Conference in February 1995, visit Crookwell to audit the seed potato industry there, accompanied by the Indonesian Consul. This enhances relationship and industry knowledge.

Potato production on terraced hillside near Bandung, Java

Step 5 - Australian potato trials in Indonesia

Thirteen varieties are shipped to Indonesia. The Consultant, David Higginbottom, presents a project paper to the Indonesian Ministry of Agriculture, visits sites and selects four locations for research and commercial trials.

Step 6 - Agronomist/grower visit

An agronomist funded by DPIE and a grower from Gippsland visit the Indonesian planting sites to give technological assistance, and assess the seed condition prior to the trial commencing - planting technology is the key requirement of the horticultural teams at each of the sites.

Step 7 - Indonesian visit

The Gippsland Potato Network, working with Ballarat and Crookwell, visit Indonesian sites to give technolog-

ical assistance to the growers.

Step 8 - Tasmanian network

Tasmanian growers, exporters and researchers visit the trial seed potato sites, recognise the market potential, and that technology exchange can enhance Australia as a preferred supplier of quality seed in the region. They formalise their network.

Step 9 - Indonesia comes to Australia

Supported by DPIE and Indonesian funding, four farmers are hosted by three networks for a week during our planting season. The networks co-operate on exchange and visit, and share costs and technology with the visiting farmers.

Step 10 - Project completion and seminar

Keith Blackmore of Toolangi Research Station at Healesville, Victoria, joins the Consultant in a post-harvest evaluation seminar at the Pangalangan site attended by Indofoods, a major potato crisp processor, participating village chiefs and potato farmers who have utilised Australian seed, Agribusiness Club members, and representatives of the LEHRI Potato Research Station. Results on the project are positive. Four key varieties emerge as viable, and the seminar endorses further co-operation and preference for Australian seed in the future.

Conclusion

Our grower networks are attractive to Asian customers because they offer capacity, continuity of supply, and a brand/quality relationship. We must back our certified seed program with a unified Australian program and with a single desk secretariat to provide a window to these emerging markets. ■

Tasmanian delegation that visited potato growers at Pangaiangan, Java

State Roundup

Victoria

ANDREW HENDERSON
is a Technology Transfer Officer, Potatoes at the Institute for Horticultural Development, Agriculture Victoria

Despite low fresh market prices, there is potential for industry expansion in Victoria.

A major potential benefit for the fresh market, seed and processing sectors in Victoria lies in the export of potato products, particularly to Asian countries. Enquiries for large quantities of export potatoes continue to be received, challenging the industry to establish a structure which can supply this market.

Weather conditions over the 1995-96 season were generally ideal, although rain delayed plantings in some areas. Overall, the summer was mild and, as a result, insect pests were not a major concern. However, there were significant numbers of potential pests in some areas. Pink rot was a particular problem for *Russet Burbank* growers in the Central Highlands during the season.

Fresh market

Any optimism resulting from improved fresh market prices in the previous season proved to be misplaced, as prices declined dramatically in 1995-96. As a result, fresh market growers, already operating in a competitive environment, are under further pressure.

Washed potatoes from sandy soils along the Murray River and interstate continue to compete strongly with those produced in the traditional growing districts of Victoria. In a series of industry meetings, growers in some of these districts, together with other members of the marketing chain, have discussed this and other problems for their industry. Quality, promotion, packaging, industry structure and consumer education are seen to be the main issues to address.

Certified seed

A total of 1,920 ha passed inspection in 1995-96, an increase of 55 ha on the previous season. Crop rejection rates were very low. At an average yield of around 17 tonnes/ha, a total of about 32,600 tonnes of certified seed was produced for the season.

Atlantic outsold *Sebago* for the first time and *Coliban* sales were also on the increase, falling just short of 5000 tonnes. *Desiree* showed a dramatic increase and seems to be replacing *Pontiac,* which has declined steadily over the last few years and is becoming a minor variety. *Kennebec* sales also markedly decreased, to less than 1000 tonnes.

Processing

The past season was ideal for growing processing potatoes in Victoria and growers achieved outstanding yields. Good weather allowed harvesting to start and finish on time and the processing companies had good quality potatoes to go into their stores. Generally, the quality of processing potatoes was very good, with high dry matter and good cooking colour.

Russet Burbank is still the major variety for French fries grown in Victoria for McCain foods, but several new breeding lines from the national breeding program at Toolangi are showing promise.

Atlantic is still the main variety for fresh crisping and about 50% is being used by the major crisping companies. There was a considerable increase in the use of *Wilstore,* a variety bred at Toolangi, in the 1995-96 season. This variety is very satisfactory for crisp production after long-term storage. The other major storage variety for crisping is *Denali.*

Queensland

KEN JACKSON
is the Senior Agronomist - Heavy Vegetables with the Queensland Department of Primary Industries

Production in QLD remains static at around 120,000 tonnes.

After 5 years of severe drought the Lockyer and Fassifern Valleys received good rain in the November-December period, hence the autumn crop planting was much the same as in 1995 (about 850 ha).

However, subsequent harsh dry conditions followed by 600 mm of rain in 5 days immediately prior to harvest, has resulted in a considerable downgrading in yield and quality of the autumn crop. An early estimate of the damage could be as high as a 50% loss, giving a yield in the order of only 8,000 tonnes.

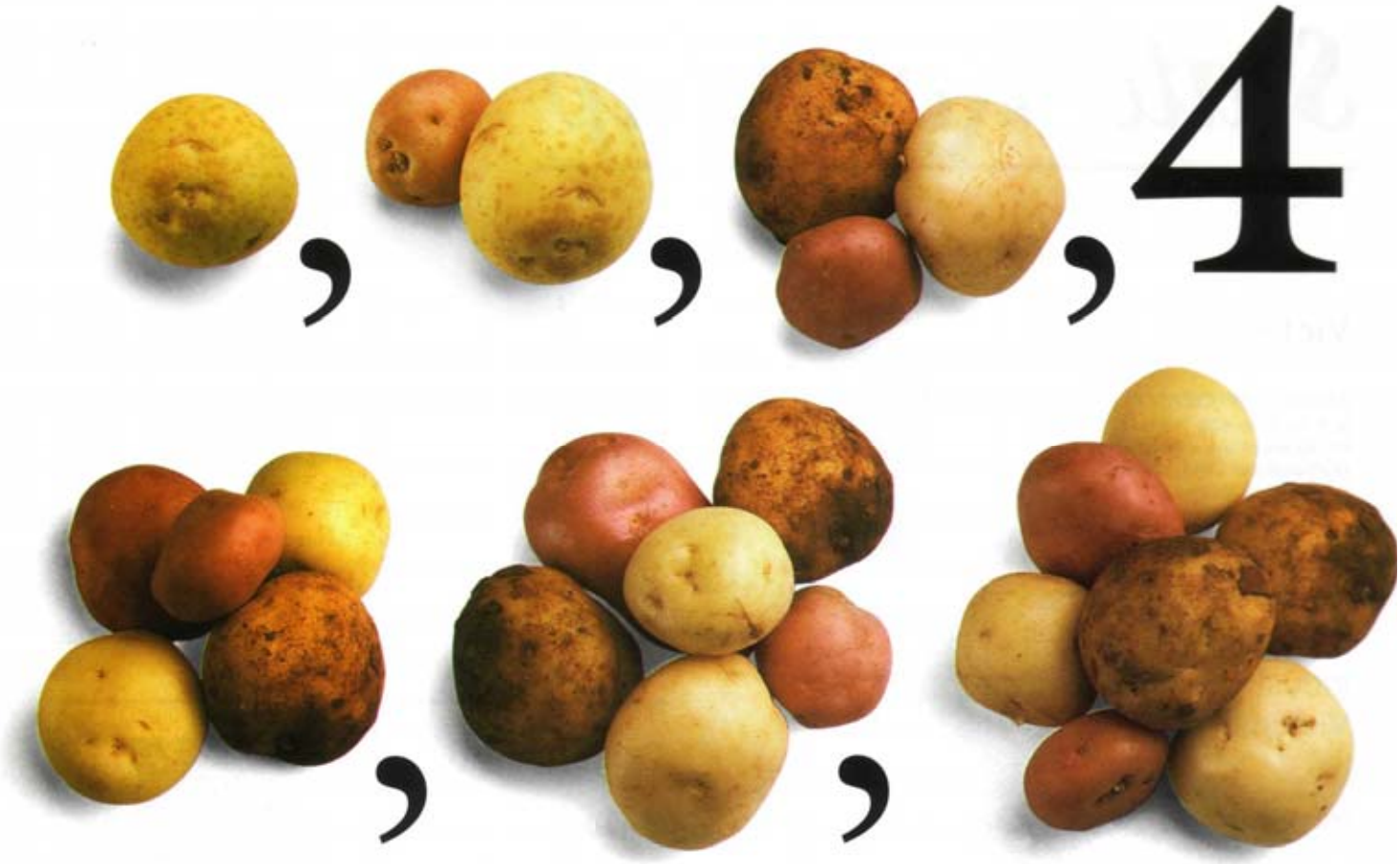
On the bright side, this good rain has gone some way to replenishing under ground water supplies, particularly in the Lockyer Valley, and has resulted in an increased winter crop planting relative to previous years. The extent of this increased planting is not known at this stage.

Sebago remains the dominant white potato variety with *Red La Soda* being the dominant red potato variety due to the bright skin colour and good yielding ability.

The 1995 production for North Queensland was 20,000 tonnes, the bulk of this being *Sebago* with smaller quantities of *Atlantic* and *Pontiac.* The projected 1996 planting is slightly greater than that in 1995.

The export market in 1995 absorbed some 4,000 tonnes and this will increase to about 6,000 tonnes in the current season. Export contracts are expected to increase in coming years and this has attracted a number of new growers to the industry.

The number of farmers in North Queensland growing for the



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crisping market has declined but the level of production has been maintained by existing growers. The Smiths Snackfood Company plant in Brisbane is expected to open in about one months time and the quantity of potatoes grown for the market is expected to increase to about 30,000 tonnes. This increased supply will be filled through existing contracts. The growers and company are now negotiating 3 year individual contracts.

New South Wales

STEPHEN WADE
is the District Horticulturist at Finley with NSW Agriculture.

The 1995-96 season will be remembered for its cool weather, good crops and fluctuating markets.

Potato production in New South Wales increased for the first time in three years as a result of higher crop yields, larger crop-ping areas and buoyant fresh market prices during the first half of the season. Growers produced 138,000 tonnes of potatoes from 6,300 hectares during 1995-96. Despite the upturn, growers continued to leave the industry due to poor returns or loss of crisping contracts. Fresh prices during 1995 were $75/tonne down on the previous market peak in 1989.

Fresh market

Crop areas were down 250 hectares on last season. Digging of the spring crop started in November with yields averaging 25 t/ha at Dorrigo, 23 t/ha at Maitland, 45 t/ha at Robertson and 32 t/ha in the Riverina. Yields were up in most districts due to the warm weather at emergence and the cooler temperatures during the growing season.

Sebago prices climbed from $340/tonne on-farm (dirty) in June to $500/tonne by the end of November. However prices dropped to $220/tonne in early December and fell to $120/tonne by mid-January. As a result the spring crop harvest in the Riverina finished at the end of March - a month later than usual - due to the higher crop yields and the slower trading conditions.

Planting of the main summer crop was on schedule following the easing of the drought. Crop areas were similar to last year. Temperatures over the summer were 3 to 4°C cooler than normal. Harvest of the summer crop started in early February. With the mild growing conditions summer crop yields averaged 45 t/ha at Blayney, 35 t/ha at Crookwell and 40 t/ha in the Riverina.

Planting of the autumn crop started two weeks earlier than usual with the cooler weather in late January. Crop areas were up 500 hectares on last year. With the favourable growing conditions good yields are expected in the Coastal, lower Tablelands and Riverina districts.

Processing

New South Wales growers supplied 18,000 tonnes of potatoes for crisp production during 1995-96. Crisp contract prices were down on last year, with base prices falling from $ 195 to $178/tonne on-farm. Tonnages decreased due to the reduced consumer demand for potato crisps and the on-going rationalisation of grower contracts by processors.

Growers also delivered 5,000 tonnes of potatoes to McCain Foods (Aust) Pty Ltd for French fry production. Contract prices improved $10/tonne on last year and ranged from $178 to $208/tonne on-farm, depending on delivery time. Consumer demand for French fries continued to remain firm.

Seed

Seed areas and production returned to normal following last year's drought. The 1996 recommended price for certified seed is $430/tonne. Field Inspection Standards for the NSW Certified Seed Scheme were revised during 1995-96. The NSW certification tolerance for powdery scab *(Spongospora subterranea)* was set at one percent.

Sebago, Atlantic and *Coliban* were the main seed varieties sold, though demand for *Sebago* seed has continued to fall. However *Sebago* still remains the main fresh market variety grown in New South Wales, while *Atlantic* and *Shepody* are the main crisping and French fry varieties.

Technico Pty Ltd, a wholly owned Australian company with world leading seed potato propagation technology, started operations in NSW in 1995. It has commissioned a plant for the mass production of Technituber™ tubers and entered into an agreement with PepsiCo for the use of its Technituber seed technology.

Technico's seed technology uses tissue culture techniques to mass produce miniature, disease free Technituber tubers throughout the year. Technituber tubers can reduce the number of field generations required to produce Certified seed and provide large savings in seed storage, transportation and planting costs.

Technico is facilitating the adoption of Technituber tubers by the Australian seed potato industry. Commercial scale demonstration trials with Technituber tubers are planned with the Victorian Seed Potato Authority and the Tasmanian Department of Primary Industry and Fisheries for the coming season.

South Australia

CHRIS WILLIAMS
is the Senior Research Officer (Potatoes) based at the Lenswood Centre with the SA Research & Development Institute

Variable prices for washed potatoes and good crops were features of the 1995-96 season.

The SA potato crop was worth $65.2m in 1993-94 (which was second to the Victorian crop in economic value). Some 200,000 tonnes were grown on 7,000 hectares.

Spring and autumn crops are produced on the Northern Adelaide Plains and SA Murraylands each year, while a summer crop is planted in the Mt Lofty Ranges and the South East.

1996 has been a very dry year however growers who maintained irrigation and good crop management obtained very good yields and quality. *Rhizoctonia* was a major problem in several crops and target spot was less prevalent compared to an average year.

Fresh market

SA is recognised as the foremost state for production of

washed potatoes. The industry is based on the cultivar *Coliban* which meets market demand for clean, light, bright skin which commands premium prices in most fresh markets. The abundance of sandy soils, favourable growing conditions and efficient crop management are some of the reasons for this success. However prices for premium, washed *Coliban* varied from some $500/tonne last June up to $800/tonne last November then dropped to around $200-$300 last January.

Coliban produced superior yields, pack outs and skin colour compared to *Nadine* in the NaPIES (National Potato Improvement and Evaluation Scheme) trials in SA. *Sebago, Crystal, Exton, Snowgem* and *Sequoia* are also being produced.

In recent years fresh market production from the SA Murraylands continues to expand by about 4,000 tonnes per year. Most fresh market growers are increasingly concerned about the lack of availability of good quality certified seed which should contain less than 2% of soil borne diseases (such as *Rhizoctonia,* silver scurf, black dot, powdery and common scab). This is a major limitation to expansion of fresh production onto new soils, previously low in disease.

Harvest of certified seed crops interstate in wet conditions in 1995 exacerbated seed quality problems (breakdown, soil borne diseases). SA growers are producing more "1 year off certified seed to try to improve seed quality.

Pontiac is the major red skin cultivar grown in SA but growers in the South East and elsewhere complain of loss of the red skin colour in this strain in recent years. *Bison* and *Red La Soda* have a darker skin colour compared to *Pontiac* but far lower yields. The orange skin, cream flesh line 90-40-1 from the NaPIES trials has produced high yields and quality in all regions. It has a smoother skin than *Desiree* and is being further tested before commercial release.

There is a pressing need to solve the red market dilemma before the red market is totally destroyed. The problem is that at the last point of sale many retailers unknowingly mix labelled *Desiree* with *Pontiac* type potatoes for sale as reds. Many consumers expect "reds" to be a *Pontiac* type, ie a light, fluffy, white mashed or boiled potato. *Desires* is excellent for stews, salads and baking but makes a heavy, yellow mash. It should be an offence to mix, unlabelled, these two very different products. This problem needs to be fully resolved before the new NaPIES red lines *(90-40-1, 87-13-3, 87-57-9)* enter the market.

Processing

Around 60,000 tonnes of the 80,000 tonnes of potatoes produced in the South East of SA were used for frozen French fry processing in the past year. Most of these were processed at the McCain Foods (Australia) Pty Ltd factory at Penola. *Russet Burbank* is the main cultivar grown with the remainder being *Shepody* and *Kennebec* for French fries. Problems of secondary growth and variable yields still occur with *Russet Burbank,* especially when grown on the light texture soils in the variable climate. Supplementary or replacement cultivars are needed.

The number of pink rot cases recorded has increased in recent years according to the South East crop monitoring service. Some growers are using phosphonic acid sprays to reduce the spread of pink rot infection - with varying degrees of success.

SA growers supplied approximately 18,000 tonnes of potatoes for crisp production in the past year with the vast majority processed by the Smith's Snackfood Company in Adelaide.

Production is sought most of the year and growers are encouraged to expand winter crops and out of season production. *Atlantic* remains the major processing cultivar for fresh delivery with *Wilstore* and *Denali* for storage.

Western Australia

PETER DAWSON
is the Potato sub-program leader with the Department of Agriculture Western Australia

Production for the 1995-96 season is estimated to be just over 100,000 tonnes with a raw product value of $35 million.

The break-up is; fresh market 50,000 tonnes, French fry processing 32,000 tonnes, crisp 14,000 tonnes, seed 5,000 tonnes and export 2,000 tonnes.

Fresh market

Western Potatoes is the new trading name of the Potato Marketing Corporation and the organisation has further raised the profile of potatoes in the community with innovative marketing and promotion.

These activities have helped to increase sales for the second year in a row. Prices are good, averaging $390 per tonne. However, some plain lines proved difficult to sell. A move to newer varieties and the introduction of a code of practice for all stakeholders (growers, carriers, packers and retailers) should see quality improve to meet consumer demands.

Deliveries are expected to be 54,000 tonnes. 50,000 tonnes is for domestic sales with 2,000 tonnes for export and 2,000 tonnes for seed. The value to growers is about $23 million.

French fry

Simplot Australia produced around 32,000 tonnes from about 700 ha. The major variety is *Russet Burbank* with small amounts of *Kennebec* grown. Simplot are interested in introducing *Shepody* and *Ranger Russet* to their program. Price to growers was similar to last year. The industry is worth more than $6 million at the farmgate.

Some production has shifted from Manjimup to the new, coastal area of Scott River. Last season, where only one pivot operated, there are now seven; three producing seed and four producing French fries. Despite late planting, production was reasonable and an earlier start next season should see even better crops.

Increased production in all areas can be expected next season and French fries look set to become the dominant segment of the industry in Western Australia.

A new, early area, north of Perth is being considered to exploit the mild winter climate and allow the processing plant to open earlier.

Crisp processing

Potato production for crisping is 14,000 tonnes, worth just under $4 million, with the vast majority processed by The Smith's Snackfood Company. *Atlantic* remains the major fresh processing variety with *Cadima* still the main storage variety. Production occurs most of the year but acceptable fresh product cannot be supplied from September to October.

Seed

About 5,000 tonnes of seed, worth an estimated $2 million, were produced for the fresh and processing sectors with small amounts also exported.

A certified seed scheme commenced this season. This is run by Mark Holland of Agwest Seed Quality, a business unit of

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Agriculture WA. Minituber plantings were inspected this season and certified seed inspections should increase next season.

Western Potatoes have appointed Murray Hegney as a seed officer to assist the industry develop opportunities for domestic and export seed.

Tasmania

BRUCE BEATTIE is the potato specialist with the Department of Primary Industry and Fisheries, Tasmania

Over 250,000 tonnes were produced from 6000ha in the 1994-95 season.

The main change in the Tasmanian industry over the last year was the sale of the two Pacific Dunlop French fry processing units at Ulverstone and Scottsdale to Simplot, the giant US potato processor.

Planting was delayed due to protracted price negotiations with Simplot whilst the McCain schedule was uninterrupted.

There were problems of set piece decay again this season and all seed showing signs of fusarium dry rot were sampled and several were found to be *F. semitectum,* the newly isolated species unaffected by Tecto.

The season had continual periods of rain and cool cloudy conditions. However good yields of 55-65 t/ha of *Kennebec, Russet Burbank* and *Shepody* have been reported and overall crops have been better than expected, of good size and having a lower incidence of common scab but more powdery scab in *Kennebec.*

The combination of cooler conditions and strategic use of Score®, Rovral®, and Bravo Plus®, served to reduce the usual scourge of target spot. Showery conditions in the North East during February resulted in Irish blight outbreaks but Ridomil®, applications quickly achieved control.

Because of the rain some of the more poorly drained regions in the Central North succumbed to water logging and pink rot was reported from some areas.

Many may believe that all Tasmania is hilly, but this is not so. This year Simplot has introduced seven centre pivot systems and one extensive trial of solid set irrigation. These trials have been mainly on more difficult soils and yields were below the current state average of 50 t/ha for processing crops. This shows that there is always more to learn about irrigation and nutrition. The word is that the number of pivots may double next season.

Both McCain and Simplot have a capacity to store some 130,000 tons but as there has been increases in production targets, the quantity stored in-ground during winter will remain at 20-25%. Fortunately this autumn/winter has been relatively mild and accumulated sugars have not been a problem as yet.

In the past two seasons some crops have been grown from "one-off seed because of a shortage of certified seed due fusarium problems and rejection because of scab. Some seed areas this season have experienced difficulty in completing harvest because of persistent showers.

The seed growers and users have co-operated in the revamping of the seed production regulations as part of the move towards national standards.

The possibility of seed exports to Asia has resulted in a visit of a local delegation to Indonesia and Thailand and a return visit by Indonesians. Six growers and businesses have commenced producing cultivars suitable for this market. ■

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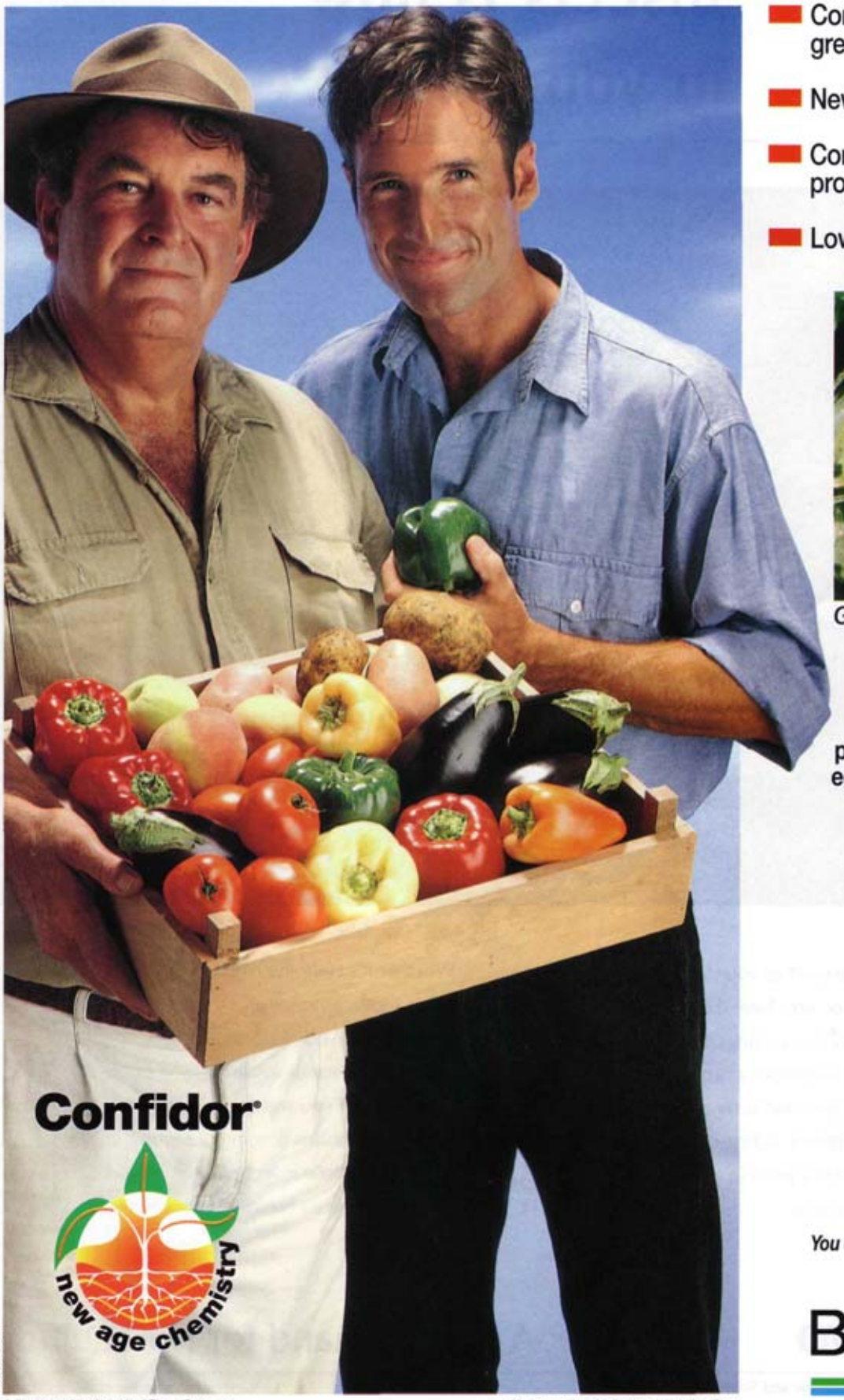

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