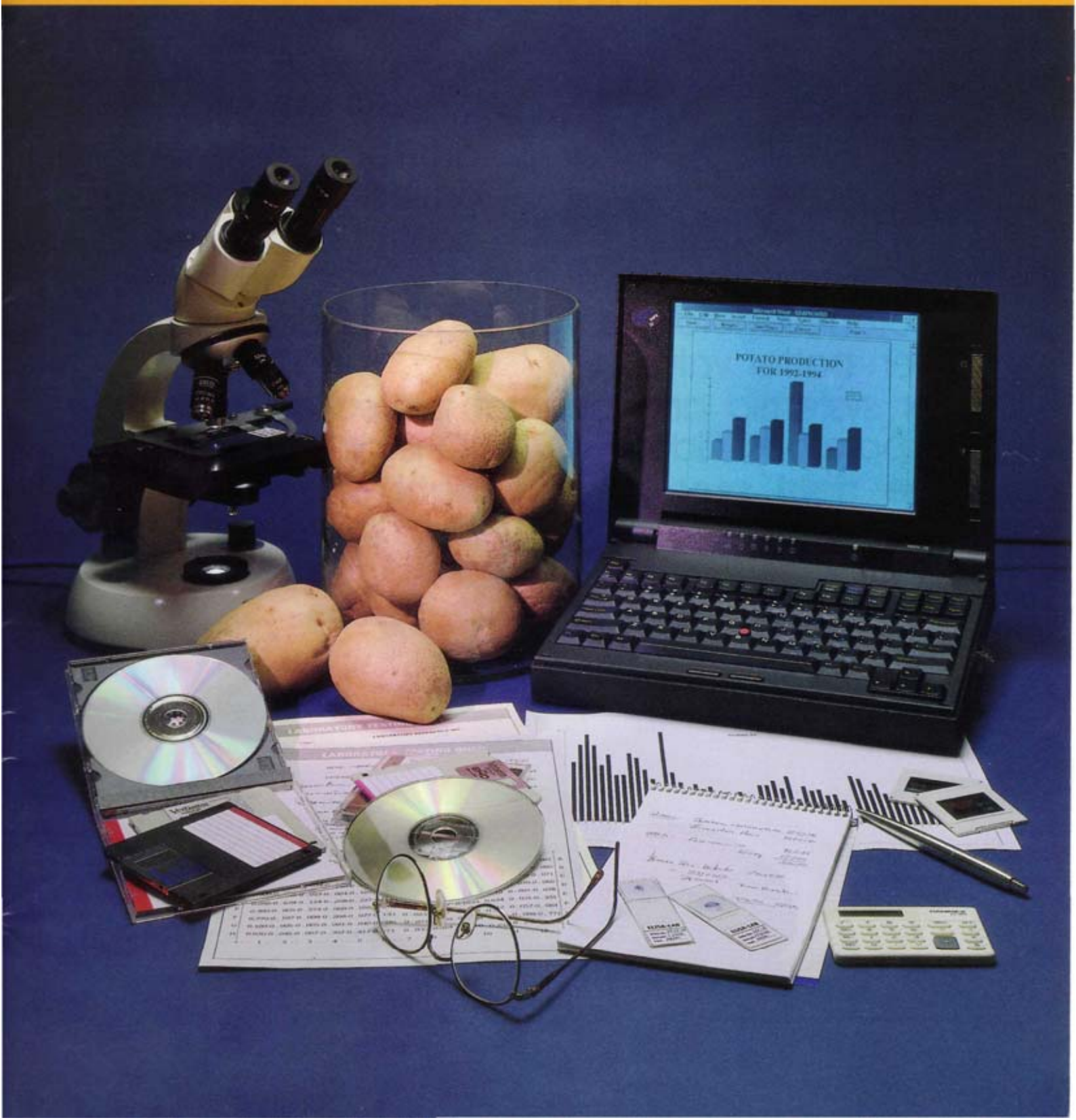
Potato Australia

PUBLISHED BY THE AUSTRALIAN POTATO INDUSTRY COUNCIL

VOLUME 5 NOVEMBER 1994 ISSN 1036 - 8558



RIDOMIL® MZ 680 PACKS THE PERFORMANCE

for protection against downy mildew in lettuce and late blight in potatoes

NOW IN WATER SOLUBLE PACKS

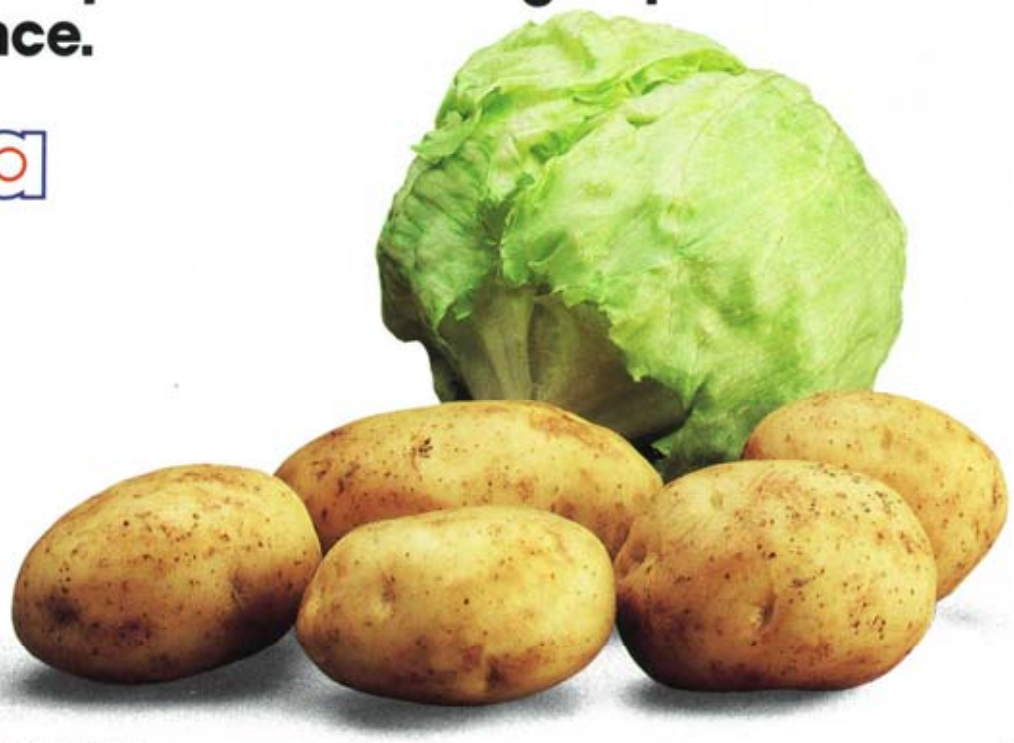
The proven performer, Ridomil MZ 68O offers growers greater economies in the optimal control of disease.

With a formulation developed for other, more difficult to protect vegetables, your regular Ridomil MZ 68O is even better value.

For systemic and contact protection of lettuce and potatoes, Ridomil MZ 68O is all you need.

The right product. The right price. The best performance.

ciba



AP2414/R2

Potato Australia

PUBLISHED BY THE AUSTRALIAN POTATO INDUSTRY COUNCIL

VOLUME 5 NOVEMBER 1994 ISSN 1036 - 8558

Editorial

You may have been wondering what has happened to Potato Australia this year.

The delay has been caused by a change in editorship of the magazine, but at last we are in print. Next year we hope to get back on track for a mid year publication. Please keep those contributions coming so that we can maintain an interesting and varied magazine. It was great to see some contributions this year from outside the State Departments of Agriculture. Keep it up!

This year Potato Australia has obtained funding from the Horticultural Research & Development Corporation to mail out the magazine so that we can overcome some of the distribution problems that were occurring in some states. Hopefully everyone in the Australian Potato Industry will now receive their copy.

We would like to take this opportunity to thank John Salvestrin for his excellent work in editing Potato Australia for the last four years and bringing it to such a high standard.

Seasons Greetings to everyone and thank you for your continued support.

The Editorial Panel — Bruce Beattie, Nathalie Jarosz and John Fennell

INVITATION TO CONTRIBUTORS AND ADVERTISERS

This magazine will be published annually. Articles are welcomed on any topic related to potatoes. Please submit copy of articles and advertising to: The Editor, 'Potato Australia', PO Box 303, Devonport, Tasmania, 7310. Phone: (004) 21 7637 Fax: (004) 245142

Contents

ACKNOWLEDGEMENT:

Front cover photograph— Romic Pajak of the Department of Primary Industry & Fisheries, Tasmania and John Farrow, Photographer, Hobart, Tasmania.

When the pressure's really on, nothing beats Rovral Liquid.

If Early Blight and Sclerotinia are putting your potato crop under pressure, you can't afford to take chances with your fungicide ... that's why you should use Rovral Liquid.

When the disease pressure is high, Rovral Liquid provides the most effective control ... so you can control the diseases quickly, and help your crop produce its maximum yield.

Rovral liquid is easy to handle, pour and mix and has a proven safety profile, so you can use it with confidence.

Rovral®
LIQUID

Performs under pressure

RHÔNE-POULENC
GOING THE EXTRA MILE

Chairman's Report

WAYNE CORNISH
is the Chairman of the
Australian Potato Industry Council

Another year has concluded and contained little good news for our industry.

The adverse effects on viability caused by extremely poor fresh market prices have been significant. These impacts surface quickly at grower level but soon move through to input and service providers. Coupled to this dilemma some in industry are faced with the very real implications of drought on their operations.

APIC has had a busy year carrying out its industry charter. Submissions have been placed before Government agencies on issues of industry importance. The co-ordination of research and development work and involvement with organising and contributing to the National Potato Industry Conference have been perhaps the main areas of activities.

The findings of the HRDC-APIC Market Research Project recently completed has a clear and unmistakable message for us all. That clear message is "get pro-active and do some positive market pulled things, or forever suffer the consequences."

WAYNE CORNISH

APIC has applied for Agri-business funding to facilitate a national information transfer process which will explain in detail to industry the findings and recommendations of the project. Industry and growers in particular then, must make decisions based on fact which will decide the direction to be taken.

I believe we must collectively face up to the two major impediments presently facing the fresh market:- the lack of quality assurance across all sectors and our inability to raise the profile and awareness of potatoes at consumer level through proper education and promotion.

I urge you all to make sure you avail yourselves of the market research findings and attend the state or regional presentations when announced. Then make a judgement based on that independent advice.

The National Conference in Adelaide was certainly a success and I thank all those who attended and contributed to the conference. The R & D program is building to real strength and has some major achievements already in place. Grass roots driven multi-state and mulit-sector approaches can be taken to the clear advantage of all.

AUSVEG has been born after a lengthy gestation period. AUSVEG is the new **peak vegetable industry** body formed by the amalgamation of Potato Growers of Australia and the Australian Vegetable Growers Federation. I wish all participants well in this exciting and perhaps overdue new initiative.

Finally, my thanks to all those involved in the various areas being addressed by APIC for their efforts and Seasons Greetings to everyone.

No.1 for
POTATO MACHINERY

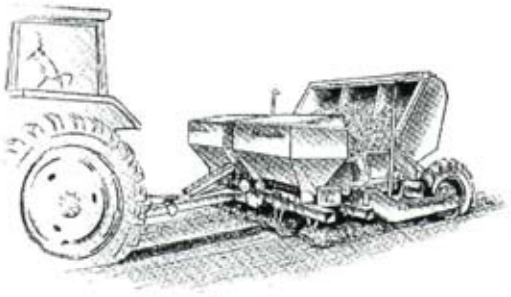
Kverneland

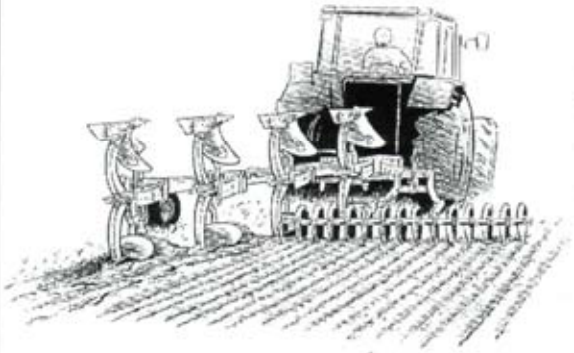
Harvesters

Single row linkage & trailing.
2 row trailing harvesters.

Planters

2 & 4 & 6 row planters.
Linkage & trailing.





Ploughs

One way & reversible mouldboard ploughs.

VIN ROWE P/L

3 Endeavour St, Warragul 3820
Phone 056 231362 Fax 056 234314

The National Variety Improvement Program

ROGER KIRKHAM is a potato breeder at the Institute of Horticultural Development, Toolangi, Vic

The Victorian Department of Agriculture has Australia's only potato breeding program. This program is based at Toolangi, Victoria, and supplies germplasm for testing in trials in the main production districts throughout Australia.

FUNDING:

Prior to 1989 the breeding program received no direct industry funding and was entirely supported by the Victorian government. From 1990 to 1992 government funding was reduced, although some industry and HRDC funds became available via voluntary levies mainly from the crisp industry in Victoria.

HRDC/APIC REVIEW OF POTATO BREEDING IN AUSTRALIA

During 1992, HRDC reviewed potato breeding and variety evaluation in Australia which resulted in some major recommendations: -

- HRDC to support a conventional breeding program
- HRDC to support molecular biology projects specifically gene transfer
- varieties from overseas to be imported and tested in Australia
- breeding program to target each end-use (fresh, crisp, French-fry) in proportion to size and levy contribution
- an integrated evaluation program to test varieties in the major production areas in Australia
- an advisory and management committee to be established with APIC and HRDC representation to administer the National Potato Improvement and Evaluation Scheme (NaPIES)

POTATO BREEDING

Initially, crosses are made between parental lines grown in glasshouses at Toolangi. Glasshouses are also used to grow on the potato seedlings and produce small tubers called mini-tubers. About twenty five thousand breeding lines are then grown in the field from the mini-tubers at Toolangi in the first year and the best performing lines are selected for further trials. After 2 or 3 years selection, seed of breeding lines is sent to each state in Australia for testing in trials in local production areas.

VARIETY EVALUATION

There are potato trials in each state which test new varieties in relevant production areas. These trials are coordinated by:

Peter Dawson	- Western Australia
John Fennell	- Tasmania
Ben Dow ling	- New South Wales
Chris Williams	- South Australia
Ken Jackson	- Queensland
Roger Kirkham	- Victoria

Variety trials are mainly grown within commercial potato crops with the appropriate commonly grown variety included to compare disease reaction, end-use quality and yield.

SPECIAL PROJECTS

- **Overseas Varieties:** Released varieties and breeding lines from overseas are being imported for French fry processing and for fresh end-use. These varieties are being tested in variety trials to compare with breeding lines from Toolangi.
- **Molecular Biology:** A collaborative project between CSIRO and the Victorian Department of Agriculture is attempting to insert genes which give resistance to (PLRV) Potato Leaf Roll Virus into a number of varieties. These varieties are for either fresh market end-use or are varieties which will be used in the breeding program at Toolangi.
- **Potato Cyst Nematode (PCN)**: PCN is a major pest problem in most overseas countries and the main method of control is resistant varieties. In a collaborative project with DSIR New Zealand advanced breeding lines from Australia are tested for resistance using infested soil in New Zealand.

NEW VARIETIES

Varieties which have been released in the past year or are in final testing trials include:

- Fresh Market

Snow Gem was released in 1993 and has short dormancy and early maturity suitable for dual cropping areas such as the Riverina or Riverland districts. It has good boiling quality and white smooth skin.

Nadine was imported from the UK and is being released in Western Australia this year. This variety is a fresh market variety that is resistant to PCN.

- Crisp

Evans was released in 1993 and has long dormancy and high dry matter content. It has light fry colour even after long term storage.

86-2-23 is a breeding line with medium to high dry matter and even round, medium-sized tubers. It is not suitable for storage and may be released as a direct delivery crisp variety.

- French fry

Ranger Russett was imported from the USA where it was released in Idaho in 1991. This variety is increasing in importance due to high recovery rates in processing. Trials in Australia indicate similar yields to Russet Burbank, better tuber shape and that this variety is not suitable for storge before processing.

86-34-4 is a breeding line which produces high yields of even, oblong shaped potatoes. Dry matter content is high and fry colour is light after processing directly after harvest or after storage.

SUMMARY

A recent review of potato breeding in Australia by HRDC/APIC has recommended funding of a national potato breeding and variety evaluation program, which will be coordinated and managed by a committee nominated by HRDC.

Fresh Potatoes -

A Future or Not?

BRYAN MATTHEWS is the Chief Executive Officer with the Western Australian Potato Marketing Authority

As many heard at the National Potato Conference in Adelaide in July, fresh potato consumption per person in Australia has been declining in recent years, whilst the consumption of processed potatoes, rice and pasta has been increasing.

We, in Western Australia, have suffered less of a decline, quite simply in my view, because we have the advantage of a legislated Marketing Authority. Despite its detractors, this has meant we at least have the opportunity to provide leadership and have the possibility of coordinating the industry in activity that can only benefit the whole.

I certainly applaud the initiative of the Horticultural Research and Development Corporation in publishing Report PT201 at the end of last year and in presenting its findings so positively at the National Potato Conference. They and their invited speakers clearly spelled out what Australia needs to do to stop the fresh potato sector declining at an increasing rate.

Having an Authority in place does not make Western Australia complacent; far from it. The Minister for Primary Industry, the Hon. Monty House, together with the Chairman of the Board of the Potato Marketing Authority, Roger Hussey, have clearly spelled out that we must develop a more relevant marketing system that is end-user focused. This we are well on the way to doing and the steps that we see as necessary certainly have relevance to all the other states in Australia.

To begin with:-

- We aim to give leadership, provide clear communication of objectives and seek to gain commitment to business strategies from all the shareholders in our industry.
- The use of ware potatoes has to be consistently promoted to end users, consumers and food service operators alike.
- Processes and systems to develop quality standards along the whole chain from paddock to plate must be put in place.
- End-user market research needs to be further developed and the results fed into our research and develop ment program.
- There needs to be some form of control in place, in particular to plan product supply so as to better prevent excessive wastage.

In the last eight months, a number of significant changes have taken place at the Potato Marketing Authority in Western Australia. These were designed to start us firmly down the path of being more market focused and commerically orientated.

Restructuring has been implemented, not simply to reduce numbers but to make better use of available skills and resources so that we improve our efficiency and as a result become cost effective. Whilst these changes were being implemented, a major piece of market research was undertaken designed to examine the needs of consumers and the food service industry in the 90's.

Our research supported the HRDC national findings. It identified that the fresh potato, whilst still a very popular food, had not adapted to changing eating habits. Our future viability and prosperity will be dependent on the willingness of us all to meet the changing needs and wants of consumers in relation to food preparation and intake.

In Western Australia we know that despite our past work in this area there is an **ongoing** need for consumers and the food service industry to be educated about the different varieties and grades available, the best cooking methods for them and new recipe and pre-prepared product ideas. This cannot be achieved without significant industry investment and is the price we all have to pay if we are to catch up with our competitors, let alone win back lost market share.

Western Australia has managed to go some way to achieving this, but only by having a Marketing Authority. No-one, grower or packhouse, can possibly manage to develop the resources needed to impact the market effectively and consistently. Whether this needs to be done on a national basis or a state by state basis remains to be seen but unless the Western Australian lead is followed then our national industry faces a bleak future.

At the same time, the potato quality issues need to be addressed, not only in the paddock but in how the product is handled in transportation, grading, washing, packing and its display and stock rotation, particularly in retail outlets.

In Western Australia we suffer the 'Delaware Syndrome' whereby not only does this variety meet most cooking needs, it is also comparatively robust. Regrettably, this has led to some very poor handling habits becoming the 'norm' to the detriment of all concerned. The development of relevant industry quality assurance programmes followed through with real commitment will, I believe, determine who will be the industry winners in the next five years.

Along with other agricultural crops, the key difference between our industry and other industries is that we do not manage a manufactured product. We are subject to climatic

uncertainties and the production cycle therefore lacks consistency. Production is also driven by a large number of individual growers each of a size that more often than not lacks critical mass thus preventing, with a few exceptions, marketability of product in its own right.

There is also a long vertical chain from grower to end user and the independent nature, the differing business objectives and market positioning of the many shareholders amongst growers, packers, wholesalers, retailers, processors and food service operators can mitigate against a cohesive market position for potatoes.

An adequately resourced, coordinated and followed through business strategy that encompasses the elements of quality research, product development, sales promotion, trade and public education, advertising and market orientated R & D cannot be managed by individual shareholders.

The answer is clear; national or individual state marketing bodies to coordinate a team effort must be formed. Without them, the Australian potato industry will lose out, not only in their domestic market but in some fast developing export markets as well.

Ciba Scores With Target Spot Control

Ciba Australia Limited has announced the registration and release of Score®, an exciting new fungicide which has been shown in trials to give superior control of Target Spot in potatoes.

For growers, target spot mean slower tuber growth, usually premature plant death, and as a consequence lower yield and poorer quality potatoes. It all adds up to reduced income at the end of the year.

Rowley Winten, Ciba Australia's Manager for New Products, says in trials throughout Australia, Score has performed impressively. In these trials, Score has delivered yield advantages of up to 30% more than untreated potato crops and 15% or more than other commonly used treatments.

Mr Winten said that one of the big advantages with Score is that the product can achieve target spot control, even if the spray interval is extended to 14 days.

"Not only will that allow less damage to the crop caused by boom spray traffic, lower application costs, less fuel and less wear and tear on equipment, it will also release more of the growers' time to do other equally important jobs."

Mr Winten said Score has also shown tremendous versatility. It has been registered with a wide range of tank-mix compatibilities so one pass spraying for a range of pests and diseases is possible.

"The yield advantages are clearly shown in our trials and Score is certainly a very powerful product on target spot. Nevertheless, growers will still need to adhere to common sense practice when dealing with the disease," Mr Winten said.

"Target spot is more likely to attack if the crop is under stress. Growers must continue to pay attention to irrigation, soil nutrition, soil structure and all of the other facets necessary to produce high yielding crops."

For more information on Score, contact Rowley Winten of Ciba on (02) 688 0410

This article has been forwarded to Potato Australia on behalf of Ciba Australia

Waste Potatoes -

National Grower Survey

KAREN FREEMAN
is a Potato Agronomist at the Institute for Horticultural Development, Toolangi, Department of Agriculture, Victoria

A recent survey of potato growers indicated that approximately 85 000 to 100 000 tonnes of Potatoes from the 1993 crop were unmarketable. Over 74% of growers surveyed considered waste potatoes were a problem to the potato industry.

During September 1993, Australian potato growers were surveyed to investigate the problem of waste potatoes on farms. This survey aimed to get a clear picture of the extent of potato wastage, so that the opportunities for potato by-product industries could then be assessed. Over one in five commercial potato growers responded to the survey. Growers from all states were represented, with over 40% producing the largest proportion of their crop for the fresh market (Figure 1).

WHAT YOU TOLD US:

What are the main reasons potatoes were not sold?

Forty-five percent of potato growers stated that greening of potatoes was one of the main reasons potatoes were not sold. Figure 2 shows that unacceptable shape and size, damage and pests or disease were also significant causes of waste potatoes.

How many potatoes were not sold?

The average volume of waste potatoes for each farm was 46 tonnes. The total volume of waste potatoes for the 500 potato growers surveryed was 22 500 tonnes. Based on these results, we estimate the volume of waste potatoes on farms last year was approximately 85 000 to 100 000 tonnes.

What methods were used to dispose of these waste potatoes ?

55% of growers surveyed chose to feed their waste potatoes to stock on their farms. 20% of growers simply left their waste potatoes in the paddocks. Only 4% of growers disposed of their waste potatoes at the tip and 8% used cull piles to dispose of them (Figure 3).

Are waste potatoes a problem, and if so why?

41% of potato growers considered waste potatoes were a problem on their farm and 74% considered they were a problem to the potato industry. The main reasons waste potatoes were considered a problem was because they represented lost income and because they impacted on the future management of the paddock (Table 1).

THE CONSEQUENCES:

Lost income:

Sixty three Victorian potato growers were interviewed at length to establish the cost of disposal and lost income from unmarketable potatoes. Growers incurred costs ranging from $0 to 4,300 depending on the method they used to dispose of their waste potatoes. On average, these potato growers lost approximately $18,000 of potential income from not being able to sell these potatoes to their anticipated markets. This amount represented, about 8% of their gross income.

Recent work assessing the effect of volunteer potatoes in Tasmania estimated the impact on gross margins of the costs associated with volunteer potatoes ranged up to $2000/ha, with an average of approximately $300/ha.

Hygiene problems:

The current farm practice of feeding waste potatoes to stock on the farm or leaving them in the paddocks is having a significant impact on farm hygiene. These practices provide a reservoir for pests and diseases. Recently, it was concluded that potato tuber moth in Tasmania is sustained from one season to another by weed potatoes and that it could be prevented by eliminating weed potatoes from the district. Weed potatoes have also been observed to dramatically increase the impact of other diseases such as early blight on nearby potato crops.

Missed opportunities:

These potatoes not only represent lost income and hygiene problems they are also potentially a missed opportunity. In overseas countries there are established industries utlilising waste potatoes for high-value stock feed, starch, sugar and alcohol production. Recent innovations may enable the conversion of potato starch into biodegradable plastics. Currently waste potatoes represent a cost to the potato

TABLE 1: The main reason potato growers considered waste potatoes were a problem.

Reasons waste potatoes were a problem	Number of potato growers that chose each category	
	On the farm	To the potato industry
Lost income	140	269
Time taken in disposal	63	96
Cost of disposal	48	95
Environmental pollution from waste potatoes (e.g. water quality)	11	51
Hygiene problems from waste potatoes	60	145
Impact on future management of the paddock (e.g. self-sowns)	113	191
Other	8	23

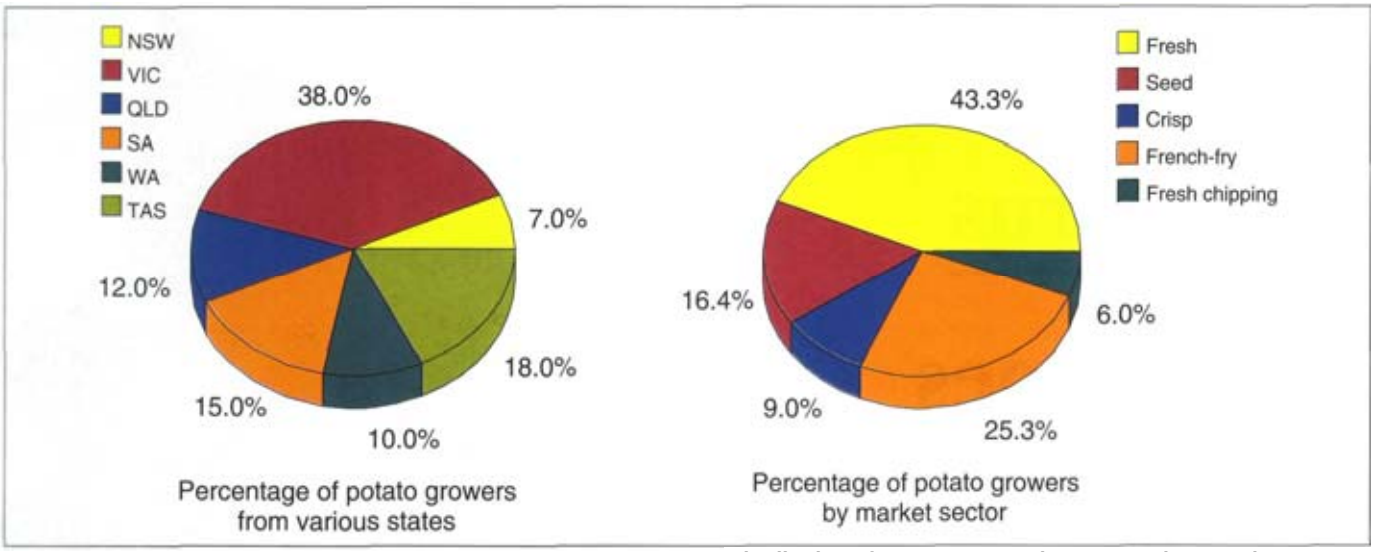


Figure 1: Distribution of potato growers between states

Distribution of potato growers between various market sectors

industry, reducing returns and impacting on the quality of marketed potatoes. The establishment of industries creating value-added products from waste potatoes would enable increased returns. It would also provide incentives for improved grading, producing the potential for improved market prices.

These survey findings highlight the need to consider management practices to minimise waste (particularly greening of potatoes). They pose a challenge to the potato industry to consider innovative solutions that will enable the value-added utilisation of unmarketable potatoes.

ACKNOWLEDGEMENTS:
We wish to thank the support of:
- **Horticultural Research & Development Council**
- **Australian Potato Industry Council**
- **Potato growers throughout Australia who responded to the survey.**

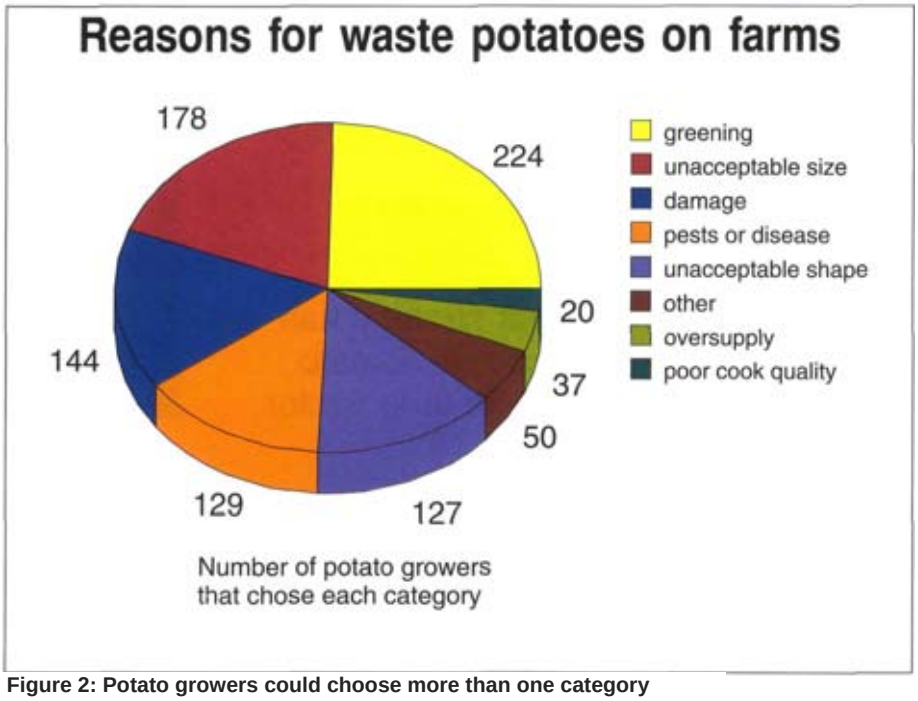


Figure 2: Potato growers could choose more than one category

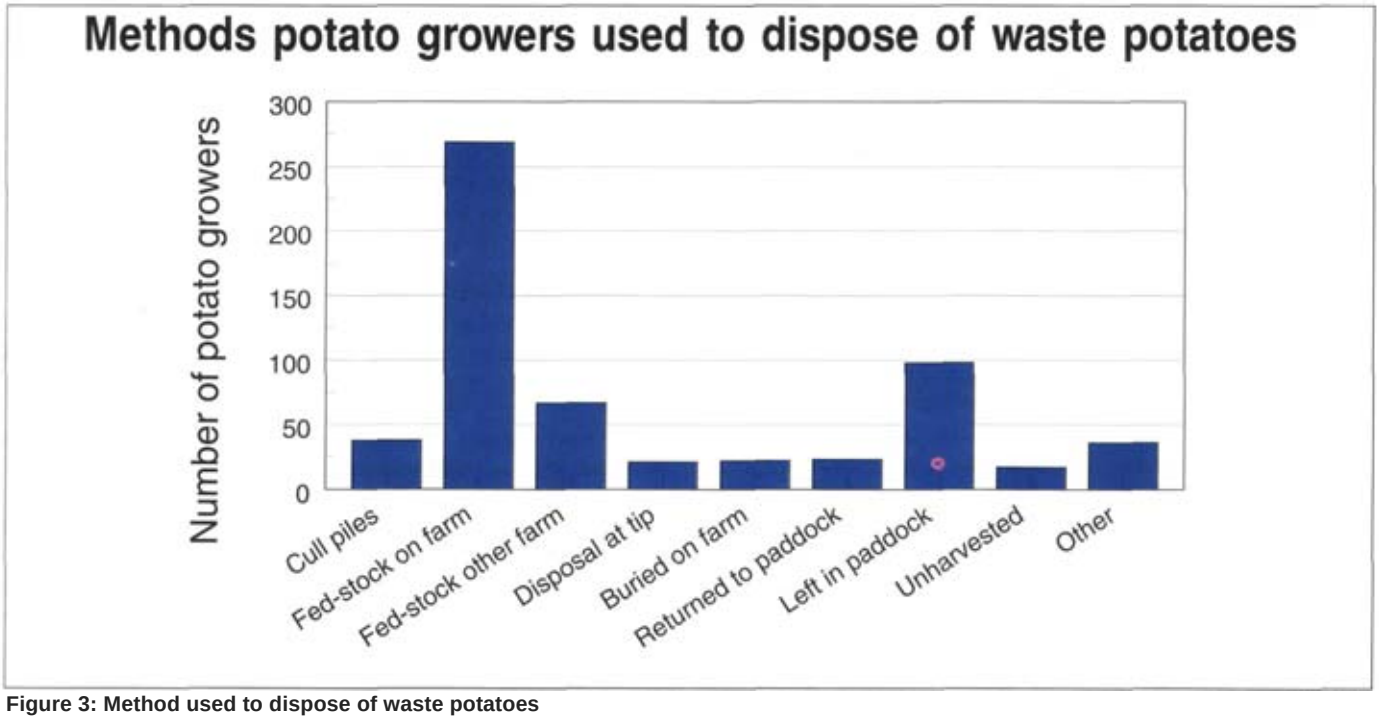


Figure 3: Method used to dispose of waste potatoes

Tomato Spotted Wilt Virus In Potatoes

JANE MORAN
is with the Institute for Horticultural Development, Knoxfield, Department of Agriculture, Victoria,
ROGER JONES
is with the Department of Agriculture, Western Australia,
LEN TESORIERO
is with the Biological and Chemical Research Institute New South Wales Agriculture

A national management strategy has been put in place to control Tomato Spotted Wilt Virus and its thrip vector.

INTRODUCTION

Tomato spotted wilt virus (TSWV) was first described in Australia in 1915 on tomatoes. In 1927 Pitman showed that the disease was caused by a virus that could be transmitted by onion thrips. TSWV was not found overseas until the 1930's, and virologists speculate that the virus evolved in Australia and spread to other countries via infected plants.

TSWV has an extensive host range which includes more than 500 species in 50 plant families. Many plants are symptomless hosts of the virus and these may include Australian natives. TSWV occurs in all States in Australia and outbreaks occur regularly in tomato and chilli/capsicum crops.

SYMPTOMS

Symptoms on potato plants infected in the field include necrotic (dead) spots or concentric necrotic rings on the leaves, and stem necrosis which may extend to kill whole shoots. One or more of the shoots may die and occasionally the whole plant dies. The symptoms are very similar to those caused by early blight *(Alternaria* leaf spot).

Tubers produced by infected plants may appear normal or be malformed, with cracks and internal rusty or dark necrotic spots. Spots, sometimes forming concentric ring patterns, may be visible through the skin or when the tuber is cut.

Symptoms on plants produced from infected tubers include necrosis, early death, varying degrees of stunting, or a rosette type of growth with coarse dark green leaves. Leaves may show necrotic spotting or pale green ring-like patterns. A few small malformed tubers may develop.

Symptoms may vary with the variety of potato and strain of TSWV. Yield losses of up to 75% have been reported. Tuber quality is also severely affected.

TUBER TRANSMISSION

The virus can persist in either malformed or normal looking tubers. In some varieties tuber transmission can reach 40% but generally does not exceed 5%, and not all tubers from an infected plant contain TSWV.

THRIPS TRANSMISSION

TSWV is transmitted by seven species of thrips, five of which have now been recorded in Australia. Major outbreaks of TSWV in Australian tomato, chilli/capsicum and potato crops have in the past been associated with onion thrips. More recently outbreaks of TSWV in chilli/capsicum and flower crops in Western Australia have been associated with Western flower thrips.

WESTERN FLOWER THRIPS

Western flower thrips was first discovered in Australia in 1993 in Western Australia and has since been found in New South Wales and Queensland. Evidence from overseas indicates that it is likely to spread throughout Australia.

Western flower thrips is a major pest on a large number of crops. It is difficult to control as it has secretive habits and very rapidly develops insecticide resistance. Not only does it cause crop losses by spreading TSWV, but also it causes losses due to feeding damage.

It is now considered the number one insect pest in New Zealand, United States of America and Europe, causing severe economic losses. In southern Europe it was recently likened to a biblical plague largely because of its TSWV vectoring behaviour.

HISTORY OF TSWV IN POTATOES IN AUSTRALIA

During the 1930's and 1940's, major outbreaks of TSWV occurred in potatoes in Australia. Infection levels ranged from 10% to 100%, mainly in potatoes growing in New South Wales. A number of seed potato crops were rejected for certification due to the incidence of TSWV. In the southern and central Tablelands 32% of seed crops were rejected and in the Orange, Millthorpe, Blayney district, 95% of seed crops were rejected.

Since then, outbreaks of TSWV in potato crops have been more sporadic. In the Crookwell district in New South Wales, TSWV continues to be a problem and onion thrips is thought to be the major vector.

The advent of Western flower thrips in Australia puts a whole new complexion on the problem with a likely future upsurge of TSWV in potatoes.

Overseas, TSWV is not a major problem in seed potato crops as these crops are generally grown in cooler areas. In Canada, where Western flower thrips is indigenous, seed potatoes are grown in the Rocky Mountains and Maritime Provinces and Western flower thrips are unable to survive the cold winters outside of glasshouses. Unfortunately, seed potato growing regions of Australia are likely to be climatically suitable for survival of Western flower thrips.

FUTURE IMPLICATIONS

It is inevitable that Western flower thrips will spread throughout Australia. As it spreads, it will transmit the virus to larger numbers of crops and the reservoir of TSWV in weeds and native bushland will increase.

We do not know how Western flower thrips will behave in Australian native vegetation or what native plant species are susceptible to TSWV. However, given the track record of Western flower thrips and TSWV overseas, it is likely that new hosts of both the virus and the insect will soon be found.

Tuber transmission is unlikely to be a major source of TSWV infection in potato crops. However, it must be noted that plants arising from infected tubers are known to live long enough to act as a source of infection within the crop.

The major threat to potato crops is most likely to be from outside the crop. It is inevitable that as Western flower thrip spreads throughout Australia the amount of TSWV in weeds, bushland, crops and home gardens will increase. Consequently, more thrips infected with TSWV will be flying into potato crops and epidemics may occur.

In 1994, potato crops in Western Australia are to be evaluated for TSWV infection and the presence of Western flower thrips.

THE NATIONAL STRATEGY

In view of the potential impact of Western flower thrips on horticultural crops, a national strategy for the management of Western flower thrips was devised with inputs from various states.

The aim of the national strategy is to minimise economic losses caused by Western flower thrips and TSWV. Various states have undertaken separate, but complementary roles, all of which are being co-ordinated in Western Australia.

Components of the program include: management of insecticides and the establishment of a resistance monitoring capability; cultural control strategies for TSWV; improved TSWV diagnostic tests and surveys for virus reservoirs; and the development of technology transfer packages for industries which contribute financially to the project.

Growers will be kept informed of all research results by a quarterly newsletter. When results of particular interest to potato growers become available, the researchers will contact the industry and present them in a form decided on by the industry.

The best way for us to combat the threat of Western flower thrips and TSWV is by working closely together so that aspects covered in different states can be immediately applied in other states. It is vital that the problem is tackled now before the situation deteriorates as has occurred overseas.

A Wholistic Approach To Growing Crisping Potatoes

PAM STRANGE is a consultant with Scholefield Robinson Horticultural Services in South Australia

The Crisping Group of South Australia Inc have been working on an Integrated Crop Management (ICM) program during the 1993/94 season.

ICM is the jargon term for what growers do every day of their farming lives - integrate all aspects of crop production. The progressive integration process uses accurate and up-to-date information to base decisions upon. This requires regular crop monitoring observations, and record keeping.

PLANTING

Seed placement, seed piece size, plant spacing and stem numbers were measured at farm walks on several properties and growers made measurements on their own properties. We found that actual mean seed and plant spacing usually varied from what the growers were aiming for. The evenness of that spacing (cv) varied significantly from even (30-40%) to uneven (70-90%).

Growers were either wasting seed by having too many doubles or were not putting out enough seed and had large gaps between plants which can cause large, mis-shapen and hollow tubers to be produced.

NUTRITION

All paddocks were soil tested and a further recommendation made using the Decision Support computer software being developed by Norbert Maier and his team from Primary Industry (South Australia). At least two follow up petiole samples were taken at the 10mm and 30-50mm tuber stages to verify adequate fertiliser application and the nutrient status of the crop.

The software produces a graph showing low, medium and high levels and the relative position of the test value. Petiole samples were taken weekly from the 10mm through to the 50mm tuber size stages to determine sap nitrate levels. The method and interpretation was based on the work reported by Dr. Chris Williams in *Potato Australia* Vol 2 June 1991 Pg 23.

The bulk of the crisping crop in South Australia is planted with the variety Atlantic and the season is almost all year round with numerous districts supplying the Adelaide factory. The requirements for a crisping potato are tightly set at a preferred size range of 80-300g, a SG of 1.075-1.085 and a minimum tolerance for colour, bruising, physical damage & tuber defects.

CROP MONITORING

An important part of ICM is regular crop inspections and accurate record keeping. During the 1993-94 season, the project employed two crop monitors. Crops were inspected weekly from emergence to the 50mm tuber stage after which they were

Measuring plant spacing and stem numbers at a farm walk in the Adelaide Hills

Growers attend a farm walk to discuss bruising at harvest and delivery to the factory

inspected fortnightly or as required. Crop appearance, tuber size, pest and disease counts and observations and soil moisture observations were all recorded and a crop monitoring report was faxed or posted back to the grower together with a sap nitrate reading on the same day.

Correct identification of plant symptoms and insects is crucial to an effective ICM. Specialists were consulted in all suspicious cases.

IRRIGATION

Unlike nutrition that has had the support of many years of local research, growers have been left to their own devices on irrigation scheduling and the set up and running of irrigation systems. The group went through some basic soil, water and plant relations with an irrigation engineer from PI (SA). The views on how to irrigate were varied and have prompted the Group to look more closely at irrigation and soil moisture monitoring for the next two years.

HARVEST

A bruise free sample returns the highest dividends to the grower. Bruising and shattering occur at harvest in cold temperatures or on poorly set machinery and poor handling procedures. Recommendations, such as reducing the dropping distance, were made very strongly at a farm walk addressed by representatives from the Smiths Snackfood Company.

RECORD KEEPING

Growers were given record books to cover two of their crisping paddocks. All details including paddock and seed preparation, planting details, fertiliser, chemical and water use and pest and disease numbers and observations were recorded in the booklets.

Most, but not all, of the growers in the Group keep some sort of diary of activities on the farm. The diary entries were then transcribed into the record books at the end of the season. Some growers found the record books useful to keep as a record of that particular paddock, others however found it a tedious and worthless task.

A couple of growers went further still and made computer records of their farm using the Paddock Action Management (PAM) for Potato Growers program.

TECHNOLOGY TRANSFER

Getting growers to adopt new and better methods or technology is every extension officer's challenge. We have had a few wins in this department.

Our group meetings range from an annual one-day technical seminar to half-day workshops or farm walks to individual 'across-the-kitchen-table' discussions. All are useful and necessary.

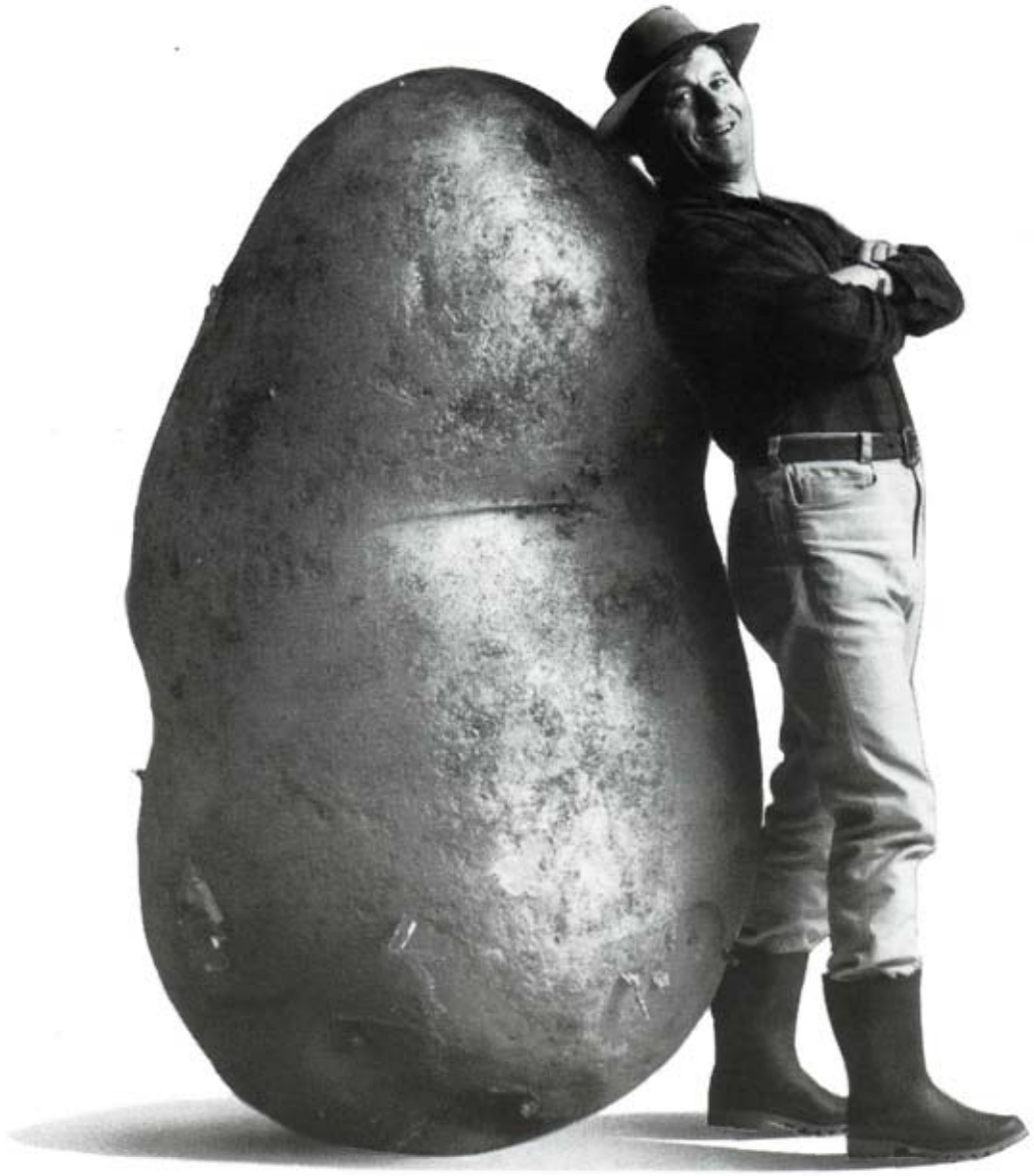
The seminar is an opportunity to catch up with technical experts, both local and interstate, research or overseas happenings. The farm walks are more of a hands-on, down-to-earth look at aspects of crop production. They involve small numbers of growers geographically close and they offer an excellent opportunity for the growers to look at how someone else does things or to have a yarn between themselves or with a representative from the Smiths Snackfood Company who usually attends.

The one-to-one meetings allow a grower to say exactly what he thinks, and to describe his individual problems and successes. This type of meeting takes place at least once a year for general discussions and at other times for specific functions such as formulating the fertiliser program.

Activities during the ICM project collect useful data from growers paddocks and compare it to other growers and to what we agree is the best practice. Growers can see for themselves what is really happening in their crop and can take action accordingly. Management decisions are based on actual measurements and not on 'gut feeling' or the just-in-case insurance policy thinking.

For example, all growers have looked at adjusting or even replacing their planters after doing the seed placement measurements. Chemical use has gone from using up to 7 or 8 fungicidal and insecticidal sprays to an average of only 1.5 fungicides and one insecticide spray after crops were monitored regularly.

ACKNOWLEDGEMENTS:
This project has been jointly funded by the Horticultural Research & Development Corporation, the Crisping Group of South Australia Inc and The Smiths Snackfood Company.



WE'RE MEETING THE GROWING NEEDS OF ALL POTATO FARMERS

Your area is different from other potato growing regions. You know it, Pivot knows it. That's why we produce the specific fertiliser that you need to get the most out of your crop.

Nothing beats local knowledge.

Contact your local distributor or: Alan Reid 053 525 242, Mobile 018 501 231. Malcolm Douglas 054 416 664, Mobile 018 507 043.

PIVOT
Fertilisers

The Phosphate Co-operative Company of Australia Limited. 160 Queen Street, Melbourne 3001. Tel: (03) 605 0400 ACN 004 080 264

PIVOT PROMOTING PRODUCTIVITY

PV 2596

Success of Fertiliser Workshops in Perth

JOHN BURT
is a Vegetable Development Officer with the Department of Agriculture, Western Australia

In recent years in Australia, there has been a change from one to one contact with vegetable growers by state Departments of Agriculture, to group and mass media extension. With this aim, the Department of Agriculture in Western Australia has organised three fertiliser workshops for vegetable growers in different areas around Perth in the last 12 months.

Fertiliser usage was chosen as an important study for vegetable growers, because this is a major factor in obtaining high yields and quality. In an age of diminishing returns, it is economically important to obtain the best results from the cheapest fertilisers. It is also being increasingly recognised that we need to place more attention on fertilisers to prevent a build up of nitrogen in drinking water, and to reduce phosphorus pollution of rivers and estuaries.

The course was run by Neil Lantzke and Bob Paulin, environmental project officers, and vegetable development officers; Margaret Graham and John Burt.

The workshop comprised six hours over two days and included the following topics:

- What fertiliser nutrients do (main elements)
- Composition of fertilisers
- How to calculate how much of each nutrient is added
- Soil types, soil testing and plant analysis
- What fertiliser nutrients do (trace elements)
- Department of Agriculture fertiliser recommendations
- Calculations of nutrients applied in growers' fertiliser programs

Each grower was supplied with a calculator and course notes entitled "Understanding Fertilisers". Total cost for the course was $30.00.

The importance of all essential nutrients in fertilisers was discussed. It was pointed out that potassium was the nutrient removed most by plants, closely followed by nitrogen. These two nutrients were important as top dressings and should be applied weekly if possible to sandy soils.

The mobility of nutrients was covered, and how this helps to determine plant deficiency symptoms. For instance, nitrogen and magnesium are mobile nutrients and move readily from old to new leaves. As a result, deficiencies are noticeable on the old leaves, whereas with immobile nutrients such as calcium and iron, deficiencies are seen on the new leaves.

The effect of pH on nutrient availability was also discussed. On coastal soils around Perth, there was often a shortage of trace elements such as boron, iron, manganese and zinc, due to the high pH.

The influence of soil type and relationships to fertilisers was explained. For instance, the acid Bassendean Sands need careful management compared with coastal alkaline soils, as they readily leach phosphorus. It was also explained that with some crops a soil analysis before planting would indicate the need for applied phosphorus. For instance, with potatoes, a soil test of phosphorus of less than 15 ppm on Perth coastal soils, would indicate a need for 175 kg/ha applied phosphorus, whereas a soil test of over 60 ppm would indicate a need for only 30 kg/ha applied phosphorus.

Poultry manure is a significant polluter of nitrogen and phosphorus into the groundwater, if applied at heavy rates before planting. There may be closer controls on the usage of poultry manure in future because of this factor and also due to its association with a build-up of flies in urban/hobby farm areas.

Comparisons were made of all the main fertilisers for their nutrient cost. The cheapest top-dressings for nitrogen and potassium were urea and potassium chloride (muriate of potash) respectively.

The composition of mixed fertilisers was clearly outlined and it was stated that there were only two mixed fertilisers (imported from Germany) which contained all of 12 essential nutrients.

Growers were shown how to calculate the nutrients put on with various rates of fertilisers and how to total the total nutrients for each crop. By the end of the course, growers were able to calculate the nutrients applied in their own program. A comparison was made with the Department of Agriculture recommendations and other growers. Some growers' fertiliser programs were similar to the Department's recommendations whilst others were widely different. For instance, the Department's recommendation for nitrogen on sandy soils in Perth is 340 kg per hectare whilst one grower used 1200 kg nitrogen per hectare.

The Department of Agriculture is encouraged by the success of the three workshops and intends to continue these in future.

Copies of the course notes are available from Neil Lantske, Department of Agriculture, 3 Baron-Hay Court, South Perth, Western Australia, 6151, for a cost of $10.

Phosphorus Requirements on Sandy Soils in W.A.

MURRAY HEGNEY is a research officer with the Western Australian Department of Agriculture

Phosphorus (P) fertilisers applied to vegetable crops have been identified as a contributor to the pollution of surface water bodies on the Swan Coastal Plain of Western Australia. Forty per cent (1000 ha) of Western Australian potatoes are produced in this region.

At present, potato growers apply phosphorus fertilisers according to either tradition or general regional recommendations. The rates used range between 100 and 250 kg P/ha, and generally bear little relation to soil test P levels which vary between 10 and 250 mg/kg (Colwell P). The combination of environmental concerns and increasing cost/price ratios has resulted in the need for more accurate methods of predicting crop phosphorus requirements on the Coastal Plain.

Spearwood and yellow phase Karrakatta sands are two horticulturally important soils on the Swan Coastal Plain. These sands have some ability to retain phosphorus, with phosphorus retention indices (PRI) of 4 and 7, respectively. Therefore, it is possible to use analyses of residual soil P to help make decisions about crop phosphorus requirements on these soils.

As part of a project aimed at calibrating phosphorus soil and plant analysis tests for potatoes in all of the major potato production regions of W.A., calibration data is being developed for the Karrakatta and Spearwood sands. The relative efficiency of either banding or broadcasting the phosphorus fertiliser is also being examined. The results from experiments conducted during 1993 are presented here.

CRITICAL SOIL P LEVELS

On sites with virgin Spearwood and Karrakatta sands, plots with different soil test P levels were created by incorporating a range of phosphorus fertiliser rates seven months before planting. Additional plots were also included where a range of phosphorus fertiliser rates were broadcast and incorporated just before planting. Delaware potatoes were planted on these sites in May 1993. Soil samples (0-15cm) for analysis of Colwell P were taken from residual P plots immediately before planting. At harvest, total and marketable yields were recorded.

On both soil types, total and marketable yield increased as the soil test P level increased up to 56 mg/kg. Yield remained unchanged at higher soil P levels. This result suggests that on Spearwood and Karrakatta sands with soil test P levels greater than 56 mg/kg, only maintenance rates of phosphorus (e.g. 30 kg/ha) need to be applied. For some growers this represents a potential saving of between $120 and $360/ha.

The rates of phosphorus that need to be applied when soil P levels are less than 56 mg/kg are shown in Table 1.

The environmental benefits of the potential reduction in phosphorus rates applied to potato crops grown on the Coastal Plain are difficult to quantify, but are no less significant than the obvious economic benefits to growers.

BAND OR BROADCAST APPLICATION

A third experiment was conducted on a virgin Karrakatta site to compare the relative efficiencies of two phosphorus application methods. A range of phosphorus fertiliser rates were either placed in two bands below and to the side of seed pieces at planting, or broadcast and incorporated to a depth of 15cm one day before planting. Again, total and marketable yields were recorded at harvest. Separate yield response functions were fitted to the data from each application method.

The rate of phosphorus required to give maximum yield (120 kg P/ha) was the same for both application methods. However, the maximum yield achieved in the banding treatments was significantly less than in the broadcasting treatments. Therefore, for potatoes grown on Karrakatta sands, broadcasting phosphorus fertiliser is

TABLE 1: Rates of broadcast phosphorus (kg/ha) required to give maximum yield[1] of Delaware potatoes on Karrakatta and Spearwood sands at different Colwell soil test P levels.

Soil test P (mg/kg)	Required rate of P	
	Karrakatta	Spearwood
0-15	137	175
15-20	121	168
20-25	109	150
25-30	97	132
30-35	86	115
35-40	73	97
40-45	62	79
45-50	50	62
50-55	38	45
greater than 55	30	30

[1] **Rates required for 95% of maximum fitted yield.**

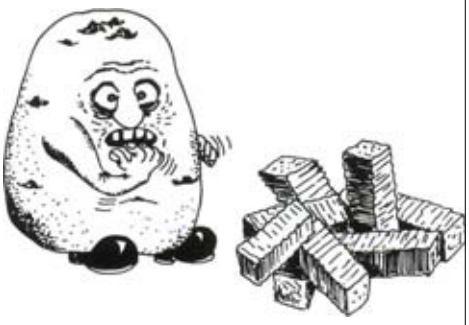
more efficient (kg tubers/kg P) than banding.

CRITICAL PETIOLE P LEVEL

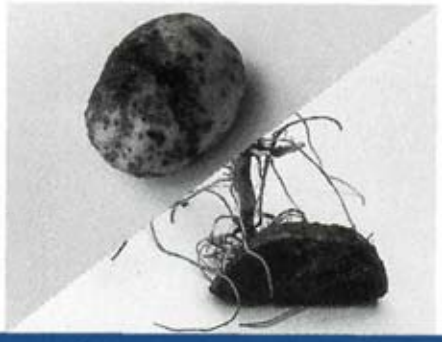
In all potato P response experiments conducted in a number of W.A. production regions during 1993, petioles from the 4th or 5th leaf (counted from the top of the plant) were sampled when the length of the largest tuber was 10mm (i.e. about three weeks after emergence). These samples were analysed for total phosphorus (% dry weight). The range in petiole phosphorus levels corresponding with maximum yields was 0.41 to 0.55%. This critical range is applicable to Delaware potatoes which was the variety used in all of these experiments.

Experiments are currently underway to assess the relative response of a number of potato varieties to both soil and petiole phosphorus.

ACKNOWLEDGEMENTS:
This work forms part of a project which is financially supported by the W.A. Potato Growing Industry Trust Fund and the Horticultural Research and Development Corporation.



Residual P experiment on a Karrakatta sand approximately three weeks after emergence. Colwell P on this plot was 3 mg/kg.



Rhizoctonia?

CYANAMID has the answer!

Rizolex® 100D

Proven control of Rhizoctonia solani

Stem Canker and Black Scurf, diseases caused by *Rhizoctonia solani* infection, result in delayed crop emergence, malformation and cracking of tubers. Yield is reduced, resulting in loss of income.

A single application of **Rizolex** helps bag the perfect potato by:

- Improving germination and increasing yield
- Producing scurf-free, clean table tubers
- Producing more evenly sized, better shaped potatoes, with greater opportunity for premium prices
- Providing healthier plants more tolerant to adverse growing conditions

Rizolex is highly effective across a wide range of soil types, pH levels and fertiliser regimes. Potato growers have relied on **Rizolex** since 1987. It is extremely cost-effective and easy to apply, with no need for expensive application equipment.

Rizolex helps you provide the perfect potatoes the market demands, reducing dockage and increasing yield and profitability.

Rizolex is the answer to the perfect potato.

CYANAMID

Technology advancing Agriculture

Cyanamid Australia Pty Limited
5 Gibbon Road, Baulkham Hills NSW 2153
Telephone: (02) 624 9333 Facsimile: (02) 674 5557

CIA: 1111 CY

RHIZOCTONIA

Disease of Potatoes

TREVOR WICKS
and BARBARA MORGAN
are with Primary Industries
South Australia

Rhizoctonia, also known as black scurf, is a common fungal disease of potatoes that in some plantings causes yield reductions of 30 to 40%. Recent surveys have shown that 28% of potatoes sampled from seed producing areas have *Rhizoctonia* on the tubers.

Most of the disease is observed as black sclerotes (scurf) on the tuber surface but the fungus also survives as minute strands of mycelium that develop in the sunken depression around the "eyes" of tubers.

In addition we have examined hundreds of tubers from growers using either "certified" or uncertified seed and found *Rhizoctonia* as either scurf or mycelium on all tubers in some seed batches. Whilst some batches were found free of *Rhizoctonia* this can only be determined by careful microscopic examination.

Dipping seed tubers in a solution of formalin has been used by many growers as an effective treatment to insure that seed is free of *Rhizoctonia.* However, formalin is a dangerous chemical and considerable care must be taken to ensure that personnel involved in the dipping process are not injured. In addition formalin can burn and damage tubers if they have begun to sprout.

Recent work in South Australia has shown that the concentration of the formalin solution and the dipping time is crucial with this operation. We have shown that dipping potatoes for 20 minutes in a *2%* solution of formaldehyde (5 litres of formalin in 100 litres of water) is an effective concentration by time combination that kills *Rhizoctonia* on the tuber surface. It is uncertain whether this treatment is effective against other tuber borne diseases such as powdery scab, so experiments to test this will be undertaken. We are also testing other chemicals and biological treatments to eradicate *Rhizoctonia* from seed, but these experiments are still in progress.

Although *Rhizoctonia* also survives in the soil, it is generally considered that seed borne inoculum is of greater importance. How long *Rhizoctonia* survives in the soil is unclear as crop rotations, weed hosts, depth and type of soil cultivation and soil treatments such as fumigation all influence this phase of the fungus.

It is unwise to expend effort in treating seed and then to plant the clean seed in soil with high levels of *Rhizoctonia* due to the soil borne phase. A simple test is needed to determine the level of *Rhizoctonia* in soil before planting. Unfortunately this is not so simple and experiments are underway to determine if this can be done using "mini tubers" or some other indicator plant.

Another complicating factor is that there are many different types of *Rhizoctonia.* These are known as anastomosis groups; abbreviated as AG types. While types AG2, AG3, AG4, AG5, AG8 and AG9 have all been recovered from diseased potato stems, roots, stolons and tubers it is the AG3 type which is mainly associated with potatoes. AG8 types are the main one involved with *Rhizoctonia* disease of cereals and have been shown both here and overseas to attack potato roots, but they do not form scelrotes on potatoes. The importance of these types where potatoes are planted in areas previously sown to cereals is unknown and needs to be investigated.

Rhizoctonia is a difficult disease to control because of the tuber borne as well as soil borne inoculum and the many interacting soil and climatic factors involved with disease development. However studies in South Australia are underway to develop and evaluate methods of control and the results of this work will be publicised when they come to light.

ACKNOWLEDGEMENTS:
We thank the Potato Industry and the Horticultural Research and Development Corporation for funding this work and the many growers who have collaborated with the program.

A successful seed management workshop was held at Lenswood, late in 1993. The 62 page proceedings is available (for $6/copy plus $1 postage) from:-

Dr Chris Williams
SA Research and Development Institute
Lenswood SA 5240

The International Potato Centre, Peru

The benefits of a continuing relationship

DR ROBERT SWARD
is a Team Leader, Special Projects and DARREN CROUCHER is a Technical Officer at the Institute for Horticultural Development, Knoxfield, Victorian Department of Agriculture

Victoria's continuing relationship with the International Potato Centre brings indirect benefits to the Australian Potato Centre.

INTRODUCTION

The Department of Agriculture, Victoria, through its Institute for Horticultural Development (IHD), has a contract with the International Potato Centre (CIP), Peru, to pathogen test potato cultivars grown for countries in CIP's East and South-east Asia and Pacific (ESEAP) Region.

This contract program is part of the Victorian State Government's commitment to overseas aid.

THE INTERNATIONAL POTATO CENTRE (CIP)

CIP is one of 16 international research and training centres supported by the Consultative Group for International Agriculture (which is sponsored by the Food and Agriculture Organisation of the United Nations, the United Nations Development Progam and the World Bank), and comprises more than 45 countries, international and regional organisations, and private foundations.

The broad charter of the International Potato Centre is to develop and disseminate knowledge to facilitate use of the potato and sweet potato as basic foods in the developing world.

CIP holds many thousands of lines of potato as part of its germplasm program

Dr Peter Schmiediche, Regional Director for CIP's ESEAP region, watches as Keith Blackmore & Bert Hemmes inspect some of the CIP potato lines growing at IHD, Tooiangi.

which aims to conserve and maintain the world's resources of ancestral and rare potato material for use in breeding and selection programs throughout the world. Unfortunately, many of these lines are infected with a range of pathogens, such as viruses and viroids, that must be eliminated before regional trials can be permitted.

THE IHD CONTRACT PROGRAM

The main objective of IHD's program is to supply the ESEAP countries with pathogen-tested potato clones of lines that have specific characteristics (for example, bacterial wilt resistance, good keeping quality, etc.) making them ideally suited for the tropical conditions of the region. The ESAEP countries that are currently on the CIP list of Australian collaborators include China, Indonesia, Vietnam, The Philippines, Thailand, Bangladesh, Fiji, Vanuatu, New Caledonia, and Western Samoa.

At IHD, Knoxfield, CIP lines required by the region are imported into post entry quarantine. In order to eliminate pathogens the potato lines are subjected to heat therapy and meristem-tip culture followed by a round of tissue culture. Thereafter follows stringent disease testing for a range of bacterial, fungal and viral diseases. When the lines are shown to be free of all the disease organisms for which they are tested, they are classified as "pathogen-tested". They are then multiplied in tissue culture for entry into the IHD germplasm storage collection or for planting out in a high health glasshouse for production of minitubers.

The minitubers are grown in a strict isolation area at The National Potato Improvement Centre at Toolangi. The resulting pathogen-tested field tubers are packaged up as trial sets and sent to the collaborating countries where they are evaluated under local conditions in statistically replicated trials.

THE BENEFITS OF OVERSEAS AID PROGRAMS

Overseas aid programs have been shown to accrue a range of benefits to the donor country as well as to the recipients of the aid. The recipients of material from our program are provided with the opportunity to access and assess selected pathogen-tested lines for use under their local conditions.

In return, CIP is currently negotiating to have large quantities of some highly sought after lines produced in Australia as pathogen-tested seed potatoes and exported by our seed producers to the collaborating countries in the ESEAP region. Not only will this generate income for the seed producers, but it will strengthen and expand Australia's export opportunities and may also result in a greater diversity of potato lines becoming available to Australian ware potato growers and to consumers.

Using Dusts On Seed Potatoes To Prevent Decay

The way you choose and use seed dusts on cut tubers depends on soil conditions at the time of planting and for the next three weeks after planting.

Use either Strategy A or Strategy B

Strategy A

If soil conditions favour rapid emergence (that is moist - above 35 centibars - and warm) and if you plant high quality, properly cured seed you may not need to use a fungicidal dust but rather a drying agent (eg lime, lime & sulfur, bark or cement).

If the weather is humid and either very hot or very cold at cutting time and during curing, you should use a fungicide dust as in Strategy B.

Use an efficient dust applicator. There are now systems available which move the seed through the dust evenly. It is essential that you cover the cut faces for any dust to be effective as pathogens can enter undusted cut areas.

Douglas fir bark has been reported overseas to enhance wound healing but bark-only dusts do not kill pathogens.

Strategy B

If the soil is likely to be wet (0-15 centibars) in the first three weeks after planting, you should use either whole seed or well-cured cut seed. If you use cut seed let it dry for one or two days then dust it.

Completely cover the cut face with a fungicide (such as Mancozeb) and correctly cure the sets. This usually produces a denser, more productive stand.

Note: in recent trials in South Australia, Atlantic cut tubers sown in cool, wet conditions were protected from breakdown when dusted with a 20% Mancozeb formulation (Tatodust®). However, in hot, wet conditions (above 25 °C) an 80% Mancozeb product was needed to improve plant establishment. (This product is not yet registered for this use).

Similar results have been reported for Sebago in Queensland.

It is essential that you completely cover the cut faces for any dust to be fully effective as disease organisms can easily enter undusted cut areas.

Recent research completed in SA by Drs Chris Williams and Trevor Wicks with financial support from HRDC

On the Road to Greater Sustainability and Productivity for Robertson Potato Growers

SANDRA LANZ
is a consultant employed by the Robertson District Potato Advancement and Landcare Association Inc., NSW

Robertson growers have completed their first season of a three year project to develop sustainable methods of potato production in highland Australia.

Erosion is a major concern to growers in the Robertson district because of the steep slopes and the very high rainfall of the district coupled with the nature of traditional potato farming. The Robertson District Potato Advancement and Landcare Association Inc (RDPA&LA) realises that if growers do not adopt new sustainable and environmentally sound methods of production, they will lose their livelihood.

The 1993/94 season saw potato growers undertake an intensive crop monitoring program. This included extensive soil and plant nutrient testing. Soil testing enables growers to tailor fertiliser applications to the crop's needs. Plant nutrient analysis helps fine tune nutrition in the current season as well as for future years.

Potato growers in the Robertson district apply up to 1.5 times more fertiliser than growers in other districts. The 1993/94 season highlighted high levels of phosphorus in the soil, however, these high levels were not reflected in the plant. A similar trend was found with potassium. A number of reasons may explain these trends which include the very dry season experienced and soil

Robertson potato grower Rodney Mauger recording rainfall and tensiometer readings.

Robertson potato grower Mark Bailey carrying out insect sweeps as part of an insect monitoring program

pH, which plays a major role with regard to the availability of many nutrients.

The focus for the 1994/95 season will be to develop management methods which will make nutrients available to the plant and lead to a reduction in fertiliser application rates.

Tensiometers are also being used by growers to help them monitor soil moisture. This enables them to make decisions regarding the amount of water to apply and when to apply. By using such methods growers are ensuring they minimise nutrient runoff and optimise water use.

The Robertson growers are working with other national research programs, such as the Integrated Pest Management project for north eastern Australia. The project aims to develop management strategies for the control of insect pests in potato growing districts in NSW and Queensland.

During the 1994/95 season, insect traps will be set up in the Robertson district, including light traps, sticky traps (to attract thrips and aphids) and pheromone traps which are specific to potato moth. By knowing what insects are present and in what numbers growers will be able to develop strategic programs for the management of insect pests.

Conservation and Land Management (CaLM) is also working with the Robertson growers to further refine minimum till techniques for potato production. Gross margins have been calculated comparing minimum till with conventional tillage on 4 properties in the district.

Cedric Schofield, who has employed minimum till techniques for the past 3 years, found that the gross margin for minimum till was 57 % higher than for conventional till. 1993/94 was the first season the other 3 growers employed minimum till. One property showed an 11% difference in favour of minimum till, the other 2 properties had a 2% and 7% difference in favour of conventional till. Minimum till also helps minimise soil loss during heavy rains.

ACKNOWLEDGEMENTS:
The project is funded by the Horticultural Research and Development Corporation, Water Board, Wingecarribee Shire Council, National Potato Levy and the Robertson District Potato Advancement and Landcare Association Inc. Support has also been received from Guy van Owen of CaLM and Bob Turnbull, Brian Herring and Clarrie Beckingham of NSW Agriculture.

VICTORIAN CERTIFIED SEED POTATOES

MORE THAN JUST A SPUD

WITH VICTORIAN CERTIFIED SEED POTATOES YOU ARE PURCHASING A WHOLE PACKAGE OF SERVICES WHICH GO INTO MAKING A QUALITY PRODUCT SUITED TO YOUR NEEDS

PERFORMANCE PROVEN

Correctly Cured Cut Seed Is Almost As Good As Whole Seed

DR CHRIS WILLIAMS and DR TREVOR WICKS are Senior Research Officers with the South Australian Research & Development Institute, Lenswood and Primary Industries, SA, Northfield Research Lab, SA, respectively.

If cut seed is correctly cured before planting, the new skin layer provides protection which is almost as good as the complete skin of whole round seed of the same seedlot.

The wounded surface of a potato heals by depositing a layer of suberin on the walls of healthy cells next to the injured surface, then wound periderm (or a cork layer) is formed below the suberised layer. This is a growth process so that suitable termperature, oxygen and high humidity conditions are necessary. These conditions influence curing time and thickening of the cured layers.

The thickest cured layer, for the best barrier to disease entry, develops when tubers are cured at

- 10 to 15°C
- 80 to 90% relative humidity
- adequate fresh air and ventilation for 10 to 14 days.

The rate of curing is temperature dependent. A temperature regime of 10 to 15°C produces the thickest cork layer and the lowest risk of infection. Higher temperatures may favour fungal or bacterial damage.

Adequate curing will not take place without a continual supply of fresh air to supply the oxygen needed for the growth of the protective layers. The cells must "breathe" or respire.

Only 2/3 fill half tonne bins with cut seed and use fans to circulate air around the bins. Usually an airflow of 30 to 40 cubic metres per tonne per hour is needed.

A high humidity (90 to 98%) is necessary to reduce moisture loss from the cut surface, or else cracking will occur. Curing at low humidity may leave two or more layers of dead cells over the whole cut surface which facilitates disease entry; but at high humidity many of the surface cells will remain.

Acknowledgements:
Funding for this project has been funded by the Horticultural Research and Development Corporation, potato levy, and the Potato Industry Trust Fund Committee of SA.

BAGS BAGS BAGS BAGS BAGS BAGS

POTATO PACKAGING

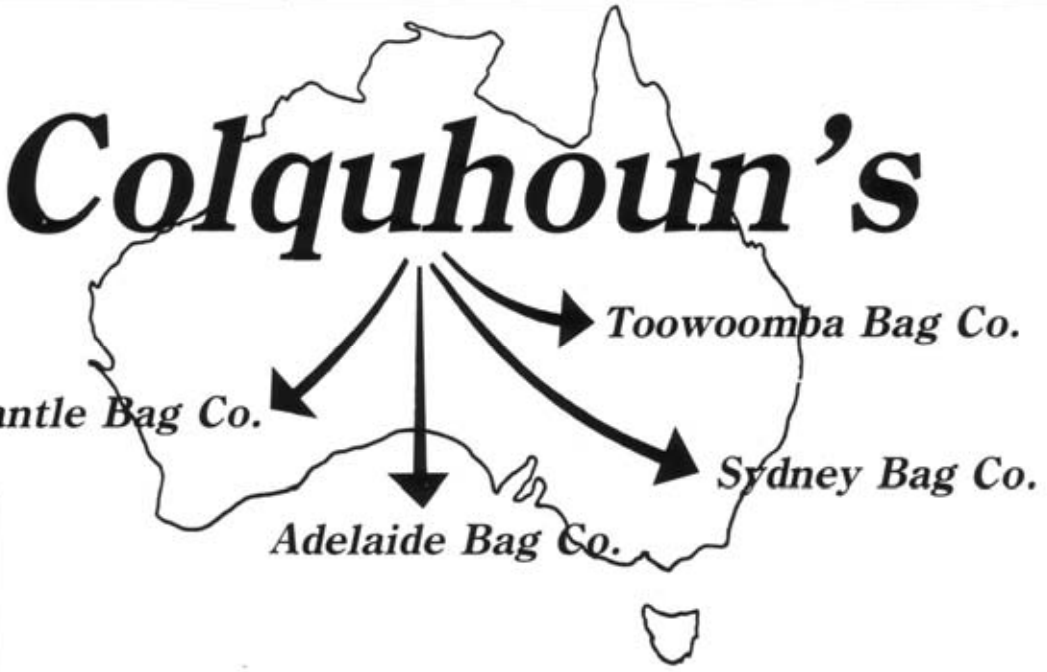
PLAIN & PRINTED BAGS

We are major importers, merchants and manufacturers of a wide range of jute, hessian and polypropylene sacks - printed and plain.

SEWING THREAD

WE ARE STOCKISTS OF THREAD SUITABLE FOR PORTABLE AND PEDESTAL SEWING MACHINES

Our sales staff are available to advise and quote on your requirements



AS

STRIVING FOR

EXCELLENCE

Colquhoun's Sydney Bag Co.
John Colquhoun, Ian Macqueen
Phone: 02-725 1411 Fax: 02-725 2961

Colquhoun's Toowoomba Bag Co.
Bob Creek
Phone: 076-33 2749 Fax: 076-33 2750

Colquhoun's Adelaide Bag Co.
Fred Downes, Bob Adams
Phone: 08-47 6033 Fax: 08-341 1466

Colquhoun's Fremantle Bag Co.
Ron Jarvis, Jim Farr
Phone: 09-434 3377 Fax: 09-434 3364

An Evaluation of Round Seed for Pontiac Production in S.E. Queensland

KEN JACKSON
is a Senior Agronomist and
ALAN DUFF
is an Experimentalist
at Gatton Research Station.
JOHN KERR
is the Principal District Adviser
based at Gatton.
All are with the Queensland Department of Primary Industries.

Joe Luck covering hand planted round seed spacing trial at Gatton Research Station

Pontiac is a high quality, fresh market potato provided its size can be controlled and bright skin colour retained.

Pontiac is the main red skinned variety grown in Queensland and in the recent consumer survey on potatoes, it was one of the few potatoes known by name. Presently, it accounts for 15 % of Queensland's fresh market production. The variety is widely adapted and high yielding. However, high yields are often accompanied by a large proportion of oversize tubers (greater than 350g). Tubers in this size range are much less attractive because of their deep eyes which result in excess peeling losses.

Pontiac was one of the varieties included in a round seed assessment trial conducted by the Queensland Department of Primary Industries at Gatton Research Station in the Lockyer Valley. Although other varieties were assessed, this article solely refers to the findings related to the use of whole seed in Pontiac. Yields within various grades were measured and the costs of using whole seed are examined.

EXPERIMENTAL DETAILS

Certified whole seed harvested in Victoria in March 1993 were received in Queensland in April. Three, round seed sizes (30-80, 80-150 and 30-150g) were planted at four plant spacings (20, 25, 32.5 and 40cm) at two planting times 18/5/93 (winter crop) and 29/6/93 (spring crop).

On arrival of the certified seed, the portion required for the winter crop was graded and held at ambient temperature for two weeks prior to planting. The portion for the spring crop was cool stored (4°C) for 1 month prior to preparation for planting. Seed for the autumn crop (planted 17/3/94) was selected from the harvest of the spring crop in October 1993 and cool stored for four months before planting in the same seed sizes and spacings as the previous two trials.

In each of the plantings a cut seed treatment was included at the 25cm spacing. All three plantings were allowed to senesce before harvest as this is the common commercial practice in Queensland. At harvest tubers were graded into small (less than 80g), No. 1 grade (80-350g) and oversize (greater than 350g).

EFFECT OF SEED SIZE

Analysis of the effect of seed size indicated that there was little difference between 30-150g and 80-150g, but these two seed sizes were consistently better than 30-80g in terms of total and No. 1 grade yields regardless of plant spacing. As there was little difference between the larger two seed sizes, results from the 30-150g seed size at the various spacings are discussed below as this seed size is commercially available. A gross margin (gross return minus variable costs) can be calculated for the various plant spacings at all the planting dates using commercial seed costs.

EFFECT OF ROUND SEED SPACING ON YIELD COMPOSITION

Yield in Figure 1 is divided into No. 1 grade (80-350g), oversize (greater than 350g) and smalls (less than 80g).

Alan Duff (left) and Ken Jackson (right) insuring precise placement of tubers in a round seed spacing trial at Gatton Research Station.

It is evident that whole seed resulted in almost half the total yield in the winter planting being oversize regardless of plant spacing. In contrast, the oversize portion of the cut seed treatment was substantially less resulting in a greater yield of No. 1 grade despite a lower total yield.

In the spring planting where the same seed was kept another six weeks, oversize was not a problem in any of the treatments. No. 1 grade and total yields for all the round seed spacings were superior to the cut seed treatment indicating the benefit of ageing and cool storing the original seed.

In the autumn planting there was little difference between the cut seed treatment and the corresponding whole seed treatment, and little difference among the treatments for oversize production.

However, autumn plantings are often made earlier than in this trial and cut seed is normally not contemplated at this time because of the risk of high temperatures and increased rainfall at plantings in late January and February.

In fact the cut seed treatment had optimum conditions in all three plantings as little or no rain fell between planting and emergence. Losses up to 50% can occur in plant stands from seed piece break down of cut seed if excessive rainfall occurs on the heavier soils of the Lockyer between planting and emergence.

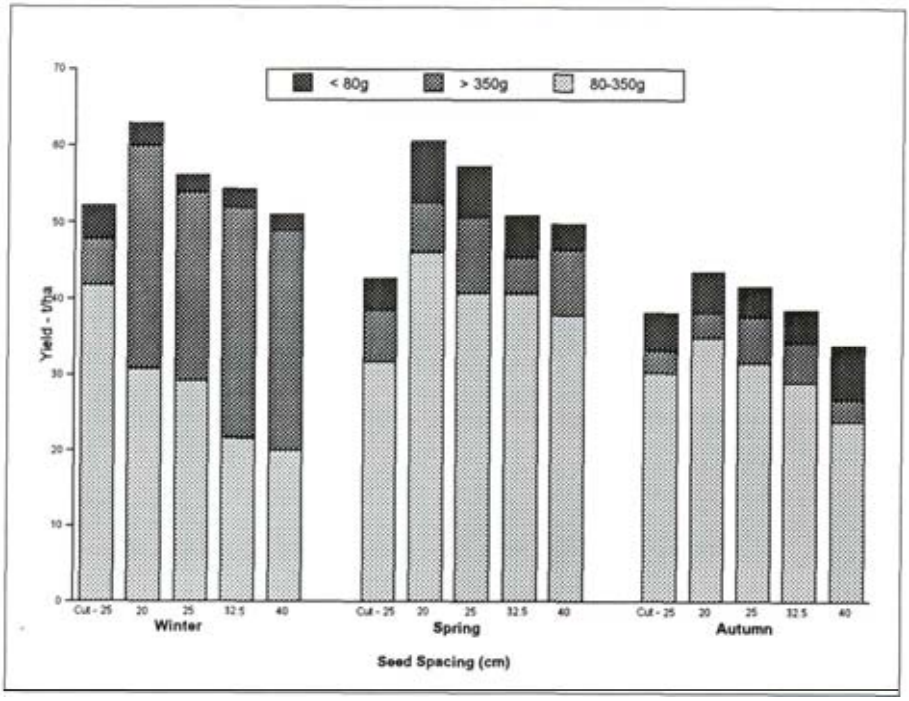


Figure 1: Composition of total yield of Pontiac potatoes grown from round seed (30-150g) at 20, 25, 32.5 and 40 cm spacings and cut seed (50g) at 25cm spacing in winter, spring and autumn growing seasons at Gatton Research Station.

EFFECT OF ROUND SEED SPACING ON NO. 1 YIELD

Figure 1 illustrates that as seed spacing was increased from 20cm to 40cm, No. 1 grade yield generally declined steadily. However, to determine if gross margins for this grade followed a similar trend, a gross margin analysis was conducted. The analysis takes into account all the variable production costs for each of the treatments. It allows for the extra cost of round seed over cut seed and the increased amount of seed required to plant at 20cm compared to the wider spacings.

GROSS MARGIN ANALYSIS

Figure 2 illustrates the gross margins for the various treatments at the three planting times. In winter, the cut seed treatment was superior while in the spring the round seed spacing at 20cm was slightly better than the round seed in the wider spacings. In the autumn round seed at 20cm was again better than round seed at wider spacings. Although the cut seed treatment performed well at this time, it is a high risk treatment for reasons mentioned above.

CONCLUSIONS

Generally, clear statements about the management of round seed in relation to maximising the yield of No. 1 grade tubers in Pontiac are difficult to make without further evaluation. As a result further trials are being undertaken. However, there is substantial evidence from the trials to date to suggest that:-

- unless planters are incapable of handling a mixture of round seed from 30-150g there appears to be no reason to separate smalls (30-80g) from larger seed (80-150g) and to have these two seed lots planted at different spacings
- round seed (30-150g) appear to give the best monetary returns from a 20cm spacing compared to wider spacings
- round seed needs to be aged to promote multiple sprouting to reduce oversizing or alternatively juvenile round seed may need to be harvested before vine maturity to minimise oversizing
- to maximise No. 1 grade yields from winter plantings certified round seed will need to be produced 4-6 weeks earlier than it is produced presently
- further comparisons of cut and round seed are needed particularly at the 20cm spacings

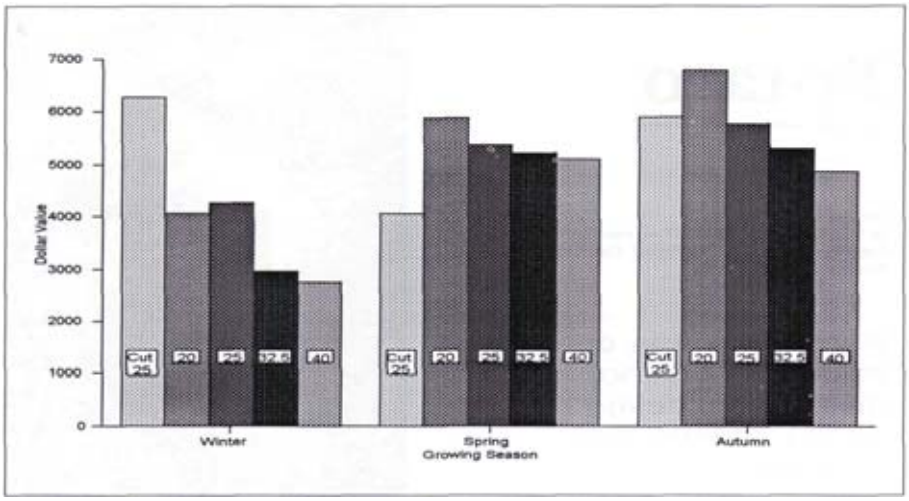


Figure 2: Gross margins for No. 1 grade (80-350g) Pontiac grown from round seed (30-150g) at 20, 25, 32.5 and 40cm spacings and cut seed (50g) at 25cm spacings in winter, spring and autumn growing season at Gatton Research Station.

George Pan (left) and Ken Jackson (right) check plan for round seed spacing trials at Gatton Research Station.

Bacterial Wilt of Potato

CHERYLE COPES
is the Team Leader, Diagnostic Services, Institute for Horticultural Development, Knoxfield, Victoria

Bacterial wilt is one of the most serious diseases affecting potato, tomato and eggplant.

It is widespread throughout the warm temperature, semi-tropical and tropical zones of the world and has also been reported in areas with relatively cool climates.

CAUSAL. ORGANISM

The causal agent, *Pseudomonas solanacearum,* is a rod shaped, motile bacterium capable of rapid multiplication. Individual cells are microscopic, measuring approximately 1.5 microns long and 0.5 microns wide (1000 microns = lmm). Multiplication is by division across the centre of the cell and may occur every hour. A population of 17,000,000 cells may result from the multiplication of a single cell over a period of only 24 hours.

HOST RANGE

Bacterial wilt has been recorded on more than 200 plant species from 33 plant families, with the largest number of susceptible species in the Solanaceae family. Apart from potato, tomato, tobacco and eggplant, other economically important hosts are pepper, banana and peanut. Nightshade and thornapple are two common weed hosts that can harbour the causal organism (possibly without showing symptoms).

Field plant showing typical bacterial wilt symptoms.

In Australia, there are two forms of bacterial wilt which are referred to as upland wilt (Race 3 = Biovar 2) and lowland wilt (Race 1 = Biovar 3). Of these, upland wilt is considered to be a more important disease of potato in Australia and is widespread. It has a narrow host range comprising mainly potato, tomato and a few weed species, it is primarily tuber-borne and has adapted to relatively cool temperatures. Conversely, lowland wilt has a wide host range including numerous weed hosts, is primarily soil-borne, is prevalent at higher temperatures and appears to be confined to areas of Northern Queensland.

SYMPTOMS

Field symptoms are wilting, stunting and yellowing of plants. These symptoms may occur during any stage of crop growth. Initially, some lower leaves may appear wilted, particularly during the hottest part of the day, however, these leaves become permanently wilted after a few days. Wilting of leaves progresses further up the stem often in conjunction with yellowing of the foliage. However, if disease development is rapid, leaves may wilt quickly without a noticeable change in colour.

When an infected stem is cut longitudinally, brown discolouration is

apparent in the vascular tissue and is usually more obvious in stem tissue around or below soil level. This discolouration is caused by bacteria blocking the vascular system, which in turn causes the plant to wilt and die.

To demonstrate bacteria in vascular tissue, heavily infected stems can be cut and suspended horizontally in a glass of water. After a few minutes, fine white strands containing masses of bacteria ooze into the water.

Tuber symptoms of bacterial wilt are characteristic, particularly in moderately to severely infected tubers. When infected tubers are cut in half, small white patches or pockets of bacteria are often visible in sections of the vascular system. Over time or when slight pressure is applied, the bacteria ooze from the vascular system forming globules on the cut surface. As the disease develops, bacteria spread through the vascular system and emerge at the "eyes" as an off-white to brown, sometimes bubbly ooze, to which soil readily adheres.

CONDITIONS FAVOURING DISEASE DEVELOPMENT

Disease development is favoured by high soil moisture levels (resulting from irrigation, rainfall or poorly drained soils). However, it should be noted that once infected, diseased plants are more obvious in hot, dry conditions (air temperatures between 25°C - 37°C) and combined with irrigation.

Damage to roots or tubers by cultivation practices, pests or fungi also predispose plants to infection.

DISEASE CYCLE

The disease is primarily tuber-borne and may carry over in seed which shows little or no sign of infection. The bacteria also survive from crop to crop in plant debris, diseased plants (derived from self-sowns), weed hosts, and may also spread to healthy seed via contaminated cutting knives.

Contaminated soil is also a method of dissemination. Infected soil can be spread via farm machinery, on boots and in bins, pallets and bags. The bacteria may also spread by soil washed down from higher ground in drainage or surface run-off water.

CONTROL

The Victorian Certified Seed Potato Scheme, based on pathogen-tested stocks, has been very successful in controlling this disease. Therefore, it is recommended that certified seed be planted in ground with no history of bacterial wilt. Measures must also be taken to minimise the risk of contaminated soil entering the property.

Strict hygiene measures should be maintained at all times, particularly following an outbreak of bacterial wilt. If this occurs, infected tubers and equipment should not be moved from farm to farm. All machinery (cutters, planters etc), bins and handling areas should be disinfested.

It is strongly recommended that infected paddocks should not be planted with potatoes or other solanaceous crops for at least 5 years. Practical experience has shown that 5 years of strong pasture growth combined with removal of self-sown potatoes and solanceous weeds will aid in the control of bacterial wilt.

It is also extremely important that a prompt and accurate diagnosis is sought on any plant or tuber that is suspected of being infected with bacterial wilt. Seek immediate advice from your local Department of Agriculture regarding the undertaking of laboratory tests to accurately diagnose this disease. If the diagnosis is confirmed, control strategies can be implemented immediately and the risk of carry over in infected seed minimised.

This disease can be contained and controlled through awareness, prompt action in seeking diagnoses and through responsive and co-operative attitudes.

Bacterial wilt infection of tubers showing "sore eye" symptom with adhering soil.

A Different Approach to Clod Separation for Single Row Harvesters

JOHN MCPHEE
is an Agricultural Engineer with the Department of Primary Industry and Fisheries at Devonport, Tasmania.

Potato harvesters use a variety of technologies to separate loose soil and clods from tubers. The digging web separates most loose soil, and agitation is often used to help break clods for easier removal. Agitation is easy to apply, but it is not the best way to remove clods, and often causes tuber damage.

After the digging web, the systems used depend on the type of harvester, but they usually rely on a pintle belt and/or some form of sizing roller. Some sizing rollers simply allow objects smaller than the gaps to fall through, while others, such as star rollers, cause some size reduction of the clods to improve removal. If separation is purely on the size of the gap, settings need to be chosen to maximise clod removal and minimise small tuber loss.

A common feature of most single row harvesters is the use of a waste web running beside the grading table, and the provision of labour on the machine for final grading. The waste web/grading table arrangement works on the basis that the grading table carries mostly potatoes and some clods, while the waste web carries mostly clods and some potatoes. Final separation is done manually. One disadvantage of the waste web is that reject tubers are often left there to fall back on the ground to become potential weed potatoes.

During the last Tasmanian harvest season, a different clod separation technology was used on a single row harvester in a joint Department of Primary Industry and Fisheries, industry and co-operator project. The system consists of a series of parallel, alternating plain and spiral rubber rollers. The plain rollers are also available in steel. The rollers are hydraulically driven in contra-rotating geared pairs.

This clod separation technology is readily available on twin row unmanned harvesters in Europe and the UK, but is not available ex-factory on single row machines. The rollers go under a number of proprietary names, usually reflecting the name of the manufacturer. The ones used in this work were Standen rollers from Standen Engineering in the UK.

A set of Standen rollers fitted to a harvester. Clods are pulled through contra-rotating pairs of rollers and crushed.

The rollers work on the principle that friction between the clods and the rollers draws the clods through the small gap (about 10mm) between the rollers, while the potatoes roll over the top and off the end. The slope and speed of the rollers can be adjusted, and both of these factors effect the separation efficiency. The rollers have an automatic hydraulic reversing unit that momentarily reverses them if a stone becomes caught. Because the separation principle is based on friction rather than size differentiation, it is possible to retain quite small tubers while removing large amounts of clod.

The Standen rollers were fitted to a Wuhlmaus 1633 harvester belonging to a grower from Cressy, in the Midlands area of Tasmania. At the time of installation, a choice had to be made between fitting them in the same direction as the digging web, and using the pintle web as a transfer web to the grading table, or fitting them in place of the pintle web itself.

Replacing the pintle web and fitting the rollers across the harvester is probably an easier and cheaper option. But for a number of reasons, including advice from the manufacturer, the rollers were fitted in line with the digging web. This meant removal of the existing haulm web, which was then replaced with an extended web with enough room inside to fit the rollers and the pintle web. The modification also meant that the waste web was no longer used, so that everything that came over the rollers ended up on the grading table.

The rollers were used in commercial harvest in sand and clay soils in the Midlands, and then tested on a range of soils (mostly krasnozems) in other areas in north-east and north-west Tasmania. As with any work to do with soil, the results tend to be variable depending on soil conditions.

However, the rollers were quite successful at removing clod, and the best performances were obtained when the clods were moist. Data collected shows that the rollers removed 60%-80% of the clod that reached the end of the digging web.

Comparisons with other harvesters, particularly ones of different design, are difficult to conduct because of the wide range of machine factors that affect clod removal and harvest rates. However, where possible, limited data was collected from similar harvesters working under the same paddock conditions as the modified machine. This data showed that the Standen rollers could halve the number of clods on the grading table compared with the conventional machine. On the basis of figures recorded by the owner of the machine, harvest costs could be reduced by between $2/t and $10/t.

Because of the effectiveness of the rollers, it was usually not necessary to use any shake on the web. There was only one occasion, in very heavy, wet soil, when shake was required to help remove soil on the digging web to ease the load on the rollers. The removal of shake should reduce tuber damage.

Numerous samples were taken off the harvester to test if the rollers caused bruising. There was no indication that the bruising levels were any different from other machines, with most samples reaching 85+% bruise free. The worst result, 76%, occurred in a stony paddock while using the plain steel rollers.

There is still some work to be done with the rollers. With the experience of the season behind us, we now believe that they will work just as well across the harvester in place of the pintle belt, and this will make the conversion much simpler. That change is yet to take place.

No piece of technology is all things to all people. The Standen rollers don't remove all clod in all conditions, but they do offer improved clod separation performance in most conditions. Equally important is the fact that they are not a limitation to harvest in good conditions. The rollers offer an option to growers or contractors to upgrade the clod handling capabilities of existing machines, without necessarily having to buy a new harvester.

Sumislex.®
Spot on for Target Spot.

Sumisclex fungicide prevents Target Spot in moist conditions. Frequent heavy dews and rain during the cropping period means your crop is susceptible to Target Spot.

Spraying with Sumisclex gives effective control for Target Spot and Sclerotinia.

Sumisclex. Superior Target Spot control.

Crop Care

CP 2124

POTATO CYST NEMATODE

- Risks and Future Directions

JILLIAN HINCH
is a Nematologist at the Knoxfield Institute For Horticultural Development Department of Agriculture, Victoria.

No new infestations of the quarantinable plant parasitic pest, potato cyst nematode (PCN), were detected in Victoria this last season. This means that no new infestations have been detected for the last two years (since the 91/92 season).

CURRENT SITUATION IN VICTORIA:

The PCN soil testing laboratory at the Institute for Horticultural Development has now processed some 8,000 soil samples in the past 4 years. Only a small percentage of the Victorian land tested has been classified as infested (less than 32 ha). All certified seed crops in the state are tested each year.

As an added check on PCN, Victorian certified seed growers had grading debris checked over several seasons for the presence of cysts. PCN was not detected by either soil or grading debris tests. So we can become more and more confident with time of limiting the spread of PCN in the industry.

Whilst PCN appears to be extremely limited in its distribution at this stage we must not be complacent. PCN is still a major threat to the potato industry because it is easily spread from infested to non-infested areas. A major aim of the program in Victoria is to limit the spread of PCN to clean regions.

The program is aimed at three areas:

- to reduce the populations of PCN on infested sites to a low level (and with time it will eventually die out)
- to encourage on farm hygiene, cultural practices and grower awareness so that if PCN is inadvertently spread, or has already been spread but remains undetected, it will not build up to damaging levels
- to encourage industry practices for packers and processors which will minimise the risk of spread to clean areas.

US STUDY ON RISK OF SPREAD:

Recent work in the USA by Dr Bill Brodie of the US Department of Agriculture has examined the risk factors associated with spread in various stages of the potato industry.

He has found that the risk of spreading cysts of *Globodera rostochiensis* (the golden potato cyst nematode) on potato tubers and farming equipment depended on the initial population density in the field and the type of equipment used.

PCN was used in two population densities, 0.04 eggs/g of soil and 0.9 eggs/g of soil. These levels are below the detection thresholds for both the Victorian and the USA PCN program.

The results of the US study are summarised below:

Equipment used	No. of cysts (g/soil)	
	0.04	0.9
two row potato hiller	0.3	2.0
two row cultivator	9.8	72.0
two bottom (40cm) moldboard plough	7.0	237.0
two row potato digger	27.0	136.6

The highest number of cysts and therefore the greatest risk of spread was associated with the largest amount of soil adhering to equipment. Surprisingly, farming equipment concentrated the numbers of viable eggs per gram of soil to a level higher than in the paddock in which the equipment was used. The greatest volumes of soil were extracted from the plough and the digger. The greatest cyst numbers were extracted from the digger (at 0.04 eggs/g initially) and the plough (at 0.9 eggs/g initially). The lowest cyst numbers were from the hiller (at both 0.4 and 0.9 eggs/g of soil).

The risk of spread of PCN cysts on potato tubers was analysed using data collected over 18 years. Potatoes were harvested mechanically from naturally infested paddocks and the tubers put through a potato grader, then collected in unused potato sacks. Packs of tubers (4.5 kg) were washed and the washings were analysed for the presence of cysts. At 0.01-0.04 eggs/g of soil 10% of the tuber samples contained at least one cyst with viable eggs. At levels greater than 50 eggs/g of soil, 76% of tubers contained cysts with viable eggs.

This work only examined the potential risk of spread of PCN not the probability of establishment i.e. once a cyst containing viable eggs has been acquired it then has to establish and reproduce on a susceptible host plant.

This study re-enforces the rationales of:

- not permitting seed potato production in areas where potato cyst nematode has been detected
- not sharing farm equipment
- not dumping grading and bulk bin debris in potato paddocks

It does suggest that the **quickest way to spread PCN** within a district is to share harvesting equipment without thorough high pressure hosing, or by planting non-certified seed.

LOOKING AHEAD:

The discovery of PCN has hit some communities very hard and threatened livelihoods. However, it may be timely for affected communities to use the discovery of PCN to revaluate their industry and try to look ahead for new directions. In fact, **use PCN** as a **vehicle for change!**

It will become increasingly difficult to sell unwashed potatoes from PCN infested regions, even though the potatoes are from non-infested farms.

Plants showing symptoms of PCN

Perhaps potatoes from affected areas could become a model for minimally processed potatoes prepared for domestic consumption.

A major problem identified at the National Potato Industry Conference in Adelaide for fresh potato consumption was the "inconvenience" of preparing potatoes when compared with pasta and rice. This was seen as a major disincentive for consumers. Potatoes produced from PCN infested regions are still good quality products for domestic consumption but market forces will determine the future for these fresh potatoes. Growers should consider a future niche market.

The area of minimally processed food production and packaging is a major initiative of the Department of Agriculture and CSIRO. Perhaps growers, the Department of Agriculture and CSIRO can work together to develop a co-operative for minimally processed potatoes on a trial basis.

On display at the National Potato Industry Conference was an innovative product; large bulk bins made out of recycled plastic. These bins are an enormous improvement in farm hygiene as they can be easily washed down and do not have any porous surfaces which will harbour soil and therefore cysts. Widespread use of these bins would decrease the risk of spread of PCN and soil borne diseases through the industry.

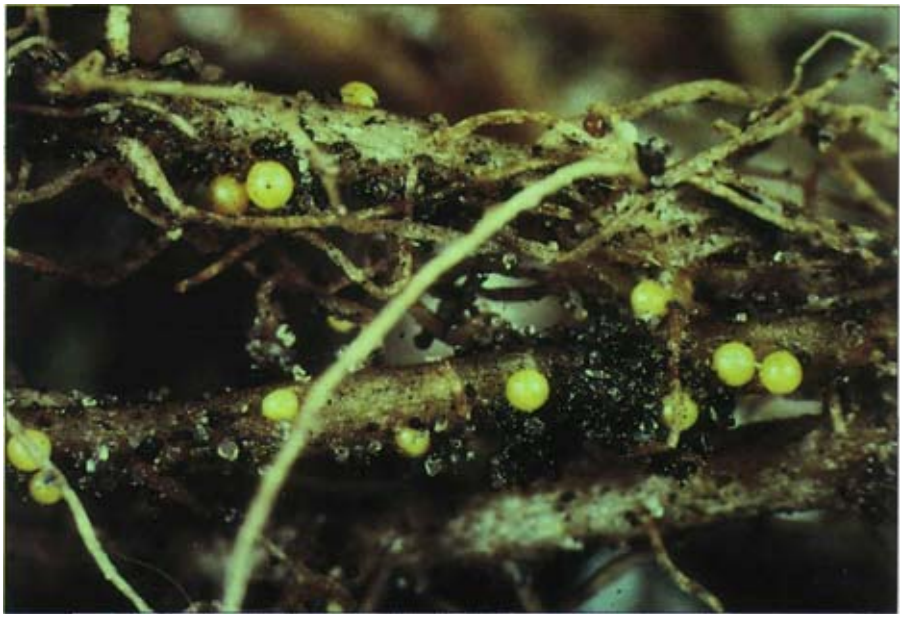
Whilst speaking of new directions and innovation there is also a need for an enterprising grower to invent a type of soil vacuum cleaner for PCN soil testing. This type of soil vacuum could be attached to each harvester so that soil samples for PCN analysis could be hygienically collected and sampling intensified. Such an automated form of sampling should also reduce costs in the long term.

IDENTIFICATION OF VICTORIAN PCN ISOLATES:

All populations of PCN detected in Victoria have been biochemically tested at the Department of Agriculture and they show up stongly as *Globodera rostochiensis*. Scientists at Rothamsted, UK are screening our isolates against potato cultivars with known resistance genes to PCN. Results of the Wandin/Silvan populations indicate they are controlled by the H_1 gene found in cultivar Atlantic. Results of the other properties will be available later this year.

We are currently determining the pathotypes of our isolates by protein fingerprinting using the latest technology and comparing these fingerprints with those of the European isolates. A range of potato lines from the National Potato Breeding Program at Toolangi are being tested in New Zealand for the presence of resistance genes using the Victorian isolates as well as some from New Zealand. Results from this work will be available in the next few years.

PCN cysts on Potato roots



National Potato Industry Conference

BRUCE BEATTIE
is the Potato Specialist with the Department of Primary Industry and Fisheries Tasmania.

The National Potato Industry Conference held in Adelaide during July presented growers and fresh market suppliers with many challenges.

The production of quality tubers for both the fresh market and processing continues to be hampered by the lack of attention to detail during the growing and harvest season as was pointed out by Mark Heap and Pam Strange in their presentations.

The major thrust of the conference, however, was in the area of fresh market requirements and potato consumption patterns.

Richard de Vos of Richard Marketing and John Barker presented market research which showed that sales of fresh potatoes are declining. They urged the industry to take action to make potatoes a more competitive product.

Although potatoes are consumed in almost all homes in Australia, younger people tend to eat less than older people, a trend which can be expected to continue as today's children take their current habits into their own homes. Rice and pasta are competing with potatoes as sources of complex carbohydrates in the diet. Rice and pasta are perceived to be quick and easy to cook, of consistent quality, easy to store, and fit modern eating patterns.

Promotion of fresh potatoes became the major topic of discussion. At the end of the conference it was agreed that each state grower organisation should provide $4,000 to be matched by DPIE Agribusiness Program to support a national presentation program for the future of fresh market potato promotion.

Richard de Vos also indicated that consumers dislike the plastic bags that fresh potates are currently marketed in and recommended that the industry adopt either alternative packaging or higher standards for potatoes in plastic packaging.

Quentin Dempster outlined the difficulties New Zealand potato growers are having in maintaining their position in the fresh market. The New Zealand industry is looking at legislation and education to ensure that only the best quality is available for purchase. He considers fresh market prices are set according to what the lowest quality product brings.

This immediately opened the door to Dr Robert McBride (the author of the Bliss Factor) of Sensometrics who told the 200 delegates that the sensory factors (ie taste, aroma, texture etc) of foods have a large impact on what we purchase. For most people, flavour is intimately linked with quality. His talk can be summarised by the phrase *"we savour the flavour we favour"*.

Quality assurance (QA) was discussed by Chris Weeks. He stressed that QA is not just about getting a good product on the market but about developing and controlling a process that consistently meets the customers expectations. To do this, product specifications are determined and each of the procedures required to achieve this are written down. The standard set in each procedure then has to be achieved to ensure a consistent product in the market place.

Chris said that having a QA system gave marketing advantages in improved and consistent quality with better service but that it also lead to better business management through less returns and less waste.

An example of how QA systems are working in the wine industry was given by Perry Gunner of Orlando Wyndham. He said that the international success of Jacob's Creek wines relied on the guarantee of supply and consistent quality anywhere in the world and that having a QA system in place actually added value to the product.

The conference was rounded out with two breakfast workshops which covered research, development and extension efforts to improve crop production.

The final day was an opportunity to catch up with delegates during the tour to a packing house at Mt Barker and then down to Currency Creek to take a look at new spraying technology from Hardie.

A busy three days with something for all. Thank you to Wayne Cornish and his team for organising the conference.

Conference delegates discussing new spraying technology from Hardie

Survey of Black Dot and Other Diseases of Potato Tubers

RUDOLF DE BOER
is a Plant Pathologist with the Victorian Department of Agriculture Institute for Horticultural Development, Knoxfield.

TREVOR WICKS
is a Plant Pathologist with the South Australian Department of Primary Industries Northfield Research Laboratories, Northfield

An upsurge in the production and marketing of washed potatoes in recent years has focused attention on diseases that affect the tuber skin. **Silver scurf,** caused by the fungus *Helminthosporium solani,* is well known and was, until recently, not considered to be a serious problem.

On the other hand, **black dot,** caused by the fungus *Colletotrichum coccodes*, appears to have gone largely unnoticed over the last twenty years or so, even though the disease was considered to be common in Victoria in the 1960's. However, its appearance on washed potatoes in recent years has once again made black dot a "hot" topic.

BLACK DOT OR SILVER SCURF?

Black dot appears as grey discoloured areas on the tuber skin. The discoloured areas contain minute black bodies (hence the name black dot), barely visible to the naked eye, called microsclerotes.

At first glance, symptoms of black dot can easily be confused with those of silver scurf. Silver scurf lesions differ in that they take on a silvery sheen as they mature and also become sooty in appearance when, under humid conditions, the fungus produces masses of dark spores.

Both silver scurf and black dot can occur together on a tuber. It is possible that black dot has frequently been mistaken for silver scurf, thereby underestimating its importance.

Black dot lesions (brown areas), caused by *Colletotrichum coccodes,* on the surface of a potato tuber. The minute "black dots" visible in the lesions are microsclerotes of the fungus.

THE SURVEY

A comprehensive survey was under-taken during the 1992/93 season to determine the incidence of black dot and other tuber diseases on potatoes grown for seed in Victoria and on ware and processing potatoes produced in South Australia.

Samples of tubers were taken at random from consignments of potatoes (ungraded in the case of seed potatoes) of different cultivars. Tubers were washed and the incidence and severity of tuber skin diseases recorded.

Comprehensive statistical analysis (linear models) of the survey data took into account possible effects of cultivar differences, the period of time tubers were left in the ground after they matured and the period of time tubers were stored in sheds and cool stores before disease incidence and severity was recorded.

SURVEY RESULTS

In general, black dot, silver scurf and black scurf *(Rhizoctonia solani)* were the most common tuber diseases recorded in both Victoria and South Australia. The incidence of other diseases, namely powdery scab *(Spongospora subterranea)*, common scab *(Streptomyces scabies)* and eel-worm *(Meloidogyne spp.)* were generally low.

In Victoria, where 33% of Certified Seed Potato Growers were sampled, black dot was found to be a common disease of ungraded seed potato tubers, with an average of 44 % of tubers affected (Table 1.). Silver scurf was more prevalent affecting 81% of tubers sampled. The incidence of tubers with black scurf, powdery scab and common scab was relatively low with 28%, 3% and 2% of tubers affected, respectively.

The incidence of black dot in Victoria varied between districts. Tubers with black dot were most common in the Central Highlands of Victoria (84% tubers affected), least common in the Otway Ranges (4% tubers affected) and intermediate in occurence in the Gippsland and Kinglake districts (42% and 47% tubers affected, respectively).

Analysis of the data showed that the incidence of black dot increased by 0.4% for every day that tubers were left in the ground after maturity. Rainfall often delays harvests, with the result that potatoes may be left in the ground for several weeks. This could account, to some extent, for the relatively high incidence of black dot recorded in Kinglake. It is possible that the relatively low incidence of black dot in the Otway Ranges, one of the colder, wetter districts of Victoria, is related to climate.

High levels of silver scurf were recorded in Kinglake, the Otway Ranges and the Central Highlands (93%, 84% and 83% respectively) and moderately high levels in Gippsland (63% tubers affected). As with black dot, the incidence of silver scurf also depends on the time of harvest - the later the harvest after a crop matures, the greater the incidence of silver scurf. This could account, to some extent, for the relatively high levels of silver scurf in Kinglake, the Otway Ranges and the Central Highlands where potatoes often have long periods of "ground-storage".

The incidence of tubers with black scurf did not vary greatly between districts (17-44% tubers affected). It should be noted that the relatively low incidence of both powdery scab and common scab (3% and 2% tubers affected, respectively) were recorded in samples of ungraded tubers. Grading tubers to the low tolerances required for certification would have further reduced the incidence of these two diseases.

Survey data collected from ware and processing crops in South Australia is currently being processed. Preliminary results show that incidence of both black dot and black scurf averaged 19% tubers affected and 11% of tubers were affected with silver scurf. The incidence of powdery scab and common scab, however, were relatively low (4% and 1% tubers affected, respectively).

Silver scurf, and to a lesser extent black dot, are seed-borne diseases and research in overseas countries has shown that planting infected seed will result in infection of the progeny tubers. Both diseases now affect income of potato growers because they reduce the quality and marketability of tubers, particularly for the pre-pack washing market. Furthermore, the black dot fungus, unlike the silver scurf fungus, can damage the roots, stems and stolons of plants causing early death and yield loss in crops. There has, for the most part, been no effot to control either disease.

This study shows that the management of both silver scurf and black dot will need to become part of routine disease control strategies for seed potato growers.

FUTURE RESEARCH

A new project, funded by the Australian potato growers and the Horticultural and Development Corporation, on the integrated control of silver scurf and black dot, is being undertaken at the Institute for Horticultural Development at Knoxfield. The project aims to develop and evaluate cultural and chemical control practices to minimise the spread and development of silver scurf and black dot in soil and stores and to ultimately develop an integrated control strategy.

TABLE 1: The average incidence of tuber-borne diseases in ungraded seed potatoes in Victoria in 1992/93.

Disease	Tubers affected (%)[A]
Black dot	44
Silver Scurf	81
Black Scurf	28
Powdery Scab	3
Common Scab	2

[A]33% of Certified Seed Potato Growers in Victoria were sampled.

A gem from the International Potato Congress held in the UK in September 1994

"Don't fight change, be the best at it!"

Andrew Batty, Tesco Supermarkets, UK

McCAIN FOODS (AUST) PTY. LTD.

State Roundup

Victoria

TONY KELLOCK
is the Industry Manager, Potatoes at the Institute for Horticultural Development, Victorian Department of Agriculture, Toolangi

The 1993/94 season has been one of the most difficult on record for the Victorian potato industry, due to reduced returns brought about by falling demand, low prices & increased competition from other production areas in Australia.

Victoria is still, however, the major producing State, with annual production of about 365,000t from 13,500ha, valued at about $90m. Average yields remain steady at 27.5t/ha. In the past season, production was boosted by good early rains and a cool to mild summer, followed by a mainly dry autumn which enabled harvesting to be completed ahead of schedule in most areas of the State. Excellent seed yields were reported from some districts, particularly the Otway Ranges.

Apart from early blight in some areas, disease was minimal in most crops, although silver scurf and black dot emerged as significant problems on seed and fresh market crops. There have been no new infestations of PCN detected since the 1992/93 season and there is now strong evidence that the PCN outbreak in Victoria has been contained. Further strategies are being developed to ensure its spread is contained.

CERTIFIED SEED

In 1993/94, a total of 1950 ha was submitted for certification by 138 growers, and 23,400t certified up to the end of June, 270t more than at the same stage last season. A total of 31,670t were certified in the 1992/93 season. It is estimated that next season about 840ha (43%) and 14,600t (46%) will be grown by accredited Quality Assurance (QA) growers.

One of the most significant changes to the Victorian Certified Seed Potato Scheme since its inception involves the transfer of the management of the Scheme from the Department of Agriculture (DAV) to a new body to be known as the Victorian Seed Potato Authority (VicSPA).

DAV will continue to provide technical services such as maintaining pathogen tested stocks in tissue culture and production of mini tubers, but DAV certification officers will only continue to operate for a period of up to three years. DAV has developed a new tissue culture laboratory and polyhouse facility at Toolangi to produce mini tubers for both the Scheme and fast-tracking varieties in Victoria and interstate.

A real opportunity currently exists to export more seed potatoes overseas, particularly into SE Asia and Pacific countries, to satisfy an increased demand for processing potatoes and to a lesser extent fresh potatoes. Currently, links are being developed with Western Australia to establish new markets for seed potatoes in these countries.

FRESH MARKET

Growers in Victoria have seen prices fall to about $60/t in some cases and it is likely that many growers will be forced from the industry. Relatively few growers can compete with the demand for high quality washed potatoes from either the Riverina or the SE of South Australia. Quality combined with increased competition from products such as pasta and rice will undoubtedly force some growers out of potatoes into alternative enterprises as already seen at Koroit and Geelong. In some cases, this challenge is being met by the development of local networks to improve quality and marketing skills, for example in the Thorpdale and Ballarat districts.

One of the possible alternatives for fresh market growers is to grow potatoes for use in starch production, biodegradable plastics, freeze dried products and animal feed stuffs.

PROCESSING

Both crisp and French fry processors have foreshadowed further reductions in both contracts and tonnage in line with the general levelling out of demand for these products. Quality remains the major criteria to meet the processors requirements, and each of the major companies reward growers in this area.

McCain (Australia) P/L at Ballarat currently process about 70,000t a year, of which about 45,000 is Russet Burbank, the remainder being Shepody and some Kennebec. Diseases such as early and late blight and Rhizoctonia caused some problems last season, although stem-end browning was generally of minor importance. McCain's have recenly installed a new unit at Ballarat to grade Russet Burbank potatoes for wedge production, and it is anticipated that this unit will provide further stability to the French fry industry in the Central Highlands.

The crisping industry has established Atlantic as the major processing variety for fresh delivery due to its quality and ability to achieve maximum returns in response to pricing incentives by the two major companies, Frito Lay P/L and Smith Snackfood Co Ltd. Denali and the new variety Wilstore are preferred storage lines, with Kennebec declining further in production.

In general, all crops showed good quality, even when late planted, with overall tonnage and dry matter (SG) above average, in a season marked by a wet start and a mild dry finish.

New South Wales

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

The 1993/94 season was another disappointing year for NSW potato growers.

For the fifth year in a row ware prices fell below the costs of production. The second half of the year was also one of the driest seasons on record in New South Wales.

NSW PRODUCTION

NSW growers produced 139,000 tonnes of potatoes on 6,500 hectares during 1993-94. The fresh market continued to be oversupplied throughout the year, while processing and seed production remained stable.

Potato production in New South Wales is located in three main areas: the Riverina, the Tablelands and the Coast. Fresh and processing crops are grown in all three areas, while certified seed production is confined to the higher altitude Tableland districts.

Three potato crops are harvested each year. Spring and autumn crops are produced in the Riverina, the lower Tablelands and the Coastal areas, while a summer crop is planted in the higher Tableland districts and the Riverina.

FRESH MARKET

The mild weather during late winter allowed an early start to spring crop planting. Crop areas were similar to last year. Favourable growing conditions produced high crop yields. Spring crop yields averaged 35 tonnes/hectare in the Riverina and 27 tonnes/hectare at Maitland. Digging was slow and prices dropped from $200/tonne (in bulk, on farm) in November to $80/tonne in December.

Wet weather disrupted the planting of summer crops. Summer crop areas remained unchanged from last year. There were no serious pest or disease problems. Despite some dry weather during the growing season, most crops had excellent yields. Summer crops averaged 44 tonnes/hectare at Orange. There were no delays in harvesting with the dry weather. Prices fell from $160/tonne in March to $140/tonne in May.

Autumn crop areas were the same as last year. Although the weather was dry, the Coastal districts had good harvests. However, quality was patchy and prices for washed potatoes remained average. Slow crop emergence; dry, windy weather; increased disease and early frosts reduced yields in the Riverina. Autumn crops averaged 22 tonnes/hectare, with prices falling from $180/tonne in June to $140/tonne in July.

PROCESSING

New South Wales supplied 22,000 tonnes of potatoes to The Smith's Snackfood Company, Frito-Lay Australia and the Kettle Cooked Chip Company for crisp production.

Crisp contract prices remained the same as last year, with base prices ranging from $205-$220/tonne. However future returns for crisp growers are expected to drop, with one processor announcing a five percent reduction in contract prices from next January.

Growers also delivered 6,000 tonnes of potatoes to McCains at Ballarat for french fry production. Contract prices ranged from $198-$233/tonnes. Prices will remain unchanged in the coming season, as the contracts were negotiated for a two year period.

SEED

Despite an excellent season, certified seed sales were down because of reduced orders from Queensland, Seed areas were the same as last year. The 1994 price for Crookwell certified Sebago seed was $360/tonne, a $20/tonne rise over last season.

Sebago remains the major fresh market variety grown in New South Wales, while Atlantic and Shepody are the main crisping and french fry varieties. The production of Coliban and Desiree for the ware market has continued in increase over the last few years.

Queensland

JOHN KERR
is a Senior District Adviser DPI, Gatton

The 1994 Queensland winter and spring potato plantings are down by 25-30% compared to the previous five year average.

This reduction has been a result of both poor returns in 1993 and water supply problems in the main growing areas. To date (late August), yields in both North Queensland and coastal areas are below average. Later plantings in the Lockyer Valley are also expected to be lower in yield due to some frost damage and water shortages.

Yields from the small south Queensland autumn planting (950 ha in the Lockyer) were initially well up on previous years but tapered off with later plantings.

The Southern Downs summer crop yields were up despite some water supply problems. The bulk of this planting is grown for processing.

No major pest or disease problems have affected crop production during 1994. Dwindling water supplies and the general lack of rain throughout most of the growing areas has increased production costs with no compensation from the market place.

Sebago remains the main fresh variety both in North and South Queensland and there is no replacement on the horizon. Although Pontiac remains the main red skin variety it has done so only due to the lack of alternatives. Red la Soda has replaced Pontiac in the Lockyer and the area of this variety this year was only restricted by lack of certified seed. The better skin colour of Red la Soda compared to Pontiac is the major reason for this. Atlantic has again performed well for processing growers.

PROCESSING:

There has been no growth in this area and growers have been forced to accept price reductions over the next three years. The processor has also reduced real returns to growers by size limitations and other penalties. This will affect all Queensland growers but particularly new growers who have been encouraged to invest in new equipment.

Western Australia

PETER DAWSON
is a Potato Sub-program leader with the WA Department of Agriculture

Production in WA is estimated at 110,000 tonnes with a raw product value of $30 million.

FRESH MARKET

Production was 50,000 tonnes for domestic and 10,000 export, mostly Delaware. The value to growers is about $21 million. The summer was very dry and quality of Delaware suffered at Manjimup. This has forced growers to seriously consider testing other varieties for this time of year. Storm damage to crops at the end of May will result in reduced supply for September.

Changes in the marketing side of the fresh market have occupied the industry for most of the year. The 1992 review of orderly marketing has resulted in the restructuring of the Potato Marketing Authority as well as impending amendments to legislation.

The changes are aimed at making the industry more responsive to market forces and increasing benefits to all stakeholders. For example unprofitable exports will be minimised. Previously the industry operated with a surplus of up to 25 %. Most of the surplus was exported at low prices, subsidised from the domestic returns. This cross subsidisation will stop and a surplus of only 5% will be produced. This is expected to result in a large decline of exports but domestic prices should strengthen.

To reduce the surplus pool, cuts have been introduced with an average cut of 20%. It is also anticipated that growers will receive stronger signals (more dollars) for domestic product which meets consumer needs. This will lead to changes in management to reap the rewards for improved quality.

FRENCH FRY

The industry is worth more than $7 million to growers and is dominated by Edgell Birds-Eye at Manjimup whose target for fry production was 35,000 tonnes from 700 ha. The season was the driest for many years in the South West and this lead to unusually high fleck and potato tuber moth damage. This may result in lower production than anticipated.

The major variety is Russet Burbank with small amounts of Kennebec and Nooksack grown. Production should remain the same next season but Russet Burbank will increase to 85% of production. In two years it is expected Nooksack will no longer be processed.

CRISP PROCESSING

Crisp production is 14,000 tonnes with the vast majority processed by The Smith's Snackfood Company. The raw product is worth 4.2 million dollars. Atlantic remains the major fresh processing variety and plantings have increased at the expense of Cadima.

Production occurs most of the year but acceptable fresh product cannot be supplied from September to October. National quality standards must now be met by crisp growers and this is being achieved with good success.

South Australia

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

Around 200,000 tonnes of potatoes grown on some 6,000 hectares with a gross value of approx. $60 m was produced in five regions of South Australia in 1993/94.

The North Adelaide Plains and Murraylands are the main regions for production of washed potatoes for the fresh market. Yields have been average to above average in the past season. Returns for the fresh market were variable, with prices often low and at times falling below growers' costs of production and marketing.

Coliban is a major cultivar grown, with Sebago, Crystal, Exton, Winlock and Sequoia also being produced. Pontiac and Bison are the major red skinned cultivars grown, with some Red La Soda. Several alternatives are being tested, especially cultivars that will hold a dark red skin colour and sheen when stored in soils or sheds.

The well drained mallee sands developed in the last 5 to 8 years in the SA Riverland (in Murraylands), particularly near Waikerie and Loxton are proving to be most suitable for potato production for the washed fresh market. Some 75% of the crop is sown in late January/February for the harvest through the winter months to produce a clean, light skin potato with good 'sheen' (very attractive cosmetic appearance).

The early sown summer crops of Atlantic in the Adelaide Hills produced a good solids and crisp colour. However, unusually large and rapid falls in the potato sap nitrate contents were recorded in the first 2 months after sowing late in 1993. Weekly monitoring of sap nitrate enabled this to be corrected early in the season, so that little loss of yield was recorded. The wet spring of 1993 and 1992 were attributed to be closely associated with the phenomena.

Overall crisp crop yields and quality were average to above average. However, more SA grown potatoes for crisp use are required (up to 10,000 tonnes per year). The major crisp factory in Adelaide processed some 28,000 tonnes of fresh potato equivalents in 1993/94.

Some 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 1993/94. Overall yields were average and quality acceptable with some problems of hollow heart and stem end browning especially for some crops grown on very light, sandy soils where irrigation frequency and rate could not be kept near optimum.

Several growers had problems with pink rot and a few experienced losses up to 20% in yield. Diseased rotten tubers had to be buried and machinery cleaned down.

The commercial crop monitoring service developed by Mark Heap in the South East has completed its first year of operation. Marked improvements in technology adoption (leading to yield and quality increase) have been recorded.

Overall, on a state wide basis, with the threats of possible increasing disease incidence from:- soil borne fungal diseases, two new bacterial wilt finds and the threat of

possible potato cyst nematode introductions from interstate, there is a need to introduce a farm hygiene/quality assurance program for the industry on a state and/or a national basis.

Increasing problems with rhizoctonia and silver scurf in certain rotations and areas have led a few growers to trial brassica break crops (eg. feed rape or turnips) sown before potatoes, as a biological control method.

Tasmania

BRUCE BEATTIE
is the Potato Specialist with the Department of Primary Industry & Fisheries in Tasmania

If We Are Standing Still Then We're Going Backwards.

The Tasmanian industry has continued to thrive despite difficult seasons. The production of French fries was enhanced by the coming on line of the new Edgell- Birds Eye factory at Ulverstone but unfortunately, the small specialty unit owned by Clements and Marshall at Paramatta Creek closed.

The 1992-93 statistics indicate that about 270,000 tonnes were grown at an average of 44.1 t/ha. Cool summers in the past two years have prevented high yields despite improved growing practices.

All industry sectors remain vigilant with respect to potential pest and disease incursions into the potato growing districts.

Seed and commercial growers are being encouraged to adopt a farm hygiene program to reduce the spread of pests, diseases and weed seeds. Guidelines have been developed to maintain and enhance the quality of seed potatoes. These were developed by consensus throughout the potato industry and were aimed at making each sector of the industry more accountable for their actions in producing and handling seed.

Testing for potato cyst nematode has now been conducted over three seasons with no positive samples. This has been most gratifying. This season, the survey has been organised with special attention paid to those paddocks having rotations of less than four years.

During the summer of 1992-93 Irish blight outbreaks were the worst for about 15 years. Ridomil was a very useful adjunct to many fungicide programs and no crops were lost because of the disease. The wetter conditions reduced the ravages of common scab but research on this disease continues with the possibility of genetically engineered resistant Russet Burbanks in the future.

In the past year, a report of an international benchmaking exercise on processing vegetables has been released. This study was supported by the Horticultural and Research Development Corporation and included New Zealand, USA and European examples of potato production.

Despite some difficulties in drawing their conclusions, the team members considered there was enough evidence between Australia and their competitors to warrant concern and to stimulate action to reduce the Australian costs of production where possible. To become internationally competitive, the French fry industry has to overcome the economies of scale in USA and the farm subsidisation in Europe.

To achieve competitiveness at the local level, a Farm Best Practice program has been esatablished. Based on a discussion group format, the program encourages potato growers to use all available knowledge in production of their crops.

ONE

COMPANY OFFERS

TWO

INSECTICIDES THAT CONTROL

THREE

OR MORE TOMATO/POTATO PESTS

One company offers the flexibilty and choice of two organophosphate insecticides for the control of Potato Moth, Heliothis and Aphids. Orthene® and Monitor® are both as easy to use as 1, 2, 3.

1. Monitor has the ability to control a wide range of insects in a variety of crops.
2. Monitor is a great alternative in resistance management strategies.
3. Monitor offers effective, economical contact and systemic control.

1. Orthene kills both sucking and chewing insects on contact.
2. Orthene also penetrates the foliage for continued protection.
3. Orthene is an effective broad spectrum insecticide with low environmental impact.

Monitor **Orthene**

Now you can afford to be choosy

AgrEvo

A helping hand for horticulture

A company of Hoechst and Schering.

Hoechst Schering AgrEvo Pty. Ltd.
1731-1733 Malvern Road, Glen Iris. Victoria. 3146. Phone: (03) 248 6666.

®Monitor is the Registered Trade Mark of Tomen. ®Orthene is the Registered Trade Mark of Monsanto.

AGH7593

Bravo®. No.1 for potato disease resistance management.

Bravo is the preferred fungicide for any potato disease resistance management programme.

Its superior formulation and rainfastness means Bravo represents value for money because it assures better disease control.

Bravo. Number one in potato fungicides

Crop Care

CP 2137