

Potato growers study tour, USA and Europe, July 2008

Greg Mc Culloch
Simplot Australia Pty Ltd -
Tasmania

Project Number: PT08019

PT08019

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Know-how for Horticulture™

Reference No. PT08019

Potato growers study tour,
USA and Europe, July 2008

Final Report (November 2008)

Donna Lucas
Rural Development Services Pty Ltd.

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Project number: PT08019

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Purpose

The purpose of this final report is to summarise and evaluate project PT08019, *Potato growers study tour, USA and Europe, July 2008.*

This project was funded via Voluntary Contributions from Simplot Australia Pty Ltd (Tasmania), Voluntary Contributions from participants, and matching funding from Horticulture Australia Limited (HAL).



Date of report

November 2008

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Media summary

Simplot potato growers from the Deloraine Grower Business Group travelled to the USA and Europe in July 2008. The Simplot Young Grower of the Year, John Cresswell, also participated in the tour. The group visited Washington and Idaho in the USA and Belgium and The Netherlands in Europe. The focus of the study tour was on 'whole of crop' (WOC) harvest systems.

Simplot will implement WOC harvest for a majority of the 2009 intake. Trials in 2008 demonstrated that the system can increase the speed of harvest, maximise cost efficiencies, and minimise tubers left in the field. The study tour reviewed all factors that impact on size, quality, uniformity and ease of harvest, and large potential for improvement was identified.

Several different types of grading operations were examined that offered big scope for improvement over the present system.

Group members were very impressed to see in action, size grading equipment that segregated over-length tubers and diverted them into a simple mechanical halver, after which they were returned to the normal process. The result of this simple operation was to eliminate breakage problems with a side benefit of also significantly reducing, defect level by count.

Also in operation at the same Simplot plant was an electronic grader that segregated tubers that still had surface blemishes after steam peeling. These tubers were diverted through an abrasive peeler before being returned to the process.

Both of the above operations have the potential to have a huge impact on reducing the amount of usable potatoes presently left in the field after harvest. As this equipment is already available to Simplot's Ulverstone operation, growers are looking forward to reaping the benefits in this coming season.

Another grading operation having the potential to speed up storage operations and reduce the number of small chats presently left in the field was the use of simple dirt and debris removers that were incorporated into the unloading and piling operations in all areas visited. These graders were used at most operations visited and eliminated problems associated with small lumps, loose dirt and potato haulms in the harvested crops.

Size grading of tubers pre process was also extensively practiced with smaller tubers being graded into as many as three different size ranges for on-processing and value adding, either on site or elsewhere.

In all areas visited emphasis was put on the need to minimise stress levels during the production and storage of seed potatoes to achieve optimum vigour in the following commercial crops. This not only improves yields significantly, but has a big impact on tuber numbers and size.

Although significant improvements have been made in the area of seed production in Tasmania in recent years, further gains can be made in some areas. Bottle necks in harvest and storage cause serious problems, with seed crops often being subject to large temperature variations in the period between vine kill, harvest and storage. This can result in weakening of seed that has otherwise been grown under ideal conditions.

Group members believe that all the observed opportunities for improvement are achievable with sufficient will from the major stakeholders involved; and that generally, the standard of management of Tasmanian potato growing operations compares favourably with that elsewhere in the world.

The outcomes of the study tour

Outcome 1: Increased knowledge and understanding of whole of crop harvest, by study tour participants.

Growers experienced first-hand (in the field), harvest systems in use overseas. This enabled a greater understanding of the systems, and also highlighted where the system may differ in Tasmania compared to overseas. Growers were able to gather information on how whole of crop harvest can be optimised in Tasmania.

Outcome 2: Increased knowledge and understanding of other crop technologies, by study tour participants.

Growers gained knowledge and understanding of other crop management technologies including nutrition, tillage, pest and disease management, planting, storage, controlled traffic, physiological aging of seed, and cultivars. This increased knowledge can be implemented on farms. Also, many of these areas link with current projects being undertaken by Simplot, therefore reinforcing the knowledge gained.

Outcome 3: Increased knowledge and understanding of whole of crop harvest and other technologies, by the Simplot potato growing community.

The potato growing community has gained increased knowledge and understanding of the systems and technologies examined by the study tour group. This has been achieved through presentations at annual grower workshops, newsletter articles, technical reports, at presentations at grower group meetings. Involvement of the agronomist for the region has enhanced technology transfer.

Outcome 4: Strengthening of Deloraine Meander Grower Group, and the Grower Group network.

Participation by grower group members has resulted in strengthening of the group. This strengthens the grower group as a mechanism, for group learning activities, participation in industry programs, and fostering participation in cross group activities.

Outcome 5: Increased knowledge and understanding of the potato industry globally.

Participation in the study tour increased the knowledge of participants (and the potato growing community) of the potato industry globally, including the differing scales of operations in different countries.

Summary of evaluation

Participants were surveyed following the study tour (a copy of the evaluation form is attached: Appendix A), with nine participants responding.

All nine respondents indicated that they would be interested in future study tours if they were given the opportunity, and would recommend a study tour to other growers.

Participants were asked to rate the study tour overall, where 0 was unsatisfied and 5 was most satisfied. The average rating was 4.4 out of five, indicating a high level of satisfaction.

Participants were asked what went well (question 3) and what could be better (question 4), responses are summarised in Table 1: Summary of what went well, and what could be better Table 1.

| What went well | What could be better |
|---|---|
| <ul style="list-style-type: none"> • Fell into place • Most things went well • All forward planning including our guides was very well organised. The sites and plants we saw was very worth while • Well organised, good group to go with • Talking to other growers they have same problem as us • It all worked well we gained a lot of info • Only eleven on the tour which was a good number, so everyone had their say. Planning good we all had things that interested everyone • Well organised and relevant visits. In depth look at potato production and processing (the complete value chain) • Planning was good. Itinerary was busy, focused, interesting and relevant. Good to talk with farmers in our own situation. Good group of growers to tour with | <ul style="list-style-type: none"> • Days were to full • The places we stayed could have been closer to the places we were looking at • It's taken 2 months for Simplot to get us together • Better transport • No improvement could be made • Communication of daily schedule. Including other relevant agriculture enterprises to break up trip. More of a break after travelling • Tour seemed to cover all aspects required. Good ratio of study and leisure (not too much free time). All should travel business class when flying. |

Table 1: Summary of what went well, and what could be better

Participants were asked what was of value to them, and what the value to their business was, responses are summarised in Table 2

| What was of value to you | What was the value to your business |
|---|--|
| <ul style="list-style-type: none"> • Realising no other place practices where actually relevant to Tasmania soil type/weather • Different variety of potatoes and machinery. The way they do things there • All the tour • To see how other growers go about growing in different countries • Bench marking • Friendships, info • Fertiliser amounts and usage. We had ideas about potatoes on beds, but had been done in America and did not work • All of the production and agronomic information. Looking at agronomic issues and solutions to adapt to • Visiting people doing and achieving what we aspire to do. I.e. Whole of crop harvest, controlled traffic. Finding that our production levels are as good as any we visited. Factory is as good or better than any we saw | <ul style="list-style-type: none"> • Confirmed we are on right track • How other people do things • Having a look at how other people do the same things • I have thought about how I grow potatoes and what equipment I really need • Bench marking • Ideas to try at home • To gain understanding of production issues in other areas of the world • Let us see how we compare to other growers in other parts of the world. See where we sit in the world scene |

Table 2: What was of value for participants, and their business

The theme for the study tour was whole of crop harvest, and participants were asked to rate the relevance of the theme from 0 to 5, where 0 was not relevant and 5 was very relevant. The average rating was 4.1 out of five.

Participants were asked if they had any suggested themes for future study tours.

Three suggestions were provided by three different participants:

- harvesting smaller tonnages,
- changing the views to yellow skin potatoes, and
- irrigation

When asked to rate whether they had sufficient opportunity to ask questions, the average response was 4.4 out of five (where 0 was rarely had sufficient time, and 5 was always had sufficient time).

Participants were asked about the relevance of the itinerary, and the average rating was 4.2 out of five. Participants were also asked, thinking about the itinerary, which part had the most meaning for them (Table 3), and which parts had the least meaning.

| Thinking about the study tour itinerary, which part had the MOST meaning for you? | Why? |
|---|--|
| <ol style="list-style-type: none"> 1. Europe 2. America & Europe 3. United States 4. All 5. All was good 6. All 7. 8. Visiting college (University) research station in USA 9. All parts | <ol style="list-style-type: none"> 1. Scale more relevant 2. The scale of both places 3. Similar varieties and irrigation style 4. Different experience 5. 6. All different 7. 8. Agronomy research and development 9. Good itinerary |

Table 3: The part of itinerary which had the most meaning for participants, and why

| Thinking about the study tour itinerary, which part had the LEAST meaning for you? | Why? |
|--|---|
| <ol style="list-style-type: none"> 1. America 2. 3. 4. Nil 5. It was all good 6. None 7. 8. 9. None | <ol style="list-style-type: none"> 1. Scale not possible 2. 3. 4. 5. 6. 7. 8. 9. |

Table 4: The part of itinerary which had the least meaning for participants and why

Participants were asked if they had any other comments, and comments from four participants included:

- Accommodation could have been better
- Russet unpopular by growers worldwide
- A great tour
- It was all good
- 3 weeks is pushing the limit for length of time - although we couldn't have done what we did in less time

Technology transfer

Technology transfer included:

1. In August 2008, presentations were presented at the annual grower review workshops, 'potato futures 2008' in each of the three grower regions (North West, Northern Midlands, and North East). These included a PowerPoint presentation, and also allowed growers to ask questions during a poster session. (A copy of the PowerPoint presentation is attached at Appendix B)
2. A report in the 'Spud News' grower newsletter (Appendix C).
3. A report on the more technical aspects studied, including nutrition, tillage, pest and disease, planting, harvesting and storage (Appendix D). This report was developed cooperatively by study tour participants
4. Presentations at Grower Group meetings. These presentations provide further opportunities for the potato growing community to learn from the experiences of the group.
5. Presentations for other interested groups, e.g. Apex meetings.

Next steps

Next steps include:

- Involvement of study tour participants in the whole of crop project activities
- Planning of a future study tour for a grower group other than Deloraine-Meander Group
- Further presentations to grower groups or other interested groups

Recommendations for future study tours

The success of this study tour has resulted in interest from other grower groups and the field officers who facilitate these groups, in future study tours.

It is recommended that another study tour be undertaken in 2009, and a grower group has already been identified. The study tour theme is to be determined, but potato seed production has been recommended, as the group identified are seed producers.

Budget

Funds were expended as per the budget.

Acknowledgements

The author of this report would like to acknowledge the assistance of the following organisations and individuals and thank them for their contribution to this project:

- The study tour participants
- Simplot Australia Pty Ltd, Ulverstone, Tasmania

Appendix A: Participant evaluation survey

Simplot - Deloraine Grower Group Potato growers study tour 2008: Whole of crop harvest of processing potatoes

Participant survey

| | |
|----|--|
| 1. | If you were given the opportunity again, would you participate in another study tour? yes / maybe / no Comments: |
| 2. | Would you recommend a study tour to other growers? yes / maybe / no Comments: |
| 3. | What went well about the study tour (including planning, the study tour, and after the tour): |
| 4. | What could be better about the study tour (including planning, the study tour, and after the tour): |
| 5. | What was of value to you? |

| | |
|-----|---|
| 6. | What was the value to your business? |
| 7. | What are your suggestions for any future Grower Group study tours? |
| 8. | <p>The theme for the tour was Whole of Crop Harvest of Processing Potatoes. How relevant was this theme? <i>Rate from 0 to 5, where 0 is not relevant at all and 5 is very relevant</i></p> <p>0 1 2 3 4 5</p> <p>Comments:</p> |
| 9. | Do you have any suggested themes for future study tours? |
| 10. | <p>Do you think that you had sufficient opportunity to ask questions (i.e. asking questions of growers, and other presenters)? <i>Rate from 0 to 5, where 0 is rarely had sufficient opportunity and 5 is always had sufficient opportunity</i></p> <p>0 1 2 3 4 5</p> <p>Comments:</p> |
| 11. | <p>Thinking about the study tour itinerary, how relevant was the itinerary? <i>Rate from 0 to 5, where 0 is not relevant at all and 5 is very relevant.</i></p> <p>0 1 2 3 4 5</p> <p>Comment:</p> |
| 12. | <p>Thinking about the study tour itinerary, which part (e.g. a tour or visit) had the most meaning for you?</p> <p><i>Which part?</i></p> |


| | |
|-----|--|
| | <i>And Why?</i> |
| 13. | <p>Thinking about the study tour itinerary, which part had the least meaning for you?</p> <p><i>Which part?</i></p> <p><i>And Why?</i></p> |
| 14. | <p>Overall, how would you rate the study tour?</p> <p><i>Rate from 0 to 5, where 0 is unsatisfied 5 is most satisfied.</i></p> <p>0 1 2 3 4 5</p> |
| 15. | <p>Do you have any other comments?</p> |
| 16. | <p>Do you give us permission to use your above comments, in any media releases, or public reports?</p> <p>Yes / no</p> <p>If yes, Name (optional): _____</p> |

Appendix B: Presentation at 'potato futures 2008' workshops

WHOLE OF CROP HARVEST

DELORAINE - BUSINESS GROUP
STUDY TOUR

Group Members



Tour Purpose

- > Increased speed of harvest
- > Maximum cost effectiveness
- > Minimum tubers left in the field
- > Reduced labour units
- > More timely harvest
- > Better use of harvest opportunities

Factors explored

- > Nutrition management
- > Tillage Management
- > Pest and disease control
- > Planting operations
- > Harvest operations
- > Grading operations
- > Storage
- > New cultivars
- > Controlled traffic cropping
- > Physiological aging of seed

Nutrition Management

- > Phosphorous
- > Potassium
- > Nitrogen
- > Calcium
- > Trace elements
- > Irrigation management

Tillage Management

- > Destoners
- > Rotary remoulders



Pest and disease control


- > Fumigation

Planting operations

- > Cup planters


Harvest operations

- > Large scale
- > Haul out bins
- > Compaction



Grading operations

- > In field
- > Pre-storage
- > Pre-process
- > In process



Storage

- > Size
- > Variety
- > Misshapen
- > Bruising
- > Sugar levels
- > Relative humidity

New Cultivars

- > U.S.A.
- > Netherlands-Belgium
- > Germany

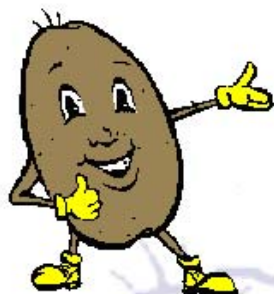
Controlled Traffic Cropping

| Benefits | Issues |
|------------------------------|-------------------------|
| > Crop health | > Set up costs |
| > Yield increase | > Adaption of equipment |
| > Reduced tillage | > Harvest |
| > Reduced draft requirements | > Livestock |

Physiological aging of seed

- > Stress free growing
- > Avoid planting headlands
- > Solids testing pre-vine kill
- > Early vine kill
- > Minimum time lapse vine kill-harvest
- > Prompt grading and fungicide treatment
- > Minimum time lapse into cool storage
- > Avoid temperature peaks cool store-planting

Appendix C: Spud News, grower newsletter, September 2008



Spud News

Spud News is produced by Simplot
for its potato growers
with assistance from
Rural Development Services and
Horticulture Australia Limited

Issue 6, Sep 2008

What's inside

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potato futures 08

More than 60 growers attended the "Potato Futures 2008" annual grower review workshops. In response to feedback from last year, this event was held earlier, and presenters were given more time to speak. This year also included poster sessions, allowing growers to talk to the presenters directly. Questions raised at potato futures will be answered in forthcoming newsletters. The average participant rating for Potato Futures was 4.4 out of 5, and the most popular sessions were: New varieties; Whole of crop harvest; Seed potato research; and Potato calculator.

Contact Simplot

Simplot Australia P/L
Field Officers
Phone: (03) 6429 8000 or mobiles

New Cultivars and Plant Variety Rights

The introduction of new cultivars into the Simplot production program brings additional obligations by growers, seed growers and Simplot. In the past cultivars such as Russet Burbank, Ranger Russet and Kennebec have been public varieties that were bred by universities or public institutions (such as DPIW). This meant that funding to breed these cultivars came from taxpayers and reimbursement from the sale of the new cultivars was not required.

Over the past decade the breeding programs have changed: private companies now develop and release new cultivars, and public institutions are no longer able to source taxpayers funding.

This has forced the breeders within the Plant Variety Rights or Plant Breeding Rights programs to implement a fee for all seed that is sold through these programs. The level of the fee depends on the potential size of the sales and to where these sales can be made.

Along with any fees it is imperative that all product grown under PVR is sold only to the registered buyer and that the produce is not on-sold.

As a result, all growers that are growing these new cultivars must sign a declaration that all product will go to Simplot and heavy penalties exist for not honouring this agreement. Your Field Officer can supply the necessary documentation.

Fertiliser management for New Cultivars

Under the direction of Mark Heap, Simplot has developed agronomy packages for each of the new cultivars. These agronomy packages have been developed over years of research on various soil types and growing conditions.

Inputs such as fertiliser and nutrition management are different to what was required with the old Russets as the new cultivars vary in performance to levels of basal fertiliser and the side dressings of nitrogen. The Field officers will hand out and discuss the changes to management for each of the new cultivars.

We would like all growers to stick to the program advised for each cultivar as it could have an impact on SG, bruise free or quality in general. When having fertiliser recommendations done please advise the consultant that you are growing a cultivar other than the standard Russet or Ranger.

Staff movements

Simon Jones has agreed to take over the Wesley Vale and Deloraine growing regions previously managed by Greg McCulloch. Simon is looking forward to working in his new area and is busy trying to catch up with growers to discuss the plans for the 08/09 season.

While we are looking for a replacement for Simon, Clint Keogh will be acting Field Officer in this region. Clint is a leader in our receival team who enjoys new challenges and is keen to get involved in this area of potato production.

Chris Russell has resigned to move into the banking sector with Rabobank as a Rural Manager. Chris has spent nearly 14 years with Simplot, beginning as a Field officer at Scottsdale before moving to Bathurst on corn. For the last four years Chris has been the R&D Agronomist working on Tasmanian crops. We wish Chris and his family all the best for the future.

Management is in the process of appointing Frank Mulcahy as the R&D agronomist. Frank returns to Simplot after experiencing potato production in India, Turkey, Canada; his vast experience will be a bonus in his new role, and we welcome him on board.

We are still looking for a replacement Field Officer in the Midlands – please contact Peter Hardman with any enquiries.

POTATO RESEARCH & DEVELOPMENT

Every year a number of field trials are performed to evaluate products or ideas with potential benefits for Simplot potato growers.

The trials are prioritised from a list compiled by field service staff. Where possible the trials are replicated to determine how reliable the outcomes are.

- 🟢 Results look promising – OVER to YOU
- 🟡 Re-trial in 2008-09
- 🔴 Poor results in our trials – Not looking to re-trial

Potato Research and Development
Chris Russell - Senior Agronomist
Sharon Saunders - Research and Development Technician

If you have any suggestions and would like discuss the possibilities please make contact

Projects

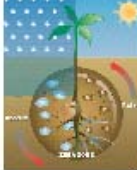
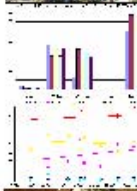
- 🚰 Water sanitation - Iodine sterilised irrigation water applied via gun and pivot
 - No fungicide applied to pivot and no disease
 - Blight under gun – one application per week
 - Need pivot frequency to work
 - Similar cost to fungicide program
- 🌱 NutSmart - Fungal loaded carbon granule to replace up to 70% of fertilizer
 - Same yield as standard fertilizer blend at lower cost
- ✂️ Pre-cutting - Cutting seed during winter rather than in spring
 - Yield increases up to 10% – sowing during winter not critical
- 🔪 Cut/seed piece - The number of cuts per seed piece affects vigour
 - Number of cuts not critical unless conditions are bad
- 📊 EM38 Survey - Detailed soil survey to reveal paddock variability
- 🚛 Track Stacks - Ideal for variable rate irrigation systems and precision-Ag
 - Polyethylene applied to pivot wheel tracks to prevent bogging
 - Pivots selected in 2007-08 did not have issues
- 🌱 Zebe - Trial again on pivots with known bogging issues
 - Starch granule to absorb water and release to plant as needed
 - No benefit in strip trials but replicated trials led 5% yield increase
- 🌱 Degradable film - Degradable Polymer Film for earlier germination and water saving
 - Initial work looks promising
- 🌱 Arclay A6 - In furrow application of liquid green clay for scab control
 - No observed difference between plots
- 🌱 Low Analysis - Using low analysis fertilizer only rather than high analysis
 - Reduced yield by 5-8%
- 🌱 EcoGrow Type T - Compound fertilizer from NZ (high cost but low application rate)
 - Reduced yield by around 20%
- 🌱 Post plant ripping - Ripping to remove compaction/break hard pan post planting
 - No increase in yield – in line with international results

Future Projects

- 🌱 White Fingred Weevil Bio-control - Beauveria clover root weevil control in NZ
- 🌱 Powdery Scab control - Neogen in furrow registered in NZ
- 🌱 De-stoning demonstration - Comparing with and without de-stoner
- 🌱 Harpin - Protein based product (Messenger) - Systemic Acquired Resistance reaction for disease protection
- 🌱 Aussen - Organic soilifier - Nutrient solution to kill bacteria, fungi, mould and virus



potato futures 2008
annual grower review



Harvester Workshop

The main topic of discussion at the recent harvester workshop was Whole of Crop (WOC) harvesting and the impact it has on quality into the plant.

Consensus at the workshop was for those harvesting contractors and growers who were involved in last year's WOC trials that the concept was well accepted and should continue.

In agreement with this consensus, Simplot will implement WOC across the majority of the intake for 2009 harvest including storage, although it is recognised that some paddocks will not be suitable for this practise.

It was agreed that training for harvest contactors and operators is essential for Simplot to outline the new tolerance allowances for quality parameters.

Simplot will roll out a training program prior to harvest— everyone involved in harvesting is invited to attend this event.

Watch this space for dates and venues.

US, Europe visit for Young Potato Grower of the Year

John Cresswell of Branxholm, has been named the Rabobank Young Potato Grower of the Year. In the past John has grown poppies, onions and potatoes. Now he focuses his effort on potatoes (and particularly seed potatoes) to get better returns. John is also now involved on the Seed Potato Negotiating Committee.

As Young Grower of the Year, John travelled to Europe and USA, together with Deloraine Grower Group members, on their study tour.

"It was incredible to see the scale of operation in the US ...it was common for growers to grow about 200,000 t" said John. In the US there is a six week window for harvesting before the ground freezes over, making it necessary to handle large quantities of product very quickly.

In The Netherlands, farms were smaller, and similar in size to Tasmania. They work and

own machinery co-operatively.

In Germany there was still a contrast between the east and the west: smaller farms in the west of the country, while in the east, single growers own larger (formerly communal) properties.

All over the world, Russett Burbanks are still the predominant variety because of McDonald's requirements. In Europe, lots of yellow flesh potato varieties are grown, however, they are still growing Russet Burbanks to meet their McDonalds contracts.

John found it interesting to talk to growers in other countries, who are facing the same challenges as growers here - for example, rising costs of fertiliser and fuel:

"They are looking for commodity prices to rise in order to continue operating profitably, which is similar to our situation here".

They also have some of the same disease issues.

John was also interested in the new technology being used in factories and on farms: in the US, factories use potato halvers on bigger potatoes, meaning a 50% decrease in reductions, including reduced rejects for sugar ends.

"The study tour was a once in a lifetime experience; to see the sheer scale of their operations, and to visit processing factories. Everyone got something different out of it; you had the chance to talk to people one on one, so you could talk to them about what you were interested in, for example it might be viruses, or it might be bio-fumigation."

John said he "felt honoured to be nominated and selected as the Young Grower of the Year", and really appreciated the support from Rabobank and Simplot. "The study tour was a fantastic opportunity".

Whole of crop harvest: preparation the key to success

What is *Whole of Crop* harvest?

Everything can be taken out of the paddock, with a view to improving harvester efficiency. With minimal grading on the back of the harvester; graders remove gross rot, grub, weeds and rock.

Simplot successfully harvested 35,000 t using WOC method in 2008. To be successful, non cloddy soil is required.

Why do it?

- Reduces weeds in subsequent years.
- Improved harvester efficiency - less labour required, and increased speed.
- Increase yields by 2.5 to 8 t/ha (an increase in smalls harvested and also knobby / ugly potatoes)

What is the value to the grower?

- Reduced weed management
- Less labour required for harvesting
- Faster harvest

- Increased yield

What are the cost/benefits to Simplot?

- Increase in usable white flesh potato
- Additional material used in hashbrown, granule and gem products (not high value fries)
- If dirt is free flowing, then increases are not significant
- Simplot are spending several \$ million, improving raw sorting at the plant.

Where to now?

Prepare your soil; soil preparation is the key to successful WOC harvest.

Field Services will be working on re-education of acceptable raw intake standards.

Simplot spending on a number of capital projects some of which will be in place by new season 2008.



Hardman's Hints

At the series of Potato Futures Workshops held recently a session called Hardman's Hints covered topics that Simplot Field officers feel have a big impact on the yield, quality and financial results for growers:

Seed Bed Preparation

If a one pass operation achieves a good seed bed with minimal clods and turf, then it is OK to plant into. If you don't achieve a suitable seed bed be prepared to work on it more. It will save time and money at harvest and will assist your contractor with the Whole of Crop (WOC) approach to harvesting.

White Fringe weevil

Last season the incidence of White Fringe Weevil increased and is presented a problem into the Simplot plant. It is believed to be moving out from town gardens, where it is endemic. Usually slow moving, it can be transported by machinery. Two methods of control are: farm hygiene; or Regent[®] applied during ground preparation and worked in or in furrow spray to control the pest. Check with your Field Officer or consultant.

Plant Population

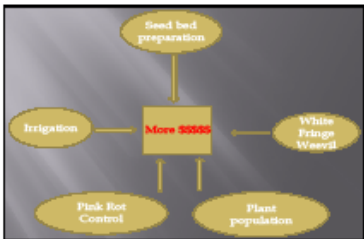
It costs as much to spray and irrigate a low population as it does the correct one. Studies have proven there is much to gain by having the correct

population. Apart from yield, quality bruise free and size gains can be made. A planter evaluation is the best way to determine if the best result is being achieved— ask your Field Officer for more information. Remember fertiliser flows faster in warmer weather and varies from supplier to supplier. Don't waste fertiliser— it costs too much!

Pink Rot control

Last season saw a slight increase in the level of pink rot. Ridomil[®] has been proven to be a good control over this disease. It would appear that some growers are taking short cuts, either by reducing the rate of the granules or not applying the two sprays as a follow up. For maximum control it is essential to adhere to the label rates and timings. Reducing rates could lead to resistance issues in the future.

There has confusion about the use of Ridomil[®] Gold MZ spray applications: the timing of the two sprays has been too late and the new recommendation is to first spray at emergence and the second at 50% ground cover. The aim is to spray as much on the soil and allow it to leach down to the plant roots. . We do not solely recommend



Ridomil[®]— there are alternatives with the same active ingredient, however we recommend that pink rot is controlled

Irrigation

When do you start irrigating your potato crop? Experience has shown that irrigation on potato crops starts too late by a matter of weeks. While there is pressure during this time of the year to maintain irrigation on other crops, and that the potato crop isn't adversely affected by the wait, studies have shown that delaying irrigation start up on potato crops can cost thousands of dollars for every week delayed. Look at your own circumstances and decide where you could lose the most money as a result of your decisions about irrigation.

Commence irrigation if the soil is dry even before planting and keep the moisture level at an optimum. For more information contact your Field Officer.

Simplot products:

Know-how for Horticulture™

Appendix D: Technical report and conclusions

**Deloraine Potato
Growers Study Tour**

Deloraine Potato Growers Business Group
C/O G & S Clark
20 Cassidy's Rd.
Redhills, Tasmania
7304

Report and Conclusions

Whole of Crop Harvest of Processing Potatoes

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Section

1

Nutritional Management

United States

Strategies for filling P and K needs differ from our own in that the bulk of these elements are applied as a pre-spread then moulded in at planting. Rates are dictated by soil test indications.

Three distinct approaches to nitrogen management were encountered. All taking soil analysis results as their base.

Simplot advisor Mel Martin recommended applying a large proportion of N at planting, up to 225kg's per hectare followed by maintenance only applications after first tuber set. Plant needs were closely monitored using both petiole sampling and soil N analysis.

The reasoning behind this approach being that there is no advantage in, and significant disadvantages to promoting excessive top growth. A leaf area sufficient to obtain maximum exposure to sun light is all that is required and by using a substantial base dressing this level can be achieved rapidly, thereby enabling maximum photosynthesis throughout the growing season. Excessive top growth encourages diseases such as sclerotinia which thrive in the resulting damp conditions, particularly with the 36 hour irrigation schedule used on the free draining sandy soils under centre pivot irrigation.

When using this approach, the crop is however, more vulnerable to diseases such as early blight. A comprehensive fungicide programme is necessary to ensure full protection.

The strategy recommended by nutrition advisors at the Hermiston research station differed by using a much lower base dressing (as low as sixty kg's per hectare) and monitoring plant needs from an early stage using both petiole and soil analysis. The crop was then given regular small applications of N to meet its needs.

The third approach encountered was that adopted by a grower who was Simplots biggest supplier to its Caldwell processing plant. This man was a long term supplier growing an average of one thousand acres of potatoes per year.

After years of using the approach of monitoring and applying N to meet the indicated plant needs he had ceased this approach because of large variation in results he was getting in identical petiole samples tested at the same time. His strategy now is to apply a substantial amount of N as a pre spread and base dressing as indicated by soil analysis, followed by regular pre-scheduled maintenance dressings throughout the season.

None of these approaches normally exceeded a total of 350kg's of N per hectare.

The role of calcium in tuber development was considered important. Because calcium moves slowly in the plant, the tuber, when in the bulking stage, cannot absorb enough to fill its requirements. This can cause problems with brown spot and hollow heart. To overcome this problem calcium nitrate is applied as a foliar, at intervals during this period.

The critical nature of irrigation in nutrition management was not evident at operations visited in the US because the usual 36 hour irrigation cycle did not let this become an issue.

The Netherlands and Belgium

Large amounts of animal manure were injected in a liquid form into fields after harvest of previous crops, in preparation to growing potatoes. Soil tests prior to planting then dictated fertiliser requirements. Little if any N and K needed to be applied after this treatment.

Strict environmental controls were in place to stop the over application of nitrogen.

Germany

The farming operations supplying the Agrarfrost processing plants were not allowed the use of animal manure on potato fields prior to planting.

Their approach was similar that in the US as far as the base dressing went with most of this being applied as a pre-spread then being moulded in at planting. Rates were dictated by soil tests. Nitrogen requirements were generally lower and one or two applications were applied after tuber set, depending on variety.

Conclusions

Large N applications as a means of obtaining high yields has fallen by the wayside in favour of a more measured approach designed to meet plant needs without causing incidental plant health or environmental issues. Spiralling fertiliser costs are also encouraging a needs only approach.

Apart from the use of animal manure in the Netherlands, these strategies are similar to the various approaches already being practiced by many Tasmanian process growers and they reinforce the growing feeling that excessively high levels of N are not generally economically cost effective or environmentally responsible.

Ongoing trial work needs to be continued to ascertain the most cost effective strategy for meeting N needs under our conditions.

More trial work needs to be done on the pre-spread approach to base-dressings that was commonly practised in the areas visited. This needs to be done, particularly, on ferrosol soils where it is commonly believed the high iron content quickly binds the P into a form inaccessible to plant roots. It may be possible that with good irrigation management this may not occur as rapidly as thought.

The practice in the US of using calcium nitrate to lessen problems with brown spot and hollow heart is also being used with reported success by some Tasmanian growers and agronomists. This should be encouraged more extensively.

The role of irrigation management in nutrition was evident in the Netherlands and Belgium where most crops were dependant on rain for moisture requirements and rare dry spells could have a dramatic effect on yield and quality.

Section

2

Tillage Management

Nowhere were any major differences in primary tillage observed, with the diversity of tillage operations seen reflecting the diversity of our own operations for varying soil types and conditions. The only major difference was the scale of some of the operations, particularly in the US.

The Grimme machinery plant was producing alternative de-stoning equipment that may offer advantages over similar equipment being operated in Tasmania. Some of these machines are already operating on mainland Australia.

A rotary mould former was also being built at the Grimme plant. This machine gives the opportunity to produce a good tilth over the planted set where conditions for primary tillage were not favourable.

When using the rotary mould former sets can be planted at a shallow depth, with mould forming often taking place after emergence. This offers the advantage of allowing for faster emergence of plants. Faster emergence could compensate for delayed planting and also lessen the emerging stems vulnerability to rhizoctonia.

Conclusions

Opportunities should be taken to visit sites in Australia where Grimme de-stoners are in operation, to make comparisons with existing equipment. There may be advantages to be gained in this area.

Operations that could benefit from use of the rotary mould former should be encouraged to investigate the possibilities of importing such a machine. These machines offer great advantage during a difficult, wet, planting season and would greatly benefit early planted crops.

Both of these machines offer the possibility of producing a tilth suited to the whole of crop harvest concept. A fine tilth not only makes for ease of harvesting but also produces conditions conducive to healthier plants with a resulting, lower defect levels.

Section

3

Pest and Disease Control

United States

Within the areas looked at by the study group the only commonly shared insect pest of significance was the potato moth grub and our own practice of including an insecticide in the last two or three fungicide applications, where a problem existed, was similar to their recently developed practices.

Control of late blight was generally achieved using mancozeb applied through their irrigation systems every three days which was practical in their situation because of the frequency of waterings. This practice is not permitted within our own system. Outbreaks of late blight were controlled using Ridomil sprays such as we would use.

Control of early blight is obtained using similar timing and chemicals to our own system with emphasis being put on more regular applications were lower, maintenance only, nitrogen application practices are used.

Where pink rot may be a problem Ridomil sprays only, are used. This is generally successful on their low risk free draining soils but would not be adequate in our higher risk situation.

Soil fumigation is commonly practised and few crops are planted without it. Growers consider it worth about twelve tonnes to the hectare in yield gain.

Some growers do not use chemical fumigation but grow mustard as a bio-fumigant this has the added benefits of helping to maintain the organic carbon content of the soil while not harming many of the beneficial organisms. Growers using this method claim it is as effective as the chemical alternative.

Rhizoctonia is controlled successfully using Maxim seed treatment. This is not successful in our situation because of the prevalence of the soil born organism and is an indication that fumigation may be controlling the disease in the US.

Powdery scab although a major problem in Shepodies is not recognised as impacting on yield levels in Russet Burbanks by inhibiting the ability of the root hairs to function in the later stages of plant growth as appears to be the case in the more heavily cropped areas of Tasmania. This may indicate that fumigation is having some control or it may indicate that the problem is just not recognised. In the area visited that can be impacted by cold snaps conducive to powdery scab development (Caldwell Idaho) yields for Russet Burbank only averaged 47 tonnes per hectare.

Conclusions

Extensive trial work needs to be carried out on the possible use of bio-fumigants for controlling diseases such as nematodes, rhizoctonia and powdery scab.

A study group member is presently running a trial using mustard (the recommended option) and further larger scale trials need to be run as timing and sealing of the surface after incorporation are crucial to the success of this operation.

If bio-fumigation can be used successfully for control of any or all of these diseases there are considerable yield and quality gains to be had in this area, all of which will benefit whole of crop harvest operations.

Section

4

Planting Operations

The sites visited in all countries undertook their cropping in very flat conditions with planting operations being carried out using cup planters. These planters offer great precision but are not practical for use in hilly conditions because sets often fall off the cups in steep situations.

Conclusions

No better options are available for hilly situations than our own locally built clamp planters.

Section

5

Harvesting Operations

Harvest operations observed in all countries were large scale operations using two or four row diggers and haul out bins.

These operations were capital intensive, caused heavy compaction problems and were followed by varying degrees of post harvest grading.

Compaction problems were dealt with effectively in the light and deep sandy loam soils of the Columbia basin in Washington state but severe problems were evident in some of the heavier soils observed, particularly in Germany.

Many of the smaller European operations use bunker style single and twin row harvesters similar to those commonly used in Tasmania.

Conclusions

For the average scale of our operations and for the topography and soil types typical of Tasmanian conditions bunker style harvesting is still the most cost effective option available.

Extra trafficking of our heavier soils would also cause needless compaction issues that would then have to be dealt with by extra tillage.

Our best hope for improving the speed and efficiency of our present harvest system lies in the creating conditions conducive of low defect levels with a tith that will sieve as freely as possible.

The capacity of processors to deal with a reasonable level of dirt, defects and oversize needs to be increased by the inclusion of dirt and debris eliminators into their receival system, size graders into pre-process operations and electronic grading into their process operations.

Section

6

Grading Operations

United States

The use of manned grading stations, pre-process delivery was a common practice here with large capacity units incorporating even flow bins and dirt and debris eliminators being normal. These operations had considerable drop points and potatoes graded in this way were processed within hours to avoid bruising.

Pre storage dirt and debris eliminators were commonly used. These were much less aggressive than the grading stations with minimal drop points and removed loose dirt, small clods and potato haulms.

In process grading was also carried out with oversize tubers being diverted to a mechanical halver in an operation that not only minimised breakage of over length fries but halved the defect level, by count, where sugar end blackening was a problem.

Tubers with heavy skin defects such as scab were electronically sorted then diverted into an abrasive peeler for further peeling. This had a big advantage in allowing minimum steam pressure to be used in the general peeling operation thus allowing for maximum recovery of usable product.

The Netherlands and Belgium

Storage operations generally use dirt and debris eliminators in their unloading and piling systems.

The Farm Frites process plants incorporate grading operations into their receipt prior to process. This gives considerable advantage to both the process plant and growers.

For the processor the shorts are largely eliminated from the French fry production and small potatoes are separated into three grades for value adding.

The grower gets paid at some level for all but the smallest grade and can minimise the amount of potential ground keepers left in the paddock.

Graded potatoes are either stored in bunkers where they are used within 48 hours or diverted into trucks to be transported elsewhere.

Some growers choose to grade their own potatoes, grading of the usable smalls for the fresh market and using the others for animal feed.

Germany

Field operations visited at Agrarfrost farms used grading stations after harvest and before delivery for immediate process. These eliminators removed up to 25% by volume of loose dirt from the potatoes still leaving large clods that were removed in a liquid sand, dirt and rock eliminator, prior to process.

This field operation was effective but very rough with considerable drop points. It was only used for potatoes destined for immediate process where bruising did not have enough time to become visible.

Unloading and piling operations into storage incorporated much gentler dirt eliminators into their systems. These had no drop points of significance and were considered effective for their purpose.

All potatoes were size graded, pre-process, with smaller tubers either on processed for value adding, in the case of yellow and cream fleshed varieties, or removed for use as stock feed in the case of Russet Burbanks.

Conclusions

Because of the smaller scale of our operations, farm based grading stations would not be cost effective and the use of centrally based grading operations would be unlikely to be warranted for the majority of crops if good general management practices were adopted for growing and harvest.

Simple dirt and debris eliminators may be of considerable value as these could practically be incorporated into our present unloading system prior to storage or process. These eliminators have negligible drop points and properly set up would have no significant impact on bruising. They would allow harvesters to be adjusted to achieve maximum pick up of small tubers in reasonable digging conditions. The use of these eliminators would also allow for reduced crews, on harvesters operating at large per hour volumes, to concentrate on removing major defects without having to bother about the removal of plant debris. Another major advantage of such eliminators would be in allowing the digging and storage of potatoes sooner after rain, which would have a significant impact on reducing time taken to fill stores in a wet harvest season.

Pre-process size grading operations offer the possibility of optimising recovery rates in processed French fries while allowing for the segregation of different size ranges for on processing or value adding, on site, or elsewhere.

In process electronic grading for size and surface defects would allow for segregated treatment of affected tubers, thereby substantially increasing recovery levels after process. It would also increase the amount of raw material available for process and increase average grower yields.

All the above grading operations would ultimately contribute to yield and quality improvements in future crops by minimising the amount of tubers left in the field, thereby reducing the amount volunteer potatoes in following crops and reducing disease carry over.

Section

7

Storage

In all countries visited it was evident that there was a high tolerance for defect levels and small tubers into storage. Dirt and debris graders were also incorporated into storage receive systems.

Both of these factors were considered necessary to facilitate the speed of harvest required to dig crops in the narrow window of opportunity available.

Simplot operations in the US endeavoured to time planting and harvest to minimise the period between vine kill and harvest. This was considered important in minimising the development of sugar in stored tubers.

Conclusions

There are substantial quality gains to be had by processing companies by incorporating appropriate grading equipment into their receive and processing systems.

Gains are to be had not only from the better utilisation of available product but by the more timely harvest of crops that would be possible by increasing the speed of harvest. Improved uniformity of sugar levels in stored potatoes would reduce production costs and improve quality.

Section

8

New Cultivars

United States

At the Simplot operations visited in the US the varieties presently being used were identical to our own with Russet Burbank still the only viable long term storage variety and Ranger Russet being stored for periods of 3 – 6 months depending on the climatic region grown. Although Ranger Russet suffers higher bruising in storage than Russet Burbanks it is grown and stored in regions where growers can no longer viably grow Russet Burbanks. These are grown either for direct processing or for short term storage. A bruise free of 70% into storage is considered ideal for this variety but down to 50% is acceptable.

Umatilla Russet is stored in smaller volumes by individual specialist growers with sandy soil types that seem to improve the varieties storage attributes. This is generally considered a difficult variety to store but because of its resistance to sugar development it is used to blend with stored Ranger Russets to produce acceptable colour.

Shepodies are used for early season supply but powdery scab in this variety is a big problem.

Two yellow fleshed varieties, Piccolo and Binges are being trialled on a commercial scale for the production of mini roasters.

Netherlands & Belgium

Cultivars being used for processing in the Farm Frites European operations consist largely of what by Australian standards are considered cream fleshed or yellow fleshed varieties. Generally speaking these varieties are producing a French fry that is shorter, three inches is ideal, and of a superior texture and colour (as judged by group members) compared to the white fleshed varieties favoured for process in Australia. The variety Innovator is the nearest thing to a white fleshed variety being used.

For fry production these varieties fall into three general groups:

- early season pre-storage process
- early storage
- late season storage

Asterix, Binjes and Victoria are some varieties commonly used.

For late season storage Ramos, a variety resistant to sugar development is favoured.

It should also be noted that for oven fry production of a healthier fry with 50% less fat, a higher sugar level is targeted to produce a darker finished colour without the fat content.

This fry was developed and marketed in consultation with Jamie Oliver to help combat the tendency of the British school children of buying their lunch at the corner fish and chips shop rather than the healthier alternatives offered by the school canteen.

Germany

The Agrarfrost Company visited was the major supplier of Mc Donald's operations in Germany and throughout much of Europe, and, for this reason Russet Burbank was still a major part of its production volume. The balance of the Agrarfrost production was made up of yellow and cream fleshed varieties of which Innovator was the major part. Mc Donalds were starting to accept Innovator as an alternative to Russet Burbank.

Pre-process size grading was carried out at the Agrarfrost plants but only the cream and yellow fleshed varieties were considered suitable for value adding.

Smalls graded out of Russet Burbank crops were used for animal food only.

Conclusions

As long as white fleshed varieties continue to be favoured there is no "wonder" variety hovering on the horizon that can match the long term storage attributes of the Russet Burbank.

There is great potential in the growing health conscious climate, for the development of new product lines if these tastier, better textured varieties are exploited. The need for large amounts of oil to create an appealing taste would not be necessary and would have the added benefit of cutting production costs.

A move towards the European style of chunkier, shorter fries would also enable the better utilisation of the different size ranges and also help reduce oil requirements.

A move towards some of these yellow fleshed varieties would end our dependence on Russet Burbanks for long term storage and give both yield and quality benefits. These would come both from the extra yield potential of some of these varieties and the absence of the hollow heart problems common in Russet Burbanks in our climatic conditions. There are also disease resistance advantages to be had with some of these varieties.

Section

9 Controlled Traffic Operations

A controlled traffic farming operation was visited in the Netherlands.

This was a farm operated with an organic cropping regime and it was considered that soil and plant health benefits to be had from minimising compaction were necessary for success.

After five years of monitoring it was found that significant yield benefits were to be had in an average season, 5-10%.

This operation used conventional harvesting of potatoes and root vegetables and therefore suffered compaction issues at these times. It would be reasonable to assume that if this compaction was eliminated better outcomes could be had.

This system is not normally compatible with livestock production but for specialised cropping situations has huge potential.

Considerable capital outlay would be necessary to convert tractors and machinery to the three metre wheel spacing probably most suited to Tasmanian cropping operations but ultimately this could be compensated for in the reduced draft requirements. Smaller tractors would be needed and much less tillage required in preparation for planting.

With spiralling fuel costs and the need to reduce green house emissions great advantages are to be had using this system.

If harvesters can be adapted to this system it would be a low cost way of eliminating many of the problems associated with whole of crop harvest.

Section

10 Physiological aging of seed

United States

Because of the large scale of their operations great emphasis is put on the management of the production and handling of seed to minimise physiological aging.

It has been demonstrated that seed grown in a stress free environment and killed at an early age, fifteen to sixteen weeks, will have maximum vigour.

Post vine kill handling is also considered critical with temperature fluctuations before harvest and cool storage considered to have an adverse affect on P age.

Ideally crops are harvested about two weeks after vine kill.

Crops are graded and treated with fungicide promptly following harvest.

Cooling of the seed into the cool store controlled at the correct rate and humidity to minimise shrinkage and allow suberisation.

After withdrawal from the cool store for planting, fluctuation in temperature pre-planting is also considered to have a multiplying effect on P age.

Netherlands and Belgium

Because of potential disease and virus issues resulting from their climatic conditions and the need for smaller tubers for round seed, killing and harvest of seed crops is carried out at an early stage, twelve to fifteen weeks. This practice also ensures that with proper post harvest handling physiological aging is kept at a minimum.

Germany

At the Agrarfrost operations visited great value is put on supplying vigorous seed to its commercial growers. For this reason the company produces all of its seed from their own farming operations to ensure it has full control over the growing and handling of seed.

Seed is harvested at approximately fifteen to sixteen weeks but sampling for size and solids content is carried out before vine kill to ensure minimum standards are met.

Correct dry matter content is considered important in ensuring resistance to breakdown in the sets.

Conclusions

There are large gains to be made in yield, quality, predictability and reduction in undersize tubers by controlling factors influencing the physiological aging of seed potatoes.

Foremost in the problem areas impacting on adverse aging of seed in our present system is the post harvest handling of seed. It is critical that the seed crop is harvested quickly after vine kill, transported to the cool store, graded and treated with appropriate fungicides and held in a controlled environment for minimum possible time prior to cool-storage.

Testing needs to be carried out pre vine kill to ensure correct dry matter content.

A controlled planting and harvest schedule needs to be developed to ensure cool stores can feasibly handle the volume of intake.

Increased handling capacity may be needed.

Commercial potato growers need to be educated on the impact of their own treatment of seed potatoes, after withdrawal from the cool-store for cutting and planting, on the vigour of the subsequent crop grown from that seed. Ideally seed should be held in a controlled environment during this period.

Management of seed crops needs to be lifted to a more uniform high standard. An ongoing education programme needs to be developed for seed growers to help them understand the impact of their management practices on the ultimate vigour of their seed at the commercial production stage.

The present practice of seed growers of planting headlands and spray rows needs to stop as seed grown in these areas is highly stressed.

In the United States commercial growers are very proactive in the production of their seed potato crops, developing long term agreements with their seed suppliers and visiting their seed crops two or three times throughout the growing season. This practice needs to be encouraged among our own commercial growers.

Large gains can be made in the predictability of seed performance if all these issues are addressed, enabling commercial growers to have confidence in making decisions, such as set spacing, to optimise yield, quality and size.

Controlling the physiological aging of seed will have a major impact on enabling the successful adoption of whole of crop harvest practises.