



Know-how for Horticulture™

**Market research for
potato nutrition
software**

Zing Hai Tan
McGregor Tan Research

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CropTest Software Evaluation Study

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Section 1

Introduction

This document has been prepared by McGregor Tan Research to report on the CropTest Software Evaluation Research.

Background

- 1.1 McGregor Tan Research was commissioned to conduct market research to assess the viability of repackaging and marketing the Potato Crop Nutrient Evaluation System software.
- 1.2 The software is marketed via a CD ROM and a plant analysis and interpretation manual under the brand name of CropTest. Essentially, the software is a decision support system for improved nutrient management of potato crops.
- 1.3 There are 3 key outputs of the software:
- Symptomatology module to identify symptoms of nutrient stress
 - Chemical analysis module to interpret test results
 - Information module which provides reference data on plant analysis, tissue values etc.
- 1.4 The uses of the plant analysis are:
- Detect deficiencies of nutrients
 - Assess the adequacy and timing of fertiliser or nutrient management programs
 - Diagnose deficiency or toxicity symptoms, cause of poor growth
- 1.5 Typically the potato leaf sample is dried and pulped, and tests are done in a laboratory. The test results are then provided to the end user such as the farmer who would use the software to interpret the imported data.

1.6 At this stage there are some 58 users for the software, however it is estimated that there are about 2,000 potential users in Australia with the breakdown of these being:

➤ Farmers	1,759
➤ Potato Processors	90
➤ Consultants	60
➤ Rural providers	120
➤ Fertiliser companies / agronomists	40
➤ Government	30
➤ Laboratories	12

1.7 The cost of the product is \$390, which is a once off fee, and to date, the product has not been promoted in any significant way.

1.8 Another problem is that CropTest was designed for Windows 3.1 and 95. There is now a requirement to update it to operate on the more current Windows platforms such as XP or 2000 – assuming that the research can show that there is future demand for the product.

1.9 While a positive return on investment on the costs of research and production of the software is desirable, the more important issue is to try to get the product used by as many people in the potato industry as possible.

Methodology

- 1.10 To assess the viability of repackaging the CropTest program, we undertook a comprehensive study to examine the needs of the potato industry for such a product.
- 1.11 This study also looked in depth at the “in situ” application of this program to determine possible causes of current sales levels, and modifications that could be made to improve the package.
- 1.12 The first component of the qualitative research into the use of the product was a series of 10 structured depth interviews:
- Current users of CropTest – non farmers such as fertiliser companies and consulting firms
 - Current users of CropTest - potato farmers
- 1.13 The second stage of the qualitative research was a software trial with a sample of 12 potato farmers (and service providers) who are not using the product.
- 1.14 These participants were sent a copy of the software to trial it, and were asked to provide their opinions via a telephone interview at the end of a 2 week trial period.
- 1.15 We targeted a sample of users who had access to different Windows operating systems, ranging from Windows 95 to Windows XP.
- 1.16 Following on from the qualitative research, we conducted a telephone survey of the market. This telephone survey included responses from growers in Queensland, Tasmania, South Australia, and New South Wales. Potato industry service providers were also interviewed across these states and Victoria.

1.17

In order to ensure that the responses to the survey were proportionally representative across each of the states, the data was re-weighted to reflect the distribution of growers resident in each state surveyed (see appendix 1 for more detail).

Section 2

Executive Summary

The following Executive Summary covers the findings of the CropTest Software Evaluation Research.

2.1 ***Effectiveness of a Nutrient Evaluation Tool***

The central issue facing CropTest is how to bridge the gap between a package that contains quality nutrient evaluation information, and a package that is an effective nutrient evaluation tool for the Australian potato industry.

It was clear from the responses received that the accessibility of quality nutrient information, and the ease by which test result interpretation could be achieved were important factors in the effectiveness of any nutrient evaluation tool such as the CropTest package.

These factors and many others surrounding the effectiveness of a nutrient evaluation tool are explored in this report, covering areas such as functionality and navigation, and the importance of training in the effective and efficient use of the package.

2.2 ***Nutrient Evaluation in the Potato Industry***

As might be expected, soil testing (76%) was the most frequently mentioned method of conducting nutrient evaluation of potato crops. Interestingly, more than half (53%) of all respondents indicated that they undertake plant tissue testing during the growing season.

A significant proportion (77%) of respondents indicated that they undertook soil testing prior to the planting of every crop, while more than half of all those who carry out tissue testing indicated that this is done more frequently than once every four weeks.

The majority (79%) of those interviewed indicated that they seek information on nutrients and potato crop nutrition. Many respondents looked to consultants, fertiliser companies, sales staff, and processing

company field officers for this information. Potato Australia and Eyes on Potatoes were mentioned by 17% of respondents as sources of potato crop nutrient information.

2.3 *User Friendliness of Current CropTest Package*

Feedback from both the current purchasers of the CropTest package, and the participants in the software evaluation trial, suggests that the current program needs to be easier to navigate.

This issue was highlighted by the fact that many of the purchasers interviewed were not currently using the product, although this may be attributed in part to the length of time between the purchase of the package and the commencement of this study.

Software trial participants also raised many navigational issues, comments that could be broadly encapsulated by the suggestion that modification of the CropTest package should:

“Try and reduce the amount that you need to be a scientist, and increase the grower useability.” – consultant

Importantly, the lack of time available for growers and service providers to investigate a complex package such as CropTest is limited. Therefore, it is essential for the program to be easy to use, and grab a users attention by quickly providing the desired outputs without forcing users to probe for information.

2.4 *Importance of Specific Features*

As might be anticipated, the most important features according to respondents to the telephone survey were the interpretation of tissue test results, and symptom keys to identify which nutrients are deficient or toxic.

It was apparent that growers valued the visual features of the CropTest package, such as graphs and photos, more highly than the service providers interviewed.

Following on from the suggestions made in the qualitative research, some potential new features that could be included in a redeveloped CropTest package were tested.

From the responses it was clear that it was very important for nutrient standards to be specific to soil types as well as varieties. Service providers in particular also felt that the inclusion of Internet updates for varieties and standards would be an important feature.

2.5 *Assessment of Feasibility*

Taking into account the objectives of Horticulture Australia, the feasibility of redeveloping and updating the CropTest software package hinges on the balance between maximising the benefit to the potato industry, while ensuring funds are utilised most effectively.

This report contains extensive information relating to the causes of low sales levels for the CropTest package, and suggestions for improvement of the package.

This information provides a sound base from which to modify the CropTest package to better suit the needs of the potato industry.

As a sobering reminder of the potential market for the current version of CropTest, one consultant offered this feedback:

“Probably the key fundamental problem with (CropTest) is that you are in one of three camps:

- *60% would never buy it because they don't see any value in it, or they are not computer literate*

- *30% would never buy it cause they would say 'I get a consultant and pay him good money to tell me all of this"*
- *10% who say 'I pay for a consultant but maybe I can do some things myself' may buy it, these are the highly educated ones in the middle." - consultant*

As previously mentioned, the responses to the telephone survey indicate that more than half of all respondents are currently conducting plant tissue testing to assess the nutrient status of potato crops (see 7.1), and more than three quarters indicated that they would be likely to use a tool that would assist them with nutrient evaluation (see 7.5).

The challenge for an updated CropTest package will be to increase relevance to growers and service providers in the potato industry in-line with the recommendations and feedback in this report, and take advantage of the significant proportion of respondents likely to use a nutrient evaluation tool such as CropTest.

2.6 ***Promotion of CropTest***

In order for the revised CropTest package to rise above the barrage of communications and products that growers and service providers in the potato industry are exposed to, a combination of approaches should be utilised.

When respondents to the telephone survey were asked to indicate whether they were aware of the CropTest package, 40% indicated that they were aware of the program (see 7.4).

This level of awareness has not resulted in significant sales volumes, therefore, in order to drive maximum awareness of the package's benefits to those conducting nutrient evaluation, the aim of communications should be to get growers talking "leaning on the rails in the sale yards".

Clearly this aim can be accomplished in a number of ways, but a key vehicle for driving word of mouth communication is grower meetings.

At such meetings, the program should be available for a full version free 30 day trial, with a simple but comprehensive training module attached to it. To add credibility to the presentation, a grower who is quite knowledgeable as a user of the new version of the CropTest software could provide useful anecdotal evidence of the usefulness of such a product.

This kind of presentation could sow the seeds of thought in each region, with each attendee then able to test the software over the coming month on their own farm, to see how it can benefit them.

After 30 days the CropTest trial version would revert to a “bare bones” viewer which allows growers to view their consultants reports and graphs created in the new version of CropTest. The intention would be to get this trial package with a free viewer widely distributed to as many in the industry as possible, along the lines of the Adobe Acrobat model.

The inclusion of a flyer in the Potato Australia and Eyes on Potatoes publications would also help to raise awareness in the industry of the new version of CropTest.

For promotion to consultants, it will be important to emphasise the ability of the new version of CropTest has to help consultants get results back to the grower in very quick time. This would be due in particular to features such as easy email import of test data, and report templates ready for creating reports with graphs and advisory notes.

For more detailed information, see Section 8 – Promotion of CropTest.

2.7 *Software Modification Recommendations*

The following recommendations are derived from feedback gained during the qualitative stages of the research:

- Update the CropTest program to cater for windows 98/2000/XP operating systems, with a revised user interface to deliver a more aesthetically appealing program with updated graphics.
- New standards and varieties must be easy to input, including the ability to download Internet updates of nutrient standards and varieties.
- Improve navigation within the program by allowing access to the main menu, help etc at all times through permanent icons, rather than icons that change depending on where you are in the program.
- Simplify supporting material to allow users to bypass complex information if desired. This should include redesigning the user guide to make it a simple small reference booklet, and redesigning the plant analysis and interpretation manual to enable easy access to deficiency photos, and then place more complex material at the end of the manual.
- Allow easy transfer of graphs into Microsoft Office suite software such as Word and PowerPoint, Graphs should paste in at the right size with ease and allow an advisory note and comments to be added.
- The help window should maximise and allow scrolling with a mouse wheel.
- When the CropTest program is running, it should appear in the windows programs bar at the bottom of the screen, and when the main window only is open, the program should remain running when you switch to another program window.
- Possibly include the capacity to import laboratory test results directly from email.

Section 3

Qualitative Findings

This section outlines the key findings of the depth interviews conducted with both existing purchasers of the CropTest software package, and software trial participants.

3.1 Usage of Crop Nutrient Status Testing Methods

3.1.1 Initially, interviewees were asked to describe the methods that they currently used to assess the nutrient status of Potato crops.

3.1.2 As expected, the main testing procedures identified were soil, and Petiole sampling. Typically, both growers and consultants identified soil testing with once off pre-planting paddock evaluation:

“Soil testing is mandatory with every crop.” – purchaser grower

“We need good soil test information for a starter ... generally two to three months before planting.” – purchaser consultant

3.1.3 Soil testing was generally utilised most frequently when looking at a new paddock, or one that is beginning a new rotation, and in those paddocks without a traceable cropping regime.

3.1.4 In contrast, Petiole testing was utilised more frequently, in order to provide ongoing feedback on the status of a crop during the growing season:

“Depending on the individual grower, we would undertake leaf tests anywhere from six leaf stage to just past flowering if required. If the grower is really motivated.” – purchaser consultant

3.1.5 One consultant offered this explanation of the role of petiole analysis:

“Once the crop is growing, that’s when we come in and start doing our petiole analysis, and from that we try and pick paddock differences, seasonal differences, and make recommendations to the farmers from them (petiole test results) on which way to go with side dressings to get the best benefit from the crop.” – purchaser consultant

Petiole Testing

3.1.6 A common thread among those growers interviewed was that the results from Petiole testing were usually provided to the grower by a consultant who attached advisory notes recommending any remedial action necessary.

“Growers either ring consultants, or they don’t bother.” – purchaser consultant

3.1.7 In theory, this could therefore remove the need for growers to perform any further interpretation of the results:

“Once you have got the information (back from the consultant) it is fairly easy to deal with.” – purchaser grower

3.1.8 However, some growers raised doubts about the accuracy of the recommendations from a consultant who was not a specialist in their region:

“A consultant may be biased on something that he is more familiar with, and the district that he operates out of.”- purchaser grower

- 3.1.9 The testing of petioles during the growing season appeared to be encouraged by some fertiliser companies, with one grower stating:

“We get three samples for free when we order so much fertiliser.” – software trial grower

- 3.1.10 The ability of consultants to account for regional differences when analysing results was therefore very important to growers interviewed.

- 3.1.11 This issue of accounting for regional variations was also prevalent in discussions about the standards used to assess nutrient deficiency/toxicity of petiole test results (see 3.2.1).

- 3.1.12 One software trial consultant was reluctant to undertake petiole testing, and offered this explanation of crop nutrient evaluation:

“I primarily look at soil testing before planting...from that we derive a soil program...we usually get it right before we start. Very rarely do I get involved in tissue testing...once a crop is growing, my most common way of doing it (nutrient evaluation) would be visual assessment.” – software trial consultant

- 3.1.13 This view was also held by some growers interviewed:

“The nutrient status is generally not a great concern for me because we will very often do a soil test before we put the crop in, and we will put in a level of fertiliser, enough to do the job, and historically nutrient stress hasn’t been a problem.” – software trial grower

“If they are green and healthy, they are the right colour green...I stand at the end of the paddock and say ‘yeah they’re growing alright’.” – purchaser grower

- 3.1.14 The time it took to obtain results was a reason provided by one grower who conducted Petiole testing only occasionally:

“In reality it takes two to three weeks to get the results back, and in the growing season that’s too long.” – purchaser grower

- 3.1.15 A one week timeline for the return of Petiole results seemed to be the key to the popularity of Petiole testing:

“Getting the results back to the grower within one week is critical.” – purchaser consultant

“If I could get the samples off Monday morning, and get the results back by Wednesday afternoon, then I can order fertiliser on Thursday and maybe get it in by Friday.” – purchaser grower

3.2 *Nutrient Evaluation Needs*

- 3.2.1 When asked about their needs for crop nutrient evaluation, the need for accurate and relevant reference data to compare against Petiole test results was raised particularly often by both growers and consultants who had previously purchased the CropTest package:

“You need a set of reference tables, there is no use getting a number back from a test without having anything to refer back to.” – purchaser consultant

“You need a guide to be able to tell you where that element falls, and you need it to be specific for different soil types...” - purchaser consultant

“I have used CropTest’s standards but...we have some peculiarities in our small area here which we have to take into account.” – purchaser grower

“A lot of the information that you find around isn’t really relevant to our area...every area is different for growing potatoes, every soil type is different and that’s where we’ve had our biggest problem.” - purchaser grower

- 3.2.2 Talking about their needs for crop nutrient evaluation, both growers and consultants who had either participated in the software trial, or had previously purchased the product, placed a strong emphasis on the importance of soil test data in determining the nutrient status of a potato crop:

“Soil test data...that’s one of the most criticals, cause that’s our starting point. Without that...without a history of the site we are driving a little bit blind on major macro and micro deficiencies that may occur.” – software trial consultant

3.2.3 Information on the amounts of different nutrients each variety draws during each stage of the growing season was also mentioned by some growers and consultants interviewed:

“What they are actually extracting, both the green plant plus the tuber, based on average yields...that type of information would make life a little bit easier in determining with new sites what is a good nutritional starting point.” – software trial consultant

“eg this is its peak nitrogen period...some of that information I found in there, but its all in individual points not in a graph format.” – software trial consultant

3.2.4 An issue raised by both growers and consultants was that nutrient evaluation needs to be easy:

“It needs to be quick and simple, and easily digested.” - purchaser grower

- For consultants that had purchased CropTest, ease of use meant software that could import data from an email at the click of a button, and easily produce graphs and tables of test results.
- For growers, ease of use did not necessarily relate to the operation of software:

“If it is something where I have to come back to the house, turn the computer on...to access it, that is not what I call easily accessible.” - purchaser grower

“For a farmer, it is the time factor...you’ve just got to make that effort to come in and decipher it.” - purchaser grower

3.2.5 In addition, consultants interviewed were also concerned with the speed of the testing process, raising needs such as:

- Speedy and reliable couriers to deliver samples to the laboratory,
- Email and fax to receive results quickly,
- Nutrient analysis software that produces initial analysis of results with the click of a button

3.2.6 These responses can be seen in light of the pressure placed on consultants, by growers, to get Petiole test results back within a week (see 3.1.12).

3.3 *Sources of Nutrient Information*

3.3.1 When those interviewed were asked about where they seek information about potato crop nutrition, it was apparent that this type of information was generally only used when there was a peculiarity in the paddock.

3.3.2 Many of the consultants and growers interviewed felt that seeking nutrient information was difficult because of the relevance of the information to their region:

“It’s a hard one because there’s not a lot of areas like what we’ve got ... growing potatoes in this particular soil type ... this is why we need the fertiliser companies and the work they’re doing ... where CropTest has come in building up our own database and then there are other areas and ... because it’s a similar soil type you have a look at what’s going on in that area.” – purchaser consultant

3.3.3 For normal day-to-day operations, nutrient information was usually garnered from past-experience, and the advice of colleagues.

“It’s only when you are doing specialist work with an individual grower that you use the wider sources of information.” – purchaser consultant

“You get to have a feel of...what the results are, what the crop looks like, and the stage of the crop...and you just know from experience what things should be and how things are going without referencing it.” – purchaser grower

3.3.4 When nutrient information was sought, a variety of sources were nominated by those interviewed. Growers commonly mentioned seminars and local grower meetings as good sources of information:

“At seminars you get a lot of good information...it’s all quite interesting to learn.” – software trial grower

3.3.5 In contrast, consultants interviewed were more likely to source information from nutrient publications such as.

- Fruit and vegetable publications that contain nutrient information updates,
- Agricultural magazines from overseas - such as Potato Review,
- CropTest's nutrient information section,
- Rural store staff that are specialists in certain areas,
- and material from fertiliser companies.

3.3.6 The Reuter and Robinson Handbook on nutrients for vegetable crops was used as a source of information by both growers and consultants, although the source was described by one grower as:

"A bit too broad for our region." - purchaser grower

3.3.7 One grower indicated that the testing that they carry out is their most important source of nutritional information:

*"We do a lot of our own research on different things...mainly on nutritional rates and different things within our own crops."
- purchaser grower*

3.3.8 When seeking information about potato crop nutrition, some growers and consultants interviewed would continually look to update their knowledge and seek out new information:

"Anything, anywhere, anytime, anywhere in the world." - purchaser grower

3.3.9 However, many growers interviewed sought most nutritional information from their consultant, or left nutrient problems entirely to the consultant, while others would rely on experience:

"I'm always listening, but it generally gets back to...the old way is the best way." – software trial grower

3.4 *User Friendliness of Program*

- 3.4.1 To begin the process of probing any functionality issues that may be associated with the CropTest package in its current form, both those who had previously purchased the product, and participants in the software trial were asked about the user friendliness of the installation procedures, first impressions of navigation, and the programs ability to easily produce the outcomes that they were seeking.
- 3.4.2 When those interviewed were asked about how user friendly the program was to install and load, most replied that it was easy, and had no problems.
- 3.4.3 When software trial participants were asked to give some overall impressions of the user friendliness of the navigation of the program, many participants indicated that the program would take some time to get used to, while others felt that navigation could be improved:
- “I did get a little bit confused sometimes. It tends to jump you around a lot and you’re not quite sure where you are.” – consultant*
- “Didn’t like it ... it should look like a book where you start at the beginning and you’ve got an index.” – consultant*
- 3.4.4 A common problem among trial participants with later versions of the Windows operating system, such as 2000 and XP, was an error message “**routine not found**” that would appear when accessing the symptomatology and nutrient information sections of the program.
- 3.4.5 However, this problem was only mentioned in passing by many respondents, who were more concerned with terms used in the menus to describe the information available (see 5.2.4).

- 3.4.6 When purchasers were asked about the navigation of the program, it was apparent that the purchaser consultants used the program more frequently than the growers (see 3.4.8), and thus were more happy with the navigation of CropTest.
- 3.4.7 While one purchaser grower was positive about the navigation of the program:
- “That’s good ... cause I’m not real computer literate, and I can get around.” – purchaser grower*
- 3.4.8 Other purchaser growers interviewed felt that the navigation of the program was not completely friendly:
- “Its not as user-friendly as it could be, and it’s a bit big and cumbersome for most peoples requirements.” – purchaser grower*
- “I think it would be much better to have someone who is really familiar with it to train you, or to have a training module that was tacked on to it.” – purchaser grower*
- 3.4.9 Finding nutrient information was rated as easy and straight-forward by many of those purchasers interviewed:
- “That whole chart down the side where you just click on the element and click on the particular feature that you wanted ... is very good.” – purchaser consultant*
- “Its fairly straight-forward...when we have enquired in there you seem to get to where you want fairly quickly.” – purchaser consultant*
- 3.4.10 The interface for inputting Petiole test results was described as “easy enough” to use by one purchaser consultant, while other purchaser consultants had some feedback to offer on this function:

“I’d like to be able to email the stuff straight in ... cause that’s where you make mistakes, with your copying across.” – purchaser consultant

“I know earlier on we did have a few glitches ... just setting it up to take the information as we were getting it from the lab ... we had to go back to the lab and say..if you can put it in this format for us then we can cross it over into the program pretty easily.” – purchaser consultant

3.4.11 Responses from software trial participants were mixed, when asked to give their overall impressions of the outcomes that the program produces:

“It does have very specific information ... once you find it I think its good.” – consultant

“If I’d gone through this for an hour in a shop somewhere, I would not have bought it ... it just didn’t do anything for me.” – consultant

3.5 *Importance of Specific CropTest Features*

3.5.1 When asked about the symptomatology keys to identify symptoms of nutrient stress, the consensus among those interviewed was that they were important for growers:

“The growers want to be able to see what is wrong...Its good to work out quite quickly what might be their problem and then back it up with a leaf test.” – purchaser consultant

“For a grower like myself, its very important ... cause that’s your starting point.” – software trial grower

“That’s the guts of the whole program I guess ... with the problems that we’ve had with things ... but its possibly not specific enough.” – purchaser grower

“You don’t hang your hat on it ... its just good educational stuff, it really helps a farmer understand his crop, help him be observant.” – purchaser researcher

3.5.2 In contrast, consultants interviewed were less likely to indicate that the symptomatology keys in the program were important:

“Its not what I’ve been using it for ... we’ve done soil tests and we are just monitoring what’s there ... we are not expecting to see manganese deficiency, or magnesium deficiency ... but on the occasions that we have used it, its just been to double check things.” – purchaser consultant

“I suppose cause we have a good history in our area, if there’s a deficiency there ... we’ve been through it often enough and know what it is ... its very rare that you come up with something new and have to go looking for it.” – purchaser consultant

“In most potato crops you don’t actually see deficiencies like you see in the book, cause the potato crops we are dealing

with are in the top 10-15% of deficiency..or probably even less than that.” – purchaser consultant

“You don’t always take the plant to your computer, a field handbook would be better ... that would be very useful.” – software trial consultant

- 3.5.3 When asked about the published descriptions of both deficiency and toxicity symptoms, many felt that this was important, but that it was more useful in the book:

“Better to have it in a hard copy form, than actually plod through the computer trying to look for it.” – purchaser grower

“In the book they are useful ... I don’t carry my computer in the field. I carry the book with me, its good to show people.” – purchaser consultant

- 3.5.4 Responses to the importance of the coloured pictures of deficiency symptoms were positive from many of those interviewed:

“Its good to work out quite quickly what might be their problem, and then back it up with a leaf test ... a picture says a thousand words.” – purchaser consultant

“There are times there where we have looked at them ... they’re pretty relevant to what you see, there’s no doubt about it.” – purchaser consultant

“the pictures are big and good quality” – purchaser grower

“The whole plant photo is very useful ... you get some idea of what the plant looks like in relation to other plants.” – purchaser grower

- 3.5.5 However, some of those interviewed raised some limitations of the photographs:

“Symptomatology is useful but symptoms of different deficiencies can often look the same, and it’s by no means a clear cut way of diagnosing what deficiency a plant has got.”

– purchaser researcher

“It is extremely difficult to be able to look at a photograph and be able to correlate that with a tuber.” – purchaser grower

“There are quite a few different deficiencies that actually result in having the same looking leaf ... you look it up, and it could be anything of about three or four different things.” – purchaser grower

“They are not really good photographs, by today’s standards of photography.” - purchaser grower

“They are as good as you are going to get, but you cant print the photos off for some reason.” – software trial grower

3.5.6 As might be expected, the researcher interviewed and consultants rated the test result interpretation for Petiole samples as very important:

“That’s the whole basis of why I bought the software” - purchaser consultant

“Chemical analysis of the plant is the most reliable way of assessing plant nutrient status.” – purchaser researcher

3.5.7 Specifically, the bar charts of multiple nutrient data were rated as very important by consultants and the researcher interviewed, as were the charts that allowed test data to be trended across the growing season:

“I would print out a bar chart of the instantaneous result, and then..as soon as I had two results I would plot all the elements. Two pages of small charts, and a bar chart so they could see where they were, and how things were trending.” – purchaser consultant

“It’s is important to be able to trend the data during the growing season.” – purchaser consultant

“We tend to go with the graphics for each nutrient ... one at a time...I suppose it’s just a preferential thing.” – purchaser consultant

“It’s great to have a single page where you can get a quick look at the status of your whole crop ... the line graphs help you with the trend, and that’s good educational stuff.” – purchaser researcher

- 3.5.8 In contrast, growers interviewed were much less likely to view the chemical analysis section as important. This was reflected in the fact that none of the growers interviewed currently used the Petiole test result section of the program:

“We’ve probably had it for five or six years, and I’ve never used the part where you enter in your petiole results ... cause I’ve never had any real need to.” – purchaser grower

“My consultant provides recommendations, I wouldn’t use it on a day-to-day basis.” – software trial grower

“I don’t find that (graphing petiole results) particularly useful.” – purchaser grower

- 3.5.9 One grower identified the trending of test data over the growing season as not particularly useful:

“I just don’t need that ... I’m not interested in that, you know in your own mind ... how things are going without having to see it on a graph.” – purchaser grower

- 3.5.10 The information database and bibliography for each nutrient was rated as less important by many of those surveyed, with the researcher interviewed, and consultants, indicating that it is “good backup data”:

“Especially with some of the micro-nutrients, you like to look at what some of the options are.” – purchaser consultant

“It’s very helpful for me, it’s all good information.” – software trial consultant

“I don’t know how a lot of growers handle all that...I’m a researcher so I find that interesting ... growers would probably like it a bit more summarised.” – purchaser researcher

3.5.11 Many growers interviewed indicated that they would employ a consultant to look at this.

3.5.12 Some growers interviewed were interested in this information as a learning tool:

“Just the basic text information ... that’s the most important thing that I’ve got out of it ... reading up on what all the elements do and the relationships to other things.” – purchaser grower

“Its good information ... if you wanted to follow it through yourself.” – software trial grower

“Its great to have access to this kind of information specific to potatoes.” – software trial grower

It was suggested by this grower that this information was particularly useful was an education tool:

“I’ve never had any other education, I’ve left school and gone farming, I haven’t had any other agronomic education of any sort...” – purchaser grower

3.5.13 An interesting piece of feedback on the most important feature of CropTest was offered by one researcher interviewed:

“I think that the important feature of the program is that it is very accurate ... its very objective ... you can put your variety in , your tuber length in, and it comes up with a pretty unambiguous result for Australian conditions.” – purchaser researcher

Section 4

Software Purchasers

This section outlines the key findings of the depth interviews conducted with existing purchasers of the CropTest software package.

4.1 *Usage of CropTest*

4.4.1 Many growers and consultants interviewed were not currently using the CropTest package, although this may be attributed in some degree to the length of time between purchase of the software, and the commencement of this study. Of all those interviewed, only one grower interviewed had not used the package in any significant way.

4.4.2 Among consultants and the researcher interviewed, the most commonly used, and most important, feature of the CropTest program was the chemical analysis section for analysing Petiole test results. Consultants tended to provide the graphs of test results from the chemical analysis section to their growers.

4.4.3 The Bar graph showing all nutrients on one page was identified as useful to show the results from the current test, while multiple line graphs were used to show individual nutrient trends over the growing season.

“The key one for me is just putting the data in and graphing it back out for the individual for the individual growers.” – consultant

“Growers don’t want to have to read 10 numbers ... and then work out whether they are actually within the right zone ... they just want a nice simple sheet and it tells him whether he is in the right areas and then read the comments from the consultant about the remedial action to take.” – consultant

“When you talk elements to them, and numbers, they’re not up to speed with it, but if you put the different elements and show their trends on a graph they can understand what’s going on ... and then if they respond to a problem, they can see what happens too.” – consultant

“Its easier for them (growers) to check out a graph and say..ok ... I’m low, or I’m high, or I’m in range, rather than actually read pages and pages of notes.” – consultant

4.1.4 Some consultants interviewed indicated that they **had built up significant databases of information** on the testing that they have carried out, and thus had also used the archiving functions of the program.

4.1.5 While one grower interviewed utilised the chemical analysis section of the program to enter test results, the relevancy of the standards in CropTest was of concern:

“Because the standard varieties they give are not specific to my area, I need to be very careful in interpreting. (the CropTest graphs)” - grower

4.1.6 Interestingly, growers appeared to be much more interested in the symptomatology keys and photographs of deficiency symptoms than consultants. Generally only the manual was used as a symptomatology reference.

4.1.7 In contrast, consultants indicated that the symptomatology section was less useful for their purposes:

“A lot of the samples I don’t actually see the crop, especially with the weekly monitoring. I’ll train the guys to take the samples, they send them off and I only get the results.” - consultant

“With experience ... its pretty easy to see some things, and others you wont pick from the visuals.” - consultant

4.1.8 Nutrient information was accessed less regularly by both growers and consultants. While most of those interviewed indicating that they had looked at the nutrient information previously, this information did not appear to be sought with any significant frequency:

“I have referred to the tables on different deficiency disorders at times.” – consultant

“I’ve looked at some of the archive stuff they have there.” - grower

“Certainly ... look there are times where things get out of whack a little bit and you go in and use the help file for some ideas on what to change or options on what products to use.” – consultant

- 4.4.9 Consultants appeared to use the program most frequently, with seasonal usage of the chemical analysis section reaching a height of 15 tests per week for one consultant interviewed, while others would access the program weekly to input test results.
- 4.4.10 In contrast, growers would access the program less frequently, preferring to refer to the nutrient manual, and rely on the advisory notes and graphs provided by their consultants to determine any remedial action they should take as a result of Petiole testing.

4.2 *Satisfaction with CropTest*

- 4.2.1 The level of satisfaction with the outcomes that the CropTest package produces varied between consultants and growers interviewed. Consultants and the researcher interviewed were relatively satisfied with the outcomes of the program:

“...works everytime..its just been so reliable.” – consultant

“...for what we are wanting from the program, we are achieving that without any worries.” – consultant

“I’d give it a high mark, it’s a good comprehensive program. I’d say it’s probably one of the best around ... it actually delivers on what it says it will deliver on.” - researcher

- 4.2.2 In contrast, growers were less satisfied with the outcomes that the package produces:

“There is a lot of good information in there, but a lot of it is not relevant to our soil type, and our climatic conditions...” – grower

“The outcomes are not really useful.” – grower

“For someone who is up to speed with things it is probably much better than their intuition.” – grower

- 4.2.3 Among the purchasers of the product interviewed, the current price (\$390) was perceived to represent good value for money:

“You look at \$390 and that’s barely a tonne of fertiliser...and you’d think any grower that got into a proper program and used that would soon get that sort of value out of it.” – consultant

“It’s made its money over many times.” – consultant

“It’s pretty cheap for the data you get.” – consultant

“I think its very good value ... the possibility of avoiding nutrient problems far outweigh the cost ... I think you could put the price up, you’d have to keep it under a thousand ... you could probably double the price ... you’d have to market the benefits of it though,” – researcher

“The literature is good...good value for money.” – grower

“There is a lot of information in there ... so you expect to pay something for that.” – grower

- 4.2.4 There was a general consensus among those interviewed that the title of the package “CropTest” could be better suited to the functions of the package. Given that the package deals only with potato nutrition, interviewees suggested:

“It might be a bit misleading, in that its only (for) potatoes.” – consultant

“If its called CropTest then the name is pretty poor if its aimed at potato growers ... you would think that they could have potato in the name.” – consultant

“It should have something for potatoes in the title...whether some people look at it and think ... its just for cereals rather than being potato specific.” – consultant

“The short title is ok, but the long title is probably more to the mark.” – grower

- 4.2.5 The current packaging was well rated by all those interviewed, with comments like:

“Very appealing to the eye ... looks the part, tells you on the back ... gives you a brief description of it and how it operates.” – grower

“Looks good, very professional ... I have actually on-sold copies of the software to growers using the leaflets.” – consultant

4.2.6 The only suggestion for improvement of the current packaging was:

“It needs a heavier gauge box cause it crushes too easily.” - consultant

4.2.7 When asked to indicate their level of satisfaction with the way that CropTest has been promoted, many respondents felt that the product could have been promoted better:

“One out of a hundred ... they are no longer placing any emphasis on CropTest.” – grower

“One out of five ... the only way we got on to it was through an ad in a magazine ... eyes on potatoes or something like that...they had a front page ad in there when it was first released, but other than that I don't think I've seen it advertised anywhere.” – grower

“It was promoted when it was released, but I don't think there has been any follow up.” – consultant

“Two out of five...that's the weakest aspect.” – consultant

“It was pretty mediocre at the end of the day. I mean there were plenty of write-ups about it.” – consultant

4.2.8 One consultant offered this feedback on the presentations:

“I've seen a couple of presentations where the guy actually presented it. The problem with them sorts of presentations is, you stick it up on a data projector and no-one can read what's on the data projector cause they are too far away from it ... people out there have got no idea what you are talking about.” – consultant

4.2.9 Supporting the lack of awareness of the program's promotion, one consultant was unaware that the program was still available for sale:

"I'm not too sure ... was there limited amounts of it or something..." – consultant

4.2.10 While it was suggested by some growers interviewed that the supporting manual for the CropTest program was useful for its symptomatology and nutrient information, one consultant indicated that a grower "has to have done leaf tests" to understand it.

4.2.11 Therefore, among the purchasers of the product, who had all previously conducted Petiole testing previously, the comprehension of the material in the manual did not prevent its use.

Section 5

Software Evaluation Trial

This section outlines the key findings of the CropTest Software Evaluation Trial exercises undertaken by all participants to test navigation, satisfaction with the information gained from each area of the program, and suggestions for improvement.

5.1 Deficiency Symptom Photographs

- 5.1.1 In the first exercise, participants were provided with a scenario where they have a plant with symptoms of uniform yellowing, and asked to determine possible causes of this yellowing. The resulting feedback from this exercise is presented below.
- 5.1.2 The consensus among software trial participants was that navigation to the photos of the nutrient deficiency symptoms could be improved. Some participants commented that they found it “**really hard**”, although in some cases this could be attributed, in part, to the appearance of an error message (see 3.4.3) when the program was run on more recent versions of the Microsoft Windows operating system.
- 5.1.3 It should be noted however, that the error message encountered by some participants was not consistently mentioned as the main cause of the difficulty encountered with navigating to deficiency symptom photographs. As detailed below, many more suggestions were made for improvement of this section.
- 5.1.4 Regarding navigation, many of those interviewed felt that it would be much more useful to begin with a range of photographs of symptoms, against which the plant could be evaluated visually. One consultant identified a “**picture key**” would be a useful starting point from which to identify causes visually.
- 5.1.5 The current layout was criticised for either beginning with a written description or a healthy plant, from which the symptom had to be identified. It was suggested that if this process of linking causes with symptoms was to begin in a visual format, this would be more attractive

to many growers that are less comfortable with written information, or prefer to work visually.

- 5.1.6 One grower, referring to the healthy plant that appears as a starting point for the detailed symptomatology key, commented:

“But my plant doesn’t look like that plant.” – software trial grower

- 5.1.7 This comment highlights a problem that could potentially arise when, for example, a grower brings a plant back to the house and looks at the detailed symptomatology key, only to begin with a plant photograph displaying no nutrient deficiency symptoms.

- 5.1.8 Another issue raised by many participants was that larger photos of deficiency symptoms would be desirable, with the user then able to zoom in to look in detail at a particular section of the plant if desired.

- 5.1.9 The comment was then made by some participants that the program should provide information on remedial actions to take in order to correct deficiencies that have been identified:

“It doesn’t tell you what to put in the ground.” – software trial grower

- 5.1.10 Many participants, particularly growers, also indicated that this type of information would be very useful if presented in a robust field handbook which could be kept “in the ute” for use in the paddock.

- 5.1.11 In order to aid in correct diagnosis of the cause of plant symptoms, it was suggested that some information should also be available on bugs, diseases, and other factors that could contribute to or cause similar symptoms in the same section.

5.2 *Information Search*

This section examines the key findings from two exercises which asked participants to seek out some of the information available in the nutrient information section of the program.

- 5.2.1 In the first of these two exercises, participants were asked to look for information about sources of chloride (salt), with the express aim of finding a page of information on “Chloride in Irrigation Water”. The second exercise required participants in the software trial to search for information on how effective it is to spray potassium onto the crop.
- 5.2.2 When participants were asked about how easy the information was to find in each exercise, mixed responses were received. Some participants were unable to find the information in these exercises, with the navigational structure of the nutrient information section cited as a significant barrier to finding this information easily. In contrast, other participants found the information without encountering major problems.
- 5.2.3 While some participants encountered an error message (see 3.4.3) which was initially mentioned as a barrier to effective navigation, many respondents were more concerned about the terminology used to describe the information found in each linked section.
- 5.2.4 This terminology was criticised by many participants, with the consensus being that the descriptions on some links did not give an easy and clear indication of the information available. Some growers suggested that finding information on symptoms would be more user-friendly if “**normal every day words**” were used, with the scientific term in brackets.

5.2.5 One example that illustrates the issues raised by some participants regarding the use of terminology is that when searching for information on the effectiveness of spraying potassium onto a crop, there was no mention of fertiliser application. Some participants were not aware of the terms used to describe the application of potassium, and this prevented accessing the information.

5.2.6 The inclusion of an index menu that would permanently show the user which section of the program they are currently examining was put forward as a suggestion to make the navigation of this section more user friendly. One consultant interviewed provided feedback on the navigation of this section as follows:

“I found the menu on the left didn’t encourage me to want to use the program or find out more (information). The biggest criticism I’ve got is that the information is there but the navigation and feedback as to where you are is not that good ... so you tend to get lost ... I wouldn’t be confident that I could get back to the place where I just was if something happened.” – consultant

5.2.7 Some feedback on the content of the information in this section of the program was forthcoming. Many felt that while the type of information contained in the program was potentially very useful, the writing style used to present the information was criticised by both growers and consultants:

“It’s very scientific, they sort of tried to sum up some of the information, but when you write it so that it says ‘Johnson and Johnson 1983 said that this happens’ ... I know that they have referenced it properly, but I don’t think that you need to write it like that, cause otherwise you think, well ... what does CropTest think?” – consultant

5.2.8 Many growers participating in the trial also provided feedback consistent with the following comment:

“The information probably wasn’t concise enough.” – consultant

5.2.9 It was suggested that the nutrient information section should provide summary information that offered a concise explanation of the concept which could be easily comprehended by growers, and the option to drill-down for more detailed information on a particular issue if desired:

“Cause you are there, you want an answer and it would be better to summarise it a bit more and then have optional extra information if you wanted to read deeper rather than just putting the whole lot there in front of you.” – consultant

5.2.10 One consultant also suggested structuring the information to subsequently enable the user to easily find an explanation of the suggested action(s) to undertake to address the nutrient issue being examined.

5.3 *Petiole Test Result Analysis*

- 5.3.1 Largely positive feedback was received when participants were questioned about their experiences with the chemical analysis section of the program.
- 5.3.2 The ability of this section of the program to present test results in an easy to comprehend format was commended by many interviewed. The coloured bar charts received positive mentions for their layout, with the only comment from participants being that the date should appear as well as tuber size, allowing the user to discriminate among tests where the tuber size has not varied dramatically between samples.
- 5.3.3 Trending of nutrient levels over the growing season was looked on as important and useful for future reference as well as current season crop management. One improvement suggested by a participant was that labels showing the date the sample was taken should be attached to each arrowhead in line graphs.
- 5.3.4 While the outputs of this section were commended for their usefulness to growers and consultants alike, some suggestions to improve the results input interface were forthcoming. The majority of comments related largely to functionality issues such as:
- Increasing the size of the icons at the bottom of the results window, and generally make their functions more obvious to the user
 - Allow the user to navigate to all test result tabs without having to click a close button within the add new crop window
 - When part of the variety name is entered in when setting up a new test, the available varieties appear in a drop down menu, with the most likely variety already selected (eg type in 'col' and the menu drops down with Coliban selected). It was suggested that this variety should be selected when the user strikes the enter key.

- To get users familiar with entering test results, it was suggested that a wizard should be included, which assists the user to enter all the relevant information and click the right buttons to produce the desired results.

5.3.5 In light of the responses received from those who had already purchased the package (see 4.2), there is a large potential for the program to sit idle and unused once purchased. Therefore, this kind of assistance is important to continued use of the program, as it is vital to establish a pattern of behaviour right from the first use of the program.

5.3.6 The inclusion of a wizard is one example of how the CropTest program can be modified to provide a positive experience to first time users regardless of their level of education, background, or level of computer literacy.

5.4 *Plant Analysis and Interpretation Manual*

- 5.4.1 The majority of comments from participants relating to the plant analysis manual were positive, with many growers in particular indicating that they were more comfortable with information in a written form.
- 5.4.2 The inclusion of photographs of deficiency symptoms in the back section of the manual was well received, with many growers indicating that this information would be useful to **“keep in the ute”** as an on-site reference for deficiencies. One suggestion regarding the manual was to make it sturdier, with a more robust cover to ensure that it lasts as a field resource.
- 5.4.3 Information regarding the collection and handling of samples for nutrient testing was also described as useful information, particularly for consultants new to the industry, and growers looking to conduct their own sampling.
- 5.4.4 See section 7.6 for more feedback on how the plant analysis and interpretation manual could become a useful field handbook for preliminary in-paddock nutrient evaluation.

Section 6
The Ultimate Nutrient
Evaluation Tool

6.1 *The Ultimate Nutrient Evaluation Tool*

Product Purchasers

- 6.1.1 Among purchaser consultants and the researcher interviewed, there was a consensus that the ultimate nutrient evaluation tool would consist of a modified version of CropTest that was more up to date, and catered for weblinks and emailing of test results. Referring to the CropTest program, purchaser consultants interviewed had some positive feedback on the package:

“At the time, and even now I think the thing is quite good, honestly there wasn’t anything left out of it.” – purchaser consultant

“I find it very reliable.” – purchaser consultant

- 6.1.2 Suggestions for improvements were also forthcoming from purchaser consultants interviewed:

“I guess now that time has moved along you would probably have a section for weblinks to it so that you could automatically download data updates, and provide an integrated email service for test results.” – purchaser consultant

“Importing of results needs to be easy ... If those guys (growers) that have the program got the results and it was just click click transfer and press test results, they would do it.” – purchaser consultant

- 6.1.3 Among the purchaser growers interviewed, the responses suggested that the current program may be too detailed and complex at present. The ultimate tool according to many purchaser growers interviewed would allow easy input of results and changing of nutrient standards:

“If we could change the levels to the new desired levels and for the different varieties as well ... I think that would be very, very beneficial.” – purchaser grower

“Rather than the graphs, one half of the screen you could have the standards that you have got in, and in the other half of the screen you put the latest values that you have just come through the fax from your laboratory.” –purchaser grower

“A small subset of CropTest that you could easily enter your own standards into, and quickly and easily compare the results on a tabular basis. I think keeping it simple ... I think it’s a bit too complicated.” – purchaser grower

“Have icons (on the windows desktop) that you could just click on..so that you can go immediately to that function.” – purchaser grower

- 6.1.4 The inclusion of a soil test component for different types of soils in different regions of Australia was suggested by some of those interviewed:

“I think that a nutrient program for potatoes ... a fully comprehensive one would have to include soil type ... I f you wanted to improve on it, that’s the next step ... just the macro elements.” – purchaser researcher

“It would contain a soil test component for each variety which says this is what variety A requires to obtain a 40 tonne per hectare potato crop.” – purchaser grower

- 6.1.5 One researcher interviewed had a suggestion for how to categorise soil types to make it easy for growers:

“I’d say for most regions of Australia you could probably come up with a soil type based on vegetation ... a reasonably common and reliable way of assessing soil types.” – purchaser researcher

Software Trial Participants

- 6.1.6 When software trial participants were asked to indicate features that an ultimate nutrient evaluation tool would possess, two distinct types of suggestions were put forward.
- 6.1.7 Many consultants, and some growers, suggested that an ultimate nutrient evaluation tool would be all encompassing, with more information in areas such as:
- Soil test standards, and soil structural information
 - A pre-crop section covering pre-plant application
 - The effects of applying nutrients at different times
 - What will happen if you do (or do not) apply nutrients at different growth stages
 - Environmental impact of different types of nutrients and application methods
 - Irrigation information on the effects of moisture levels
 - Information on tuber symptoms with photographs
 - A flow chart that assists diagnosis by working through symptoms from “**more common ones**” through to symptoms specific for different deficiencies – leading to a list of possible causes eg nutrient, disease, moisture related
 - Some growers suggested that they would conduct testing if they had a testing method that could be carried out in the paddock, with the results subsequently entered into the CropTest program.
- 6.1.8 Positive feedback was also received from many growers, and some consultants, with the ultimate nutrient evaluation tool consisting of a modified version of the CropTest package:

“It needs to be more simple, and visual, with results that can be graphed easily.” – software trial grower

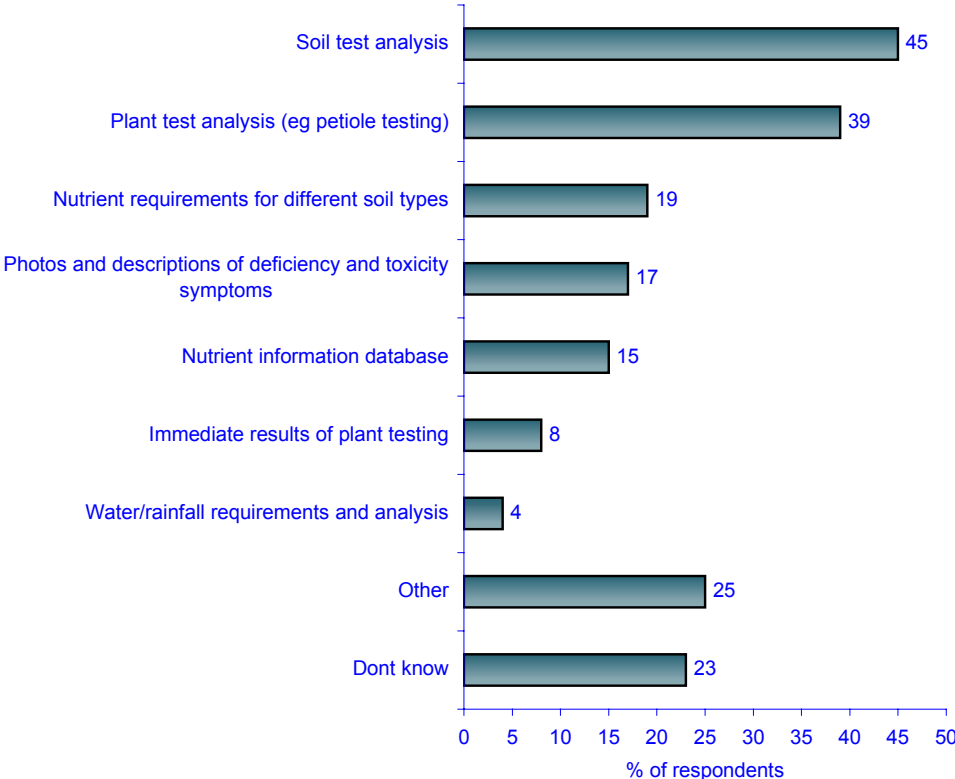
“You should be able to bring up all the photos for yellowing and click on them to enlarge and find detail.” – software trial grower

“Have a search feature, be able to zoom in on the photos, and have more friendly menus that feed you information so you don’t have to dig.” – software trial consultant

Quantitative Feedback

- 6.1.9 When respondents were asked to nominate features that they felt an “ultimate” nutrient evaluation tool should possess, soil test analysis (45%) was mentioned most frequently, followed by plant test analysis (39%).
- 6.1.10 Interestingly, one in five (19%) respondents to the telephone survey indicated that the ultimate nutrient evaluation tool would contain information on the nutrient requirements for different soil types, highlighting the importance of soil type specific information.
- 6.1.11 These results provide a guide to the types of features that respondents would seek in an ideal nutrient evaluation tool for potato crops.

THINKING ABOUT CROP NUTRIENT EVALUATION, IF YOU WERE TO DESIGN THE ULTIMATE TOOL TO ASSIST YOU IN THIS TASK, WHAT FEATURES WOULD IT POSSESS? (n=297)



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 6: Thinking about crop nutrient evaluation, if you were to design the ultimate tool to assist you in this task, what features would it possess?

Probe all components required, Unprompted, multiple response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Soil Test analysis	135 45%	37 38%	57 50%	8 27%	24 67% +++	125 46%	10 40%
Plant Test analysis (e.g. Petiole testing)	117 39%	30 31% -	41 36%	16 58%	19 54% ++	106 39%	11 45%
Nutrient requirements for different soil types	58 19%	14 15%	30 26% ++	1 2%	6 16%	50 18%	8 32%
Photos and descriptions of deficiency and toxicity symptoms	51 17%	23 24% +	17 15%	0 0%	5 13%	45 16%	7 28%
Nutrient information database	43 15%	12 12%	18 16%	1 5%	4 13%	36 13%	7 30%
Water/rainfall requirements and analysis	10 4%	6 6%	3 3%	0 0%	1 2%	10 4%	1 3%
Immediate results of plant testing	22 8%	5 5%	3 2% ---	6 22%	6 17% ++	20 7%	3 12%
Other	75 25%	26 27%	28 25%	11 41%	4 12% -	70 26%	5 19%
Don't know	68 23%	23 24%	30 27%	3 12%	7 21%	64 23%	4 17%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 6: Thinking about crop nutrient evaluation, if you were to design the ultimate tool to assist you in this task, what features would it possess?

Probe all components required, Unprompted, multiple response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Soil Test analysis	135 45%	25 50%	20 32% --	22 38%	66 53% ++	2 40%	0 0%
Plant Test analysis (e.g. Petiole testing)	117 39%	28 56%	18 30%	24 41%	46 37%	1 20%	0 0%
Nutrient requirements for different soil types	58 19%	0 0%	13 20%	13 23%	32 26% ++	0 0%	0 0%
Photos and descriptions of deficiency and toxicity symptoms	51 17%	6 13%	13 20%	15 26%	17 13%	1 20%	0 0%
Nutrient information database	43 15%	3 6%	7 11%	12 21%	20 17%	1 20%	0 0%
Water/rainfall requirements and analysis	10 4%	0 0%	3 5%	4 8% +	3 3%	0 0%	0 0%
Immediate results of plant testing	22 8%	13 25%	1 2%	6 10%	3 2% ---	0 0%	0 0%
Other	75 25%	19 38%	20 32% --	7 13% --	27 22%	2 40%	0 0%
Don't know	68 23%	3 6%	17 27%	12 21%	34 28%	2 40%	0 0%
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298	50	62	58	123	5	0
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

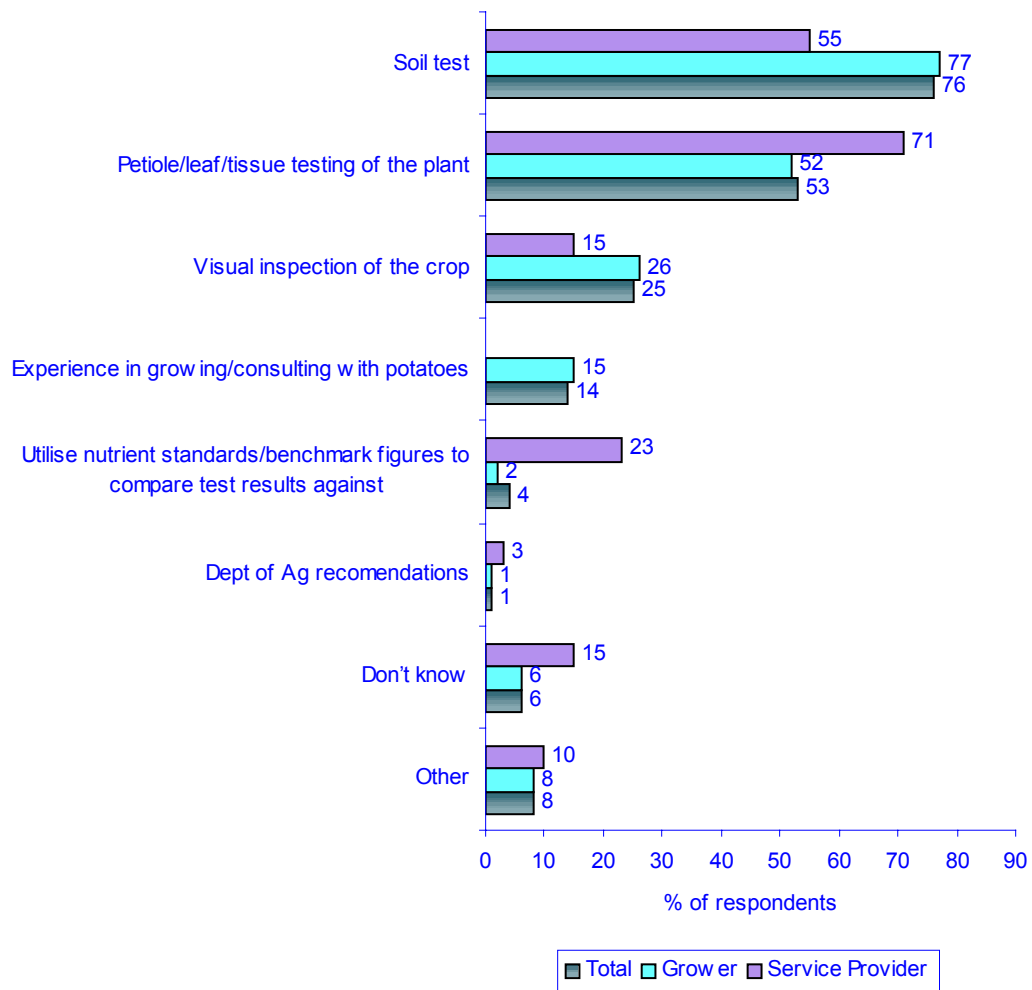
Section 7
Quantitative Analysis

This section outlines the key findings of the quantitative telephone research conducted with growers and service providers from different states in Australia. The questionnaire for this stage of the study was developed based on the responses gained from the qualitative stages of the research.

7.1 Crop Nutrient Evaluation

- 7.1.1 In order to gain an understanding of the needs of the potato industry for a nutrient evaluation tool such as CropTest, respondents were asked to indicate how they currently assess the nutrient status of a potato crop.
- 7.1.2 More than three quarters (76%) of respondents indicated that they utilise soil testing, a response significantly more common among growers (77%) compared to service providers (55%).
- 7.1.3 Plant tissue testing was nominated by more than half (53%) of respondents as a technique they use to evaluate the nutrient status of a potato crop. Not surprisingly, a higher proportion of service providers (71%) than growers (52%) nominated this method of nutrient evaluation.
- 7.1.4 Visual inspection of the crop, and experience with growing potatoes were also methods frequently nominated by growers, while many service providers interviewed stated that they utilise nutrient standards to benchmark test results against.

CAN YOU TELL ME HOW YOU CURRENTLY ASSESS THE NUTRIENT STATUS OF YOUR POTATO CROP? (n=297)



7.1.5 When asked how frequently soil testing was utilised, the largest proportion of respondents (77%) indicated that this type of testing was carried out prior to the planting of every crop.

7.1.6 Of those respondents who indicated that they conduct plant tissue testing, more than half (61%) stated that they typically carry out this testing at a frequency of between once every week to once every four weeks.

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 1: Can you tell me how you currently assess the nutrient status of your Potato crop?
Probe all components needed to identify nutrient status
Unprompted, multiple response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Soil Test	225 76%	68 71%	90 79%	23 81%	31 87% +	212 77%	13 55%
Petiole/ leaf/ Tissue testing of the plant	158 53%	37 38% ---	66 58%	15 54%	23 65%	141 52%	17 71%
Visual inspection of the crop	76 25%	41 42% +++	12 11% ---	17 60%	3 7% ---	72 26%	4 15%
Experience in growing/ consulting with Potatoes	41 14%	25 26% +++	9 8% --	6 22%	1 4% -	41 15%	0 0%
Nutrient standards/ benchmark figures to compare test results against	12 4%	3 3%	3 3%	0 0%	0 0%	6 2%	6 23%
Department of Agriculture recommendations	2 1%	1 1%	0 0%	0 0%	0 0%	1 1%	1 3%
Other	24 8%	12 12% +	7 6%	1 2%	1 4%	21 8%	2 10%
Don't know	19 6%	4 4%	8 7%	0 0%	3 7%	15 6%	4 15%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 1: Can you tell me how you currently assess the nutrient status of your Potato crop?
Probe all components needed to identify nutrient status
Unprompted, multiple response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Soil Test	225 76%	47 94%	38 61% ---	36 62% --	99 81% +	5 100%	0 0%
Petiole/ leaf/ Tissue testing of the plant	158 53%	19 38%	24 39% --	39 67% +	74 60% ++	3 60%	0 0%
Visual inspection of the crop	76 25%	28 56%	17 27%	18 31%	13 10% ---	0 0%	0 0%
Experience in growing/ consulting with Potatoes	41 14%	13 25%	13 20%	6 10%	10 8% --	0 0%	0 0%
Nutrient standards/ benchmark figures to compare test results against	12 4%	0 0%	1 2%	4 8%	4 3%	2 40%	0 0%
Department of Agriculture recommendations	2 1%	0 0%	1 2%	0 0%	1 1%	0 0%	0 0%
Other	24 8%	6 13%	6 9%	3 5%	8 6%	1 20%	0 0%
Don't know	19 6%	0 0%	3 5%	6 10%	10 8%	0 0%	0 0%
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298	50	62	58	123	5	0
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 2: Do you test the soil prior to planting every Potato crop? **If no,** How often would you test the soil?

Unprompted, single response

BASE: If use soil testing

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Test prior to every crop	174 77%	18 45% ---	115 87% +++	6 55%	23 77%	162 76%	12 86%
Only test new paddocks	13 6%	4 10%	3 2% ---	0 0%	6 20% +++	13 6%	0 0%
Test new paddocks and after 1 or 2 crops	21 9%	9 22% +++	6 5% ---	5 45%	1 3%	21 10%	0 0%
Test new paddocks and after 3 or 4 crops	8 4%	2 5%	4 3%	0 0%	0 0%	6 3%	2 14%
Test new paddocks and after 5 or more crops	6 3%	4 10% +++	2 2%	0 0%	0 0%	6 3%	0 0%
Other	5 2%	3 8% ++	2 2%	0 0%	0 0%	5 2%	0 0%
Don't know	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
No. OF RESPONDENTS	227 100%	40 100%	132 100%	11 100%	30 100%	213 100%	14 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 3: How often do you typically take petiole/ leaf/ tissue samples during growing season?
Unprompted, Single response

BASE: If use Petiole/ leaf/ tissue testing

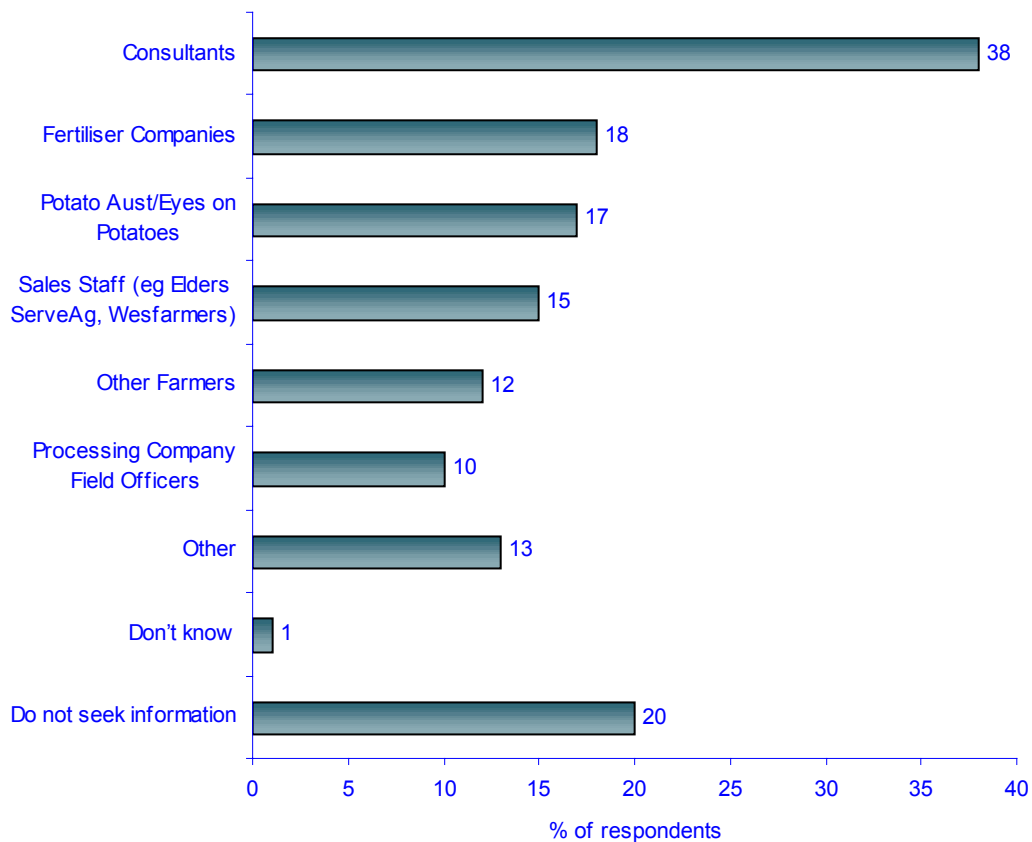
	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
More frequently than once a week	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Once a week	17 10%	1 4%	13 13% +	0 0%	3 14%	17 11%	0 0%
Once a week to once every two weeks	48 29%	5 20%	33 34% +	2 25%	5 23%	45 30%	3 19%
Once every two weeks to once every four weeks	53 32%	8 32%	29 30%	2 25%	9 41%	48 32%	5 31%
Less frequently than once every four weeks	45 27%	11 44%	19 20% --	4 50%	4 18%	38 25%	7 44%
Don't know	5 3%	0 0%	3 3%	0 0%	1 5%	4 3%	1 6%
No. OF RESPONDENTS	168 100%	25 100%	97 100%	8 100%	22 100%	152 100%	16 100%

Prepared by McGregor Tan Research (REF: 6750)

7.2 *Sources of Nutrient Information*

- 7.2.1 To establish where the major sources are for information nutrients and potato crop nutrition among the potato industry, respondents were asked to indicate where they seek this type of information.
- 7.2.2 Eight out of ten (79%) respondents interviewed indicated that they seek information on nutrients and potato crop nutrition.
- 7.2.3 Many respondents sought nutrient information from industry sources such as:
- Consultants (38%)
 - Fertiliser companies (18%)
 - Sales staff (15%)
- 7.2.4 Interestingly, Potato Australia and Eyes on Potatoes were mentioned by 17% of all respondents as a source of nutrient information.

WHERE DO YOU SEEK INFORMATION ABOUT NUTRIENTS OR POTATO CROP NUTRITION? (n=297)



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 4: Do you seek information about nutrients or Potato crop nutrition?
If yes, probe sources of information
Unprompted, multiple response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Consultants	114 38%	24 25% ---	68 60% +++	3 12%	16 44%	112 41%	2 9%
Fertiliser companies	54 18%	24 24% +	11 10% ---	6 22%	9 25%	50 18%	4 17%
Potato Australia or Eyes on Potatoes	52 17%	9 9% --	15 13%	13 47%	10 29% ++	47 17%	5 19%
Sales staff (e.g. Elders, Serve Ag. Wesfarmers)	45 15%	22 22% ++	13 12%	8 30%	1 4% --	45 16%	0 0%
Other farmers	35 12%	12 12%	9 8%	9 34%	3 7%	33 12%	1 6%
Processing company field officers	29 10%	1 1% ---	17 15% ++	3 11%	4 13%	26 9%	3 12%
Department of Agriculture (Primary Industries)	20 7%	9 9%	2 2% ---	3 11%	1 4%	15 5%	5 22%
Books of Field Guides	8 3%	3 3%	2 2%	0 0%	1 2%	5 2%	2 9%
Do not seek information	59 20%	29 29% +++	15 13% --	3 12%	8 22%	54 20%	4 18%
Internet sites	12 4%	3 3%	3 3%	0 0%	0 0%	6 2%	6 25%
Other	40 13%	19 20% ++	5 4% ---	5 16%	1 4% -	30 11%	10 41%
Don't know	3 1%	0 0%	2 2%	0 0%	0 0%	2 1%	1 3%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 4: Do you seek information about nutrients or Potato crop nutrition?
If yes, probe sources of information
Unprompted, multiple response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Consultants	114 38%	0 0%	18 30%	24 41%	71 58% +++	1 20%	0 0%
Fertiliser companies	54 18%	19 38%	13 20%	10 18%	10 8% ---	2 40%	0 0%
Potato Australia or Eyes on Potatoes	52 17%	19 38%	7 11%	7 13%	17 13%	2 40%	0 0%
Sales staff (e.g. Elders, Serve Ag. Wesfarmers)	45 15%	6 13%	13 20%	10 18%	15 12%	0 0%	0 0%
Other farmers	35 12%	16 31%	3 5% -	7 13%	9 7% --	0 0%	0 0%
Processing company field officers	29 10%	3 6%	1 2% -	0 0%	21 17% +++	3 60%	0 0%
Department of Agriculture (Primary Industries)	20 7%	3 6%	7 11%	4 8%	4 4% -	1 20%	0 0%
Books of Field Guides	8 3%	0 0%	1 2%	3 5%	3 3%	0 0%	0 0%
Do not seek information	59 20%	19 38%	14 23%	12 21%	14 11% ---	0 0%	0 0%
Internet sites	12 4%	0 0%	4 7%	3 5%	4 3%	1 20%	0 0%
Other	40 13%	3 6%	17 27% +++	9 15%	8 6% ---	3 60%	0 0%
Don't know	3 1%	0 0%	0 0%	0 0%	3 2%	0 0%	0 0%
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298	50	62	58	123	5	0
	100%	100%	100%	100%	100%	100%	100%

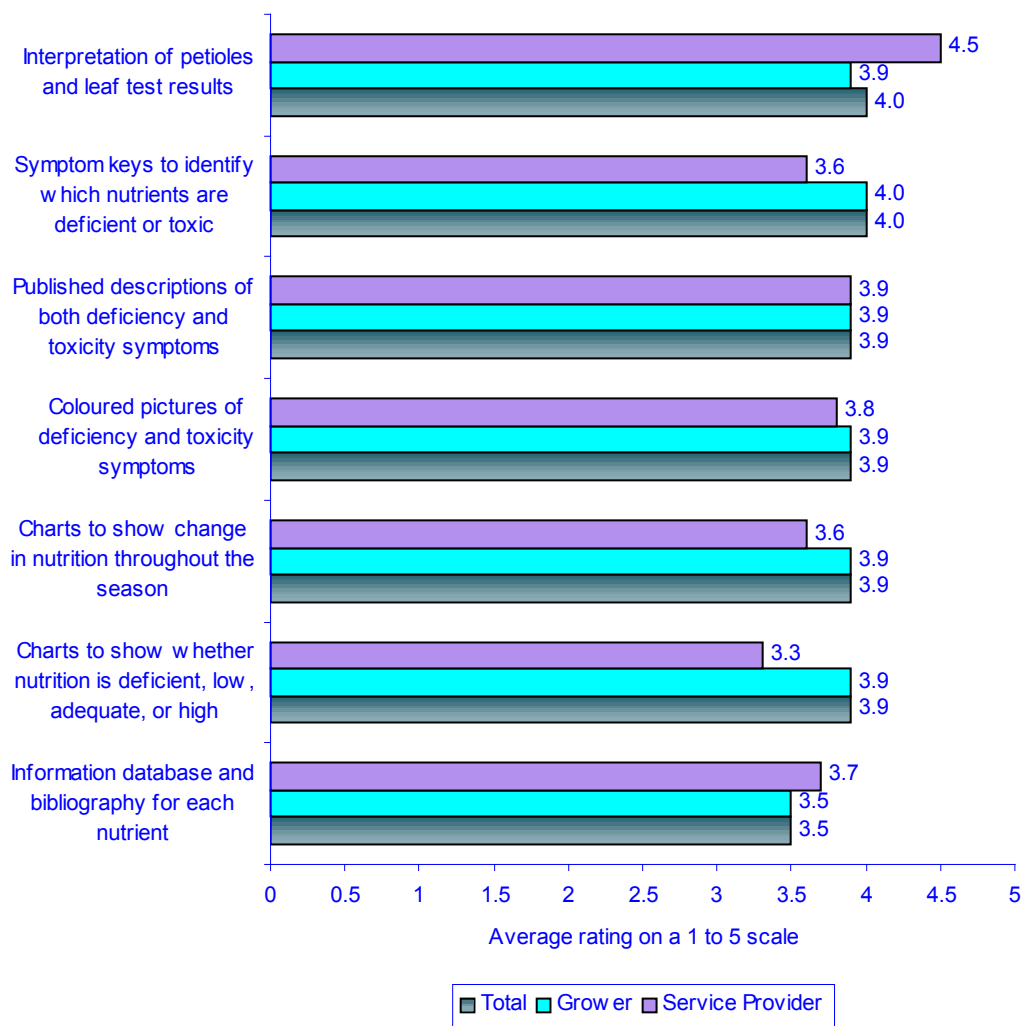
Prepared by McGregor Tan Research (REF: 6750)

7.3 *Importance of Nutrient Evaluation Features*

Current Features

- 7.3.1 Respondents were read a list of features that the CropTest package currently possesses, and asked to rate their importance on a 1 to 5 scale where 5 was very important, and 1 was not at all important.
- 7.3.2 Not surprisingly, the features rated as most important were the interpretation of tissue test results (4.0), and symptoms keys to identify which nutrients are deficient or toxic (4.0).
- 7.3.3 As might be expected, service providers rated the interpretation of tissue test results as very important (4.5), while growers gave the highest average rating to the symptom keys to identify which nutrients are deficient or toxic (4.0).
- 7.3.4 While both growers and service providers rated the coloured pictures of symptoms, and their published descriptions as important, it was apparent that growers valued the visual features of the program more highly than service providers. Specifically, growers rated the two types of graphs available in the CropTest program as more important compared to the service providers interviewed.
- 7.3.5 In contrast, service providers rated the information database as more important compared to growers interviewed, a finding consistent with the qualitative research undertaken prior to the telephone survey (see 3.4.18) where service providers valued this information as “**good backup data**”.

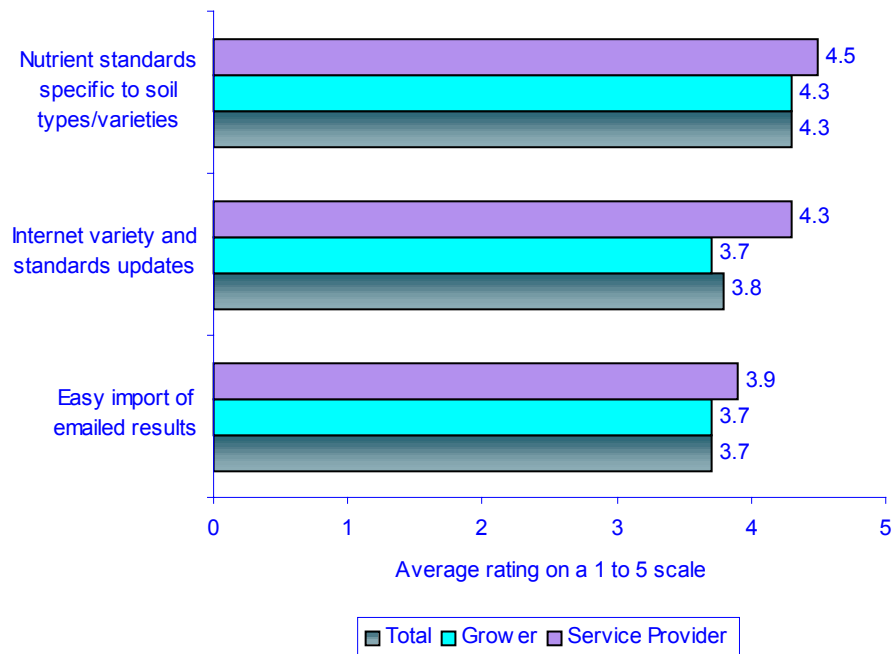
IMPORTANCE OF NUTRIENT EVALUATION FEATURES (n=297)



Potential Features

- 7.3.6 Subsequent to the completion of the qualitative research, several potential new features suggested by those interviewed were tested for their importance as a feature of a nutrient evaluation tool.
- 7.3.7 It was clear from the responses that it was important to both growers and service providers that the nutrient standards used for test tissue result interpretation be specific for both soil type and varietal differences.
- 7.3.8 Service providers interviewed also felt that an Internet update feature which allowed the user to download new varieties and nutrient standard updates to be added into the program was important. Easy import of emailed test results was also rated as important by many service providers interviewed.

IMPORTANCE OF NUTRIENT EVALUATION FEATURES? (n=297)



Note: The following table displays mean (average) statistics, as described below.

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 5: Thinking about nutrient evaluation of Potato crops, could you please rate the importance of the following features of a nutrient evaluation tool, on a scale from 1 to 5 where 5 is very important, and 1 is not at all important, code as 6 if don't know.

Read out each statement

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Interpretation of petioles and leaf test results	4.0 293	3.7 94	4.0 112	3.7 28	4.6 35	3.9 269	<u>4.5</u> 23
Symptom keys to identify which nutrients are deficient or toxic	4.0 292	3.8 94	4.0 113	3.9 28	4.5 33	4.0 268	3.6 23
Charts to show whether nutrition is deficient, low adequate or high	3.9 291	3.7 92	4.1 113	3.5 28	4.3 35	3.9 268	3.3 23
Coloured pictures of deficiency and toxicity symptoms	3.9 295	3.7 95	3.8 113	4.2 28	4.4 35	3.9 271	3.8 23
Charts to show change in nutrition throughout the season	3.9 295	3.6 95	4.1 113	3.7 27	4.3 35	3.9 271	3.6 23
Published descriptions of both deficiency and toxicity symptoms	3.9 290	3.7 93	3.8 112	4.2 28	4.2 35	3.9 267	3.9 23
Information database and bibliography for each nutrient	3.5 281	3.2 91	3.5 110	4.1 23	3.6 33	3.5 258	3.7 23
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Average rating on a 1 to 5 scale

Number of respondents (does not include don't know responses)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 5: Thinking about nutrient evaluation of Potato crops, could you please rate the importance of the following features of a nutrient evaluation tool, on a scale from 1 to 5 where 5 is very important, and 1 is not at all important, code as 6 if don't know.

Read out each statement

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Interpretation of petioles and leaf test results	4.0 293	3.6 50	3.9 61	4.3 57	4.0 120	4.0 5	.0 0
Symptom keys to identify which nutrients are deficient or toxic	4.0 292	3.8 50	3.9 61	4.1 55	4.0 121	3.6 5	.0 0
Charts to show whether nutrition is deficient, low adequate or high	3.9 291	3.5 47	3.9 62	3.9 57	4.1 121	3.2 5	.0 0
Coloured pictures of deficiency and toxicity symptoms	3.9 295	3.9 50	4.0 62	4.0 57	3.8 121	3.4 5	.0 0
Charts to show change in nutrition throughout the season	3.9 295	3.6 50	3.8 62	3.7 57	4.1 121	4.0 5	.0 0
Published descriptions of both deficiency and toxicity symptoms	3.9 290	3.9 50	3.8 61	4.2 55	3.8 120	2.8 5	.0 0
Information database and bibliography for each nutrient	3.5 281	3.4 47	3.4 56	3.4 54	3.5 119	4.0 5	.0 0
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 16: How important would you say the following features are to a Potato crop nutrient evaluation tool, on a 1 to 5 scale where 5 is very important and 1 is not at all important?

code as 6 is don't know

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Nutrient standards/ benchmarks specific for different soil types or varieties	4.3 294	4.1 95	4.4 112	4.2 28	4.5 35	4.3 270	4.5 23
An Internet update feature which could update varieties, standards and information	3.8 292	3.6 95	3.6 110	4.0 28	3.9 35	3.7 268	4.3 23
A feature that allows easy import of emailed test results	3.7 292	3.5 95	3.8 110	3.7 28	4.0 35	3.7 268	3.9 23
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 16: How important would you say the following features are to a Potato crop nutrient evaluation tool, on a 1 to 5 scale where 5 is very important and 1 is not at all important?

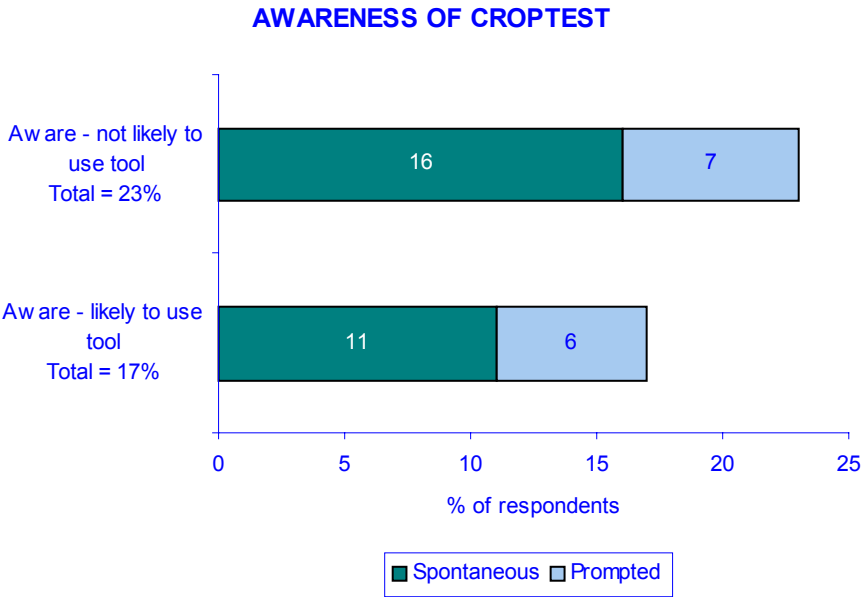
code as 6 is don't know

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Nutrient standards/ benchmarks specific for different soil types or varieties	4.3 294	4.1 50	4.4 62	4.3 55	4.3 122	4.6 5	.0 0
An Internet update feature which could update varieties, standards and information	3.8 292	3.6 50	3.7 62	3.9 54	3.7 121	4.6 5	.0 0
A feature that allows easy import of emailed test results	3.7 292	3.4 50	3.5 62	3.8 54	3.9 121	4.0 5	.0 0
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Prepared by McGregor Tan Research (REF: 6750)

7.4 Awareness of CropTest

- 7.4.1 When respondents were asked to indicate whether they were aware of the CropTest package, a total of 40% of all respondents indicated that they were aware of the program.
- 7.4.2 Interestingly, although there is a level of awareness of the CropTest package across the potato industry, this has not translated into significant sales volumes as yet.
- 7.4.3 In light of the feedback on the importance of many current features of CropTest (see 7.3), it would appear that an increased level of awareness of the **features** of the updated CropTest package may in fact assist sales of the product.



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 8: CropTest is a Potato Nutrient Evaluation Tool designed by Norbert Maier for the Potato industry, are you aware of this package?

BASE: If likely to use tool

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Yes	25 11%	0 0%	4 8%	12 27% +++	8 9%	1 20%	0 0%
No	208 89%	38 100%	46 92%	33 73% ---	87 91%	4 80%	0 0%
No. of Respondents	233	12	36	30	150	5	0
Weighted Base	233 100%	38 100%	51 100%	45 100%	96 100%	5 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 9: CropTest is a software package designed to assist potato growers and technical advisors to identify symptoms of nutrient stress, interpret plant test data, and access information on plant nutrition for potato crops. Do you now recall being aware of this package?

BASE: If not aware of package

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Yes	12 6%	3 8%	4 9%	0 0%	4 4%	1 25%	0 0%
No	196 94%	34 92%	42 91%	33 100%	84 96%	3 75%	0 0%
No. of Respondents	209	12	33	22	138	4	0
Weighted Base	209 100%	38 100%	46 100%	33 100%	88 100%	4 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 10: Do you own this package? **If yes:** are you currently using the package?
Single response

BASE: If aware of package

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Own CropTest - using it	6 24%	0 0%	0 0%	4 38%	1 8%	1 100%	0 0%
Own CropTest - not using it	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Don't own CropTest	19 76%	0 0%	4 100%	7 63%	8 92%	0 0%	0 0%
No. of Respondents	25	0	3	8	13	1	0
Weighted Base	25 100%	0 100%	4 100%	12 100%	8 100%	1 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 11: CropTest is a Nutrient Evaluation Tool designed by Norbert Maier for the Potato Industry, are you aware of this package?

BASE: If not likely to use tool

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Yes	10 16%	0 0%	3 25%	4 33%	3 12%	0 0%	0 0%
No	54 84%	13 100%	8 75%	9 67%	24 88%	0 0%	0 0%
No. of Respondents	64	4	8	9	43	0	0
Weighted Base	65 100%	13 100%	11 100%	13 100%	27 100%	0 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 12: CropTest is a software package designed to assist potato growers and agribusinesses to identify symptoms of nutrient stress, interpret plant test data, and access information on plant nutrition for potato crops. Do you now recall being aware of this package?

BASE: If not aware of package

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Yes	4 7%	0 0%	1 17%	1 17%	1 3%	0 0%	0 0%
No	51 93%	13 100%	7 83%	7 83%	24 97%	0 0%	0 0%
No. of Respondents	54	4	6	6	38	0	0
Weighted Base	54 100%	13 100%	8 100%	9 100%	24 100%	0 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

7.5 Likelihood of Using a Nutrient Evaluation Tool

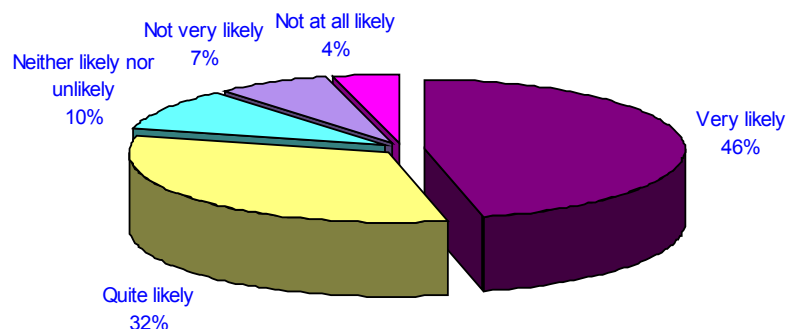
7.5.1 Current sales figures suggest that the CropTest package has been purchased by less than 5% of the potato industry. In contrast, 78% of respondents indicated that would be likely to use a tool to assist them with the nutrient evaluation of potato crops, with almost half (46%) indicating that they would be very likely.

7.5.2 This result is encouraging, as it suggests that approximately three quarters of the potato industry may in fact be likely to use the “right” nutrient evaluation tool.

7.5.3 As might be expected, nine out of ten (91%) service providers indicated that they would be likely to use a nutrient evaluation tool. Among growers, seed growers (92%) most frequently indicated that they would be likely to use a nutrient evaluation tool, with 73% of this group indicating that they would be very likely.

7.5.4 While it is acknowledged that there may be competing products that could also serve as a nutrient evaluation tool for potato crops, this result certainly indicates that a properly promoted and updated version of the CropTest package has the potential to target a large proportion of the potato industry who would be likely to use such a nutrient evaluation tool.

HOW LIKELY WOULD YOU BE TO USE A TOOL TO ASSIST YOU WITH THE NUTRIENT EVALUATION OF POTATO CROPS?

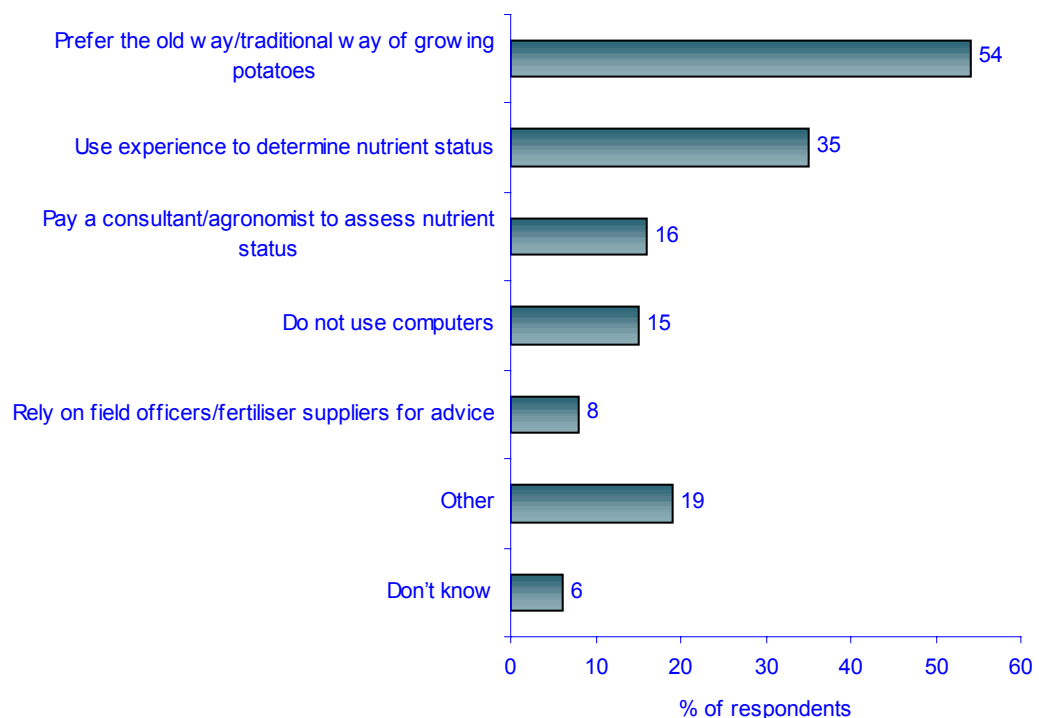


7.5.5 Now looking at those respondents who indicated that they were not likely to use CropTest, when these respondents were read a brief description of the CropTest package, only 6% indicated that they would be likely to use the package.

7.5.6 This result suggests that the mere description of the package is not sufficient to arouse interest among those in the potato industry who indicated that they are not currently likely to use a nutrient evaluation tool.

7.5.7 When respondents that were unlikely to use CropTest were subsequently asked to indicate why, more than half (54%) stated that they prefer the old/traditional way of growing potatoes, while 35% indicated that they use experience to determine nutrient status.

**WHY ARE YOU UNLIKELY TO USE CROPTTEST TO ASSIST WITH
THE NUTRIENT EVALUATION OF POTATO CROPS?
(If not likely to use CropTest n=59)**



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 7: How likely would you be to use a tool to assist you with nutrient evaluation of Potato crops, if one was available, on a scale from 1 to 5 where 5 is very likely and 1 is not at all likely?

Single response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
TOTAL LIKELY	233 78%	73 76%	84 74%	22 78%	33 92% ++	211 77%	22 91%
Very likely	137 46%	34 35% --	57 50%	3 10%	26 73% +++	119 43%	18 77%
Quite likely	96 32%	40 41% ++	27 24% --	19 68%	7 20% -	93 34%	3 15%
Neither likely nor unlikely	30 10%	7 7%	14 12%	6 22%	3 8%	30 11%	0 0%
TOTAL UNLIKELY	34 11%	16 17% +	16 14%	0 0%	0 0%	32 12%	1 6%
Not at all likely	11 4%	7 8% ++	4 4%	0 0%	0 0%	11 4%	0 0%
Not very likely	22 7%	9 9%	12 10%	0 0%	0 0%	21 8%	1 6%
Don't know	1 0%	0 0%	1 1%	0 0%	0 0%	1 0%	1 3%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%
Mean	4.1	3.9	4.1	3.9	4.7	4.0	4.7

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 7: How likely would you be to use a tool to assist you with nutrient evaluation of Potato crops, if one was available, on a scale from 1 to 5 where 5 is very likely and 1 is not at all likely?

Single response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
TOTAL LIKELY	233 78%	38 75%	51 82%	45 77%	96 78%	5 100%	0 0%
Very likely	137 46%	16 31%	23 36%	36 62% ++	61 49%	3 60%	0 0%
Quite likely	96 32%	22 44%	28 45% ++	9 15% --	35 28%	2 40%	0 0%
Neither likely nor unlikely	30 10%	6 13%	7 11%	3 5%	13 11%	0 0%	0 0%
TOTAL UNLIKELY	34 11%	6 13%	4 7%	10 18%	13 10%	0 0%	0 0%
Not at all likely	11 4%	3 6%	0 0%	4 8%	4 3%	0 0%	0 0%
Not very likely	22 7%	3 6%	4 7%	6 10%	9 7%	0 0%	0 0%
Don't know	1 0%	0 0%	0 0%	0 0%	1 1%	0 0%	0 0%
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298 100%	50 100%	62 100%	58 100%	123 100%	5 100%	0 100%
Mean	4.1	3.9	4.1	4.1	4.1	4.6	0.0

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003
Question 13: How likely are you to use the CropTest package?
Single response

BASE: If not likely to use tool

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
TOTAL LIKELY	4 6%	0 0%	4 13%	0 0%	0 0%	4 6%	0 0%
Very likely	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Quite likely	4 6%	0 0%	4 13%	0 0%	0 0%	4 6%	0 0%
Neither likely nor unlikely	10 15%	3 12%	6 21%	0 0%	1 24%	10 16%	0 0%
TOTAL UNLIKELY	47 73%	21 88%	18 61%	6 100%	1 24%	46 73%	1 69%
Not at all likely	21 33%	12 49%	7 22%	3 50%	0 0%	21 34%	0 0%
Not very likely	26 40%	9 38%	12 40%	3 50%	1 24%	25 39%	1 69%
Don't know	3 5%	0 0%	1 4%	0 0%	1 53%	3 4%	1 31%
No. of Respondents	64	15	42	2	3	62	2
Weighted Base	65 100%	23 100%	30 100%	6 100%	3 100%	63 100%	2 100%
Mean	1.9	1.6	2.3	1.5	2.5	1.9	2.0

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003
Question 13: How likely are you to use the CropTest package?
Single response

BASE: If not likely to use tool

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
TOTAL LIKELY	4 6%	0 0%	0 0%	1 11%	3 9%	0 0%	0 0%
Very likely	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%	0 0%
Quite likely	4 6%	0 0%	0 0%	1 11%	3 9%	0 0%	0 0%
Neither likely nor unlikely	10 15%	0 0%	1 13%	1 11%	7 26%	0 0%	0 0%
TOTAL UNLIKELY	47 73%	13 100%	8 75%	10 78%	16 58%	0 0%	0 0%
Not at all likely	21 33%	6 50%	6 50%	3 22%	6 23%	0 0%	0 0%
Not very likely	26 40%	6 50%	3 25%	7 56%	10 35%	0 0%	0 0%
Don't know	3 5%	0 0%	1 13%	0 0%	2 7%	0 0%	0 0%
No. of Respondents	64	4	8	9	43	0	0
Weighted Base	65	13	11	13	27	0	0
	100%	100%	100%	100%	100%	100%	100%
Mean	1.9	1.5	1.6	2.1	2.2	0.0	0.0

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003
**Question 14: Why are you unlikely to use CropTest to assist with the nutrient evaluation of Potato crops?
Unprompted, multiple response**

BASE: If not likely to use crop test

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Prefer the old way/ traditional way of growing potatoes	33 54%	18 76%	12 45%	3 50%	0 0%	33 56%	0 0%
Use experience to determine nutrient status	21 35%	14 59%	8 29%	0 0%	0 0%	21 37%	0 0%
Pay a consultant/ agronomist to assess nutrient status	9 16%	3 13%	5 20%	0 0%	1 53%	9 16%	0 0%
Rely on field officers/ fertilizer suppliers for advice	5 8%	3 13%	2 7%	0 0%	0 0%	5 8%	0 0%
Do not use computers	9 15%	1 3%	4 15%	3 50%	1 24%	8 14%	1 31%
Other	12 19%	8 35%	2 7%	0 0%	0 0%	10 17%	1 69%
Don't know	4 6%	0 0%	3 12%	0 0%	1 24%	4 7%	0 0%
No. of Respondents	59	15	37	2	3	57	2
Weighted Base	61 100%	23 100%	26 100%	6 100%	3 100%	58 100%	2 100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003
**Question 14: Why are you unlikely to use CropTest to assist with the nutrient evaluation of Potato crops?
Unprompted, multiple response**

BASE: If not likely to use crop test

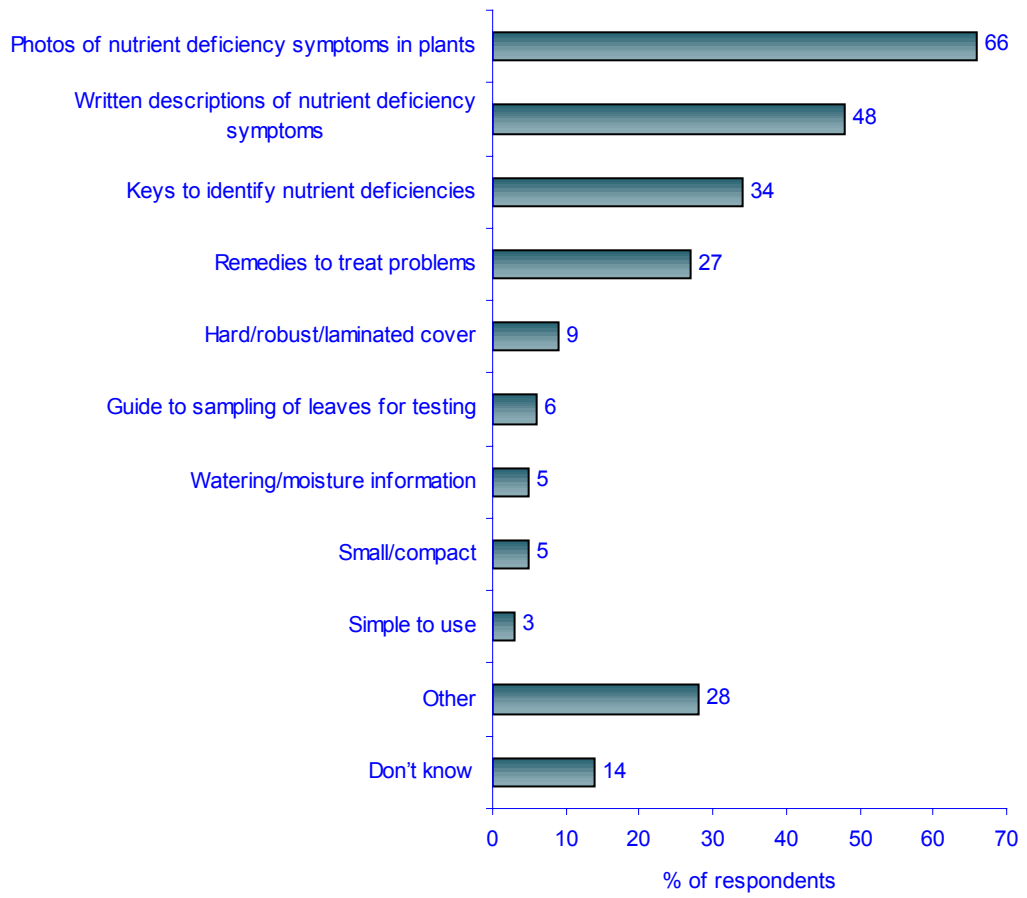
	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Prefer the old way/ traditional way of growing potatoes	33 54%	9 75%	6 50%	9 75%	9 36%	0 0%	0 0%
Use experience to determine nutrient status	21 35%	3 25%	7 63%	7 63%	4 15%	0 0%	0 0%
Pay a consultant/ agronomist to assess nutrient status	9 16%	0 0%	1 13%	3 25%	5 21%	0 0%	0 0%
Rely on field officers/ fertilizer suppliers for advice	5 8%	0 0%	0 0%	3 25%	2 8%	0 0%	0 0%
Do not use computers	9 15%	3 25%	0 0%	0 0%	6 23%	0 0%	0 0%
Other	12 19%	6 50%	3 25%	0 0%	3 10%	0 0%	0 0%
Don't know	4 6%	0 0%	0 0%	0 0%	4 15%	0 0%	0 0%
No. of Respondents	59	4	8	8	39	0	0
Weighted Base	61	13	11	12	25	0	0
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

7.6 Nutrient Evaluation Field Handbook

- 7.6.1 One of the suggestions made by those interviewed during the qualitative research was that the plant analysis and interpretation manual could be taken “into the paddock”, and “kept in the ute” (see 5.4). During this initial stage of the research, the need for this information to be presented in a “field handbook” was identified (see 5.1.8). This concept was subsequently tested in the quantitative telephone survey to determine what features a field handbook should possess.
- 7.6.2 As might be expected, the most commonly mentioned features that a potato nutrient field handbook could possess were photos of nutrient deficiency symptoms in plants (66%), and written descriptions of these symptoms (48%).
- 7.6.3 Interestingly, one third (34%) of respondents indicated that such a handbook should contain keys to identify nutrient deficiencies where multiple symptoms could be investigated to narrow the possible causes of the symptoms down to a few possibilities. More in depth feedback from the qualitative research on this issue suggests that it is important to include a mention of other possible causes of these symptoms that are not nutrient related.
- 7.6.4 The inclusion of remedies to subsequently treat the problems that have been diagnosed was also suggested by 27% of respondents as a way to put diagnosis into action.
- 7.6.5 Some respondents interviewed also suggested that a nutrient evaluation field handbook should have a robust laminated cover (9%) and be compact in size (5%). Verbatim responses to this question suggest that a guide that fits into a glovebox would be preferable.

NUTRIENT EVALUATION FIELD HANDBOOK FEATURES
(n=297)



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 15: If you were to design a field handbook to assist with nutrient evaluation that you could take into the paddock, what features and information would it contain?

Unprompted, multiple response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
Photos of nutrient deficiency symptoms in plants	197 66%	66 69%	60 53% ---	22 78%	28 79% +	176 64%	21 89%
Written descriptions of nutrient deficiency symptoms	142 48%	44 46%	51 45%	14 50%	15 42%	124 45%	18 74%
Keys to identify nutrient deficiencies	102 34%	30 31%	44 39%	5 19%	15 43%	95 35%	7 30%
Remedies to treat problems	82 27%	33 35% +	29 25%	6 22%	7 20%	76 28%	6 26%
Hard/ robust / laminated cover	28 9%	6 6%	14 12%	3 11%	3 8%	25 9%	3 12%
Guide to sampling of leaves for testing	16 6%	7 7%	6 5%	0 0%	3 8%	16 6%	1 3%
Small/ compact	15 5%	1 2%	7 7%	3 11%	3 8%	15 5%	0 0%
Simple to use	9 3%	0 0%	2 2%	0 0%	6 17% +++	8 3%	1 6%
Watering/ moisture information	14 5%	3 3%	10 9% ++	0 0%	0 0%	13 5%	1 4%
Other	82 28%	31 32%	30 26%	5 19%	11 32%	77 28%	5 22%
Don't know	40 14%	14 15%	20 18%	3 12%	1 4% -	39 14%	1 5%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%

Prepared by McGregor Tan Research (REF: 6750)

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 15: If you were to design a field handbook to assist with nutrient evaluation that you could take into the paddock, what features and information would it contain?

Unprompted, multiple response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
Photos of nutrient deficiency symptoms in plants	197 66%	38 75%	48 77% +	40 69%	67 54% ---	5 100%	0 0%
Written descriptions of nutrient deficiency symptoms	142 48%	22 44%	32 52%	28 49%	54 44%	5 100%	0 0%
Keys to identify nutrient deficiencies	102 34%	3 6%	20 32%	30 51% +++	48 39%	1 20%	0 0%
Remedies to treat problems	82 27%	9 19%	17 27%	24 41% ++	32 26%	0 0%	0 0%
Hard/ robust / laminated cover	28 9%	3 6%	6 9%	7 13%	12 10%	0 0%	0 0%
Guide to sampling of leaves for testing	16 6%	0 0%	6 9%	4 8%	6 5%	0 0%	0 0%
Small/ compact	15 5%	3 6%	0 0%	6 10% +	6 5%	0 0%	0 0%
Simple to use	9 3%	3 6%	0 0%	3 5%	3 3%	0 0%	0 0%
Watering/ moisture information	14 5%	0 0%	3 5%	1 3%	8 7%	1 20%	0 0%
Other	82 28%	13 25%	18 30%	16 28%	33 27%	2 40%	0 0%
Don't know	40 14%	9 19%	7 11%	3 5% -	21 17%	0 0%	0 0%
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298 100%	50 100%	62 100%	58 100%	123 100%	5 100%	0 100%

Prepared by McGregor Tan Research (REF: 6750)

Section 8

Promotion of CropTest

This section outlines guidelines for promotion of the CropTest Nutrient Evaluation System.

8.1 Qualitative Feedback

8.1.1 When asked about how the package should be promoted, many of those interviewed suggested Eyes on Potatoes, Potato Australia and local state potato literature as media that could get the initial message to the industry. Other ways of getting the message out to the potato industry were also suggested, such as:

- Potato industry field days
- Growers meetings/workshops and growers associations
- State Farmers Federations
- Horticulture agents/inspectors
- Promoting through the washing sheds
- Fertiliser companies
- Website promotion – should be found when searching for farming software or potato software

8.1.2 There was also a clear consensus among purchasers interviewed that the promotion of the package should extend beyond presentations and editorials. The importance of training was raised by many interviewed:

“Go to conferences and ... actually give people some training.” – purchaser consultant

8.1.3 Purchaser growers, in particular, suggested that small group, or one-on-one training should be utilised to get users familiar with the package:

“Unquestionably the way to handle it would be ... to get a group of growers together. Hands on, talk to the neighbour, I think that’s the only way.” – purchaser grower

“Go out to grower meetings and present it at grower level ... give them the opportunity at that level to see what it can do and what information they can get from it.” – purchaser consultant

8.1.4 When questioned about what types of messages should be put forward to the industry, purchasers interviewed suggested emphasising:

“The ability to quickly take into account regional and varietal differences.” – purchaser grower

“Stress the ease of import (of test results) as a feature.” – purchaser consultant

“The potential for loss of yield ... if you don’t have everything in adequate supply, and say that this program at X cost could really pay for itself very easily.” – purchaser consultant

“Most importantly easy use system for growers ... because there are a few growers who are a bit dubious...they have tried this one, tried that one and it doesn’t work, it’s a bit hard on using. It must be easy use.” – purchaser consultant

“The importance of nutrient management in yield and quality of potatoes... If you don’t get your fertiliser management right, you can cost yourself thousands of dollars.” – purchaser researcher

“...the grower would like it because it is impartial, they’re very suspicious of fertiliser companies that do plant testing and come back with their own recommendations.” – purchaser consultant

“One of the great features of CropTest is that its got this educational capacity which really empowers the farmer ... a lot of farmers who haven’t gone on to higher study can learn a lot about it, and not be snowballed into using excess fertiliser by salesmen.” – purchaser researcher

“From a grower point of view, nutrition is probably their number one priority ... because it’s the easiest one for them to change.” – purchaser consultant

8.1.5 The types of messages that software trial participants suggested should be put forward to industry are as follows:

“Its very useful to keep records of your crops, and you can take the manual with you.” – software trial grower

“Streamline your farming.” – software trial grower

“I’ve got a new insight into what I’m doing.” – software trial grower

“We’ve got rid of our consultant and we use CropTest.” – software trial grower

“All you need to know about potatoes, you can pick a leaf, go home and match it to the photos.” – software trial consultant

“You can get more consistent yields, and potentially use less fertiliser to reduce costs.” – software trial consultant

“It’s a quality information resource that you can trust.” – software trial consultant

“It’s past experience, all bundled up in a computer program, a son would be able to gain from this what it has taken me 30 years to learn.” – software trial grower

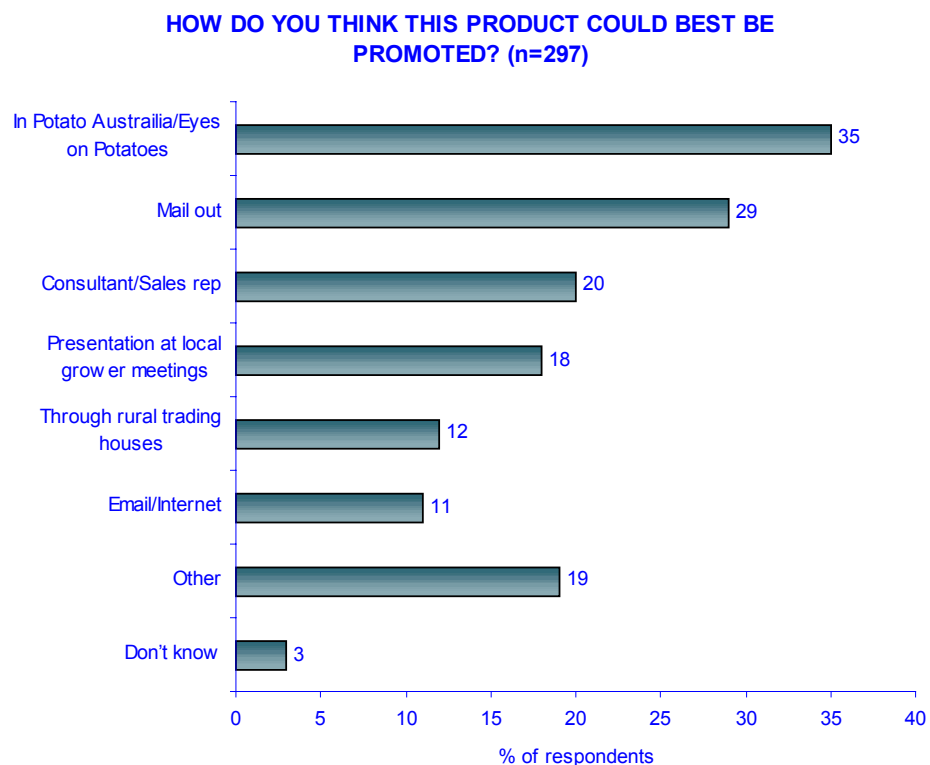
“You get your best results with regular side-dressing and foliars by far, rather than relying on lump sums. The smaller the beginning, and the more you spread through the crop’s demand periods, the better we are.” – software trial consultant

8.2 *Quantitative Feedback*

8.2.1 Consistent with the feedback received during the qualitative research (see 8.1), respondents most frequently (35%) nominated Potato Australia and Eyes on Potatoes as media that should be utilised to promote the CropTest package. One in three (29%) also suggested a mail out would be the best way to promote the product.

8.2.2 Interestingly, many of those interviewed suggested more personal approaches to promoting the CropTest package. One in five (20%) respondents felt that the program could best be promoted through consultants and sales representatives in the potato industry, while 18% suggested that the product should be presented at local grower meetings.

8.2.3 More than one third (35%) of service providers felt that consultants and sales representatives could best promote the CropTest package to growers and the industry generally. This approach to promotion was also mentioned frequently respondents from South Australia (36%), and Tasmania (27%).



CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 17: How do you think this product could be best promoted to growers and the industry generally?
Unprompted, multiple response

	MARKET GROW MAJORITY OF POTATOES FOR					ROLE IN INDUSTRY	
	Total	Washed	French Fry	Crisping	Seed	Grower	Service Provider
In Potato Australia/ Eyes on Potatoes	105 35%	38 40%	23 20% ---	19 69%	12 33%	92 34%	13 54%
Mail Out	87 29%	30 31%	43 38% +++	5 16%	8 22%	85 31%	1 6%
Consultant/ Agronomist/ Sales Representative	60 20%	12 12% --	31 28% ++	1 2%	8 23%	52 19%	8 35%
Presentation at local grower meetings	55 18%	17 17%	23 20%	5 16%	5 14%	49 18%	5 21%
Through rural trading houses (e.g. Wesfarmers, Serve Ag, Elders etc)	36 12%	12 12%	15 13%	2 7%	5 13%	33 12%	3 11%
Email/ Internet	33 11%	15 16%	11 10%	3 11%	0 0%	29 11%	4 16%
Local paper	20 7%	3 4%	9 8%	1 2%	2 6%	15 6%	5 22%
Through the Dept of Ag	16 5%	3 4%	7 6%	3 11%	1 4%	15 6%	1 3%
In Good Fruit and Vegetables/ National Marketplace News	13 4%	3 3%	3 3%	2 7%	5 13% +++	13 5%	0 0%
Field days	12 4%	0 0%	3 3%	0 0%	3 9%	6 2%	5 22%
Through processing company	20 7%	5 5%	10 9%	1 5%	3 9%	19 7%	1 3%
Other	57 19%	22 22%	19 16%	2 8%	8 24%	51 19%	6 27%
Don't know	10 3%	6 6% +	4 3%	0 0%	0 0%	10 3%	0 0%
No. of Respondents	297	61	164	14	36	275	22
Weighted Base	298	97	114	28	35	274	24
	100%	100%	100%	100%	100%	100%	100%

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

Question 17: How do you think this product could be best promoted to growers and the industry generally?
Unprompted, multiple response

	STATE						
	Total	NSW	QLD	SA	TAS	VIC	WA
In Potato Australia/ Eyes on Potatoes	105 35%	34 69%	23 36%	24 41%	21 17%	3 60%	0 0%

Mail Out	87 29%	13 25%	18 30%	13 23%	43 35%	0 0%	0 0%
					+		
Consultant/ Agronomist/ Sales Representative	60 20%	0 0%	6 9%	21 36%	34 27%	0 0%	0 0%
			--	+++	++		
Presentation at local grower meetings	55 18%	6 13%	6 9%	10 18%	29 24%	3 60%	0 0%
			-		+		
Through rural trading houses (e.g. Wesfarmers, Serve Ag, Elders etc)	36 12%	3 6%	6 9%	9 15%	18 15%	0 0%	0 0%
Email/ Internet	33 11%	6 13%	7 11%	7 13%	11 9%	1 20%	0 0%
Local paper	20 7%	0 0%	4 7%	3 5%	12 10%	1 20%	0 0%
Through the Dept of Ag	16 5%	3 6%	3 5%	1 3%	8 7%	0 0%	0 0%
In Good Fruit and Vegetables/ National Marketplace News	13 4%	3 6%	3 5%	4 8%	3 2%	0 0%	0 0%
					-		
Field days	12 4%	3 6%	0 0%	3 5%	4 4%	1 20%	0 0%
Through processing company	20 7%	3 6%	3 5%	0 0%	14 11%	0 0%	0 0%
					++		
Other	57 19%	3 6%	18 30%	16 28%	18 15%	1 20%	0 0%
			++	+			
Don't know	10 3%	0 0%	4 7%	1 3%	4 3%	0 0%	0 0%
			+				
No. of Respondents	297	16	44	39	193	5	0
Weighted Base	298	50	62	58	123	5	0
	100%	100%	100%	100%	100%	100%	100%

***Appendix 1:
About The Research***

How We Did The Research

To assess the viability of repackaging the CropTest program, McGregor Tan Research undertook a comprehensive study to examine the needs of the potato industry for such a product.

The first component of the qualitative research into the use of the product was a series of 10 structured depth interviews:

- Current users of CropTest – non farmers such as fertiliser companies and consulting firms
- Current users of CropTest - potato farmers

The second stage of the qualitative research was a software trial with a sample of 12 potato farmers (and service providers) who are not using the product.

- These participants were sent a copy of the software to trial it, and were asked to provide their opinions via a telephone interview at the end of a 2 week trial period.
- We targeted a sample of users who had access to different Windows operating systems, ranging from Windows 95 to Windows XP.

Following on from the qualitative research, we conducted a telephone survey of the market. This telephone survey included responses from growers in Queensland, Tasmania, South Australia, and New South Wales. Potato industry service providers were also interviewed across these states and Victoria.

308 interviews were conducted in total, however 11 interviews from Queensland had to be removed from the sample when it was discovered that the main variety of potato grown was in fact a sweet potato variety.

In order to ensure that the responses to the survey were proportionally representative across each of the states, the data was re-weighted to reflect the distribution of growers resident in each state surveyed.

Who was involved

Gender and Age – Total Sample

Sample characteristics - Gender and Age	No. of respondents (unweighted)	% of respondents (unweighted)	No. of respondents (weighted)	% of respondents (weighted)
Males	266	90	272	91
Females	31	10	26	9
Age groups:				
18-24	0	0	0	0
25-30	15	5	16	5
31-39	58	20	58	19
40-54	148	50	145	49
55-64	54	18	52	17
65+	22	7	28	9
Growers	275	93	274	92
Service Providers	22	7	24	8
Total sample	297	100	298	100

Industry Experience – Total Sample

Sample characteristics – Experience in Industry	No. of respondents (unweighted)	% of respondents (unweighted)	No. of respondents (weighted)	% of respondents (weighted)
Less than 5 yrs	43	14	37	12
6-10 yrs	32	11	33	11
11-15 yrs	53	18	50	17
16-20 yrs	46	15	39	13
21-25 yrs	28	9	27	9
More than 25 yrs	95	32	112	38
Total sample	297	100	298	100

Region – Total Sample

Please Note: The following contains regional information from the entire sample, interviews conducted with service providers are therefore also included.

Sample characteristics – Region	No. of respondents (unweighted)	% of respondents (unweighted)	No. of respondents (weighted)	% of respondents (weighted)
TOTAL TASMANIA	193	65	123	41
North West	154	52	98	33
Central/Midlands	20	7	13	4
North East	9	3	6	2
Southern	7	2	4	1
Other	4	1	3	1
TOTAL QUEENSLAND	44	15	62	21
Southern	22	7	31	10
Atherton Tablelands	6	2	8	3
Bundaberg	6	2	8	3
Other	10	3	14	5
TOTAL SOUTH AUSTRALIA	39	13	58	19
South East	11	4	16	5
Adelaide Hills	10	3	15	5
Virginia	6	2	9	3
Riverland	3	1	4	1
Mallee	3	1	4	1
Other	6	2	9	3
TOTAL NEW SOUTH WALES	16	5	50	17
Northern Highlands	4	1	13	4
Riverina	3	1	9	3
Southern Highlands	3	1	9	3
Other	6	2	19	6
TOTAL VICTORIA	5	2	5	2
Wimmera/Mallee	3	1	3	1
Gippsland	1	0	1	0
Western Districts	1	0	1	0
TOTAL WESTERN AUSTRALIA	0	0	0	0
Total sample	297	100	298	100

Potato Grower Characteristics – Market/Variety

Sample characteristics – <u>market for potatoes</u>	No. of respondents (unweighted)	% of growers (unweighted)	No. of respondents (weighted)	% of growers (weighted)
Washed	61	22	97	35
French Fry	164	60	114	42
Crisping	14	5	28	10
Seed	36	13	35	13
Total sample – growers only	275	100	274	100

Sample characteristics – <u>main variety grown</u>	No. of respondents (unweighted)	% of growers (unweighted)	No. of respondents (weighted)	% of growers (weighted)
Russett Burbank	181	66	119	43
Sebago	44	16	81	30
Ranger Russett	40	15	26	10
Coliban	23	8	41	15
Desiree	22	8	31	11
Kennebeck	18	7	17	6
Shepody	17	6	18	7
Atlantic	15	5	33	12
Nadine	12	4	18	6
Ruby Lou	7	3	12	4
Pontiac	5	2	8	3
Other	37	13	54	20
Total sample – growers only	275	100	274	100

***Appendix 2:
Additional Comments***

This section lists the responses, made by individual interviewees, which did not fit within the coded responses. Each is a single response, except where specified by a number of respondents shown in brackets.

These comments are included for completeness, but always remember they are minor responses, negligible in relation to the main, coded data. *In other words, remember that these are generally isolated comments, providing flavour but not constituting the main ingredients.*

CROPTEST QUANTITATIVE TELEPHONE SURVEY - SEPTEMBER 2003

***Question 1: Can you tell me how you currently assess the nutrient status of your
Potato crop?***

Agronomist

Agronomist.

All Testing Done Externally, Pay Consultant To Look After All Testing And Checking Of Crops

Ash Testing, Water Level Testing (Simplot Do It For Us)

Bric Test

Consultant Does All The Testing For Me

Don't Test And Rely On Instincts

Don't Test At All

Dry Ash Test

Gopher Testing (Water Testing

History Of Paddock From My Own Records Ie See What's Been Grown In The Paddock And What's Been Required Like Nutrient Deficiency Or Specific Potatoes Grown

I Use A Set Programme After Planting.

Local Fertiliser Companies

Look At Previous Yields.

Own Experience In Growing

Paddock History

Plant Them Then Leave It To Nature

Trying Different Fertilisers

Tuba Analysis

Tuber And Top Inspection.

Water Monitors To Gauge Stress Levels.

Question 2: Do you test the soil prior to planting every Potato crop? If no, How often would you test the soil?

It Varies Depending On The Paddock, We Rotate Crops
Once Per Year
Only Test The Soil Every 5 Years Or So/
Only Test If Necessary If Things Dont Look Right.
Test The Soil Once A Year About 4 Or 5 Months Before The Crop

Question 4: Do you seek information about nutrients or Potato crop nutrition?

Fruit And Vegetable News Qld.
Agriculture Suppliers
Field Days
Going To Seminars And Experimenting With Nutrismart Aust P/L.. Fruit And Veggie News
Good Fruit And Veg, Magazine And Potatoes Australian Magazine And An American Magazine D/K Name/
And Horticultural Field Days
Horticulture Aust.
I Am Given Specific Guidelines Re Nutrition By The Company I Contract To Grow My Potatoes For, I Have No
Need To Get Further Information.
In House Research Department , The Internet
In House Research Lab
Internet Or Qfvg Fruit And Veg News
Journal Of Plant Nutrient, American Plant Journal, European Journals
Just uses the information from the soil sample
Leigh Walters Who Directs Us To The Appropriate Industry
Local Potato Grower Group
Package Called Potato Starter Pack (Designed By South Australian Scientist) Software Package
Pamphlets
Potato Grower & Spud Man Magazines From America
Potato Journal From America (Magazine) Internet Specific From Unis In America
Qfvg
Qfvg And Gatton Field Days
Qld Fruit And Veggie News Magazine
Rely On Original Testing Done By Fertiliser Companies And The Ensuing Combination Of Recommendations.
Rely On our Own Experience
Tascountry And Weekly Times And Tas. Horticultural Paper
Universities In America(Idaho, Dakota, Oregon & Washington State)And Local Uni's In Tasmania
University Papers
University Papers Publications

University Researchers

Use My Own Experience

Via Roberts Who Does Leaf Test.

Victorian Crop Health

We Send The Soil To Electolic Company To Test Our Soil- Then They Send A Report Back To Us

Weekly Times By The Fairfax Co

Workshops

Question 6: Thinking about crop nutrient evaluation, if you were to design the ultimate tool to assist you in this task, what features would it possess?

24 Hour Computised Constant Readings Of The Plant.

A Small Kit (Like A Swimming Pool Testing Kit) That Could Be Done On The Field. Testubes Type Vessels That You Pour Solution Into And Cut A Slither Of Potato That Could Be Dipped Into Solution ,And Corresponding Strip Of Indicator Paper To Be Able To Give Instant Results In The Paddock

Accuracy

Accuracy And Ease Of Being Able To Understand It And The Results That It Gives.

Align With Standards Or Benchmarks. Water Inputs & Rainwater ,Fertiliser Inputs What's Been Applied & Yield & Quality Parameters

Any Kind Of Disease To Look For In A Leaf

Because Of My Soil Type ,I Would Need To See Practical Examples Of Benefits To The Soil . I Have Yet To See Any Additives Which Have Been Advantageous

Charts Of Growing Stages Of When Deficiency Is Likely To Occur.

Cheap And Easy To Use /.

Computer Disc ,Up To Date Internet Site

Constant Monitoring Of The Paddock On The Computer

Constant Updates Which Could Give You Readouts Throughout The Life Of The Plants As Far Testing Nutrients And Health Of A Cross Section Of Plants

Correct Amount Of Moisture Needed .. Crop Needs To Be Of Marketable Appearance

Correct Fertiliser Or Ph Balance.

Correctability Of Nutrients And Deficiencies. Ease Of Use And Understanding For The Farmers

Dont Believe I Need A Tool As Have 30 Yrs Experience In Growing Crops

Dry Ash Testing (As Long As They Keep Improving The Testing Procedure

Dry Ash Testing.

Ease Of Operation

EXPERIENCE

Extensive Fertiliser Requirements.

Field Officer - From Processing Company Should Be Responsible For All Testing Of Crops

Getting A Product That Is Genetically Modified To Eliminate The Problems. Having The Seed That Is Up To Scratch.

Good Dry Ash Test

Graph Form To See Where Plant Nutrients Are

Growth For Amount Of Growing Time

HAND HELD ON THE SPOT ANALYSIS THAT WOULD DOWNLOAD STRAIGHT ON TO A LAP TOP COMPUTER TO ASSESS LEAF ANALYSIS

Have Water Charts Available As Most Growers Are Moisture Readers Called Gibson Block

Historical Data Attached

History Of Soil Testing . Soil Health And Records So You Can Refer Back To Last Years Results For Comparison...Managing Soil Health And Then Fine Tune From There. Soil Moisture Needs To Be Constant To Be Able To Keep Nutrient Levels Under Control.

How To Predict The Weather As This Is So Important.

In Graph / Charts Form Easy To Interpret

Information On Irrigation Requirements Specifically For Regions

Instant Leaf Evaluation Of The Plant Showing Levels Of Nutrients.

Interpretation Of Nutrient Status Needs At Different Growth Stages

It Comes Down To Hands On Experience In The Industry Rather Than Relying Too Much On Other Tools.

It Would Have To Be Anything That Would Help Prior To The Crop Being Planted

Just Something That Is Comprehensive And Complete Ie Maybe The Agronomy Of The Crop.

Local Experience/History Is Critical

More Information From Analysis Currently Done Sometimes Results Are Stated But With No Real Explanation, Sometimes Can Be Technical

No Ultimate Tool Just Comes Down To Experience.

Not Interested

Portable To Take To The Field , Give Immediate Results

Reasonable cost of the tool

Remedies To Correct Deficiencies In Trace Elements

Scale Of Deficiency And How To Remedy It

Show Anything Lacking In The Tuber Or Plant As Well As Nutrient And Water

Simple Quick Reference Chart

Simplicity. Easy To Understand At A Glance

Some Charts Go For Pages, So Keep It Simple Try To Limit A Chart To One Page, Keep Language Easy To Understand

Something That Gives You An Immediate Diagnosis If Something Was Wrong Or Out Of Balance With The Crop- The Current Tools Are Too Slow By The Time You Get The Results It Is Too Late To Correct The Problem

Something That Could Give Me Rainfall And Weather Implications. Indications Of How It Affects My Crop

Something That Is Easy To Understanding, Accurate & That Can Used Weekly

Something That You Could Do Yourself On The Farm Ie A Program That You Could Yourself On Computer And Enter Relevant Data Like Rainfall Charts Etc.

Something To Allow For Different Yields Of Crops. Clear And Concise And Easy To Use. Coloured Graphs For Different Yielding Crops.

Testing Needs To Be Affordable & Simple So More Testing Can Occur Through Growing Seasons

Testing That You Could Do At Home

The History Of Specific Paddocks

The Irrigation Times Are Very Important Digging At The Right Time

The Ratios Correct For Good Cooking Quality, Exchangeable Cations

The Right Amount Of What The Potato Crop Requires For Its Growing And Vitality And Longevity For The Potato Plant During Its Growing Time

Types Of Soils. Toxicity And Lack Of Nutrients.

Very Simple To Use And Not Take Hours To Use

Water Levels In Soil, Stage Of Plant Growth Is At What Stage Is Nutrient Required

Way Of Predicting The Way Nutrient Is Going To Go . Something Closer To Home And With Quicker Results. We Are Reactive Rather Than Proactive At Present

When Lab Test Results Are Mailed Back , Should Also Have Recommendations Of How To Address The Problems, Rather Than As Is Now Chasing Someone To Interpret Results & Offer Steps To Be Taken To Fix Problems

When Soil Tests Are Done They Need To Be Done 12 Months Prior To Planting, As Soil Tests Done 3 Months Before Planting Is Too Late Any Problems Cant Be Fixed. Have A Laid Out Strategy Like A Plan Or Map For Long Term. Have Guidelines Or Maps /Charts For Growers To Advise Them When Soil Testing Should Be Done.

Would Need A Better Variety Of Potatoes To Grow

Yield Performance And Quality Performance

Question 14: Why are you unlikely to use CropTest to assist with the nutrient evaluation of Potato crops?

Believe That It Would Be Impossible To Design To Tool As Each State & Region Is Very Different Re Soil Types And Water Requirements

Cant Read.

Cost

Depends On Cost

Dont Have The Time As We Already Have Too Much Work To Due To Lack Of Workers Wanting To Work In The Country.

I Need To Keep The Size Of My Potatoes Down As I Am Not Striving For Size Like Other Growers. I Want Nothing Larger Than An Orange So Nutrient Addition Is Not So Important.

Need To Look At It First. Hard To See That It Would Be Beneficial.

The Diagnostic Pictures Are Very Confusing Dont Look Like The Symptoms That The Plants Actually Exhibit,

Question 15: If you were to design a field handbook to assist with nutrient evaluation that you could take into the paddock, what features and information would it contain?

A Book Which Will Keep Records For Several Years Even Rainfall

A clear index to look up things quickly

A Handbook Would Not Be Of Much Use To Me If The Plant Was Showing Some Deficiency You Would Have To Know Before Obvious Symptoms To Rectify The Problem

A Place To Keep The HISTORY OF THE PADDOCK

A Place To Write Down Every Single Thing Relating To The Potatoes, Soil/Weather/Winds Etc If A Potato Has A good Variable Diet Every Problem Can Be Traced Back To Conditions

Actual Diseases In Picture Form And A Description.

Be Kept Simple And Easy To Read & Interpret

Cant See How That Could Be Presented In A Book As The Early Detection Signs Would Be Hard To Detect Or Identify In Book As Then It Would Be Too Late.

Charts that show moisture in the ground

Chemicals That You Could Use

Chocolate Spot (Diseases)

Coloured grafts

Crop History. Ie Fertiliser And Sprays Used

Crop Stage Graph, Also To Have Aid Or Guidelines To Look For Problems Before They Become Major Problems

Cross Reference Chart . Standard Levels Of Nutrition For Pots. Trace Elements Per Hectare . Crop Needs Per Season.

Description And Photos Of Diseases And Pests Presenting With Similar Symptoms

Different Products Available From Different Companies

Different Stages Of The Crop Development And Weather Effects On The Crops. Wind Damage Also

Disease Symptoms . Small Booklet ..That Is Serviceable

Drawings And Clear Pictures Of Leaf Structures And Pests And There Effects Ie End Results.

Early Onset Of Disease. Show The Difference Between Disease And Deficiency, Weather Report/Patterns And Weather Related Problems.

Explanatory notes on how to use the guide

Flow Charts To Be Able To Follow A Sequence For Treatment. Small Booklet

General Appearance Colour Of The Crop Is Very Important- If We Are Comparing Potato Plant We Need To Have The Time That The Photos Are Taken And The Temperature Are Very Important

Growth Stage Of The Plant & What's Required Nutrient & Water

Growth Stages Of The Plants. Large Print

Have Ability To Place Charts In From Previous Years

Have Handbooks Specific For Different Regions Like Soil Types And What Advantages Different Testing Relates To Different Regions

How Much Fertiliser To Put On A Crop- Always Make Sure That The Crop Is Never Too Dry- Water Is Very Important

I Don't Need A Handbook In The Field

I Rely On An Agronomist

I Would Have All The Details In There To Identify The Problems With Potatoes When Growing/

I Would Not Bother With It

Identification Of Different Insects And Diseases That Affect The Plant

illustrations of diseases

Information On Diseases That Effect Crops. Plus Pictures And Description Of What The Crop Should Look Like Week By Week

Information On How Different Nutrients Relate To Each Other, Sometimes A Specific Type Of Nutrient May Not Be Able To Be Used With Another Type

It Would Be To Difficult To Have The Right Information A Book Best Left To An Agronomist. It Comes Down To Experience In The Industry That Helps Identify Systems As Well As Solid Tests.

It Would Have Very Practical Concise Details In There-

It would need to be specific for each variety of spud

Key To Identifying Diseases As Opposed To Nutrient Deficiencies.

List Different Diseases

List Of All Products Available (Not Just One Companies)To Treat A Range Of Common Problems

Local History Of Paddock.

Lots Of Scales Showing High, Medium, Low Levels.

Moisture Levels Of Soil, Previous Crop History

Moisture Levels On The Plant

Most Of What We Do Now Is By Visual Inspection And Experience In The Industry

Need To Record The Conditions Of The Soil- And The Plant At Growing Stages-Water Merges- Weed Control

Needs To Be Focused Locally As Different Regions Have Different Soil & Climate Conditions

Not A Great Fan Of Visual Things Like Books Or Brochures As They Can Be Deceiving When Actually Looking At The Plant Or Leaf Trying To Determine Causes For Problems

Nothing Comes To Mind As Selwyn Has Been Growing Spuds For Over 20 Years And Has Natural Instinct On When And What To Plant

Nutritional Requirements During The Development Stages Of The Plant. Case Studies.

Only If The Handbook Was Specific To A Region

Paddock History And Soil Testing And Leaf Testing

Pest Identification And Diseases In An Easy Pocket Book

Photos Of The Pests

Pictures And Or Descriptions Of Insects Which Are Likely To Affect The Crop

Range Of Trace Elements For Eg If Pot Ash Needs To Be Within A Range Of 3to5 Or Nitrogen Of 4 To 6

Simple And Easy To Use. Descriptions Of Diseases And Pests. Remedies.

Simple To Use

Small Booklet And Simple To Understand .What Fertilisers Are Available And What Percentage Of Nutrients Are In Each Of Them.

Small Cardboard Chart Which Has A Spin Cover To Enable Results To Be Matched To Appropriated Information, Plus Telephone Numbers Of People To Contact For Advise

Small In Size To Carry. Must Have Clear Coloured Pictures.

Soil And Water Quality/

Soil Identifier As Different Soils Have Different Nutrient Problems Ie A Cross Reference

Some Leaf Deformities Don't Always Affect The Crop So We Need To Be Able To Distinguish Bet Those

Something That You Could Use And Test There And Then In The Paddock.

Specific Information Rather Than Generalised Ie One Specifically For Qld. Products That Have Been Deemed To Work For Specific Problems Ie Iron Deficiency.

Stalk Identification. Leaf Colouring. Insects Responsible For Infestation Ie Extensive Info To Cover Every Problem

Standard Graphs For Different Nutrients. Table To Record Results In. A Timeline Table To Look At For Certain Stages Of Crop Growing. Somewhere To Record Rainfall And Irrigation Applied. Soil Moisture Monitoring Data. A List Of Registered Chemicals To Use On Potato Crops Which Should Be Updated Regularly

Suggested Costing For Remedy Per Acre

The Critical Timing Of Finding Problems Without Damaging The Quality Of Potatoes , Eg Trying To Rectify Problems In Time Without Compromising Potato Tuber Quality , To Prevent Getting Hollow Potatoes

The Times For Spraying- Times For Fertiliser And How Much - The Right Amount Of Irrigation

Think There's Enough Books Around , They Just Tend To Sit In The Glove Box Of The Ute

Time For Tests To Be Done .. As Far Progress /Age Of The Crop Is Concerned. How Long It Takes To Do And Applications And Remedies

Toxicity Guide Eg Too Much Sodium , Chloride Etc

Various Fertiliser Info

Watering And Fertigation Program.

What A Healthy Plant Looks Like At Certain Stages As Apposed To A Nutrient Deficient Plant Looks Like

Would Recognise The Variety Being Grown

You Have To Be Able To Do The Sap Test Of The Leaves To Be Sure So I Would Like To Be Able To Interpret The Data And Remedy The Problem Myself

Question 17: How do you think this product could be best promoted to growers and the industry generally?

A Newsletter Especially Designed For Potato Growers

ABC Country Hour (Radio)

All Farmers Listen To The News And Weather Reports ..So On The Radio

An Expert That Could Set The Farmers Up In Using It And Most Importantly To Monitor Their Progress With Handling It.

Circular In The Qfvg

Courses Run Specifically For The Tool

Data On How To Access The Info. On The Computer

Demonstrations If Possible Directly To The Farmers.

Face To Face With The Growers

Fertiliser Companies

Field Days And Local Agricultural Papers Eg Tas Country And Stock And Land

Gatherings Of Farmers Conducted By The Experts That The Locals Have Confidence In.

Have A Meeting Where All The Potato Growers Gather Around And Have Someone Talk To Them Face To Face And Explain Things

Have Meetings, Face To Face, Eye To Eye Contact. Then It Will Be Used. Sardi Should Do It.

Heard Of Crop Test But Wasn't Aware It Was Available To Growers, Thought It Was Only For Consultants, Suppliers , Processors

Ido People From Horticulture Australia. On The Internet

In A Booklet Form

In Tasmania Agriculture Journal Put Out By The Dept. Of Primary Industry
In Victoria They Have Focus Groups Called " Veg Check
Industry Development Officers
Internet
Mouth To Mouth From One Farmer To Another
Other Farmers, Word Of Mouth
Personal Visit
Personal Visit To Growers, Suppliers, Processors, Consultants
Personal Visits Or Field Days Or Email
Potato Growers Seminars
Proven Results
Qfvg Magazine. Presentation Night By Fertiliser Company.
Qfvg
Qld Fruit And Veggie Grower...Qfvg
Qld Fruit And Vegetable Growers Assoc.
Research Station And In Our Own District
Seminars And E-Mails
Show The Product On TV
Simplot Or On The Radio Or At A Local Traders On The Counter Or In The Rural Press. " The Tas Country
" A News Paper Based On The Rural Community
Stock Journal And ABC Country Hour And Landline
T.V. Adverts On Local TV Channels
Tasmania Country (Paper),
The Grower
The Internet And Crt , Our Local Supplier Of Fertiliser And Chemicals..Combined Rural Traders
Through Potato Magazines
Through Researchers Or Word Of Mouth
Through The Packing Sheds.
Through Newsletter That Simplot Publish For Growers
Through Processor (Simplot) Tasmania Farmers & Graziers Association
Via Fertiliser Distributor. Word Of Mouth. SA Publication The Grower
Via Seminars And Via Professional Agronomists
Word Of Mouth
Word Of Mouth
Word Of Mouth
Word Of Mouth In The Industry
Word Of Mouth Is The Best Way To Promote, A Good Product Always Sells Itself
Word Of Mouth- One Person Needs To Deal With It And Spread The Word Around
Word Of Mouth, If Other Farmers Are Getting Good Results It Would Become Known About

Question 20: *How would you define your role in the industry?*

Service Provider - specify

Agronomist

Agronomist

Agronomist

Agronomist

Cart Spuds

Consultant To Vegetable Industry

Consultants/Agronomist

Agronomy Services And Product Sales

Fertiliser Company

Field Rep. For All The Local Growers

Information Source To Potato Industry

Information Source To The Potato Industry

Pest Disease Consultant

Private Consultant

Processors

Research Provider

Research Scientist (Specialising In Soil & Plant Nutrient) Conduct Research At Dept Of Primary Ind (Qld)le
Conduct Trials & Testing Of Potato Crops On Sites

Sales Agronomist

Sales Agronomist

Scientific Consultant To Grower. Provide A Total Service From A-Z

Technical Consultants To The Potato Industry

We Provide Services To Chemical Companies To The Better Provision Of Crop Development

Question 22: *Which region of Australia are you in?*

*Please Note: The regions listed below appear coded as 'other' in the
Appendix 1 region table*

Adelaide Regional

Central Coast.

Central North

Central North

Central NSW

Central Queensland

Central Tablelands

Central Tablelands.

Darling Downs Qld-S.E.
Hunter Valley
Kangaroo Is.
Kangaroo Island
Kangaroo Island
Kangaroo Island
Lochier Valley
Lockyer Valley Qld
Lockyer Valley
Lockyer Valley
Mallee
North Qld
Northern Tasmania
Northside Of Brisbane
Redlands Bay
Southern Tablelands

Question 23: What is the main variety that you grow? What other varieties do you grow?

Please Note: The varieties listed below appear coded as 'other' in the Appendix 1 varieties table

1867
Balour
Bismark
Bismark - Celeste
Bison
Bison
Canabeck ,Brownall
Dutch Creams
Dutch Creams & Nicola
Exton And Kennebec
Exton.
Exton. Secoya.
Extons
FL 1867
FI 1867.
FI 1837
Harmony, Argos, Exton. Grows Experimental Potato Varieties

Hawaiian

Kenabeck. Ranger Russet. Nicolas. Bissmark.

Kennebec And Nicola

Kennebeck And King Edward

Lustre

Nicola And Kennebec

Nicola, Kipfler

Nicola, Bismark, Pink Eye, Kenabeck, Brownall, King Edward, Kipler, Uptodate

Pink Eye

Red Losada

RISMARK

Sequio, Exton

Sequio. Exton.

Sequoia

Sequoia

Sequoia. Extons. Snow Gems.

Sequoia & Exton

Sonic

Trent

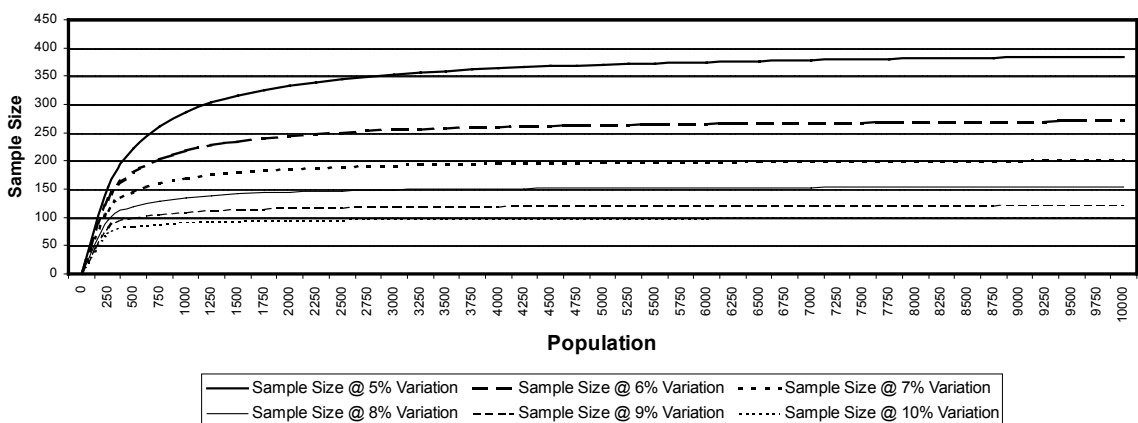
Willwash. Shine. Lustre.

Appendix 3:
Sampling Tolerance

It should be borne in mind throughout this report that all data based on sample surveys are subject to a sampling tolerance. That is, where a sample is used to represent an entire population, the resulting figures should not be regarded as absolute values, but rather as the mid-point of a range plus or minus x% (see sampling tolerance table below). Only variations clearly designated as *significantly* different are statistically valid differences and these are clearly pointed out in the Key Findings section of this report. Other divergences are within the normal range of fluctuation at a 95% confidence level; they should be viewed with some caution and not treated as statistically reliable changes.

MARGIN OF ERROR TABLE										
(95% confidence level)										
SAMPLE SIZE ↓	Percentages giving a particular answer									
	5% 95%	10% 90%	15% 85%	20% 80%	25% 75%	30% 70%	35% 65%	40% 60%	45% 55%	50% 50%
50	6	9	10	11	12	13	14	14	14	14
100	4	6	7	8	9	9	10	10	10	10
150	4	5	6	7	7	8	8	8	8	8
200	3	4	5	6	6	6	7	7	7	7
250	3	4	5	5	6	6	6	6	6	6
300	3	4	4	5	5	5	6	6	6	6
400	2	3	4	4	4	5	5	5	5	5
500	2	3	3	4	4	4	4	4	4	5
600	2	2	3	3	4	4	4	4	4	4
700	2	2	3	3	3	4	4	4	4	4
800	2	2	3	3	3	3	3	4	4	4
900	2	2	2	3	3	3	3	3	3	3
1000	1	2	2	3	3	3	3	3	3	3
1500	1	2	3	2	2	2	3	3	3	3
2000	1	1	2	2	2	2	2	2	2	2
3000	1	1	1	2	2	2	2	2	2	2

Optimum Sample Sizes to Ensure the Given Maximum Variation



Appendix 4:
Questionnaire

Project No: 6750

CROPTEST QUANTITATIVE TELEPHONE SURVEY QUESTIONNAIRE

Good my name is from McGregor Tan Research, the independent market research company. We have been commissioned to carry out market research by Horticulture Australia on behalf of the Australian potato industry.

We are undertaking an industry-wide survey to determine what information and tools are required for determining the nutrient status and fertiliser needs of potato crops. The results from this survey will be used to develop an understanding of the nutrient evaluation needs of the potato industry. This knowledge will be used by the Potato Industry Advisory Committee of Horticulture Australia to benefit the entire potato industry.

1. Can you tell me how you currently assess the nutrient status of your Potato crop?
Probe all components needed to identify nutrient status
Unprompted, multiple response
 - 01 ... Soil Test
 - 02 ... Petiole/Leaf/Tissue testing of the plant
 - 03 ... Visual inspection of the crop
 - 04 ... Experience in growing/consulting with Potatoes
 - 05 ... Nutrient standards/benchmark figures to compare test results against
 - 06 ... Department of Agriculture recommendations
 - 07 ... Other - ***specify***
 - 08 ... Don't know

2. **(If use soil testing – code 01 in Q1)** Do you test the soil prior to planting every Potato crop? **If no**, how often would you test the soil? ***Unprompted, single response***
 - 01 ... Test prior to every crop
 - 02 ... Only test new paddocks
 - 03 ... Test new paddocks and after 1 or 2 crops
 - 04 ... Test new paddocks and after 3 or 4 crops
 - 05 ... Test new paddocks and after 5 or more crops
 - 06 ... Other – ***specify***
 - 07 ... Don't know

3. **(If use Petiole/Leaf/Tissue testing - code 02 in Q1)** How often do you typically take petiole/leaf/tissue samples during the growing season? ***Unprompted, single response***
 - 1 More frequently than once a week
 - 2 Once a week
 - 3 One a week to once every two weeks
 - 4 Once every two weeks to once every four weeks
 - 5 Less frequently than once every four weeks
 - 6 Don't know

4. **ASK ALL:** Do you seek information about nutrients or Potato crop nutrition? If yes, probe sources of information. **Unprompted, multiple response**

01 ... Potato Australia or Eyes on Potatoes
02 ... Books or field guides
03 ... Sales staff (eg. Elders, Serve Ag, Wesfarmers)
04 ... Department of Agriculture (Primary Industries)
05 ... Fertiliser companies
06 ... Processing company field officers
07 ... Consultants
08 ... Other farmers
09 ... Other – **specify**
10 ... Don't know

5. Thinking about nutrient evaluation of Potato crops, could you please rate the importance of the following features of a nutrient evaluation tool, on a scale from 1 to 5 where 5 is very important, and 1 is not at all important: **Rotate, Code as 6 if don't know**

Symptom keys to identify which nutrients are deficient or toxic
Published descriptions of both deficiency and toxicity symptoms
Coloured pictures of deficiency and toxicity symptoms
Interpretation of petiole and leaf test results
Charts to show whether nutrition is deficient, low, adequate or high
Charts to show change in nutrition throughout the season
Information database and bibliography for each nutrient

6. Thinking about crop nutrient evaluation, if you were to design the ultimate tool to assist you in this task, what features would it possess? **Probe all components required. Unprompted, multiple response**

01 ... Plant Test analysis (eg petiole testing)
02 ... Soil Test analysis
03 ... Photos and descriptions of deficiency and toxicity symptoms
04 ... Nutrient requirements for different soil types
05 ... Nutrient information database
06 ... Other – **specify**
07 ... Don't know

7. How likely would you be to use a tool to assist you with nutrient evaluation of Potato crops, if one was available, on a scale from 1 to 5 where 5 is very likely and 1 is not at all likely?
- 1 Not at all likely
 - 2 Not very likely
 - 3 Neither likely nor unlikely
 - 4 Quite likely
 - 5 Very likely
 - 6 Don't know
8. **(If likely to use tool – codes 4 or 5 in Q7)** CropTest is a nutrient evaluation tool designed by Norbert Maier for the Potato industry, are you aware of this package?
- 1 Yes
 - 2 No
9. **(If not aware – code 2 in Q8)** CropTest is a software package designed to assist potato growers and technical advisers to identify symptoms of nutrient stress, interpret plant test data, and access information on plant nutrition for potato crops. Do you now recall being aware of this package?
- 1 Yes
 - 2 No
10. **(If aware – code 1 in Q8 or Q9)** Do you own this package? If yes, are you currently using the package?
- 1 Own CropTest – using it
 - 2 Own CropTest – not using it
 - 3 Don't own CropTest
11. **(If not likely to use tool – codes 1, 2, 3 or 6 in Q7)** CropTest is a nutrient evaluation tool designed by Norbert Maier for the Potato industry, are you aware of this package?
- 1 Yes
 - 2 No
12. **(If not aware – code 2 in Q11)** CropTest is a software package designed to assist potato growers and agribusinesses to identify symptoms of nutrient stress, interpret plant test data, and access information on plant nutrition for potato crops. Do you now recall being aware of this package?
- 1 Yes
 - 2 No

13. **(If not likely to use tool – codes 1, 2, 3, or 6 in Q7)** How likely are you to use the CropTest package?
- 1 Not at all likely
 - 2 Not very likely
 - 3 Neither likely nor unlikely
 - 4 Quite likely
 - 5 Very likely
 - 6 Don't know
14. **(If not likely to use CropTest – codes 1, 2, 3 or 6 in Q13)** Why are you unlikely to use CropTest to assist with the nutrient evaluation of Potato crops?
- 01 ... Prefer the old way/traditional way of growing potatoes
 - 02 ... Use experience to determine nutrient status
 - 03 ... Pay a consultant/agronomist to assess nutrient status
 - 04 ... Rely on field officers/fertiliser suppliers for advice
 - 05 ... Do not use computers
 - 06 ... Other – **specify**
 - 07 ... Don't know

Now I would like to ask you about some specific products that could assist with evaluating the nutrient status of a potato crop.

15. If you were to design a field handbook to assist with nutrient evaluation that you could take into the paddock, what features and information would it contain?
- Unprompted – multiple response**
- 01 ... Photos of nutrient deficiency symptoms in plants
 - 02 ... Written descriptions of nutrient deficiency symptoms
 - 03 ... Keys to identify nutrient deficiencies
 - 04 ... Hard/robust cover
 - 05 ... Other – **specify**
 - 06 ... Don't know
16. How important would you say the following features are to a Potato crop nutrient evaluation tool, on a 1 to 5 scale where 5 is very important and 1 is not at all important?
- Code as 6 if don't know**

Nutrient standards/benchmarks specific for different soil types or varieties
A feature that allows easy import of emailed test results
An internet update feature which could update varieties, standards and information

17. How do you think this product could be best promoted to growers and the industry generally? **Unprompted – multiple response**

- 01 ... In Potato Australia/Eyes on Potatoes
- 02 ... Presentation at local grower meetings
- 03 ... Through the Dept of Ag
- 04 ... In Good Fruit and Vegetables/National Marketplace News
- 05 ... Local paper
- 06 ... Through rural trading houses (eg Wesfarmers, Serve Ag, Elders etc)
- 07 ... Other – **specify**
- 08 ... Don't know

CLASSIFICATIONS:

18. **Record gender:**

- 1 Male
- 2 Female

19. In which of these age groups do you fall?

- 1 18 to 24
- 2 25 to 30
- 3 31 to 39
- 4 40 to 54
- 5 55 to 64
- 6 65+

20. How would you define your role in the industry?

- 1 Grower
- 2 Service Provider - **specify**

21. **(If grower – code 1 in Q20)** Which market do you grow the majority of your potatoes for?

Read out - single response

- 1 Washed
- 2 French Fry
- 3 Crisping
- 4 Seed

22. Which region of Australia are you in? **read out for state calling**

- 01 ... North East Tasmania
- 02 ... North West Tasmania

- 03 ... Gippsland, Victoria
- 04 ... Western districts, Victoria
- 05 ... Wimmera/Mallee, Victoria

- 06 ... Riverland, SA
- 07 ... Mallee, SA
- 08 ... South East, SA
- 09 ... Virginia, SA
- 10 ... Adelaide Hills, SA

- 11 ... Riverina, NSW
- 12 ... Southern Highlands, NSW
- 13 ... Northern Highlands, NSW

- 14 ... Atherton Tablelands, Qld
- 15 ... Bundaberg, Qld
- 16 ... Southern Queensland

- 17 ... Albany zone, WA
- 18 ... Busselton zone, WA
- 19 ... Donnybrook zone, WA
- 20 ... Metropolitan zone, WA
- 21 ... Myalup zone, WA
- 22 ... Pembertyon zone, WA
- 23 ... Other – **specify**

23. What is the main variety that you grow? What other varieties do you grow?
record main variety first

- 01 ... Atlantic
- 02 ... Coliban
- 03 ... Delaware
- 04 ... Desiree
- 05 ... Nadine
- 06 ... Pontiac
- 07 ... Ruby Lou
- 08 ... Russet Burbank
- 09 ... Sebago
- 10 ... Other – **specify**

24. Approximately how many years have you been growing/consulting in potatoes?

- 1 Less than 5 years
- 2 6-10 years
- 3 11-15 years
- 4 16-20 years
- 5 21-25 years
- 6 More than 25 years

***Appendix 5:
How To Read The
Computer Tabulations***

The computer tabulations in the report show the comparisons between [1] the answers given by the total number of respondents and [2] those given by the various subgroups. This is done in the form of percentages. Under certain data, you may notice the presence of + or - signs. These indicate where there is a statistically significant difference between the responses of the subgroup (eg. males, people over 65, etc) and the group as a whole. When the responses of the subgroup are significantly less than the group as a whole, this is shown by a minus (-) sign. If, on the other hand, there is a significantly higher response by the subgroup, then a plus (+) sign appears. The degree of significance of difference is also indicated. Where a single (- or +), double (-- or ++) or triple (--- or +++) sign occurs, you can be, respectively, 90%, 95% or 99% sure that the subgroup is in fact answering differently to the group as a whole, and that it is not just a random fluctuation in the data. (See example below)

Please note that, because of rounding, answers in single response questions will not always sum precisely to 100%.

In addition, as the base for percentages is the number of *respondents* answering a particular question (rather than the number of *responses*) multiple response questions sum to more than 100%.

Example: How would you describe yourself?

	GENDER			AGE GROUP				
	TOTAL	Male	Female	16-24	25-34	35-44	45-54	55+
Complete non-smoker	298 72%	148 70%	150 74%	59 67%	56 63%	55 69%	78 76%	50 89% +++
No. of respondents	416 100%	212 100%	204 100%	88 100%	89 100%	80 100%	103 100%	56 100%

72% of all respondents said that they were complete non-smokers

74% of all females surveyed said that they were complete non-smokers. This is not a significantly different proportion to the total of 72% (no plus or minus signs)

63% of all 25-34 year olds said that they were complete non-smokers. We are 90% sure that this age group's response is significantly fewer than the total of 72% (single minus (-) sign)

89% of all 55+ year olds said that they are complete non-smokers. We are 99% sure that this age group's response is significantly higher than the total of 72% (triple plus (+++) sign)