VALUE ADDED WHEAT CRC

PROJECT REPORT

Review of Program 5: Education & Technology Adoption

4th February 2003

Program 5 Manager: Clare Johnson

Date: February 2003

VAWCRC Report No: 24
Copy No: 1

Review of Program 5:
Education and Technology Adoption

4 February 2003

Contents

Executive Summary

C. Johnson

Achievements supporting the range of research and technology transfer interests of Value Added Wheat CRC were reported.

Postgraduate students; researcher workshops
Clare Johnson, VAWCRC

Charles Sturt University has agreed to run the Cereal Science Certificate course. The course requires 2 more subjects to be a stand-alone Graduate Certificate, and the plan is to integrate Wheat CRC noodle etc. outcomes and possibly to create a complementary RACI-CCD methods course in TAFE.

Two students on summer scholarships offered by VAWCRC and Arnotts are working on Arnotts' project to improve the quality of Salada biscuits made from blends of hard and soft flours. The other two summer students are working on monoclonal antibodies against starch granule peptides identified in project 1.1.2, and helping Dr Matt Hayden integrate recently published markers into a sequence-tagged microsatellite map of Australian wheat. The supervisors have expressed their appreciation of the assistance VAWCRC provides via this scheme. Many of the applicants showed potential for higher degree study at a later stage.

Three new PhD students have been appointed, and a further two are undergoing selection, bringing the total to fifteen students. Students are submitting regular quarterly reports and have made excellent use of their $1,500 training grants to improve their technical skills in the most relevant areas. In addition, two research staff have been sponsored on microarray analysis BioIT courses.

VAWCRC sponsored workshops at industry conferences this year include:

- *Microarrays and Proteomics for Gene Discovery* (30 attendees)
- *Diversity Array Technology* (19 attendees)
- *Bioinformatics* (17 attendees)
- 3 day Masterclass: *Population Breeding Methodology and Plant Improvement* (54 attendees)
- *3-D Structural Considerations in Design for Mutagenesis* (21 attendees)
- *Prebiotic Carbohydrates & Gut Health* short course, coordinated by Curtin University staff (4 deliveries, approx. 60 attendees).

Manuals have been / are being compiled, for use by research staff and students. A technology transfer workshop with the Diagnostics CRC has resulted in collaboration.

Student training: BioIT programming course
Yunxian Mak, APAF

Yunxian, a postgraduate student of VAWCRC, will save 2 full months per year, i.e. 50% of the time otherwise required for database searching to analyse her proteomic results, as a result of attending a BioIT programming course offered by BioLateral Pty Ltd. The course has enabled her to write short *Python* programs to automate repetitive data entry for proteomic database searching, and to filter the output. Other staff at APAF have naturally been very interested in using or adapting Yunxian's *Python* programs, and she envisages a collaborative paper will be written on this.

Researcher training: Microarray, Protein Structure and programming BioIT courses
Mui-Keng Tan, EMAI

Mui-Keng applied successfully for a $3,875 High Growth Bio-Business Program Grant by the NSW Department of State and Regional Development, with the assistance of the Program Manager. The grant provided a 50% subsidy of the cost of her training in BioIT at BioLateral Pty Ltd courses.

She attended courses in:

1. Protein Modelling
2. Microarray / Image Analysis
3. Bioprogramming

These courses will enable Dr Tan to derive more information from the data she generates, and to generate time savings as illustrated by Yunxian Mak (above).

For growers: FertiPlan® crop nutrition software
Tom Yeatman, PIRSA Rural Solutions

Our grower initiatives include the release next month of FertiPlan®, in which VAWCRC's sponsorship enabled development of PIRSA Rural Solutions data into predictive crop nutrition software applicable to South East Australia. The software is based on extensive research undertaken by J.N. Ladd and others at the CSIRO Division of Soils, Glen Osmond, S.A. with significant input from R.A. Payne, now of the South Australian Department of Water, Land and Biodiversity Conservation. FertiPlan® helps to calculate the nutrient requirement (N, P, Zn, Cu, Mn) for each individual crop and paddock to achieve target yield and protein, based on paddock history. It also calculates least-cost fertiliser rates, and can be configured to meet the farmers' needs. They can also model the dollar margin *vs* percent grain protein to target the highest return.

Building post-farm gate capacity, and TOPACTIVE module development
Dave Lewis, PIRSA Rural Solutions

Durum segregations are in place on the Eyre Peninsula. This enables farmers to obtain competitive payments without a freight penalty, though drought has affected production this year.

Working with farm business groups over the last 18 months, Dave has demonstrated that vertical integration of farm business into supply chain processing can be achieved. There has been interest from potential markets for the products, including frozen dough, premixes, frozen parbake and Asian noodles.

Dave is also developing an integrated series of 6 TOPACTIVE modules - resource packages for use by trainers when delivering workshops. The first two modules planned explore opportunities in building value chain businesses. The other 4 modules will focus on targeted crop management: pre-season planning, nutrition management to meet quality specifications, harvesting and storage, marketing: quality wheat for speciality end uses. The modules will target SA conditions in the first instance, but with the facility to substitute appropriate AgNotes in other regions.

There is also to be capacity development using FertiPlan® to target premium grade wheat at specific protein contents for speciality food products.

Strategic Value Chain Marketing for Wheat Producers: CD and short courses
Geoff Watson, University of Sydney, Orange

Australian wheat producers are confronting major shifts in their marketing environment, requiring greater chain and consumer awareness, more downstream linkages, and increased

accountability in their production and marketing activities. Our response was to develop an introductory value chain marketing course that covers the scope of 3 marketing pathways in the value chain: the commodity, contract, and branded product arenas. The course will enable participants to evaluate their current approach, and to become more market focused within these 3 arenas. Follow-up via action learning will be encouraged.

The Value Chain Marketing course materials have been reviewed, and a CD for distance educational delivery will be completed in June. We are also adapting the materials for TOPACTIVE delivery, and will provide training for workshop leaders.

Growers in WA and NSW; and Stalk to Store
Clare Johnson, VAWCRC

Our "Quality Wheat – Meeting Market Requirements" courses farmers and grain handlers in WA describe wheat quality in terms of suitability for a particular end use. Ben Curtis and Steve Penny demonstrate the key grain specifications for end-products including yellow alkaline, white salted, instant and long life noodles, flat, steamed and pan breads and pasta. They then describe agronomic strategies to achieve the targeted market quality profitably. This course has been running since 1998, and Geoff Watson's material will mesh well with it.

In NSW, Jan Edwards and Shauna Dewhurst maintain regular liaison with district agronomists in the Northern Focus project and have a role in Cropcheck data entry. This provides insight into management practices in the central and northern districts, and into key steps in dryland Prime Hard wheat production.

Shauna and Jan were unable to attend this review, as it coincided with a 3-day value chain study tour they were running for 15 extension agronomists from central and north-west NSW. Arnott's and Goodman Fielder were among the plants visited to promote understanding of end-user quality requirements.

In September 2001, Clare Johnson was invited by Kondinin Group to source up-to date information and contacts for revision of their book, "Stalk to Store". This enabled inclusion of information on Wheat CRC outcomes such as the WheatRite rain damage test, our recommendation on optimal aeration temperature (< 23°C, and preferably closer to 15°C), and current information on QA on-farm. Clare also had external research outcomes included, such as heat disinfestation and early (wetter) harvesting for improved yield, but ensured that these were cross-referenced to Wheat CRC results, to present a rounded picture. Our CD, Managing On-farm Grain Storage, is marketed as a package with the revised book, which was launched in October 2002 (630 copies sold to date).

Technology Transfer: baking process control, wheat varietal information etc.
Hayfa Salman, VAWCRC

Hayfa reported on her range of achievements in technology transfer of Wheat CRC research outcomes. She has produced a set of manuals for implementation of output from the Wheat CRC's oven process control project. The set includes an overview for bakery staff, a training manual for production and operation staff, an installation and maintenance guide, and a workbook for installation and commissioning.

She also produced a list of QWCRC outcomes suitable for inclusion in training packages, which was been vetted by the IP sub-committee on the afternoon of the review. We aim to include this updated industry best practice in the Cereal Chemistry course to be offered through Charles Sturt University.

Hayfa has adapted the data on Australian wheat varieties and grain quality genes, compiled by Colin Wrigley, and including recent updates, into web-CD format. The CD should be complete in April. Future plans include assistance with a workshop on assuring microbiological safety and stability of refrigerated noodles, and comprehensive follow-up to revise the Cereal Chemistry course.

Postgraduate students and workshops for researchers

Clare Johnson
VAWCRC

Review of Program 5:

Education & Technology Adoption

Program Manager:
Clare Johnson

4 February, 2003

Projects

5.1.1: Skilled graduates and postgraduates for industry succession
- Clare Johnson (VAWCRC),
  Vicky Solah (Curtin Uni.),
  Bob Caldwell (USyd)

5.1.2: Initiatives for uptake of VAWCRC innovation
- Clare Johnson, Hayfa Salman (VAWCRC)

5.1.3: Enabling activities for delivery of premium grain
- Dave Lewis, Tom Yeatman (PIRSA Rural Solutions),
  Jan Edwards, Shauna Dewhurst (NSWAg),
  Ben Curtis (Dept. AgWA)

5.1.4: Value chain awareness
- Geoff Watson, Tony McKenzie (USyd Orange),
  Ben Curtis (Dept. AgWA)
  Steve Penny (Dept. AgWA)

5.1.1: Summer students

Arnott's Product Research

1. Strategic blending of flours: Connie Chow
   Supervisors: Andrew Kennett and Beverley O'Neill, Arnotts, Huntingwood

2. Interactions between flour blends from hard and soft wheats: Dewi Hartono
   Supervisor: Geoffrey Cornish, SARDI Grain Quality Research Laboratory

Molecular Technologies

3. MAbs against LMW peptides from starch granules: Peter Schofield
   Supervisors: Thomas Giersch, Ming-Jie Wu, EMAI

4. Sequence-tagged microsatellite map of Australian wheat: Denny Topcic
   Supervisor: Matt Hayden, USyd Plant Breeding Institute, Cobbitty

Applicant field had good potential for higher degrees at a later stage.

5.1.1: Undergraduate scholarship 2003-2005

- $6,500 per year for 3 years
- Awarded to Angela Dennett, Pennant Hills High School
- UAI 99%
- HSC Maths, Chemistry, Agriculture, IT and Advanced English
- Enrolled in BScAgr
- Interest in sustainable agriculture and better crops

5.1.1: Postgraduate students

COMPLETING

- Andrew Verrell
  - Wheat quality and yield, Nth region
- Marcus Newberry
  - Yeasted dough rheology
- Patricia Chong
  - Glutenin polymer structure in products
- Laila Daqiq
  - Polymer size and shape in processing
- Mohammad Hassani
  - Novel storage protein genes

2002 START

- Arakuen Freeman
  - Wheat varietal diagnostics
- Karon Ryan
  - Validation of noodle quality markers, WA
- Yunxian Mak
  - Wheat proteomics
- Michelle Powell (MSc)
  - Characterisation of polymorphic proteins for valuable traits
- Cindy Soh
  - Protein composition and NSPs in pasta quality

2003 START

- Anneliese Rittau
  - Develop wheat protein quality test
- Mary Tang
  - Analysis of starch lipid complexes
- Brent Thomson
  - DArT™ wheat microarrays
- (TBA)
  - Targeted mutagenesis technology
- (Ming-Jie Wu, TBC)
  - Diagnostics, TBA

5.1.1: PhD student training

- Targeted technical training
- Quarterly reporting: budgeting, project management
- Communications and IP
- Industry co-supervision
  e.g. Di Miskelly's contribution

Postgraduate Student Quarterly Reports

(visible to supervisors & SMG in Portal\Education\Students)

- Frequency of meetings with supervisor: (daily / every few days / weekly / fortnightly / monthly)
- Frequency of team meetings
- Progress
- Expenditure this quarter
- Annual leave taken this quarter (days)
- Training/conference attendance (both last quarter and planned)
- Publications (full citation)
- Extension requested?

Student progress vs timeline expected by VAWCRC:

Year 1	Target:	Achieved:
Literature survey and adjustments to research plan written up	month 3	
3 experimental approaches in full progress	month 6	
Results from 1st 3 expt. approaches evaluated & summarised	month 12	
Methods written up	month 12	
Year 2		
Required change of direction determined	month 13	
* Student participates in budget planning for next fin. yr	month 13	
Next/continued experimental approaches in progress	month 14	
Results from 2nd 3 expt. approaches evaluated & summarised	month 24	
Further methods written up	month 24	
Year 3		
Thesis sketched	month 25	
Identification of further data required (and decision on whether an extension is required; submit by Feb. for next financial yr)	month 25	
Student submits budget planning for next financial year	month 25	
Experiments complete	month 30	
First draft of thesis complete	month 33	
Final thesis complete	month 36	

5.1.1: $1,500p.a. student allowance for targetted technical training

Araluen Freeman:
- Proteomics 2-D gel workshop, UNSW Bioanalytical Mass Spec. Facility, Sept.
- VAWCRC's 3-D structural design workshop, Oct.

Michelle Powell:
- Proteomics 2-D gel workshop, UNSW Bioanalytical Mass Spec. Facility, Sept.
- VAWCRC's 3-D structural design workshop, Oct.

Karon Ryan:
- Bioinformatics workshop at Plant Breeding Conference, Sept.
- VAWCRC's 3-D structural design workshop, Oct.
- Workshop on Spatial Statistics for Environmental Scientists, Dec.

Yunxian Mak:
- ComBio (Sydney, Sept.), which featured Proteomics sessions.
- BioLateral BioIT Programming course, Dec.
- VAWCRC's 3-D structural design workshop, Oct.

Cindy Soh:
- AACC DownUnder conference, July
- PBI Student Seminar, Nov.

5.1.2: Conference Workshops
- *maximise accessibility*

- VAWCRC sponsored workshops at the Plant Breeding Conference in Perth in September:
  - Microarrays and Proteomics for Gene Discovery (30 attendees)
  - Diversity Array Technology (19 attendees)
  - Bioinformatics (17 attendees)
  - 3 day Masterclass: "Population Breeding Methodology and Plant Improvement" (54 attendees)
- Manuals being compiled, with report on Bioinformatics 2002 Conference, for use by research staff and students
- Will run similar diagnostics workshops at Cereal Chemistry Conference, Adelaide, Sept 7-10 2003

5.1.1: Workshop, "3-D Structural Considerations in Design for Mutagenesis"

- Protein structure
- Protein viewers and analysis tools
- In-silico site-directed mutagenesis
- Homology modelling and threading

- Presented by Dr Warren Kaplan of the Garvan Institute for Cancer Research
- Run as satellite to ComBio conference in Sydney, Oct. 2002
- Attracted interest from Australia's general research community. The 21 participants included:
  - 4 VAWCRC students
  - 4 external students (USyd, UNewcastle and UWollongong)
  - 6 key VAWCRC scientists
  - 5 external scientists (Baker Institute for Heart Research, CSIRO Livestock Industries, UQld, Children's Med Res Inst, USyd, Centenary Inst., USyd, UNewcastle
  - Presenter and coordinator
- 60% cost recovered, 40% subsidised

5.1.1/5.1.2: Diagnostics Technology Transfer (VAWCRC report #7)

- Presentations on relevant diagnostic technologies by Diagnostics CRC Deputy CEO, Dr Phillip Morris, and Dr Mick Foley
- Strong interest in VAWCRC pursuing application of their affinity libraries.
- Team will visit Dr Foley's laboratory to:
  - Evaluate a 15-mer random peptide phage display library
  - Evaluate panning techniques to detect peptides that will bind to starch granules from selected hard and soft wheats, and other novel approaches

5.1.1: Curtin University workshops

- Prebiotic Carbohydrates and Gut He alth
  Presented in:
  - Perth
  - Rutherglen, in a private session to Goodman Fielder
  - Christchurch, at Cereal Chemistry conference Sept. 2002
  - Wagga
    - The final delivery included Dr John Monro (C&FNZ), "Using Glycaemic Glucose Equivalents and Wheat Bran equivalents of Faecal Bulk"

- Plan:
  Texture Analysis workshop

5.1.2: Cereal Science Distance Course

Lessons 1- 4	Cereals of the World
Lessons 5-7	Starches
Lessons 8-9	Protein
Lessons 10-11	Minor Constituents
Lesson 12	Harvest and Storage
Lessons 13-20	Decortication, Dry Milling, Wet Milling, Pearling
Lesson 22	Miscellaneous Grains
Lessons 23-32	Products and Processes
Mini-Lab 1	Gluten Washing
Mini-Lab 2	Dry Milling of Wheat
Mini-Lab 3	Germinating Barley
Mini-Lab 4	Leavening Agents

- Charles Sturt University to run at Associate Certificate le vel
- Will be stand-alone Graduate Certificate with 2 more subjects
- Integrate Wheat CRC noodle etc. outcomes
- Potential complementary RACI-CCD methods course in TAFE

5.1.1: BioIT courses for research staff

Sponsored training on BioLateral courses

- Mui-Keng Tan*:
  - Microarray Introduction
  - Microarray Analysis
  - Protein Structure BioIT
  - BioIT Programming

  * Awarded a NSW Dept of State & Regional Development $3,876 High Growth Bio-Business Program Grant

- Ming-Jie Wu:
  - Microarray Introduction
  - Microarray Analysis

- Yunxian Mak
  - BioIT Programming

Student training:
BioIT programming course

Yunxian Mak
APAF

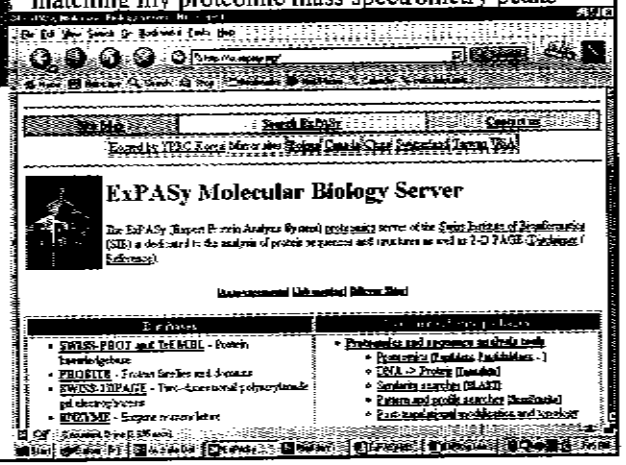
Bioinformatics Programming Course (BioLateral Pty Ltd)

Course Contents:

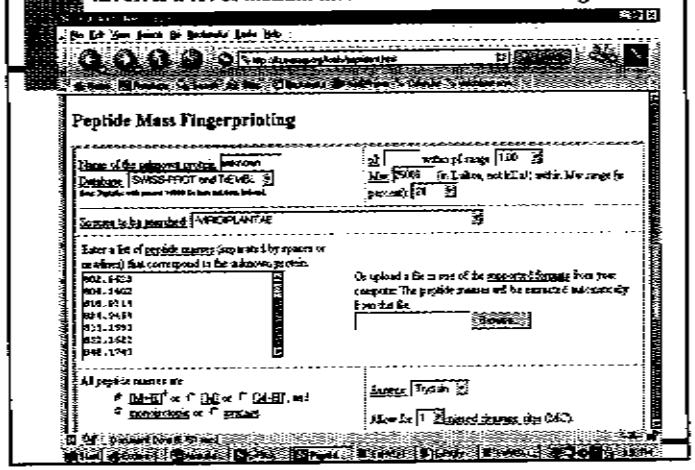
- Python language
- UNIX basics
- Practical bioinformatics applications
- Wrapping bioinformatics applications
- HTML
- Wrapping remote Web services
- CGI – Common Gateway Interface
- Web resources

The Problem:

I routinely search the ExPASy database for peptides matching my proteomic mass spectrometry peaks



Proteomic data entry for database searching using web browser involves a lot of manual intervention and time wastage



Bioinformatics Programming Course

Python Language Includes:

Python as a calculator	Methods
Condition	Scripts and modules
Lists	Parsing
Looping	Output
Dictionaries	Classes
Name spaces	Errors and exceptions
Input	

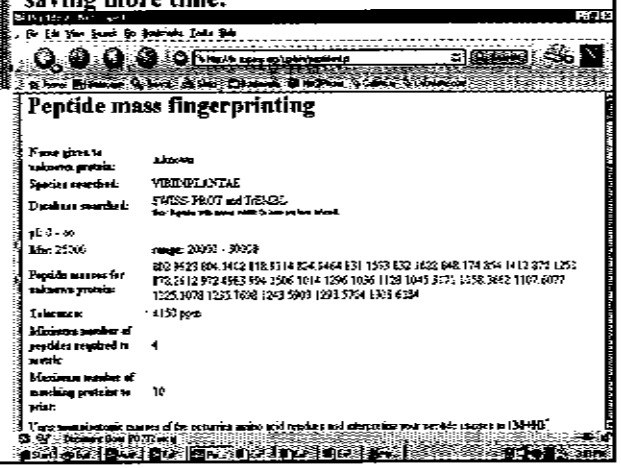
The course enabled me to write a Python script:

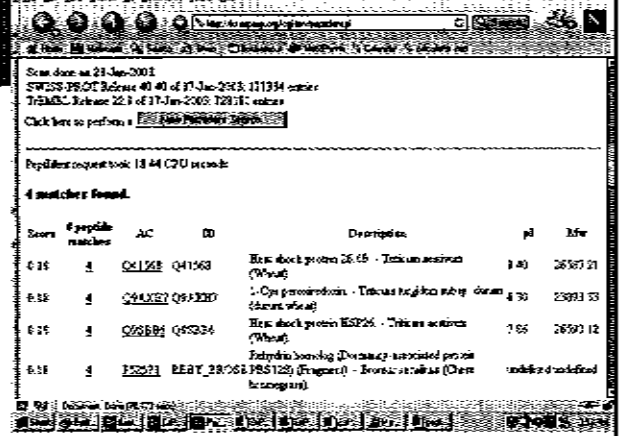
- Automates repetitive data entry for analysis of proteomic output
- Significant time savings

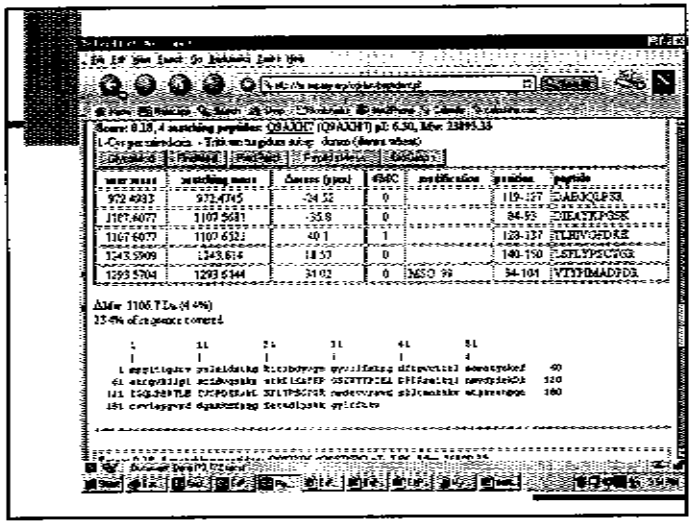
Last year:
- 2 months to run 2-D gels
- 2 months to use mass spectrometer to analyse the proteins
- 4 months searching on internet to identify the proteins

Current estimate, using Python script:
- **A 50% reduction in searching time**

My 2nd Python script filters the results, saving more time:







My Python codes are useful to other staff

- **Other APAF staff also frequently use the ExPASy web site for protein peptide searching**
- **Very interested to use my programs to run their research data, with any necessary customisation**
- **A collaborative paper is to be written about these works**

Detail on Python language from Bioinformatics Programming Course

Python as a Calculator:
"\>\>\>" is python's primary prompt
\>\>\> (50 – 5 *6) / 4 → 5

Condition: if statements and else clause

Lists: \>\>\> orgs = ['Wheat', 'Rice', 'Maize']

Looping: for loop or while loop statements
range function (range(10)) and tuples (x, y, z)

Dictionaries: \>\>\> sp = {'RAT' : 'Rattus ratus',
'HUMAN' : 'Homo sapiens'}

Name spaces: To assign local variables or global variables

Input: Input file with opening a file and read a file

Methods: File methods, string methods, list methods, dictionary methods etc.

Detail on Python language from Bioinformatics Programming Course

Scripts and Modules:
Saving code as a script with suffix '.py' appended
Creating your own modules as a executable file
Running script from the Unix shell #!/usr/bin/env python

Parsing: \>\>\> (code, aa) = line.strip().split()

Output: Open a new file and write the data into it

Classes: Class ClassName:
<statements>

Errors and Exceptions:
try:
<statements>
except Error:
<statements>

Researcher training:
Microarray, Protein structure, and Programming
BioIT courses

Mui-Keng Tan
EMAI

Training Grant
High Growth Bio-Business Program Grant,
NSW Dept. of State and Regional Development
$3,875 subsidy for 3 courses:

1. Protein Modelling Course 6-8 November 2002

2. Microarray Course 25-27th November 2002

3. Bioprogramming Course 2-6th Dec2002

Bioinformatics programming

In the post-genomic era, a molecular biologist need to be proficient with current bioinformatics tools to make the most of his own data as well as the publicly available databases.

Bioinformatics programming

Large number of datasets relevant for wheat research.

Wheat ESTs
rice genome
Arabidopsis genome
barley
maize
other eukaryotes

[redacted]

OBJECTIVES

- An ability to identify a bioinformatics problem and need in a dataset
- A knowledge of the available tools that may exist already to solve the problem.
- Skills to get that technical tool to work with my data.
- An ability to build new tools or modify existing ones when the ones about are not up to scratch.
- Skills to deliver the data.

Many freely available bioinformatics programs for Unix, for eg.

- Clustalw
- emboss
- ncbi-toolkit
- py-biopython

ANGIS

Wrapping bioinformatics applications

- run a Unix command from within Python
- check the exit status of the command
- parse the output of the command
- store the output in a useful Python data structure

Wrapping remote Web services

Reasons for wrapping remote services:

- data and/or programs not available locally
- incorporate remote data with local data and programs
- automate jobs
- reusable
- further analysis

Methods: 'GET' and 'POST' (together with Python's urllib module)

Blast a set of wheat ESTs against a database

Manual steps include:

1. Blast sequence 1 with the database
2. Retrieve result in HTML format
3. Cut and paste relevant data output in own database
4. Blast Sequence 2 with the database
5. Repeat steps 2-3 ....

A script could be written to retrieve data in a format [illegible] accession numbers [illegible] data. A loop could be incorporated for automation of successive sequences.

II. Microarray technology

A tool for large scale parallel analyses of genome sequence and gene expression

Current applications include

- global analyses of transcription programmes in yeast, mammals Arabidopsis, rice,
- classification and review of clinical tumours
- accelerated discovery of drug targets

Skills needed:

- Microarray laboratory skills
- biostatistical: experimental design, data analysis (objectives of the microarray course)
- bioinformatics
- cell biology and other biological disciplines (biochemistry, physiology)

Investigations are multi-disciplinary

Objectives of the microarray course:

- Experimental design
  - types of array (cDNA, oligonucleotides)
  - statistical and biological issues (robustness, levels of replication, direct or indirect reference in treatment comparisons).
  - biological and physical measurement issues (relationship between fluorescence intensity, hybridization intensity and cell processes; dye bias, sources of noise, choice of ESTs used as probes, choice of reference, false positives, false negatives)

Image Analysis softwares:

- CSIRO spot
- Affymetrix Jaguar
- BioDiscovery ImaGene
- DigitalGENOME Molecular Ware

Data Analysis

Statistical Microarray Analysis (SMA) - freeware -R package

Tools include: diagnostic and exploratory plots for
- single slide analysis
- multiple slide analysis
- t-statistics (quantile-quantile plots)
- log odds posterior ratios (volvano plots)

The Bioconductor project

- Sma: developed by Terry Speed and co-workers
- iRMA: developed by CMIS (CSIRO)
- affy: developed by Raphael Irizarry

Initiative by R. Gentleman of the Harvard Medical School and co-workers to coordinate various R packages to establish consistent standards of development and documentation

Http://www.bioconductor.org/

Microarray gene expression data (MGED)

- International organization for facilitating sharing of microarray data from functional genomics and proteomics experiments

- Current tasks:
  - establishing standards for microarray data annotation and representation
  - facilitating creation of microarray databases
  - providing infrastructure for dissemination of experimental and data transformation protocols

Http://www.mged.org/miame

III Protein Structure Modelling Course

- Protein Structures derived from X-ray crystallography (protein database: pdb in NCBI)

- Homology modelling

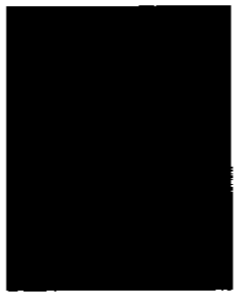
Protein Structure Viewer: Deep View

- Free
- Fairly easy to use
- runs on most OS
- offers the most functionality

Homology Modelling

1. Model sequence detection
2. sequence alignment
3. Alignment optimisation
4. Submission of alignment for model construction
5. Perform in silico site-directed mutagenesis and observe effects

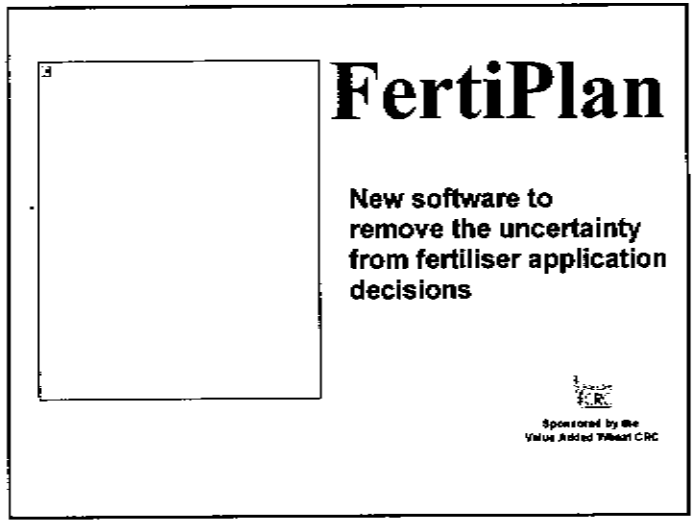
Structure of wild radishALS from homology modeling with yeast ALS

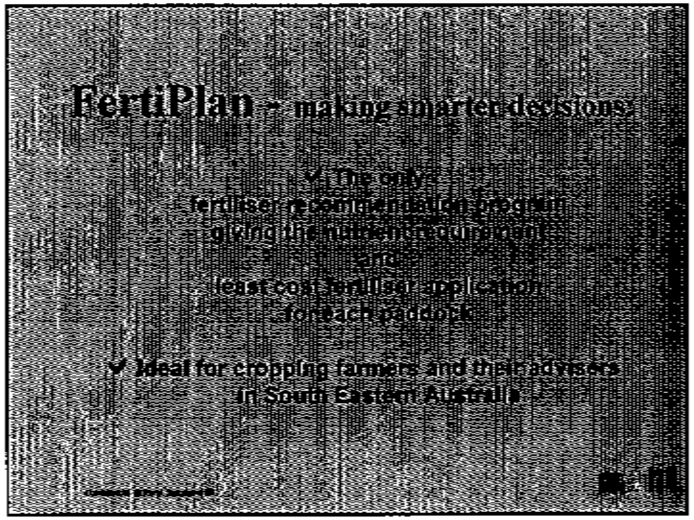


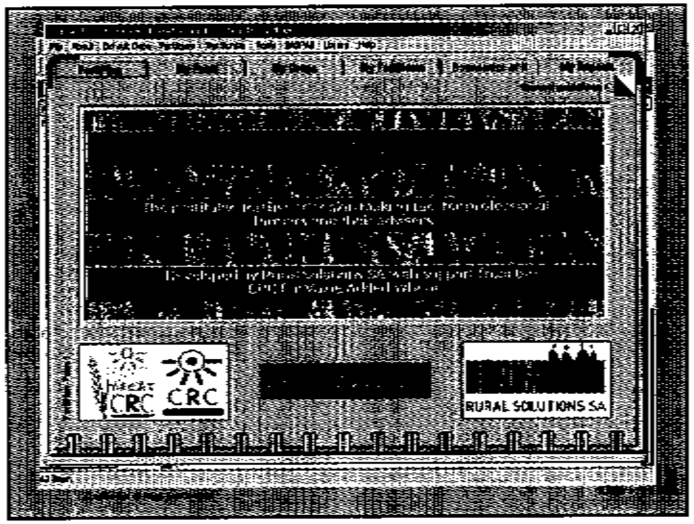
X-ray crystallography structure of yeast acetolactate synthase gene (ALS)

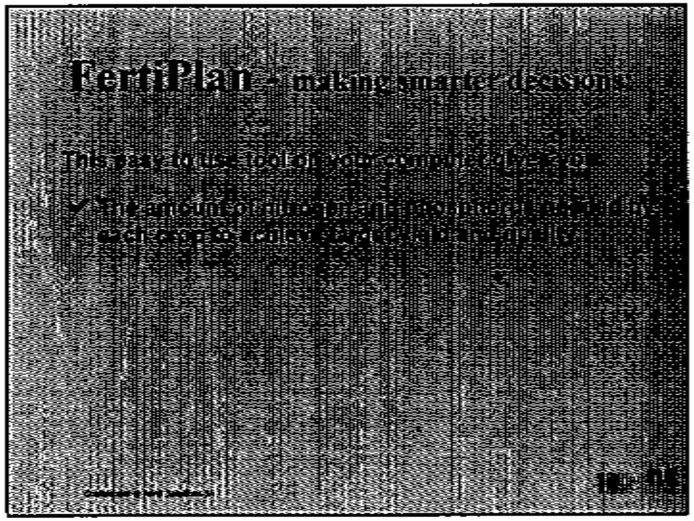
For Growers:
FertiPlan® crop nutrition software

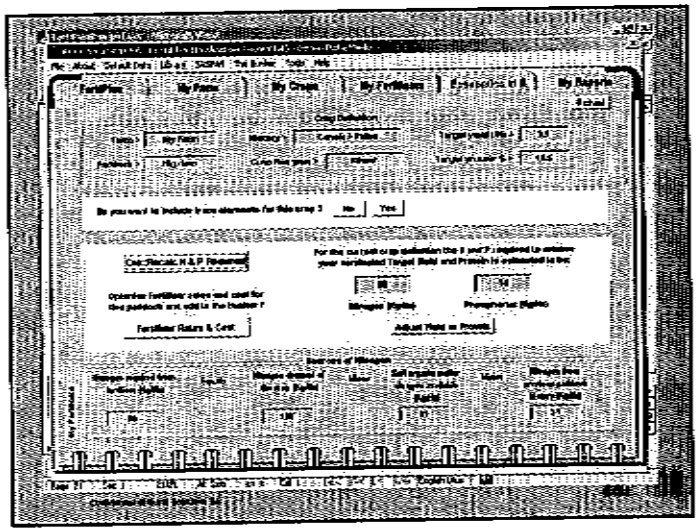
Tom Yeatman
PIRSA Rural Solutions

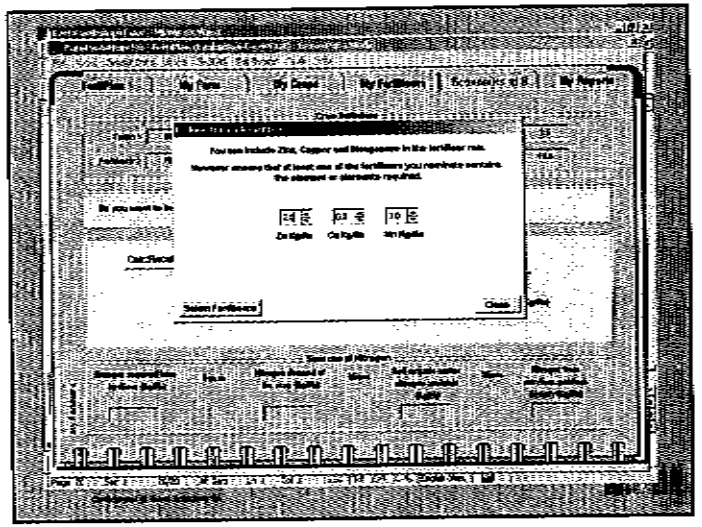

FertiPlan
New software to remove the uncertainty from fertiliser application decisions
Sponsored by the Value Added Wheat CRC

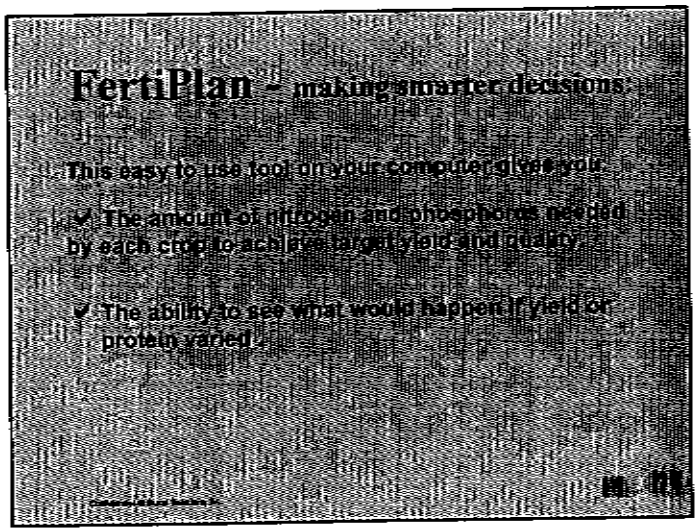

FertiPlan - making smarter decisions
✓ The only fertiliser recommendation program giving the nutrient requirement and least cost fertiliser application for each paddock
✓ Ideal for cropping farmers and their advisers in South Eastern Australia

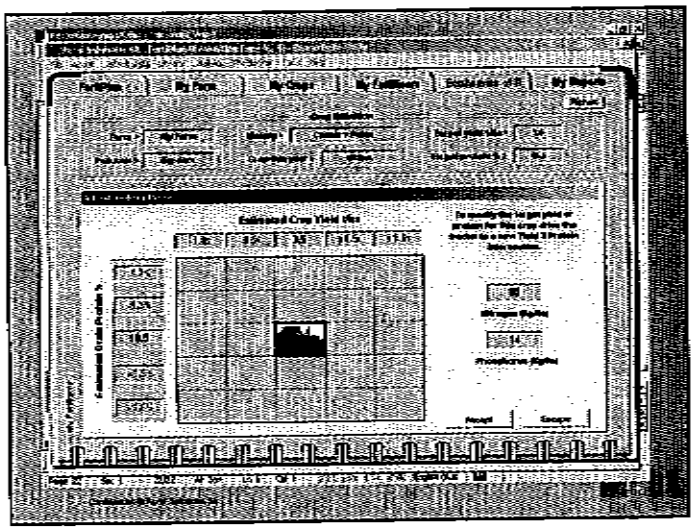

RURAL SOLUTIONS SA

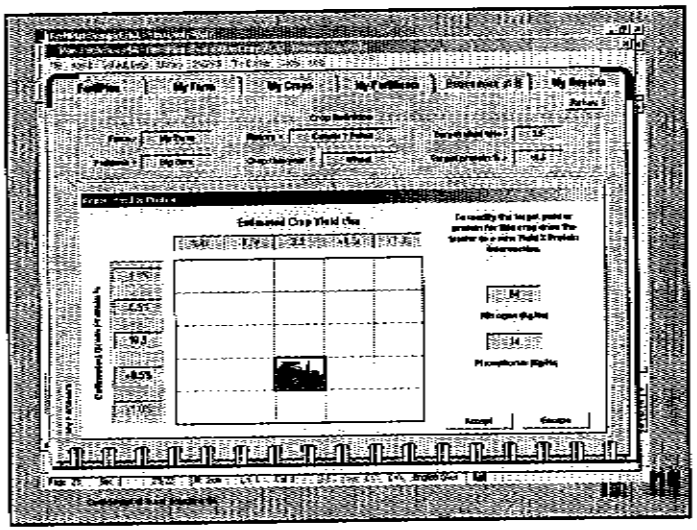

FertiPlan - making smarter decisions

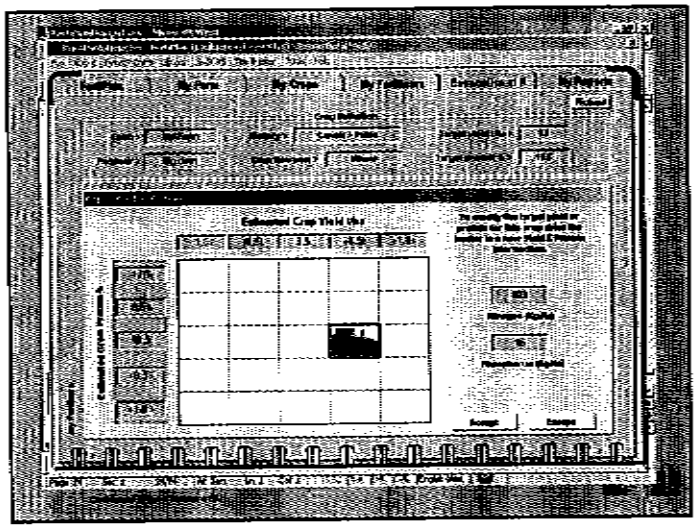





FertiPlan – making smarter decisions:
This easy to use tool on your computer gives you:
✔ The amount of nitrogen and phosphorus needed by each crop to achieve target yield and quality
✔ The ability to see what would happen if yield or protein varied.



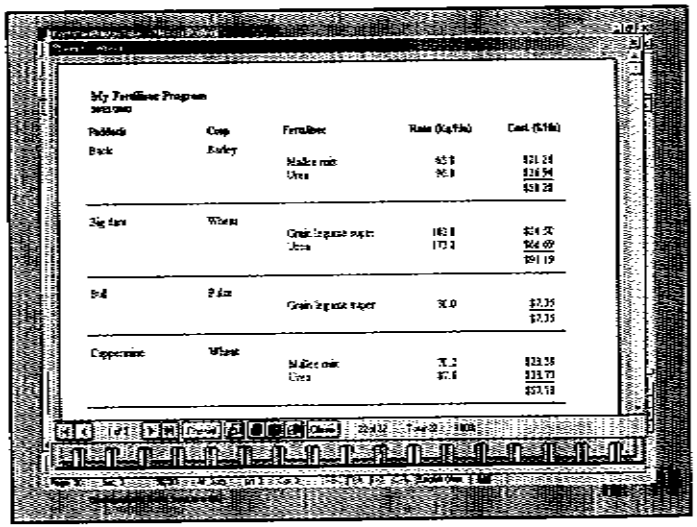




FertiPlan – making smarter decisions

This easy to use tool on your computer gives you:

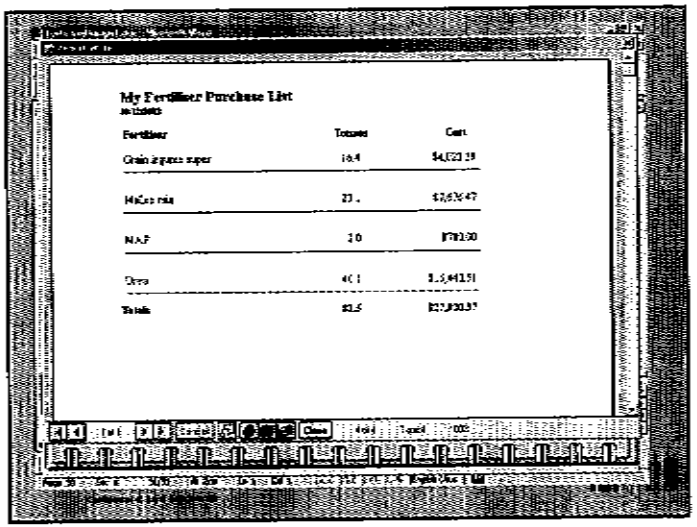
- ✓ The amount of nitrogen and phosphorus needed by each crop to achieve target yield and quality
- ✓ The ability to see what would happen if yield or protein varied
- ✓ Least cost fertiliser rates calculated for each individual crop and paddock



FertiPlan – making smarter decisions:

This easy to use tool on your computer gives you:

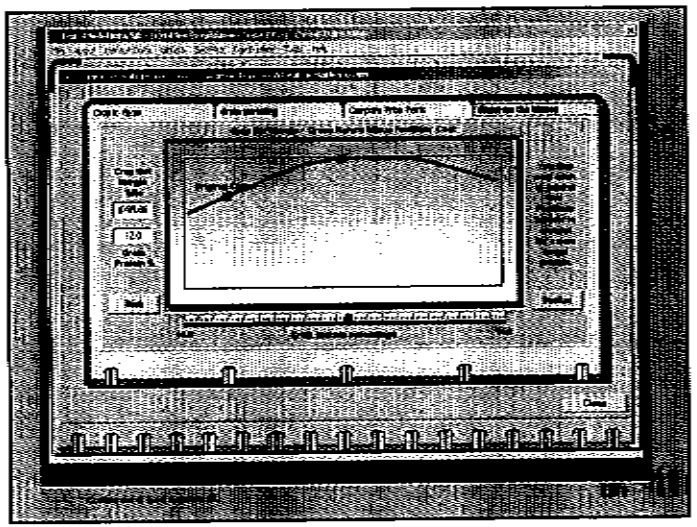
- ✔ The amount of nitrogen and phosphorus needed by each crop to achieve target yield and quality.
- ✔ The ability to see what would happen if yield or protein varied.
- ✔ Least cost fertiliser rates calculated for each individual crop and paddock.
- ✔ A summary of all your paddock fertiliser requirements into one convenient shopping list.

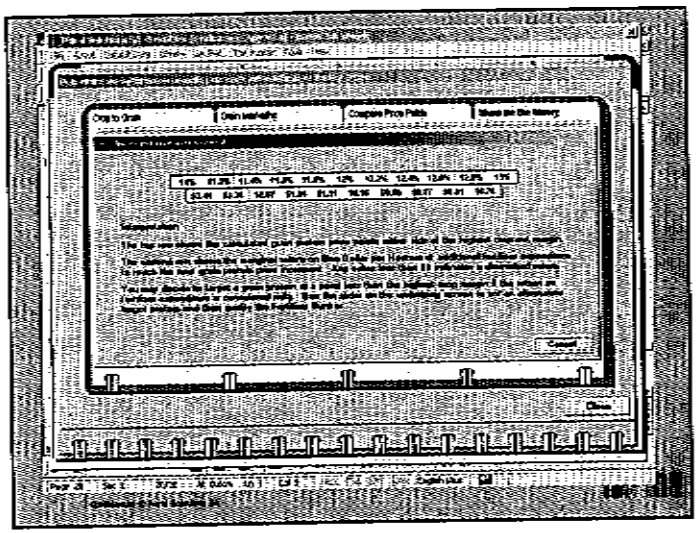


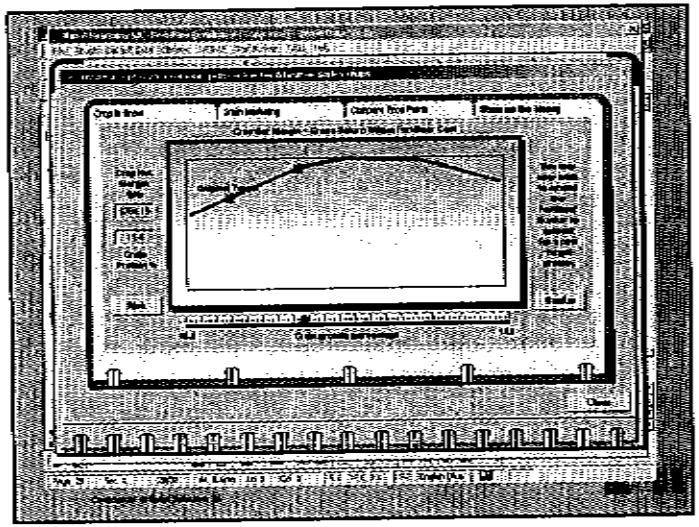
FertiPlan – making smarter decisions:

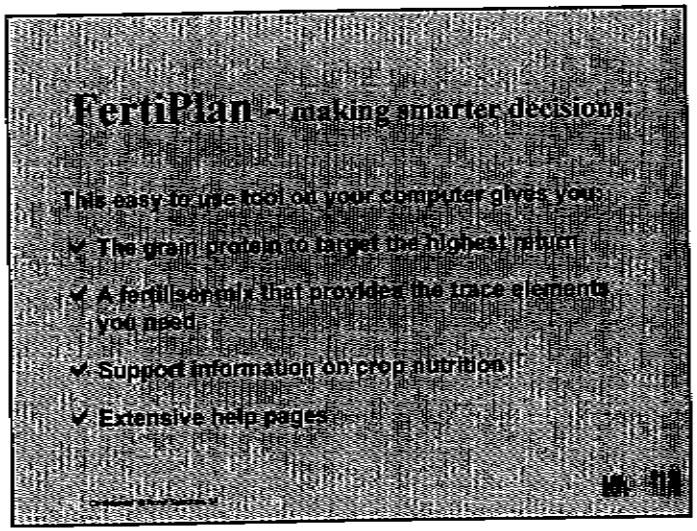
This easy to use tool on your computer gives you:

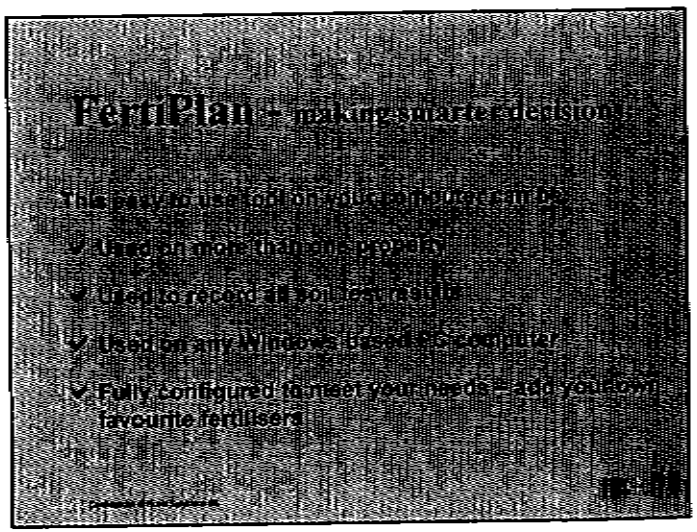
- ✔ The grain protein to target the highest return.








FertiPlan – making smarter decisions
This easy to use tool on your computer gives you:
✔ The grain protein to target the highest return
✔ A fertiliser mix that provides the trace elements you need
✔ Support information on crop nutrition
✔ Extensive help pages


FertiPlan – making smarter decisions
✔ Used on more than one property
✔ Used to record all your soil results
✔ Used on any Windows based PC computer
✔ Fully configured to meet your needs – add your own favourite fertilisers

FertiPlan – making smarter decisions:

Making it work:

- ✔ View, save to computer hard drive or disk, print out or e-mail report sheets of :
  - the fertiliser plan for each paddock

FertiPlan – making smarter decisions:

Making it work:

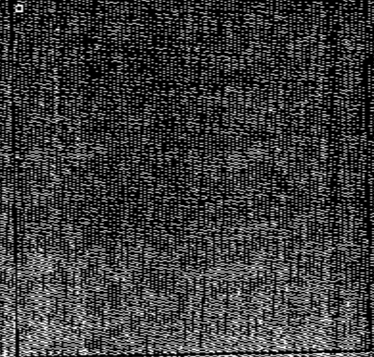
- ✔ View, save to computer hard drive or disk, print out or e-mail report sheets of :
  - the fertiliser plan for each paddock
  - the total fertiliser list for the property

FertiPlan – making smarter decisions:

This easy to use tool on your computer:

- ✔ All for $176 including GST (fully tax deductible)
- ✔ For fast delivery of your copy
  - Free call 1800 652 483
  - write to Rural Solutions SA, 2 Fourth Street, Snowtown
  - Call in to the Rural Solutions SA office near you

FertiPlan – making smarter decisions:



Post-farm gate capacity building: frozen dough initiative & TOPACTIVE training module development

Dave Lewis
PIRSA Rural Solutions

Building Capacity Post Farm Gate

Dave Lewis
Kadina, South Australia

Post Farm Gate

- **Project evolved from Wheat and Durum Projects**
  - Durum project activities concluded
  - Wheat quality project evolved to include all wheat project activities required to achieve post farm gate opportunities
- **Team**
  - Tom Yeatman (Clare) and Simon Gleriie (Kadina).
  - Other Field Crop projects provide support through Capacity Building/farming system projects and Environmental Management Systems projects

Post Farm Gate

- **Durum Project**
  - No opportunity for Value Chain development in line with new project.
  - Objective to expand durum opportunity on Eyre Peninsula partially successful
    - Segregations in place
    - Durum payments to farmers competitive without freight penalty
    - Adoption by farmers limited plus impact of drought so production increases expected not observed

Post Farm Gate

- **Capacity Building**
- Working with groups of people - in this case farmers
- Providing the opportunity to develop new skills, networks and resources.
- Together identify and explore developing new opportunities.

Post Farm Gate

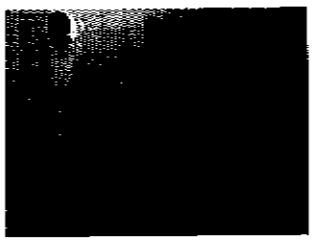
- **Primary Aim:** Demonstrate that vertical integration of farm business into supply chain processing can be achieved
  - Project products: frozen dough, premixes, frozen parbake bakery, Asian noodle.
  - Uses Capacity Building methodology
- **Clients:** Groups of farm businesses interested in expanding into grain processing
  - Groups on Eyre Peninsula
  - Flinders Ranges Premium Grain - Upper North Group
- **Funders:** Robert Rees (PIRSA Field Crop Purchaser) Brian Hansen (Food SA).
  - Additional funding support from Eyre Regional Development Board

Project Profile - Post Farm Gate

- **Skills utilised**
  - networking
  - facilitation / consultation
  - leadership and motivation
  - time and project management
  - research and development
  - conflict resolution
  - quality communication
  - counselling / mentoring
  - reporting etc

Value Adding Project: Outcomes

- New skill sets for farmers
  - Includes targeting wheat quality specifications
- Farmers linked up value adding chain
- Interest from potential markets
- Process has taken just on 18 months
- Unique process and special linkages
- Still to cross finishing line:
  - Formalise business linkages and
  - commercial product into market



Farmers checking out "first bake"

Post Farm Gate

- **TOPACTIVE MODULES**
  - TOPACTIVE - Modules are Education resource package
  - Used by trainers when delivering a workshop - contains support materials and resources
  - the processes involving SA farmer groups to be developed into Workshop support resource
  - 2 modules are planned, possibly along the lines of
    - Introduction to exploring Opportunities in Value Chain business
    - Building a new Value Chain business

Project Profile - Post Farm Gate

- FertiPlan® development
  - Premium grade wheat at a specific protein targeted for speciality food products
  - FertiPlan © software is designed to assist farmers with Nitrogen fertiliser decisions to meet speciality wheat based products

Project Profile - Post Farm Gate

- Future
  - Potential new groups on Yorke Peninsula, Mid North, and potential to service other established groups (eg Lameroo Premium Wheat Growers)

Strategic Marketing for Wheat Producers: a Value Chain Approach – CD and short courses

Geoff Watson
University of Sydney, Orange

Value Added Wheat CRC Project

Value Chain Marketing

Presentation by
Geoff Watson and Tony McKenzie
Faculty of Rural Management
University of Sydney Orange
email: gwatson@orange.usyd.edu.au

Key areas I want to cover in this presentation

- the need for such a course and the approach we are taking to position it
- key features and outcomes of the course
- delivery options we are exploring
- progress to date and the future

The need for such a course and the approach we are taking to position it in the marketplace

- Australian wheat producers are confronting major shifts in their marketing environment
- in particular the wheat value chain is demanding that producers develop:
  - greater chain and consumer awareness,
  - more downstream linkages,
  - increased accountability in their production and marketing activities

Our response is to develop a value chain marketing course for rural producers that has the following approach:

- it is *introductory* in level of detail yet *comprehensive* in covering the full scope of marketing pathways in the value chain
- it is *educative* in emphasis (ie seeks to alter mindsets/ perspectives) rather than focusing primarily on behavioural competencies
- it is, however, strongly *change oriented* for participants in that it challenges comfort zones and works towards shifts in mindsets/ purpose/ information/ relationships, and tools for getting organised

How is the course to be positioned in the training marketplace?

- it is NOT attempting to be a skills building program for commodity marketing.
- rather it seeks to provide a birds-eye view of the value of upgrading commodity marketing skills OR breaking out of commodity marketing into contract or into branded product marketing approaches

How is the course to be positioned in the training marketplace? (continued)

- as well it is not seeking to be a substitute for training rural producers to undertake *entrepreneurial business opportunities* downstream in the value chain
- rather it provides a springboard for developing the *marketing mindset and perspectives* that producers will need to undertake an entrepreneurial opportunity

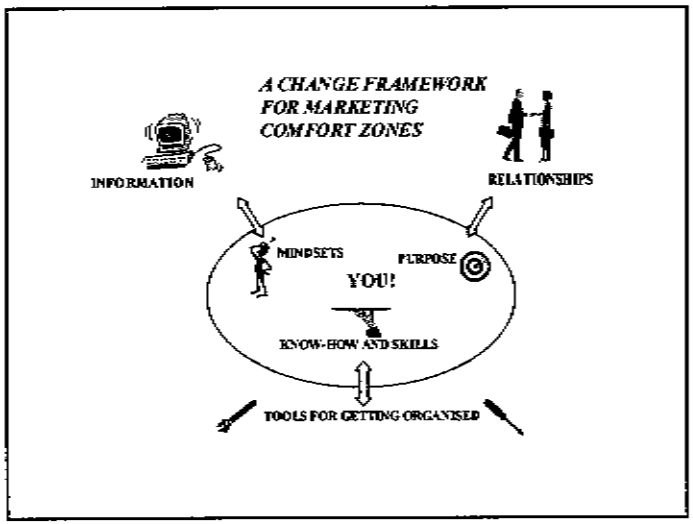
Key features and outcomes

ie, What will participants gain from this course? They will be able to:

- identify the factors that can make marketing a '*weak link*' in their farm business
- describe how marketing *adds value* to their industry
- use the *language of value* in discussing marketing activities

What will participants gain from this course?cont.

- evaluate how *market focused* they currently are and what it might take to shift
- evaluate their *marketing comfort zone* and design change strategies to become more market focused within:
  - the commodity arena
  - the contract arena
  - the branded product arena



some key features of this course

This course is different because:

- it uses the concept of marketing *arenas*
- it focuses on the *person* (via comfort zones) as well as on marketing skills and tools
- it initially uses *case studies* to drive home the key issues
- it encourages participants to subsequently relate to the concepts and tools via *action learning* within their various marketplaces

some delivery options and progress

- The options are:
  - via 2 day workshops
  - via CD ROM through a provider
  - via online
  - via some combination of the above
- Progress to date is:
  - we have trialled the workshop format
  - the CD ROM is being developed right now
  - the online version may follow!

Activities for growers in WA, NSW and nationally

Clare Johnson
VAWCRC

5.1.4 : wheat quality courses, WA

Quality: Suitability for a particular end use

- Courses for farmers and grain handlers
- Market/customer end-use requirements for:
  - Yellow alkaline noodles
  - White salted noodles
  - Instant noodles
  - Flat breads
  - Steamed breads
  - Pan breads
  - Long life noodles
  - Pasta
- Key grain specifications/characteristics for these products
- Role of grain quality in milling efficiency for specific end use
- Strategy to achieve target market profitably

5.1.4 : wheat quality courses, WA

- 2 major courses in Northam in June
- 2 regional courses in Cunderdin & Northam in June / July
- 61 attendees: mainly CBH staff, and some farmers (drought)

- Envisage a continuing but lesser demand for these courses
- Obtaining accreditation, for distance /kit delivery

Negotiating potential outlet for all farmer-based training publications through UNE sustainable agriculture distance course

5.1.3: NSW agronomists

- Regular liaison with DAs in Northern Focus project
- Strong linkages with Northern Focus through role in Cropcheck data entry:
  - Insight into management practices in central and northern districts and key steps in dryland wheat production, with emphasis on Prime Hard.
- 3-day Value Chain Study Tour, 4-6 Feb 2003:
  - 15 extension agronomists from central and north-west NSW who are in daily contact with growers.
  - promote understanding of end-user quality requirements

- Shauna Dewhurst resigns as T.O. on 11 Feb. 2003
  - Re-evaluating sub-project objectives

5.1.2: Stalk to Store book / Manage On-farm Grain Storage CD package

- New edition
  - invited to source up-to date information/contacts
- Included Wheat CRC outcomes:
  - WheatRite rain damage test
  - Optimal aeration temperature (< 23ºC, and preferably closer to 15ºC)
  - QA on-farm.
- Ensured inclusion of external research outcomes:
  - heat disinfestation
  - early (wetter) harvesting for improved yield
- Reviewed / cross-referenced, to present rounded picture
- Case study:
  - Lea farm (Denliquin) uses aeration cooling and Great Grain QA to provide contract seed to SunPrime.
- Sales: 630 ($3,900) since Aug. 2002

Technology Transfer: baking process control, wheat varietal information, noodle HACCP etc.

Hayfa Salman
VAWCRC

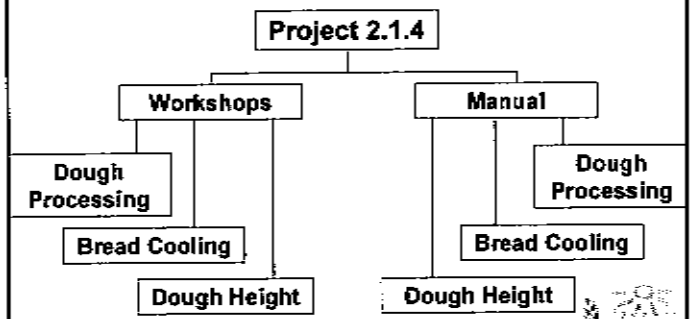
Project 5.1.2: Initiatives for Uptake of VAWCRC Innovation

Hayfa Salman
Research Officer – Technology Transfer

Achievements

- Training manual for oven technology
- IP list of innovation for potential technology transfer
- Wheat varieties website

Oven Technology Transfer and Training

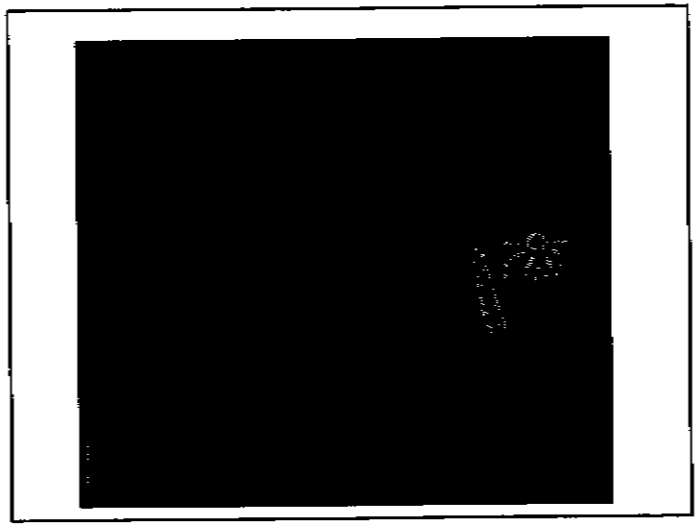


- The current benefit per bakery from the Dough Processing Optimiser is $110,000 p.a.

- Benefits include:
  - Increased water uptake
  - Increased yield
  - Reduced yeast

Oven Training Manuals

- Liaison with Thomas Adamczak
- Produced master-document on the Dough Processing Optimiser
- Divided the document into:
  - » Training manual for production and operation staff
  - » Installation and maintenance guide.
  - » Workbook for installation and commissioning



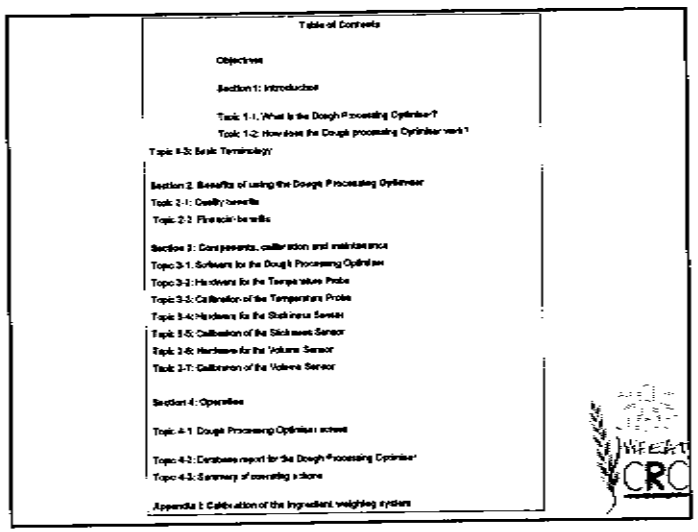


Table of Contents

Objectives

Section 1: Introduction

Topic 1-1: What is the Dough Processing Optimiser?

Topic 1-2: How does the Dough processing Optimiser work?

Topic 1-3: Basic Terminology

Section 2: Benefits of using the Dough Processing Optimiser

Topic 2-1: Quality benefits

Topic 2-2: Financial benefits

Section 3: Components, calibration and maintenance

Topic 3-1: Software for the Dough Processing Optimiser

Topic 3-2: Hardware for the Temperature Probe

Topic 3-3: Calibration of the Temperature Probe

Topic 3-4: Hardware for the Stickiness Sensor

Topic 3-5: Calibration of the Stickiness Sensor

Topic 3-6: Hardware for the Volume Sensor

Topic 3-7: Calibration of the Volume Sensor

Section 4: Operation

Topic 4-1: Dough Processing Optimiser screen

Topic 4-2: Database report for the Dough Processing Optimiser

Topic 4-3: Summary of operating actions

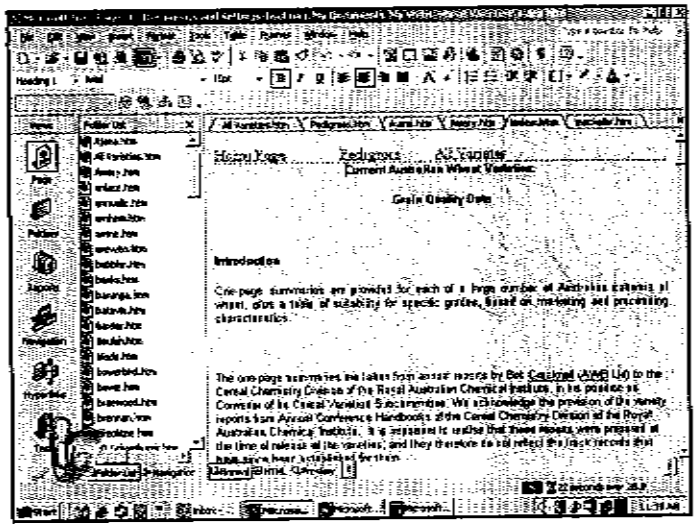
Appendix I: Calibration of the ingredient weighing system

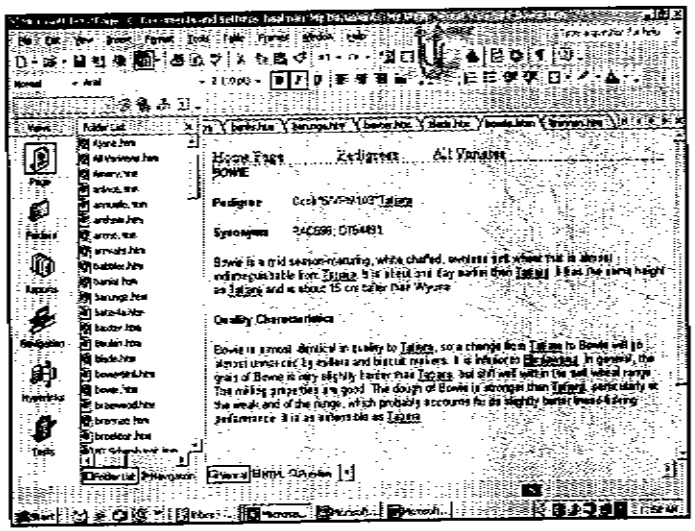
Potential Technology Transfer: IP List

- Existing TAFE training packages were purchased
- Quarterly reports of Quality Wheat CRC were compiled and studied
- A list was made for the IP committee to approve incorporation of results into TAFE courses

Wheat Varieties Website

- Learned FrontPage software
- Formatted data on each wheat variety from QWCRC Report #48 into webpages
- Created the web, to be saved to CD
- 80% complete, looking at April to finish





Future Plans

- Workshop for Microbiological Safety and Stability of Refrigerated Noodles
- Follow up development of training from items on the IP list; make a new list from Quality Wheat CRC Program 5 and VAWCRC projects