LEADING RESEARCH PROFITABLE BUSINESSES

2-3 JULY 2014, PALMERSTON NORTH

ADDING VALUE TO THE BUSINESS OF ARABLE FARMING™
Welcome to FAR’s 2014 Conference: Leading research, Profitable businesses

The theme for the conference was drawn from FAR’s recently released 2014 – 2017 Business Strategy which recognises that a successful arable industry is one where the businesses involved are profitable and that research plays a key role in this success.

Over the years FAR’s research focus has shifted from projects with a largely agronomic, crop specific focus, to a farm systems approach, reflecting the changing needs of our growers and the industry as a whole. That change is reflected in the programme of our conference with a whole session dedicated to Farm Systems research, with particular emphasis on managing nutrients in such a way that they reduce environmental impacts and add value to the farm system.

That doesn’t mean that research into improving crop yields has ceased. We firmly believe that increased yields are the key to increased profitability. In the Agronomy session you will hear about research aimed at increasing feed wheat yields to 20 tonnes per hectare and an update on pest management and pesticide resistance issues. Our Keynote Speaker, John Cameron from ICAN Rural in Australia will outline the huge impact that herbicide resistance is having on Australian growers and outline some potential solutions for the future.

Finally, we couldn’t hold a conference in the North Island without talking about maize. The four presentations in the Maize session look at the crop through a farm systems lens, with a particular focus on its role within the dairy industry, where as well as providing supplementary feed, it has the potential to assist with nutrient management.

We are very grateful to Hew Dalrymple for giving us access to the complex farm system that is Waitatapia Station and to MaltEurop for welcoming us to their malting facility. These visits provide a practical focus to the conference, and the opportunity to see the industry in action.

Finally thanks must go to Gold sponsors: John Austin Ltd and Pioneer Brand Products; and Silver sponsors: NZX Agri, Pacific Seeds and Corson Maize Seed, for their financial support of this conference.

Nick Pyke
CEO
8.00am - 11.00am
Federated Farmers AGMs

9.30am onwards
FAR Conference registration

11.00am
FAR Conference opens - Welcome
*Nick Pyke, FAR*

11.10am - 1.00pm
**SESSION ONE: FARM SYSTEMS**
Chair: *Allister Holmes, FAR*

11.10am - 11.30am
National overview of Land and Water issues
*Ian Mackenzie, Federated Farmers*

11.30am - 11.50am
Grass to Crop
*Nick Poole, FAR*

11.50am - 12.10pm
Alternative N sources in cropping systems
*Dirk Wallace, Plant & Food Research*

12.10pm - 12.30pm
Nutrient flows in cropping systems
*Diana Mathers, FAR*

12.30pm - 12.50pm
ProductionWise®
Melanie Bates, FAR and grower/user

END OF SESSION - LUNCH

1.30pm - 5.30pm
**FIELD TRIPS**
*Hew Dalrymple - Waitatapia Station, Bulls*
*MaltEurop - Malting plant, Marton*

6.00pm
DRINKS followed by DINNER
8.15am
Welcome/Housekeeping

8.30am - 10.30am
SESSION TWO: AGRONOMY
Chair: Hugh Ritchie, FAR Board

8.30am - 8.50am
20t by 2020
Rob Craigie, FAR

8.50am - 9.10am
Disease resistance
Nick Poole, FAR

9.10am - 9.30am
Management of TPP and the pathogen it vectors, in potato
Jessica Vereijssen, Plant & Food Research

9.30am - 9.50am
Barley agronomy
Nick Pyke, FAR

9.50am - 10.30am
Integrated Weed Management
KEYNOTE SPEAKER John Cameron - ICAN Rural, Australia

10.30am - 11.00am
MORNING TEA

11.00am - 12.30pm
SESSION THREE: MAIZE
Chair: Alan Henderson, FAR Board

11.00am - 11.20am
Waimate West Research Farm
Joe Clough, PGG Wrightson

11.20am - 11.40am
Maize establishment
Mike Parker, FAR

11.40am - 12.00pm
Novel methods for assessing N
Matthew Norris, Plant & Food Research

12.00pm - 12.20pm
Future initiatives in maize
Allister Holmes, FAR

12.20pm - 12.30pm
CLOSING STATEMENTS and FAREWELL
SESSION ONE:
FARM SYSTEMS

Chair:
Allister Holmes
Foundation for Arable Research
National overview of land and water

Author: Ian Mackenzie, Federated Farmers
Grass 2 Crop – capturing the value of the restorative phase in the cropping phase

Author: Nick Poole, Foundation for Arable Research

New Zealand cropping systems involve a grass phase of various durations, which can be as little as six months and up to six years in the mixed livestock arable cropping system. The benefits of the grass phase in the rotation (e.g. soil quality) are well understood, however converting the grass phase back into cropping, or “breaking” grass, presents a number of problems. These problems can be associated with the method of establishment.

MPI/FAR funded research work conducted by FAR and Plant & Food Research in both the North Island and South Island illustrated that large amounts of mineral nitrogen (N) (100 kg N/ha or more for a number of years) are released to the cropping phase following grass. There was little evidence that the establishment technique following the grass phase influenced the amount of N available to the first year of the cropping phase. Though slower biomass accumulation in the early stages of growth were noted where direct drilled crops were established, this could not be related to the amount of mineral N available. Soil physical structure was poorer under plough and top work treatments compared to those that were direct drilled, but no significant yield differences were evident in the research conducted. Following the grass phase it was also noted that the distribution of carbon (and phosphorus) throughout the soil profile was altered by tillage; direct drilling concentrates carbon in the surface soil, while ploughing distributes it through the profile. However, no differences in total amount of carbon (0 - 35 cm) were detected.

With increased emphasis on nutrient management and the environmental impact of nitrogen emissions from agriculture, it is important to fully account for this N release following grass from both a financial viewpoint in terms of N fertiliser saved but also an environmental perspective. Moving from “Grass 2 Crop” is an important example of a “win win” in nutrient management whereby a restorative grass phase can lead to large profitability and environmental gains through reduced fertiliser application.
Alternative N sources - using effluents or legumes to grow arable crops

Authors: Paul Johnstone and Dirk Wallace, Plant & Food Research; Mike Parker and Diana Mathers, Foundation for Arable Research

Optimising nitrogen (N) use efficiency remains one of the big production challenges for cropping farmers in New Zealand. Too little N can compromise yield and quality, whereas too much can reduce profitability and raise environmental concerns. In 2012 we began a 3-year SFF project investigating opportunities to use N-rich dairy effluents or N-fixing legumes as slow-releasing N sources to grow arable crops.

Using dairy effluent to grow crops
The use of dairy effluent (liquids, slurries and solids) to grow crops is becoming more common as farmers look to ‘close the loop’ on N management between dairy and cropping farms. To optimise the use of effluent, farmers need to be able to predict the amount and rate at which N is released. Understanding these dynamics will help farmers to select effluent types that better match seasonal crop N demand, and in turn optimise the supply (where necessary) of fertiliser N. Additionally, application technologies (surface or injected) and timings (spring or autumn) can help farmers to maximise plant availability and minimise potential losses.

Using legumes to grow crops
Many summer crops are grown in rotation with winter grass for grazing. An alternative approach is to grow a winter-active legume crop for incorporating back into the soil in spring. The potential N benefit to the following summer crop depends on factors that influence the amount of N fixed by the legume over the winter period, how much of that is cycled to the next crop, and how quickly it is released in the soil. Understanding these dynamics can help farmers to decide on the value proposition of incorporating legumes into their rotation and optimise fertiliser N supply for subsequent crops.

Key findings from recent effluent and legume trials addressing these aspects will be presented at the conference.
Regional councils and farmers are currently focusing on nutrient flows and losses from farm systems as regional plans are developed to meet the requirements of the National Policy Statement for Freshwater Management.

In arable systems, nutrients are moved off the farm in harvested crop and around the farm by grazing animals. In certain situations, key nutrients such as nitrogen (N) and phosphorus (P), are lost to the environment and can become environmental pollutants causing damage to ecosystems. Understanding how and when these losses occur is the key to being able to farm within the limits that are being set around the country.

In 2013 FAR undertook a benchmarking exercise to get an idea of the losses from arable systems. Overseer®6 was used to generate nutrient budgets from arable farm data. In our study of 30 farms and 430 paddocks with cropping and grazing rotations, 49% of those paddocks had leaching N losses of less than 10 kgN/ha/year and 75% were less than 20. Whilst many rotations have a low risk of leaching loss, there are some situations which are more challenging to manage. These include cropping after long term pasture and cropping on soils with shallow top soils and stony profiles.

In a recent trial in a paddock with a history of maize grain and a low Overseer® nutrient budget, we tested a number of management practices associated with fertiliser management. AmaizeN was used to predict the nitrogen demand for the crop, and all the fertiliser, some of it a slow release formulation, was applied at planting. The maize was direct drilled.

We found that:

- AmaizeN did a very good job of predicting the fertiliser recommendations for the crop.
- There was no disadvantage to the crop by applying all the fertiliser at sowing but there is still some uncertainty about the value of a slow release nitrogen formulation for maize.
- The opportunity for this technology is likely to be with crops with a higher value than maize and multiple applications of N during their growth.
- It is important that farmers continue to reassess management practices with respect to their rotations as these are the key for managing nutrient losses. Many are no-brainers and cost no money.
Production Wise®: online crop management

Author: Melanie Bates, Foundation for Arable Research

Record keeping and traceability are hot topics for the arable industry and FAR is at the forefront with Grain Growers Ltd, Australia, in developing a system for growers which will tick lots of boxes.

ProductionWise is an integrated online farm management system that allows you to map your paddocks, record management practices and inputs, and automatically generate reports, gross margins and benchmarking. Grain Growers Ltd in Australia have developed the system and have worked with FAR to streamline it for use in New Zealand. They have placed a strong emphasis on ease of use. ProductionWise is freely available to all Foundation for Arable Research levy payers.

ProductionWise has four key features:

**Farm Mapping** – Google powered digital paddock mapping, topographic paddock information, general soil characteristics and grain infrastructure configuration.

**Paddock Diary and Reporting** – Record keeping of crops; operations, inputs and management practices; view, save and export paddock diary reports; comprehensive pre-populated input lists.

**Grain Storage** – On and off farm grain storage diary, record pesticides applied to stored grain, recording of current contracts and sales, auto-calculation of surplus/deficit grain.

**Gross margins** – View gross margins and cost of production, assess gross margins by paddock, crop type and farm, use map viewer to benchmark paddock gross margins.

Latest improvements include a simplified diary for data entry, layered features for farm mapping and date range options for reporting, plus a mobile app for easy data entry. A whole new Grain Storage upgrade is soon to be released, for monitoring grain inventory from the time it enters the silo to the time it leaves the farm. This is the first time any paddock management system can display the complete history of the grain from paddock to buyer, providing complete grain traceability.

As well as providing growers with information on their cropping operation, ProductionWise assists FAR in capturing regional cropping information to be used for benchmarking assessment and to provide reports back to growers at the end of the season.

Register at www.productionwise.co.nz or contact the FAR office on 03 345 5783 or email batesm@far.org.nz.
Wednesday 2 July 2014

FIELD TRIPS

1. Hew Dalrymple
   Waitatapia Station, Bulls

2. MaltEurop
   Malting plant, Marton
Dinner kindly sponsored by

PIONEER®
BRAND · PRODUCTS
Thursday 3 July 2014

SESSION TWO:

AGRONOMY

Chair:

Hugh Ritchie
FAR Board
20 by 2020: The challenge of selecting suitable feed wheat cultivars for very early sowing

Author: Rob Craigie, Foundation for Arable Research

20 by 2020 is an ambitious FAR led programme aiming to increase farm productivity and profitability by achieving the highest feed wheat yields in the world - of 20 t/ha by 2020. Most feed wheat is sown in April, although some growers are planting in March.

Over the last four years, FAR research has assessed bringing the sowing date forward, which has given good yield increases in some seasons. A crop planted earlier potentially grows more biomass and as a result, could achieve a higher grain yield. This work explores the extremes to find the earliest possible sowing date. Crops are being sown in February, March and April with a range of plant populations to compare yields from the different sowing dates. In time of sowing trials at Leeston, Canterbury over the last two seasons, March-drilled wheat has given higher yields than February and April drilled wheat (Table 1).

Table 1. Mean yields (t/ha) for cultivar Wakanui sown over three months in 2012-13 and 2013-14 at Leeston, Canterbury.

<table>
<thead>
<tr>
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<th>February</th>
<th>March</th>
<th>April</th>
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<tbody>
<tr>
<td>2012-13</td>
<td>13.5</td>
<td>14.4</td>
<td>12.6</td>
</tr>
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<td>2013-14</td>
<td>9.3</td>
<td>11.5</td>
<td>11.2</td>
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One of the challenges is that there is no experience of managing February sowings. In the 2013-14 season, crops sown in February had accumulated 3 t/ha dry matter by winter. But as a result, the very bulky crop was prone to lodging and there was also a high incidence of Septoria tritici blotch (STB). The right cultivar is key, because it has to be more resistant to diseases, and have a shorter and stiffer straw, so it is more likely to stay standing up. The cultivar also needs to be late maturing. To date cv. Wakanui has been used for most of the work because it is high yielding, late maturing and has reasonable disease and lodging resistance. Future work involves screening more suitable cultivars for early drilling.
Zymoseptoria tritici resistance to strobilurins – what does it mean for wheat growers and advisers?

Author: Nick Poole, Foundation for Arable Research

Septoria tritici blotch (STB) or Speckled leaf blotch caused by the pathogen Zymoseptoria tritici has been an increasing problem in wheat crops since 2010. Unlike the cereal rust issues (stripe rust and leaf rust) that preceded this disease outbreak, Septoria tritici blotch (STB) has been far more difficult to control. In 2013 control of the disease with foliar fungicides gave extremely variable results, leading to reduced yield in a number of crops. FAR field trial results indicated that the strobilurins (QoI’s – Quinone outside Inhibitors), for example Comet® (pyraclostrobin), no longer gave reliable or effective control of STB. Work conducted at Plant & Food Research and Massey University provided proof that the poor performance in the field was due to resistance to strobilurins in the Zymoseptoria tritici population in both the North and South Islands. Additionally, studies conducted on triazole (Demethylation inhibitors – DMI) fungicides, for example Opus®, Folicur®, Proline® etc suggested reduced sensitivity in the same populations to these fungicides.

Strategies for controlling Septoria tritici blotch (STB) in the future will need to be based on different fungicide approaches and will have greater emphasis on Integrated Disease Management (IDM) where growers use genetic resistance, cultural measures and fungicide to control disease. One of the factors reducing disease pressure is later sowing, so a simple strategy that can be employed is to avoid sowing susceptible cultivars in the early autumn sowing windows. Though strobilurin fungicides are still effective against other diseases, such as rusts, the best agrichemical solutions for control of this disease are based on the new SDHI fungicides mixed with triazole fungicides. Where high levels of STB are present in susceptible cultivars at early stem elongation (GS31-32) it is advisable to look at SDHI/triazole combinations at this timing and flag leaf. It is essential that no more than two SDHI fungicides are used in the growing season, since these products, like strobilurins, have a moderate to high risk of developing resistance.

Finally, as STB is favoured by wetter and warmer conditions, it is important to monitor the likelihood of infection events between spray applications.
In 2008, zebra chip (ZC) disease symptoms, similar to those observed in Mexico and the United States, were observed in potato tubers in South Auckland. In the same year researchers in New Zealand and the United States detected a bacterial plant pathogen not only in tubers showing ZC disease symptoms, but also in other solanaceous crops and *Bactericera cockerelli*, the tomato potato psyllid (TPP). This insect, now recognised as the vector of the ZC disease agent, has spread throughout New Zealand since it was first confirmed present in 2006.

Management relies heavily on applying a range of insecticides to control the psyllid and subsequently reduce the disease to an acceptable level. Consequently there has been a significant increase in regular applications of insecticides in the potato industry. These spray practices are not only costly but are likely to have a negative impact on the environment and beneficial insect species, while increasing the potential for insecticide resistance in TPP and other pest insects such as aphids and potato tuber moth. Also, ZC can still be found in potato tubers, thus the insecticide-based strategy is not completely efficacious in terms of disease elimination.

The interactions among the plant, pathogen and insect are various and complex, and therefore an integrated approach is needed for management. In most cases involving insect vectors and plant pathogens, no single approach will achieve adequate control. In this presentation I will discuss the difficulties encountered managing this insect vector and the pathogen and give an update on current research.
Barley – how to grow a great crop

Author: Nick Pyke, Foundation for Arable Research

This year, given the increased demand for barley from the dairy industry, the current price equity with feed wheat, the low volumes of unsold stock (56,000 tonnes at 1 April 2014 compared with 190,000 tonnes at 1 April 2013) and the wet autumn resulting in reduced areas of autumn sown cereals, it is likely there will be significant areas of spring sown barley.

In recent years the average grain yield of barley has increased slightly from an average of 5 t/ha in 1995 to 6.5 t/ha. However, yields of over ten tonnes are regularly achieved and increases in yield are required to ensure the crop remains viable. Increasingly barley is a valuable crop in the arable rotation and fits well in cropping systems where it can be used for grain or cereal silage. This year research is underway to look at double cropping barley in one season to increase productivity.

Many of the key factors required to grow a good barley crop are well known – the challenge is, how do you grow a great barley crop?

Some key drivers of crop production will be discussed:

- **Yield** is determined by the ability of the plant to intercept sunlight and convert this energy into yield. Therefore, barley production is all about harnessing sunlight and dry matter partitioning.

- A number of new cultivars have the potential to yield 1.5 to 2 t/ha higher than older varieties.

- Nitrogen uptake should be matched to both plant demand and yield potential. Yield peaks around 250 kg/ha total N.

- There is a clear relationship between N application rate and protein.

- A number of plant diseases can significantly impact on yield, so disease management practices are important. Disease management starts with cultivar selection.

- Fungicide use is about protecting leaves to capture light. In New Zealand research, preventative plant growth stage based fungicide programmes have achieved the best results. Yield increases from fungicide use are regularly in the order of 2 t/ha.

Barley is increasingly being grown for cereal silage where it provides significant opportunity as a short season crop in a feed focussed cropping system. In this position it may allow planting of summer vegetable crops, other feed crops or even a second barley crop.
Weeds and herbicide resistance – softening the landing with non-herbicide tactics!

Author: John Cameron, Independent Consultants Network Australia Pty Limited (ICAN) john@icanrural.com.au

Herbicides are effective, cheap and easy to use. As a result, they are prone to overuse. Modelling predicted what has happened in Australia which is widespread failure of multiple herbicide modes of action on an increasing spectrum of weed species. This includes several herbicides for which sustained high levels of selection are required to develop resistance e.g. glyphosate, paraquat, 2,4-D and trifluralin. Resistance in key weeds to Group A and B herbicides is so widespread, that most growers in most growing regions have resistance to one or both of these modes of action. Modelling to predict resistance onset is based on selection pressure and the frequency of resistance genes in unselected populations.

As more herbicides fail, the need to add non-herbicide tactics to the farming system becomes critical to the maintenance of remaining herbicides and to help drive down the weed seed bank to maintain cropping options and profits. Key non-herbicide based tactics include weed seed capture at harvest; increasing levels of crop competition; and the use of tactics to stop weed seed set such as cutting for silage or hay, fallowing and manuring and hand rogueing.

In long term no-till systems, tillage is making a return as some weeds cannot be cost effectively controlled in fallow using herbicides. Camera sprayers such as WeedSeeker® are in widespread use on low density fallow weed populations in the Northern Grains Region, with reductions in herbicide use as high as 90%.

Changes to how herbicides are used include: greater use of and reliance on pre-emergent herbicides and double knock strategies using paraquat; a general increase in herbicide rates to avoid unnecessary selection of lower order genes for resistance and to effect higher kill rates; and replacement of economic thresholds with a ‘take-no-prisoners’ approach using all available tactics designed to drive down the weed seedbank over time.

Future research is looking at genetic options that include more competitive crops and a greater range of herbicide resistant crops – especially to pre-emergent chemistries, providing more options to use pre-emergent herbicides in the short to medium term. Blue sky research could develop camera based selective tillage implements, or systems that use new weed detection and location systems to identify where individual weeds are and multiple robots armed with tillage or microwave technology that would be sent out on seek and destroy missions.
SESSION THREE:
MAIZE

Chair:
Alan Henderson
FAR Board

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Integrating sustainable high yielding crops into dairying

Author: Joe Clough, PGG Wrightson Consulting

A trial set up at the Waimate West Demonstration Farm in South Taranaki in the season of 2008/2009, has demonstrated that integrating high yielding crops in the dairy platform can increase dry matter and milksolids production as well as increasing profitability in a sustainable way.

This trial developed from the knowledge that while most increases in productivity in the dairy industry over the past ten to fifteen years had come about by introducing feed onto the dairy platform, many dairy farmers who didn’t own runoffs, and who were reluctant to expose themselves to the vagaries of the market in purchasing feed, were not prepared to go into these types of systems.

So the question was, could additional feed be grown on the milking platform by introducing high yielding crops into the dairy platform?

The initial trial aimed at having 10% of the dairy platform area in crops.

The trial compared this system with a self-contained all grass pasture system.

A number of crops were tried, but finally a relatively simple combination was settled on.

The crops grown were: maize for silage, turnips and chicory for summer feed, and a combination of oats and annual ryegrass for winter “in-between” crops.

It took a couple of seasons to bed the system in, but once it was, it did prove to be successful in terms of creating extra dry matter production, extra milk solids, and most importantly, more profit.

The sustainability measures completed throughout the trial also showed that it had very little negative impact on the environment.

Having completed the trial it begged the question, if more of the farm be put into crop could the results be even better?

We are currently just finishing the second season of having 25% of the dairy platform area in crops.

Year one of the trial showed that despite it being a drought, this cropping programme did produce more dry matter and more milk solids and greater profits.

The second season results are currently being analysed.

This coming season will be the third and final season of the current project which will hopefully give sufficient information combined with the first two years to conclusively show the value of having 25% of the milking platform in crops.
Establishment of maize

Author: Mike Parker, Foundation for Arable Research

Maize yield potential begins with seed germination and emergence, and the establishment of the stand, giving the required number of plants per area. However, profitable maize production is not just a function of yield but also of the cost of production.

Cultivation of a seedbed comes at considerable cost ($380/ha for disc ripping followed by power harrowing). Cultivation may be necessary to achieve objectives such as aeration and drying of a soil, improved residue or weed management, increased soil temperature or fertiliser incorporation. On the other hand, not cultivating provides an immediate cost saving, maintains soil structure and strength, and conserves soil moisture, organic matter and nutrients. The economics of crop establishment systems will be outlined, and the following points on direct drilling will be expanded upon.

- Heavy cold wet soils are better planted later or cultivation maybe the better option.
- Plant a hybrid with good early vigour.
- Slug baiting is recommended in most cases.
- Avoid sowing maize on land with a history of Northern Corn Leaf Blight.
- Apply a synthetic pyrethroid insecticide with the pre-emergence herbicides to aid greasy cutworm control when drilling into pasture containing docks or other hosts to cutworm.
- Starter fertiliser is recommended to aid early vigour and growth.
- Correct setting up of direct drilling planting systems is critical.
- Reductions in the weed seed bank can occur under longer term maize grain paddocks.
- There is a conservation of moisture under a direct drilled crop compared with cultivation.
Novel methods for managing soil nitrogen: The nitrate quick test approach

Authors: Matt Norris and Paul Johnstone, Plant & Food Research

Nitrogen (N) fertiliser is used extensively to maximise productivity across a range of vegetable, arable and forage crops in New Zealand. Matching crop N demand with supply from residual soil mineral N, N mineralisation from organic matter and fertiliser N is central to economic and environmental outcomes in these sectors.

To improve nitrogen use efficiency, effective tools and approaches are required to help guide nutrient management decisions. One potential method is the ‘quick test’ soil nitrate (NO₃-N) approach. This in-field approach utilises a ‘test strip’ impregnated with a NO₃-N sensitive alert zone which, with a simple colorimetric scale, may be used to measure soil solution NO₃-N concentrations. Measured NO₃-N concentrations can then be compared to critical threshold limits that have been established for a number of crops.

The quick test strips have already been used for a number of years overseas to support growers in making N fertiliser decisions. Depending on NO₃-N levels at sampling, a test strip reading may indicate the need for fertiliser to be applied, withheld for a period or eliminated entirely. The test can therefore provide more certainty in decision making. In addition to being cost effective and simple to use, the quick test approach provides the user with rapid information, thus enabling decisions to be made at short notice.

In 2013-14, Plant & Food Research undertook a series of proof-of-concept trials to examine the use of ‘quick test’ soil nitrate (NO₃-N) approach under New Zealand conditions. The aim of the work was to 1) substantiate the relationship between test strip nitrate values and laboratory-determined mineral N (the ‘gold standard’) and 2) assess the suggested quick test critical thresholds for making N fertiliser decisions in beetroot and carrot crops. Results from this preliminary work were encouraging. Follow on trials will test further the suitability of the strip in making field-scale N fertiliser decisions.
Future initiatives in maize

Author: Allister Holmes, Foundation for Arable Research

Maize crop establishment is based on the same principles developed before the introduction of tractors. The greatest change came with the introduction of synthetic fertilisers in the 1950s. Maize yields have increased worldwide steadily, and crops in New Zealand have followed this trend. However, in the new millennium, yields have stagnated in New Zealand.

With increasing production costs and reducing gross margins, maize growers in New Zealand must ensure they increase crop yields, control costs and improve profitability.

Agronomic drivers of maize performance continue to be the basis of profitable maize production. Hybrid characteristics such as drought tolerance, disease resistance and standability will become increasingly important with the greater prevalence of extreme weather events, and soil characteristics affect the availability of macro- and micro-nutrients. Weeds pests and diseases must be managed to ensure good control, while minimising the potential for the development of pesticide resistance.

Long-term maize production systems have traditionally included a regular rotation with a leguminous crop, classically soybeans. While soybeans have been grown in limited amounts in New Zealand, they have not proved cost-effective against imported sources of protein. Ideally a profitable leguminous crop could be introduced to the New Zealand maize growing regions to allow an economically viable crop rotation.

Adapted technologies, such as strip-tillage, can offer many benefits over conventional practices and precision agriculture also has the potential to increase profitability. New, transformative on-farm technologies such as biofuel production and stover-fuelled grain drying could also help minimise production costs and maximise profitability.

The theme of this year’s NZ National Agricultural Fieldays was “Managing Resources for a Competitive Advantage”, and environmental issues are going to be an increasing factor in primary production. By continually striving to improve cropping systems by maximising input use efficiency, and working with other stakeholders in the rural landscape, growers will help mitigate environmental degradation as a by-product of producing sustainable yields of profitable crops.

This paper outlines some areas of research that aim to add value to the maize industry by improving agronomic understanding; introducing innovative farming practices; and ensuring the sustainability of the farming systems.
ADDING VALUE TO THE BUSINESS OF ARABLE FARMING™