

ENGAGING TO CHANGE: CONSTRAINTS TO ON-FARM ADOPTION

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Abstract

Growers in Horowhenua and Gisborne have made significant change in nutrient management practices as part of Future Proofing Vegetable Production. Focusing primarily on nitrogen we have seen significant changes as growers receive and are supported to use new information.

Making significant impact on nutrient losses requires a major change in on-farm practice. How can we help farmers (and their advisors) make the necessary changes?

We adapted Tim Neale's "Drivers of Technology Adoption" (Neale, T. 2016) to propose the "10 Cs of Farm Management Change". Recognition of these drivers underpins our work with growers faced with step-change to achieve new regulatory targets limiting nutrient leaching.

Grower support includes workshops, field events and collaborative on-farm trials. It covers such things as soil sampling and nutrient management, alternative application technologies, fertiliser applicator calibration, and efficient irrigation. Workshops and field events give growers new and updated information, but it is often one-on-one interaction that sees growers gain confidence and make actual management changes.

To determine appropriate fertiliser rates, we pull together "Nutrient Management for Vegetable Crops in New Zealand" (Reid and Morton, 2019) which provides guidelines based on the best current experimental evidence, the Nitrate Quick Test developed by University of California – Davis and calibrated for New Zealand by Plant and Food Research, and FAR's "Quick Test Mass Balance Tool & User Guide". We identify alternative products and equipment and make these available to farmers for testing.

Our on-farm trials are kept simple, testing one thing against the other with four replicates and randomisation. In part, they are to continue the conversation, in part to introduce growers to better trial practices, and in part to check that the new management practice does not have negative consequences. They help build capacity, capability and confidence.

Planned trials to compare grower practice with the new nutrient guidelines quickly changed when we found many growers had already adopted them and some were already applying lower rates than in the guidelines. 2019/20 trials are looking at alternative fertilisers, alternative application methods, different rates of starter and side-dressing and whether biologicals can reduce nutrient requirements.

Introduction

With support from MPI SFF, Horizons Regional Council, Gisborne District Council, Ballance AgriNutrients and Potatoes New Zealand, LandWISE has been working with vegetable growers in Levin and Gisborne to review their nutrient management practices. Focusing primarily on nitrogen we have seen significant changes as growers receive and are supported to use new information.

Making significant impact on nutrient losses requires major changes in decision making and on-farm practice. How do we as “change agents” help farmers (and their advisors) assess alternatives and make these changes?

A Conceptual Model

A model initiated by the “Drivers of Technology Adoption” proposed by Tim Neale (Neale, T. 2016) provides a useful conceptual framework. Neale suggested “Six Cs”: Compliance, Convenience, Capacity, Complexity, Cost and Champions. These drivers, he suggested, can have a positive or negative effect on adoption.

With a little imagination and extension, this framework can apply to any on-farm management changes. We propose adding four more human factors: Connectedness, Capability, Conscience and Confidence, giving us “Ten “Cs”: Constraints to On-Farm Adoption”.

Compliance and Conscience are the bounds of behaviour with compliance an external force from above, conscience the internal foundations underpinning how we act. Compliance is a “stick” and a powerful driver of change if enforceable and enforced. But balancing the driver of compliance, we must acknowledge Conscience, the idea that most people are motivated to adopt practices because they are “the right thing to do”. Salespeople recognise the power of reaching your heart through values, rather than your brain through logic.

Connectedness and Champions increase the likelihood that growers will become aware of new approaches, have support to learn and adopt, and accept that the new way is beneficial and worth doing. Connectedness includes being part of communities that share knowledge and experience; the wider the reach, the more ideas are brought in for consideration and the more opportunities to bounce those ideas around. We can help by connecting growers to ideas and equipment alternatives and making human connections with people who “click”. Champions include trusted influencers and advisors who have skills and experience to validate ideas and technologies and choose to promote them. Whom any individual accepts as a champion is a very personal thing. Referencing the Technology Adoption Life-cycle, we do not believe “majority” or “late majority” farmers pay much if any heed to “innovators” or “early adopters”¹.

Convenience and Complexity work in opposite directions. In a busy world, things that add convenience are rated highly and more likely to be accepted and adopted, whereas the converse is true of complexity. Trying to come to grips with complex systems and technologies is hard, so there is a high barrier to adoption which needs a high perceived benefit reward to overcome. We help by accessing and identifying good resources and tools, by making them readily available and by creating the simplest, easiest to integrate into existing practice packages we can.

Capacity and Capability go hand in hand. Growers must have both the resources and tools and the ability to access and use them. Capacity is having access to the right resources (capital, labour, products and equipment). Capability is having the skills and knowledge required to successfully implement new practices. We help build capacity by identifying alternatives, whether new information, products, tools or practices. We help build capacity by providing access and information in multiple ways and explaining, coaching and supporting individuals’ development.

Cost is important but must be taken in context. There are many costs including equipment, products, training and licensing, but also the opportunity cost of not adopting. There is a real

¹ Read Moore, G.A. (1991) “*Crossing the Chasm*” for a good discussion on this.

risk of losing a market if industry regulations are not met, or the right to farm if you cannot comply with government regulation. On a strict price basis, we think cost of equipment or technology is not at the top of anyone's list. Purchase decisions are far more complex than price, being derived from a personal weighing of all the other Constraints. We can help by providing a sounding board, by pointing to efficiencies and minimising the negative costs of regretful decisions.

Confidence is personal. Doing something different can be somewhat intimidating, which can be a psychological block to changing behaviour. All farmers have stories and scars from trying to introduce a new element to a complex system subject to many uncontrollable factors (their farm). Change carries high real and perceived risk. We can help address this by introducing and testing new things in small, safe, controlled ways. Building Confidence is a large part of why we do on-farm trials that have growers at the centre.

Application in Practice

It is an approach we believe is successful. We see growers in Horowhenua making significant changes in nutrient management practices as part of Future Proofing Vegetable Production. As noted, farmers who want to remain in business cannot avoid Compliance, whether government or market imposed. But we see them being proactive and committed to improvement despite there being some significant real costs, because it is the right thing to do. With a clear Conscience, they sleep well at night and enjoy farming again in the morning.

Our Connectedness enables us to broaden awareness of opportunities and to access inspiration and support. It helps us find new technologies and processes for evaluation and possible adoption. As change agents, we are Champions of tools and technologies we believe add or unlock opportunities and value. As our relationships deepen and trust builds, we become more effective.

Our grower support starts by understanding the issues they face, their goals, constraints, and priorities and gaining some idea of their knowledge gaps and our knowledge gaps. We have to know and trust each other. Then we can start bringing information together for them and packing it in forms that they find best to access.

Delivery of information includes handouts, webpages and various tools and templates, with workshops and field events to introduce and begin processing ideas. Presentations to date cover soil sampling and nutrient management, the nitrate quick test, Visual Soil Assessment, alternative application technologies, fertiliser applicator calibration and efficient irrigation.

Despite many ways to give growers new and updated information, it is most often follow-up interaction that sees growers make actual management changes. We add to workshops and field events through one-on-one meetings on farm and by phone. This allows us to deal with details, questions and clarifications and customise things to the farm and farmer. Reviewing soil test results, fertiliser recommendations, the vegetable nutrient guideline recommendations and helping pull it all together is providing the deeper discussion, farm and crop-specific tailoring and capability and confidence building that is necessary.

To determine appropriate fertiliser rates, we pull together "Nutrient Management for Vegetable Crops in New Zealand" (Reid and Morton, 2019), the Nitrate Quick Test developed by University of California – Davis and calibrated for New Zealand by Plant and Food Research, and FAR's "Quick Test Mass Balance Tool & User Guide".

The nutrient management guidelines add Convenience by bringing science-based good practice information based on the best current experimental evidence together in one place in a

reasonably digestible form. We put test kits together for the farmers and helped them take representative soil samples, so they had Capacity to do Nitrate Quick Testing. We made sure they knew about and could use the FAR Quick Test Mass Balance Tool which reduces Complexity by doing all the hard sums! And we coached (another “C”?) them in how to successfully use these resources as a bundle to determine and justify the amount of fertiliser required in any situation. We refer to this as Precise Prescription.

We further help grow Capability by demonstrating calibration of fertiliser application and irrigation equipment. We identified, researched and accessed or made test prototypes of alternative application equipment. To reduce Complexity, we introduced and demonstrated FertSpread and Irrig8Lite, tools we developed with protocols and calculations for, and interpretations of, equipment performance and the significance of results. We do practical workshops and one-on-one demonstrations to ensure understanding and give Confidence in their use and value. This enables Precise Application.

A final stage is collaborative on-farm trials, further helping build Capability and Confidence. We may be testing equipment we have acquired or designed to allow an alternative approach, an adaptation of their existing equipment, an alternative nutrient product, a new prescription method, or any another management alternative that warrants scrutiny.

On-Farm Trials that Support Change

In part, our trials are to continue the rich conversations with growers, in part to introduce growers to better on-farm trial practices, and in part to check that the new management practice does not have negative consequences. They are truly collaborative, with growers deciding their questions, us helping ensure good design and both together setting it up in the paddock. We call in and view the trial with the grower, or ring them and ask how it is going. At harvest, the grower determines the quality, picking selectively as is their norm. We measure and record the detail we need and we “do the stats”. Then we sit down with the grower and together work out what the results are telling us, and the implications for future management.

Typically testing a current practice against an alternative, we ensure robust, simple trial designs with four replicates and randomisation. We ensure the site is suitable and that we have base data including soil nutrient tests. We work for simple implementation with minimal disruption to the farm’s day to day operation and minimising the chance of mistakes.

We base all trials on the LandWISE/FAR “How to run successful on-farm trials” reference book and templates (Stone, P.J., Pearson, A.J. and Bendall, M.J., 2003). This sets out a 10 Point Plan, beginning with understanding what you want to find out and why. If we can’t state the question in a short, simple sentence we keep refining until we can. Then it is an easy path to ensure good design and monitoring to get and analyse good data.

In the 2019/20 season, our planned trials were to compare current grower fertiliser rates with the new nutrient guidelines and use of the Nitrate Quick Test. The plans quickly changed when we found many growers had already adopted the new guidelines because once explained, they made sense so growers “just got on with it”. Through closer discussions, we also found some were already applying lower rates than in the guidelines and were not interested in trying higher rates because they didn’t think it would help yields. So, we collaborated on trials further reducing nutrient inputs, looking at alternative fertilisers, alternative application methods, different rates of starter and side-dressing and whether biologicals can reduce nutrient requirements.

References

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