

Evaluating the effectiveness of an integrated extension delivery approach in the Australian vegetable industry

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Abstract. The Soil Wealth and Integrated Crop Protection projects have struck a chord with growers and advisors alike, filling a need in the provision of practical and useful information in a new way for the Australian vegetable industry. The projects have developed innovative approaches to deliver information on soil, pest and disease management to growers. Methods focus on engaging directly with growers and advisors; demonstrating new innovations on the farms of leading growers; social media (Twitter, Facebook and YouTube) and webinars. More conventional methods have also been used, including workshops, farm walks, fact sheets, videos and a central website. This paper discusses the key success factors of the projects in engaging with the target audience and promoting the adoption of research and development drawing on evidence collected through primary data collection and research.

Keywords: soil management, plant health, vegetable production, capability, demonstration sites, e-extension

Introduction

The Australian vegetable industry is the largest of the horticultural industries with a farm gate value of \$3.7 billion, and invests \$12-14 million in research, development and extension each year. Funding for R&D in the vegetable industry is sourced through a levy system administered by the Research and Development Corporation (RDC) Hort Innovation. The levy covers 42 commodity groups including most vegetables, some of which have their own separate funds.

Commercial vegetable growing operations vary in scale, commodity type and location; however, they share intensive production systems and tight crop rotations. This diversity increases the complexity of the extension effort while the intensive nature of production heightens the importance of sustainable soil management and plant health practices. For many years, the information generated by R&D in soil health, pest and disease and soil-borne disease management has not always been communicated to growers and advisors in an effective way.

The Soil Wealth and Integrated Crop Protection (ICP) projects provide research and development (R&D) extension services, products and communication on improved soil management and plant health to the Australian vegetable industry.

Over the past three years from 2014 to 2017, RMCg and AHR have delivered the projects for Hort Innovation. The project team played a knowledge brokering role between researchers, growers and other industry stakeholders to ensure adoption of R&D on-farm. The key technical areas included cover crops, bio fumigation, reduced tillage, compost and soil biology, control methods for specific pests and diseases, integrated pest management (IPM) and pesticide application technology.

Methodology

An impact survey was undertaken by the project team with growers, advisors and key industry stakeholders. The survey was open from 1 to 24 May 2017 and took respondents less than 10 minutes to complete. It was predominately administered online through existing industry communication channels with some responses sought face-to-face at the Hort Connections conference in Adelaide from 15 to 17 May 2017. Participation was voluntary and all responses remained confidential. A total of 165 responses were received that covered all major vegetable growing regions in Australia, which was considered a representative sample.

A large variety of stakeholders from all states and territories responded to the survey, which provided a strong and representative basis for the findings. This was predominately comprised of advisors (40%) and vegetable growers (18%), as well as natural resource management (NRM) agency staff, extension officers and community organizations (11%).

Results

The key success factors for the project in engaging with the target audience and promoting the adoption of R&D on-farm include:

- Integrate a range of communication platforms and engagement methods to improve awareness and knowledge.

- Drive practice change through demonstration – ‘make it real and relevant’.
- Build a trusted voice – scientifically sound and timely services and communication.

These themes are discussed in turn below and supporting evidence is provided from the impact survey.

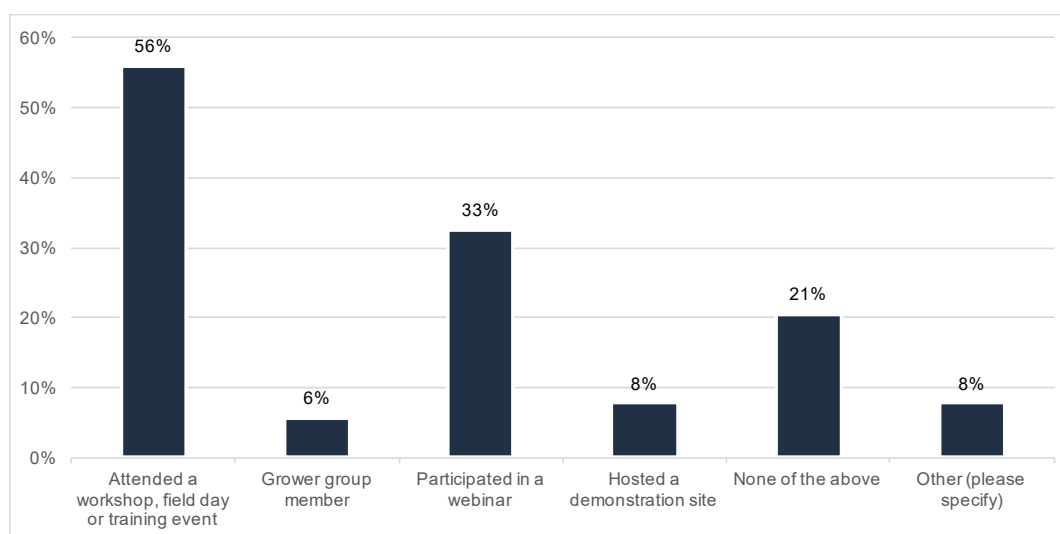
Integrate a range of communication platforms and engagement methods

The projects needed to integrate a number of communication platforms and engagement methods due to the broad geographic coverage and large amount of historic R&D on soil management and plant health (Leeuwis 2013; Stirling, Larsen & Boland 2015; Reichstein 2017). This meant the projects played a knowledge brokering and prioritisation role, with a focus on quality rather than quantity. The different tools and methods used by the project team included:

- demonstration sites
- grower groups
- master classes and networking opportunities
- training and events: workshops, field days, farm walks, webinars
- benchmarking activities and economic case studies
- publications and videos
- online communication and knowledge management: website, social media (Facebook, Twitter, YouTube), e-news.

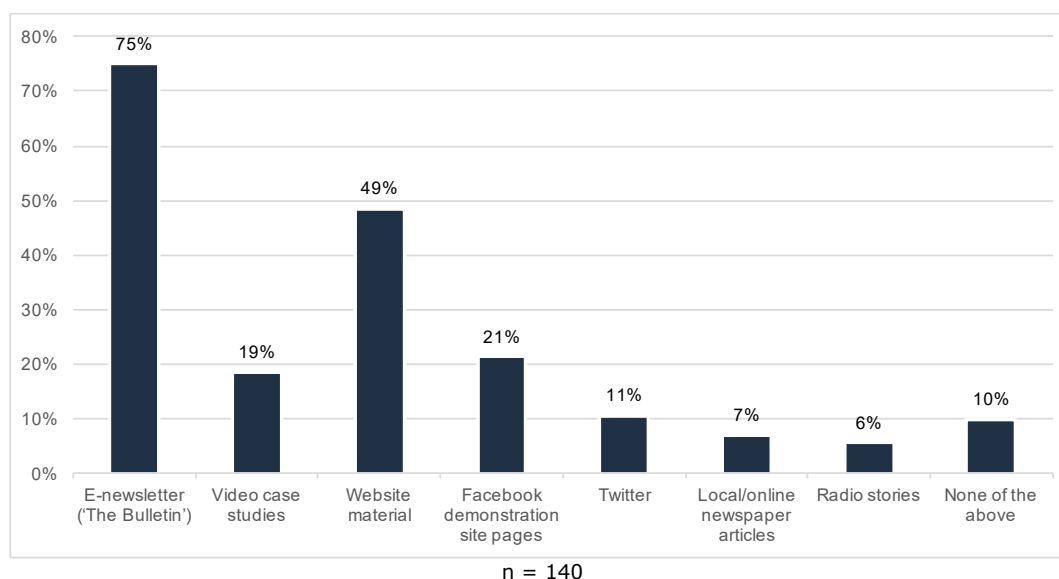
The projects have connected with growers and industry stakeholders in a variety of ways, with 1,934 unique growers and industry stakeholders engaged from 2014 to 2017. More than half (56%) of respondents to the impact survey were involved in a workshop, field day or training event, while one-third (33%) participated in a webinar (Figure 2). The least number of people were engaged in grower groups (6%) due to the relatively discrete nature of this activity.

Figure 2. Project engagement methods

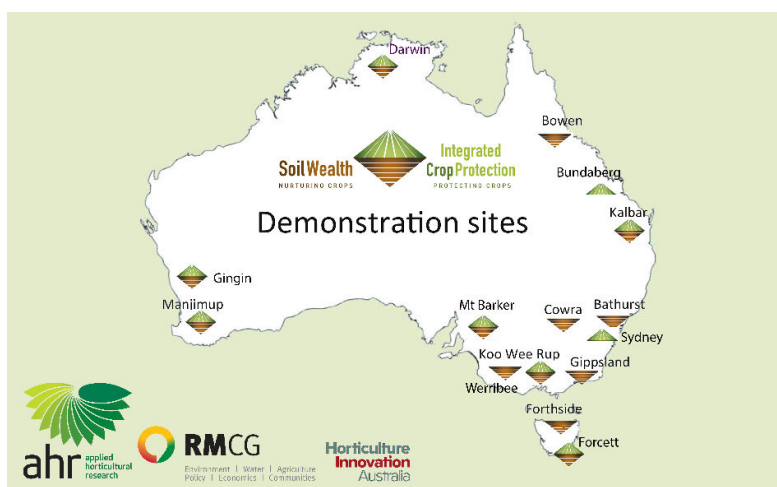


n = 141

There has been a strong focus on communication products and resource development during the first phase of the projects. Three-quarters (75%) of respondents had received the e-newsletter ‘The Bulletin’ and almost half (49%) had accessed material from the website (www.soilwealth.com.au and www.integratedcropprotection.com.au) (Figure 3). Social media was relatively popular for demonstration site updates on Facebook (21%) and news and events on Twitter (11%). Video case studies, while produced later in the project, were viewed by 19% of respondents. Positively, only a few respondents (10%) had not been communicated with via one of the designated channels.

Figure 3: Communication channels***Drive practice change through demonstration – 'make it real and relevant'***

A central engagement method and corner-stone of the extension projects were 15 on-ground demonstration sites in every major vegetable growing region of Australia (Figure 4). These sites provided the 'practical sand pit' for leading growers, researchers and other industry stakeholders to put R&D into practice (Leeuwis 2013; Reichstein 2017).

Figure 4. Location of demonstration sites

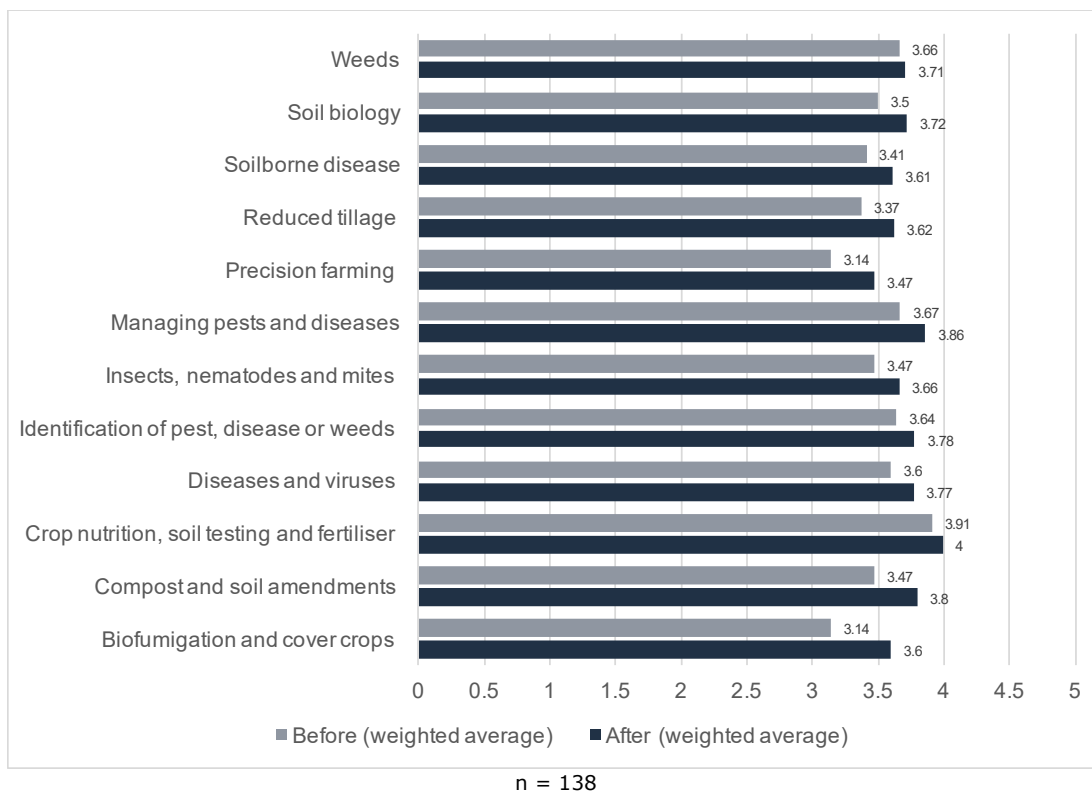
The demonstration sites were the 'practical hook' for the delivery of workshops and farm walks, as well as the development of resources such as fact sheets, case studies and videos (Stirling, Larsen & Boland 2015). These sites covered a number of different technical areas based on the specific objectives and interest area of the host grower including cover crops, bio fumigation, reduced tillage, compost and soil biology, control methods for specific pests and diseases, integrated pest management (IPM) and pesticide application technology.

Respondents were asked to rate their level of knowledge (from 1 to 5) in key areas before and after being involved in the project (Figure 5). Importantly, gains across all 12 key topics were demonstrated, particularly in relation to bio fumigation and cover crops (0.46 weighted average² change), compost and soil amendments (0.33), and precision farming (0.33). There were less significant gains in weeds (0.05), crop nutrition, soil testing and fertiliser (0.09), and identification

² Calculated as follows: $\frac{x_1w_1 + x_2w_2 + x_3w_3 \dots x_nw_n}{Total}$, where: w = weight of answer choice, x = response count for answer choice.

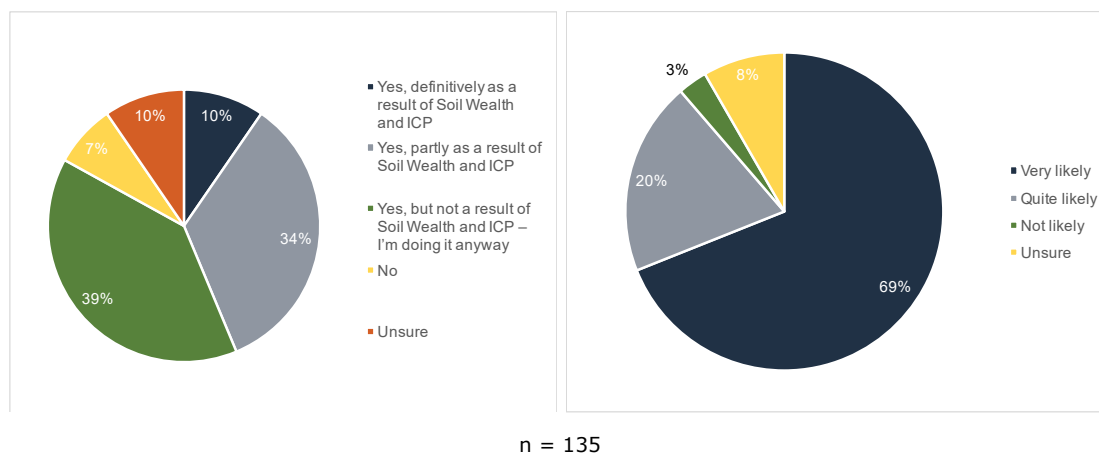
of pest, disease or weeds (0.14). This may have been due to a higher level of knowledge in these areas prior to being involved in the project.

Figure 5. Change in knowledge before and after project involvement



One of the key aims of the projects was to influence decision making and practices on vegetable farms. Almost half the survey respondents (44%) identified undertaking, or planning to undertake, activities aimed at improving soil health and/or crop protection on their farm or in the advice they provide due to their involvement in the Soil Wealth and ICP projects (wholly or partly) (Figure 6). A further 39% of respondents were undertaking, or planning to undertake changes, but not as a direct result of the projects. It was very likely (69%) or likely (20%) these changes would be implemented in the next two to three years.

Figure 6. Practice change as a result of the projects (left) and likelihood change will occur in two to three years (right)



These changes mainly related to (n = 83):

- general soil health (28%) e.g. biology, physical properties, testing

- cover crops (27%)
- compost (23%)
- bio fumigation (12%)
- crop rotation (10%)
- green manure crops (6%)
- undertaking trials on-farm (5%)
- controlled traffic (2%)
- reducing tillage (2%).

Only very few (7%) weren't planning to make changes, while 10% were unsure. This may be due to needing further support, resources and/or capacity to make the required change.

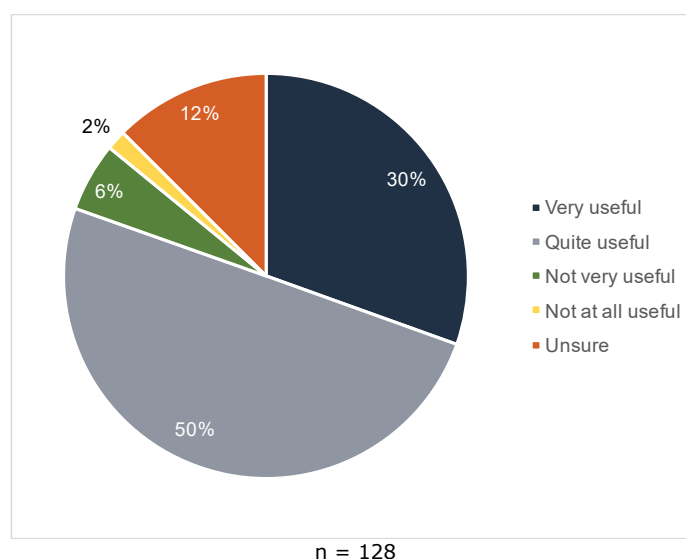
Build a trusted voice – scientifically sound and timely

The projects placed a high degree of importance on providing scientifically sound and timely services and communication relating to soil management and plant health. The principles of approach to information provision during the project period included:

- Understand the audience and segmentation to inform a tailored and targeted approach - based on production system, location, information needs, cultural background and individual drivers.
- Quality over volume – prioritisation of content.
- Focus on engagement to complement communication.
- Integration of platforms to build presence – various communication platforms for different segments (Stirling, Larsen & Boland 2015).

The majority of survey respondents found the support and information provided through Soil Wealth and ICP very useful (30%) or quite useful (50%) (Figure 7). Only very few (8%) did not find the support and information useful.

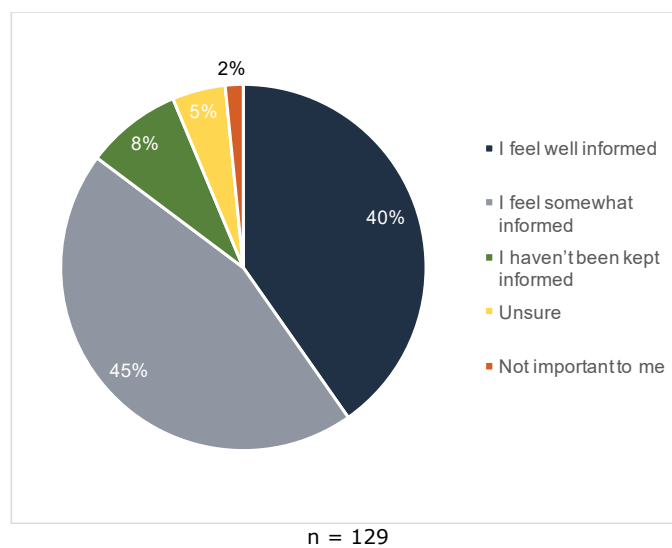
Figure 7. Usefulness of support and information provided by the projects



Almost half (40%) of survey respondents felt well informed about the latest advancements in the vegetable industry, while a further 45% felt somewhat informed (Figure 8). This was usually due to receiving information via the preferred method (e.g. e-newsletter, workshop) that was high quality (n = 19).

A small proportion (9%) felt they had not been kept informed or were unsure (5%). The reasons respondents provided for this were already having a high degree of knowledge in the area, not having sufficient time to investigate the full suite of project resources, or the complexity of the topics covered (n = 19).

Figure 8. Extent to which respondents felt informed about the latest advancements in the vegetable industry



Respondents were invited to provide qualitative feedback on the benefits and areas for improvement for the projects. The main benefits for respondents being involved in the Soil Wealth or ICP projects were (n = 80):

- improved knowledge and confidence (23%)
- improved soil health and management practices (16%)
- relevance and specificity to the vegetable industry (11%)
- networking opportunities with like-minded people (10%)
- practical demonstrations, advice and solutions (6%)
- linking with the latest research (5%).

Conclusions

The Soil Wealth and ICP projects have achieved a reasonable level of extension of R&D in the 3-years from 2014 to 2017. This can be considered both in terms of the:

- Reach of project information across all major vegetable growing regions around Australia with various available communication channels.
- Rate of adoption of soil management and crop protection management practices or advice being provided, predominately due to the practical demonstration site delivery mechanism.

The projects have been effective in delivering scientifically sound and timely services and communication, which has benefited participants by being relevant to the vegetable industry, providing useful networking opportunities, and practical solutions to problems in the farm production system.

There is also broad support for continuation of the projects that cover a wider range of soil management and plant health topics. The proposed second phase of the project aims to respond to grower and industry needs, engaging new segments of the target audience, while providing equitable geographic coverage.

Acknowledgements

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