

Horticulture Innovation Australia

Final Report

Vietnamese Field Extension Officer for the Western Australian Vegetable Industry

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Vegetables WA

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Summary

Vietnamese growers comprise approximately a quarter (225/1033)¹ of the WA vegetable industry. These growers have a very low English literacy rate and approximately 30% are also illiterate in Vietnamese. Thus, there is a significant lag amongst Vietnamese growers in adopting R&D recommendations. Poor growing practices amongst this farmer group may have implications for the broader vegetable industry in terms of market position and social license to farm.

This project employed a bilingual Vietnamese Field Extension Officer to provide extension and communication of research and development outputs and other information to Vietnamese vegetable growers, with a view to increase knowledge and adoption of good agricultural practices.

Different qualitative methods were employed during the selection of a suitable candidate, the management of the Field Extension Officer's performance, and implementation of field extension tasks of the officer to shape the project activities toward achieving the desired outcomes.

Vietnamese native, Mr. Vo The Truyen was selected for the role due to a strong background in horticulture and community development, extensive experience in agricultural extension services, and fluent English and Vietnamese.

Over the three years of this project the Vietnamese Field Extension Officer has maintained regular contact with a large number of growers in WA and engaged in several R&D projects targeted at the Vietnamese vegetable growing community.

Key activities of the Vietnamese Field Extension Officer during the project were: (i) Maintaining Vietnamese growers contacts, (ii) Engaging in R&D programs; (iii) Building industry partnerships and connecting people; (iv) Contributing translated articles to vegetablesWA magazine; (v) Providing language assistance; (vi) Promoting adoption of good on-farm practices; (vii) Feedback and representation, and (viii) Reporting and communication with vegetablesWA.

Given that there was almost no awareness in the grower group (only 2 Vietnamese growers were aware of industry services prior to the project), the outcomes of increased knowledge and improved growing and business practices were achieved. At least 90 of the 225 growers adopted new innovations (40%) and through the Vietnamese Field Extension Officer's 700 face to face discussions alone (not including collaborative projects and magazine translations) awareness of the national R&D system has increased by around 90%.

Additionally, within the Vietnamese grower group of 225, a total 133 innovation adoptions were recorded during the 3-year project, in which 22 growers improved irrigation efficiency; 54 applied safer and more efficient chemical application; 16 applied innovations in consumers and markets; 34 biosecurity, hygiene and virus minimisation; and 8 biting stable fly management. More details of how this was achieved are under the Outputs section on page 8.

The understanding of the characteristics of the Vietnamese vegetable grower community has been greatly increased, which helped the Vietnamese Field Extension Officer and other industry stakeholders to be able to better tailor R&D services with the needs and learning capability of this group.

The innovation system of the Vietnamese vegetable growing community and its characteristics was identified. As a result, supportive measures could be applied to maintain the effective linkages among all key stakeholders (e.g. growers, researchers, Government agencies). This enabled an increased rate of innovation adoption by the Vietnamese growers.

¹ VegetablesWA database, August 2015.

Importantly, increasing the level of participation of Vietnamese vegetable growers in R&D projects and programs resulted in increasing the adoption of good practices in the Vietnamese grower community. It is widely recognised by vegetablesWA and the Department of Agriculture and Food WA that employing a Vietnamese Field Extension Officer to enhance the knowledge of the R&D system and its outputs within the Vietnamese grower community was successful. The project increased the level of participation of Vietnamese growers in diverse types of R&D activities such as field days, training workshops, project meetings and discussion forums. As a result there was increased adoption within the Vietnamese vegetable grower community.

Given that the Vietnamese grower community with described characteristics is a significant part of the vegetable industry, securing the Vietnamese extension service for the future is essential. This service does not only benefit this grower group but the vegetable industry as a whole.

Keywords

Vietnamese Field Extension Officer; vegetable industry; Western Australia; growers; innovation skills; Vietnamese; vegetable growers.

Introduction

Vegetable production in Western Australia had a farm gate value of about \$336 million in 2013, with the total industry value being \$909 million². The main growing areas are in the South-West, especially the Swan Coastal Plain from Gingin to Busselton, and around Manjimup and Albany. Beside that the Midwest (mainly Geraldton) and the Gascoyne region (mainly Carnarvon) are also considered as important winter vegetables production areas that supply to Perth Market.

Vietnamese growers comprise approximately a quarter (225/1033)³ of the Western Australian vegetable industry. This figure excludes a number of non-registered Vietnamese share-farmers and lease-farmers which varies every year between 80 to 100 businesses. The Vietnamese vegetable growers in WA are mainly located around Perth metropolitan areas between Gingin and Wanneroo and in two other remote towns of Carnarvon and Geraldton. These growers have a very low English literacy rate and approximately 30% are also illiterate in Vietnamese.

There is a significant lag amongst Vietnamese growers in adopting research and development due to the disadvantaged characteristics of this grower group. A lack of knowledge of good agricultural, business & food safety practices amongst the majority of the group is the common issue. This leads to inconsistent results in applying production techniques such as pests and diseases management, soil management, limit water use efficiency and product quality. In farm management, poor farm organisation and poor knowledge in occupational health and safety are of highest concerns while lack of business strategic planning and limited market and marketing knowledge are main obstacles in their business management.

Poor growing practices of this farmer group have had implications for the broader vegetable industry in terms of market position and social license to farm.

This project employed a bilingual Vietnamese Field Extension Officer to provide face-to-face and written communication necessary to drive improvements. This was mainly to increase the extension of research and development outputs and other information to Vietnamese vegetables growers with a view to increase adoption of good practices by the growers.

² <https://www.agric.wa.gov.au/crops/horticulture/vegetables>

³ VegetablesWA database, August 2015.

Methodology

Different qualitative methods were employed individually or in combination at different periods of time during the 3-years duration of the project to achieve the project goals and objectives.

1. Selection of suitable Vietnamese Field Extension Officer candidate

The appointment of a suitably qualified Vietnamese Field Extension Officer was selected by a selection panel made up of the vegetablesWA President, CEO and a key Vietnamese vegetable grower. A suitably qualified Australian Citizen could not be identified; the preferred candidate had to satisfy the Department of Immigration's Employee Nomination Scheme. The successful employee was provided Australian permanent residency, which minimised any risks in relation to vegetablesWA and the industry related to the employee's ongoing visa status.

The successful applicant was Mr. Vo The Truyen who was appointed Vietnamese Field Extension Officer on 13th September 2012. Mr Truyen has qualifications from various institutions including a Bachelor of Science in Agriculture from Can Tho University in Vietnam and a Masters in Horticulture Science from the University of Horticulture and Forestry Solan in India. Mr Truyen has managed orchards in Thailand, including conducting research and extension activities. He has also had extensive experience interpreting and translating in training workshops and seminars.

2. Management of the Vietnamese Field Extension Officer performance

A Work Plan and Learning Agreement was established which allied with the required knowledge, skills and the Integrated Leadership System, developed by the Australian Public Service Commission (APSC) was established. As this project provided for an employee position, the Workplan and Learning Agreement also acted as an Operating Plan, which details the various milestones that the Vietnamese Field Extension Officer is responsible for completing. Each milestone was broken down into constituent Key Performance Indicators with relevant timeframes for completion.

The Vietnamese Field Extension Officer performance was managed by the vegetablesWA Chief Executive Officer (CEO) and also reported to the 12 grower members of the vegetablesWA Committee of Management. The vegetablesWA performance management approach incorporated a regularly reviewed Work Plan and Learning Agreement.

3. Performance of field extension tasks

During the course of service, the Project Manager (CEO) and the Vietnamese Field Extension Officer employed different methods either individually or in collaboration to achieve outcomes.

- i. The induction process: This process was carried out at the beginning of the project. Meetings were organised by the vegetablesWA then Policy and Program Manager, John Shannon (now CEO), and by other colleagues at vegetablesWA for the Vietnamese Field Extension Officer to contact, identify and establish linkages with key growers and industry figures within R&D community and commercial suppliers.
- ii. The snowball sampling technique⁴: This technique uses a pool of initial informants to nominate other unknown people. The name reflects an analogy to a snowball increasing in size as it rolls downhill. The Vietnamese growers have little contact with other entities in the vegetable industry and government organisations due to the language barrier. The snowball sampling technique was employed in combination with the existing database and the induction process for the Vietnamese Field Extension Officer; to contact, identify and establish initial linkages with the Vietnamese grower community and key industry figures.

⁴ David L., Morgan (2008). The SAGE Encyclopedia of Qualitative Research Methods. SAGE Publications, Inc. pp. 816–817. <http://srmo.sagepub.com/view/sage-encyc-qualitative-research-methods/n425.xml>. Retrieved 24/01/2013.

- iii. Variable extension techniques described in the reference manual developed by Food and Agriculture Organisation of the United Nations for agricultural extension⁵ were employed over time. These techniques were employed to understand Vietnamese growers' characteristics and needs, to conduct information and technology transfer, and to update the changes of grower practices and attitudes towards agricultural innovation. These applied methods included:
- Innovation system analysis technique: This was used to identify key factors and organisations involved in extension services to Vietnamese vegetable growers in WA and their roles and responsibilities, their attitudes and practices and the linkages among them. This helped the Vietnamese Field Extension Officer draw out the innovation system in which Vietnamese vegetable growers are embedded in order to appropriately position his role into the system, to access sources of knowledge and information to implement extension activities and to integrate his extension work effectively within the system.
 - Rural Appraisal technique: This refers to the use of several data collection methods to gather practical information on issues of interest in local communities quickly. These included interviewing key informants, reviewing secondary data sources, mapping exercises, and conducting semi-structured interviews with groups and individuals. This was to benchmark the current growers' practices and needs.
 - Informal Personal Observations: Valuable needs assessment data was gathered through informal observation. The Vietnamese Field Extension Officer sees and experiences a lot as he travels and socialises with farmers in their farming environment. This information was used in the valuable needs assessment to tailor the extension activities to the needs of Vietnamese growers.
 - Participatory engagement: The Vietnamese Field Extension Officer engaged in R&D projects, predominantly industry development projects, to contribute and share information and experiences.
 - Employing bilingual skill and knowledge on Vietnamese culture to establish relationships with growers, to understand growers' attitudes and practices, and to effectively perform information and technology transfer.

4. Expected Outputs

The predefined performance indicators of the Vietnamese Field Extension Officer were:

- (i) Maintaining Vietnamese growers contacts: To maintain regular and relevant contacts (8 face-to-face visits per week) with Vietnamese growers in all major growing areas of WA (Perth metropolitan areas, Geraldton and Carnarvon) to develop trust and relationships with growers and to effectively carry out extension activities.
- (ii) Engaging in R&D programs: To participate in preparation and implementation of R&D programs' activities and to promote the participation of Vietnamese growers in R&D projects.
- (iii) Building industry partnerships and connecting people: To establish linkages between industry partners and Vietnamese vegetable growers by maintaining connections and forming networks with stakeholders/industry partners.
- (iv) Contribute articles to vegetablesWA magazine: To deliver information to growers to enable more informed business decisions; translation of selected articles; at least 6 articles per quarterly magazine.

⁵ Improving agricultural extension: a reference manual. Food and Agriculture Organization of the United Nations Rome, 1997. Reprinted 1998. <http://www.fao.org/docrep/W5830E/w5830e00.htm>

- (v) Language assistance: Provided interpreting services at industry events, workshops and field days.
- (vi) Promoting adoption of good practice: To promote interaction between Vietnamese growers and other industry partners by assisting communication and delivery of results of the project to growers and to provide support over time to enable growers to implement changes.
- (vii) Feedback and representation: To provide feedback from growers to vegetablesWA and industry; to maintain a well understood and well represented grower base; regular reports on activities and, feedback formal reports to vegetablesWA Committee of Management (CoM) and assistance with project reports.
- (viii) Reporting and communication with vegetablesWA: To ensure regular verbal contact is always maintained with the CEO to ensure Vietnamese Field Extension Officer activities are in line with goals and values of vegetablesWA; To present at vegetablesWA CoM meetings as well as being a valuable contributor to in-house staff meetings when necessary.

The three-year outputs of the Vietnamese Field Extension Officer's performance will be presented in line with the sequence of the overall indicators as briefed above.

Outputs

1. Maintaining Vietnamese grower contact.

During the period of time from September 2012 to June 2015 the Vietnamese Field Extension Officer made 369 field trips to conduct about 700 face-to-face discussions with 225 Vietnamese vegetable growers in WA (varying numbers of growers attended each field trip). The numbers of field trips to maintain grower contacts over year are in table 1.

Table 1: The number of field trips to maintain grower contacts from 2012 to 2015

Purposes of visits	2012-2013	2013-2014	2014-2015	Total visits	Total face-to-face discussions
Number of planned field trips	124	94	52	270	602
The number of visits responding to grower requests	24	47	28	99	99
Total face-to-face discussions by year	240	285	176		701

Most of 369 field trips to farms were to metropolitan areas around Perth. 20 trips were made to Carnarvon, a horticultural district 950km North of Perth to conduct 85 face-to-face discussions, and 12 trips to Geraldton, a major cucumber production area between Perth and Carnarvon with 36 face-to-face discussions.

270 planned field trips were arranged for the Vietnamese Field Extension Officer to perform information and technical transfer, carry out collaborative project activities, and to gather practical information and needs assessment data through informal observation. During each planned field trip the Vietnamese Field Extension Officer would have face-to-face discussions with 1-3 growers.

99 field trips were arranged in response to grower requests for the Vietnamese Field Extension Officer to assist to address particular issues, such as identifying production problems like pests or disease identification and to discuss possible solutions. During a farm visit, the Vietnamese Field Extension Officer has also often been asked to assist different non-farming matters such as completion of application forms in English or read other English documents. The field trips that were to respond to grower requests mostly included only 1 face-to-face discussion to address a particular issue of a farm.

The geographical distribution of visits over years is presented in table 2.

Table 2: The locations and number of farm visits to different production areas to maintain grower contacts during 2012-2015

Locations of farm trips	2012-2013	2013-2014	2014-2015	Total farm visits	Total face-to-face discussions
Perth metropolitan areas	138	128	71	337	580
Carnarvon	5	8	7	20	85
Geraldton	5	5	2	12	36

The field trips allowed the Vietnamese Field Extension Officer to build and to maintain relationships, to assess growers' practices and needs, and to discuss any changes in regulation and the possible impact of these on growers' practices and potential changes to farm practices. The discussion also included sharing of personal information regarding the Vietnamese growers family, culture in origin country, history of immigration, start of farming businesses, education and business achievement, hobby and off-farm activities which helped to build trust and understanding. Results of the assessment of growers' practices and needs along with proposed extension activities of the Vietnamese Field Extension Officer were presented in the quarterly, six-monthly, annual reports to Horticulture Innovation Australia and to the Committee of management of vegetablesWA and in the yearly work plans.

The field trips were also for the Vietnamese Field Extension Officer to update and upgrade his knowledge on different technologies and innovations applied by different growers in vegetable production in different growing conditions.

The visits responding to a grower request were to assist growers addressing various problems. The growers' problems are mainly relative to technical and language issues. In many cases problems were the combination of both. The technical issues included the soil characteristics and soil care, pests and diseases outbreaks and abnormal crop growth and possible control measures. The language problems were variable such as difficulty in reading soil test results, notices from Worksafe or language assistance to attend training courses like FreshCare, AusChem, or to complete applications to participate in different projects and programs.

Beside the personal visits every week, the Vietnamese Field Extension Officer has had several group meetings with Vietnamese growers involved in R&D projects, government and private programs.

An effective way to maintain group contact was the use of Facebook for the Vietnamese community in Carnarvon. This became the platform where the Vietnamese Field Extension Officer regularly posted information about government projects, events such as seminars, meetings, training, and news about pests and diseases occurrence in the areas provided by the local agronomist. Technically, the number of people who have "seen" each post (displayed on Facebook) show the Vietnamese Field Extension Officer how well the information was received and this helped to decide whether direct contact through phone call was needed to better cover the whole targeted group.

The number and details of these group contacts with Vietnamese growers will be presented in section 2 (engaging in R&D program) and section 5 (provision of language assistance).

2. Engaging in R&D programs

The projects in which the Vietnamese Field Extension Officer was involved from 2012 to 2015 included: (i) The Strategic planning workshops project; (ii) The Planning for profit workshops project; (iii) Caring for our country (CFOC 2010-11 - Improved management practices for vegetable production in Carnarvon); (iv) Control of stable fly; (v) Water use efficiency (More Dollars Per Drop);(vi) Energy efficiency; (vii) Farm Finance Concessional Loan program; and (viii) Gascoyne food bowl initiatives.

Within those projects the Vietnamese Field Extension Officer has participated in planning and conducting a number of field days, demonstrations, seminars and workshops in conjunction with industry partners such as Department of Agriculture & Food WA, Department of Health, Department of Water, Fair Work Ombudsman, Worksafe and private stakeholders.

The major role of the Vietnamese Field Extension Officer in these projects was to provide language assistance such as translating flyers and other documents and interpreting in the classes. Other contributions from the Vietnamese Field Extension Officer included the sharing knowledge with colleagues about growing conditions, attitudes and practices of Vietnamese growers to help them to tailor the training contents to suit to the particular group of participants; spreading information about the project activities; encouraging grower participation; assisting in preparation and implementation

of project activities such as advertise the training courses, organising field days, and facilitating group discussion in the training classes.

Outputs of the Vietnamese Field Extension Officer performance in each of project are listed below.

2.1. Plan Prepare and Prospect refresher workshop

This project was funded, managed, and delivered by Department of Agriculture and Food WA. This project provided travel and accommodation costs for the Vietnamese Field Extension Officer to provide language assistance and to contribute knowledge regarding to the attitudes and practices of Vietnamese grower participants and to contribute extension skills that are effective to this group.

- Facilitating group discussion in 5 "refreshing strategic planning" workshops in 2011/12 to help 32 Vietnamese participants to review and refine their earlier developed strategic plans.
- Provided feedback to the project management board to make possible improvement.

2.2. The Planning for Profit workshops

This project was a follow up of the Plan Prepare and Prospect project that was funded, managed, and delivered by Department of Agriculture and Food Western Australia. This project provided travel and accommodation costs for the Vietnamese Field Extension Officer to provide language assistance and to contribute knowledge regarding to the attitudes and practices of Vietnamese growers participants and to contribute extension skills that are effective to this grower group.

- Assisted the project coordinator to identify potential grower participants; advertise the project activities to growers and encouraged grower participation by making several phone or face-to-face discussions.
- 4 meetings with the workshop conductors to share knowledge about attitudes and practices of Vietnamese growers, their growing conditions to help them tailor the training content to ensure its relevance to this group of participants.
- Provided language assistance to 2 "refreshing planning for profit" workshops in June 2014 and April 2015 for 24 Vietnamese grower participants to help them to make the most from their businesses.

2.3. Caring for our Country (CFOC 2010-11 - Improved management practices for vegetable production in Carnarvon)

This project was partly funded and managed by vegetablesWA and delivered by a Gascoyne Grower Association officer in Carnarvon. The Vietnamese Field Extension Officer contribution was to translate the questionnaires for a grower survey and the grower feedback sheets in the project in February 2013.

2.4. Control of Stable Fly project

This project was co-funded, managed by Department of Agriculture and Food WA and local governments of the areas affected by the stable fly problem. The project activities were delivered by different participants including local shire rangers, officers of Department of Agriculture and Food WA and a scientist of University of Western Australia. This project was also partly funded by APC- VPC. The Vietnamese Field Extension Officer provided language assistance and to contribute knowledge regarding the attitude and practices of Vietnamese grower participants and to contribute extension skills that are effective to this grower group.

- 24 field days during the project period between 2012-2015 to provide language assistance for the scientist and officer of the Department of Agriculture and Food of WA and field inspectors of local shires to spread information to Vietnamese growers about the stable fly problem and possible control measures as well as to monitor the compliance of the BAM act with vegetables producers.
- 2 visits to encourage a Vietnamese grower to participate in the field experiments to control stable fly breeding and methods to accelerate degradation of bio-residue in vegetables production.
- field days to lay out field experiments on controlling of stable fly breeding and methods to accelerate degradation of bio-residue in vegetables production.
- Translating and spreading the BAM act to vegetables growers.
- field days to assist local field inspectors to communicate with Vietnamese growers about the ban of application of raw animal manure in vegetable production.
- Respond to the requests of local inspectors to facilitate communication when problems emerge in relation to breaching the BAM acts by Vietnamese vegetables growers.
- Facilitate communication in 2 meetings between Vietnamese vegetables growers and the stable fly action group.
- Assist project officers to persuade a Vietnamese grower to provide his farm property for stable fly migration monitoring trial.

As a result, all 8 Vietnamese growers operating vegetables farms in the stable fly effected areas adopted recommended practices to minimise stable fly breeding. Those changes included:

- (i) Changes from dumping rejected products in large pile to spreading those products into thin layers to dry out quickly in summer.
- (ii) Application of slashing and chemical sprays over residues on the field as advised.
- It is interesting to observe a Vietnamese grower innovation to successfully develop an effective non- chemical practice to control stable fly breeding. The practice was simply repeatedly rotary hoeing the already harvested beds along with the newly harvested land after every new harvest was done. This practice is easy to apply, completely compatible to existing conventional practices, more cost- efficient than using the chemical spray and more environmental friendly. The improved practice was introduced by the Vietnamese Field Extension Officer to other 7 growers in the areas and was adopted by them all.

2.5. Water use efficiency (More Dollars Per Drop) project

This project was funded, managed, and delivered by the Department of Agriculture and Food WA. This project provided travel and accommodation costs for the Vietnamese Field Extension Officer to provide language assistance and to contribute knowledge regarding to the attitudes and practices of Vietnamese growers participants and to contribute extension skills that are effective to this grower group.

- Participated in 4 project meetings where the Vietnamese Field Extension Officer contributed suggestions using his knowledge on Vietnamese grower attitudes and practices for the improvement of project outcomes.

- Assisted the project coordinator to identify potential grower participants; advertise the project activities to Vietnamese growers and encouraged grower participation by making several phone calls or face-to-face discussions.
- 21 field days were carried out to assess farms and interview Vietnamese growers to benchmark irrigation practices and to provide reports to 19 Vietnamese grower participants in Carnarvon.
- Provide language assistance to Vietnamese growers who participated in the four technical workshops and field day projects.
- Assist Vietnamese growers to read the grower reports as a result of the farm assessment.
- Facilitate a forum to discuss water issues that influenced the outcomes of the Water use efficiency project. This involved project officers, representatives of the local water management bodies, officers of the Department of water, Manager of the Gascoyne food bowl initiative and Vietnamese vegetable growers.
- Participated in several informal grower group discussions where growers could share knowledge and experience on water use efficiency.

2.6. The Energy use efficiency project

This project was managed by North East Farming Futures (NEFF) through the Department of Resources, Energy and Tourism Energy Efficiency Information Grant that is delivered by the Tuna Blue contractor.

This project required the Vietnamese Field Extension Officer to collaborate with a private contractor to prepare and to deliver seminars on energy use efficiency to Vietnamese vegetables growers.

- Several discussions were required to identify possible concepts and techniques relevant to Vietnamese growers and develop suitable seminar content.
- Translating the seminar content to Vietnamese.
- Advertised the project activities to the Vietnamese grower community and encourage their participation.
- Provide language assistance during both seminars for 13 Vietnamese growers in Carnarvon in April 2014.
- Facilitated two-way communication between six Vietnamese grower participants and the private contractor after the seminar by which questions and answers on tricks and techniques to improve energy use efficiency were exchanged.

Participating growers have all indicated a change of practice towards improving energy use efficiency. Those changes included: (i) use suitable vehicle for suitable purposes (don't use tractor for general travel on farm); (ii) Turn off heaters, air conditioners when not in use (especially in accommodation); and (iii) Change the irrigation schedule and irrigation shift following recommendations of the water project to save both water and fertilisers and energy.

2.7. Farm Finance Concessional Loan program

- Informed Vietnamese growers about the program using different communication channels such as phone discussion, Facebook, and onsite visits to discuss questions about the program.

- Facilitated grower contact with the program officer to obtain application forms and application guidance.
- Facilitate the communication about the loan and loan application between grower applicants and the program officers over two teleconferences.
- Assisted 16 Vietnamese growers in Carnarvon to complete applications for the loan.
- Bridged the communication between the program officers and grower applicants during the loan application assessment.

2.8. Gascoyne Food Bowl initiatives.

- Informing the project manager of the Vietnamese growers' concerns on the possible impact of the project to their businesses by several phone discussions, direct chats, and emails.
- Worked with the Gascoyne research station to organise 1 forum in May 2014 where the officers of Gascoyne food bowl initiative and Vietnamese growers exchanged information and concerns relative to the initiative and facilitated two-way communication in the forum.
- Translate the initiative's bulletin.
- Provided language assistance in two meetings between the Water Minister and the Vietnamese growers. The meetings discussed possible water and market competition between developing land and the existing vegetable production businesses that may occur as a negative impact of the initiative.
- Maintaining contact with the project manager for continued update information on the progress of the project to inform growers.

3. Building industry partnerships and connecting people.

The Vietnamese Field Extension Officer has established and maintained relationships between the Vietnamese growers and industry partners, especially those involved in R&D. These relationships were developed whilst implementing R&D projects and program as described in the section 2 – Engaging in R&D programs.

The Vietnamese Field Extension Officer helped by maintaining the multi-directional relationships among involved stakeholders by facilitating communication.

The Vietnamese Field Extension Officer also participated in the Facebook page of Vietnamese Community in Carnarvon to effectively and timely transfer and update news and information to the community. Also the Vietnamese Field Extension Officer has become the direct contact point for the Ministerial Office of Minister of Water to link to Vietnamese community in all matters relative to water issue in Carnarvon.

3.1 Contribution articles to vegetablesWA magazine

The Vietnamese Field Extension Officer contributed 95 articles for 11 editions of the WA Grower magazine published during December 2012 to June 2015. These included 37 Vietnamese translations of articles from various authors and 29 of his own articles and their Vietnamese translations. The list of articles are in the appendix A.

The Vietnamese articles are diverse and comprise of grower profiles, project report and updates, technical news, questions and answers, facts and event reports, new policy and regulation updates.

The Vietnamese article contents include selective news and information such as the promising results of research experiments, emerging technological innovation, update activities of R&D programs, update water source status, successful stories of an advanced grower that are relevant at a given industry context and vegetable grower readers'. The content of published articles also reflects the interests of the VegetablesWA staff and how supportive they are to the development of the industry.

3.2 Provision of language assistance

Provision of language assistance is the most regular service provided by the Vietnamese Field Extension Officer during the course of the project.

Diverse forms of language assistance were provided such as translating documents; interpreting in meetings, interviews, field days, workshops and teleconferences; assisting growers reading and completing forms, reading product labels and understanding new regulations etc.

Beneficiaries of this language assistance service are also diverse including Vietnamese growers and industry partners who engage in activities involving Vietnamese growers. The language assistance was provided to individuals and groups of people when required.

The context of language assistance and frequency was diverse as it is described in the output number 2 – Engaging in R&D program and number 3 – Building industry partnership and connecting people.

3.3 Promoting an adoption of good practice

Strategically, the Vietnamese Field Extension Officer promoted adoption of good practices over a continuing process throughout the course of the project in which follow-up actions were made after an innovation was introduced to Vietnamese grower community.

Promotion of adoption of good practices was focused on the problems that were highlighted in the Horticulture Innovation Australia funding application including irrigation efficiency; chemical application; consumers and markets; biosecurity, biting stable fly management, hygiene and virus minimisation.

Promotion of adoption of good agricultural practice were integrated in diverse activities described in the output number 1 – Grower contact; 2 – Engaging in R&D program and number 3 – Building industry partnership and connecting people; 4 – Contribution of articles for WA grower magazine; and 5 – Provision of language assistant.

3.4 Promotion of adoption of improving practices to enhance the water use efficiency

A sequence of activities were implemented within and out of the More Dollars Per Drop project. They included:

- (i) Advertising the project information and activities to the Vietnamese grower community and encouraging them to participate to create an opportunity for them to approach the water use efficiency innovation. This was done by information transfer activities using Vietnamese language (Vietnamese community Facebook posts and comments, articles in WA grower magazine, phone calls, group chat etc), and making use of the already developed trust with the growers.
- (ii) Assisting grower interviews and farm assessment of existing irrigation system and techniques, grower reports. This helped to identify room for improvement for each of the individual growers.
- (iii) Help introducing concepts relative to water use efficiency such as the root zone and maintaining the water supply within the root zone, evaporation and crop factor, correlation between the

weather conditions and growth stage and crop water demand etc this created grower awareness on the introduced innovation.

- (iv) Making suggestions to the project management board on the importance of having an increased number of activities such as demonstrations and field days to better translate those introduced concepts into applicable field practices. This was to gain stronger grower interest and create a chance for grower to evaluate the practical value of introduced innovation.
- (v) Creating an informal forum for group discussion using Vietnamese language between growers who have tried an innovation by participating in demonstration activities of the project with other growers to promote more grower interest and trials.
- (vi) Spreading information about successful adoption of early adopter(s) to promote larger adoption in the community.

Grower Nguyen Van Thang from Carnarvon stated, "involvement in this project has encouraged me to adjust my scheduling, and even though this year's crop hasn't been picked, the plants are looking better than last year. The system assessment and flow variation results confirmed my observations about uneven plant growth in one of the test blocks. I intend to extend the mainline, and reduce the drip tape length in variable part of that block. I would encourage others to go through this process."

Changes in irrigation practices, in terms of adopting recommendations and conducting trials to learn new things, towards improving water use efficiency were recorded in all 21 Vietnamese grower participants in the project. It is evident that change has occurred towards adapting new successful practices through a project evaluation survey conducted by the Vietnamese Field Extension Officer and the project coordinator that is Box 1.

3.5 Promotion of an adoption of improving practices to enhance the chemical and fertiliser application

Recorded changes in these fields included changes in attitude towards being more aware of the health and environmental effects when applying chemicals; changes in decision making in the selections of the right types, concentration, time and methods of pesticides and fertiliser application.

- Other types of changes observed within the Vietnamese grower community are regular monitoring soil and water pH to maintain this factor at an optimum level. Maintaining separate spray equipment for herbicide and other chemicals; timely application of Gypsum to enhance soil fertility; developing a business plan and regularly reviewing the plan etc.
- Significantly 32 growers in Perth and 22 Vietnamese growers in Carnarvon took a paid training course on soil fumigation in March and June 2015 respectively. They have all become certified applicants of soil fumigation which means the knowledge on soil fumigant attributes and effective application practices have been acquired.

3.6 Adoption of stable fly breeding control techniques

All of eight Vietnamese growers participating in the Control of Stable Fly project adopted chemical application relevant to the right type, time and methods of application as recommended by project officers before any of them developed the repeating rotary hoeing technique which show similar effectiveness.

3.7 Adoption of hygiene and virus minimisation

Setting of wind break using sorghum plants (*Sorghum bicolor*) has become a popular practice by all Vietnamese growers in Carnarvon as a way to reduce dust as well as to minimise the migration of virus transmission vectors such as thrips to and from the farm. This was a result of participation of 32 Vietnamese growers in Carnarvon in the Plan Prepare and prospect project in which the Vietnamese Field Extension Officer got involved as a Vietnamese facilitator. It can be stated that 100% percent (34/34) Vietnamese farm owners in this area made changes.

Complete cessation of chicken manure application by Vietnamese growers around Perth metropolitan area was a result of law reinforcement of local government due to new laws in 2011 along with the information transfer using Vietnamese Field Extension Officer. The number of cases that were caught breaching the law to apply chicken manure in 2012 and 2013 were 4 and 2 respectively.

7. Feedback and representation

The Vietnamese Field Extension Officer passed on feedback received from Vietnamese growers to vegetablesWA and/or relevant industry personnel/bodies under forms of quarterly and annual reports, staff meeting reports, and direct reports to the project and policy manager of vegetablesWA.

Actions were also undertaken during grower visits to ensure growers received information they require such as reports, fact-sheets, manuals or industry contacts. Suggestions for field days and workshops were recorded and discussed with vegetablesWA team for consideration.

The Vietnamese Field Extension Officer has also been active in providing advice to relevant policy issues, such as the Seasonal labour program, the Stable Fly regulations for growers, the restriction of water supply in Carnarvon, and the Gascoyne Food Bowl Initiative.

8. Reporting and communication with vegetablesWA

Vietnamese Field Extension Officer provided timely reports and regular discussions to then vegetablesWA Program Manager (now CEO) as well as the Committee of Management. Other reports such as six-month milestone reports, annual reports were also provided to funding bodies.

There were four six-monthly milestone reports and two annual reports that were presented to the Vegetable Produce Committee (VPC) and Horticulture Innovation Australia (HAL previously). Six quarterly reports and two annual reports were submitted to the vegetablesWA Committee of Management.

Outcomes

The key outcomes of this project were proposed as follows:

1. Increased knowledge of the national R&D system and outputs amongst Vietnamese growers by 50% above current levels.
2. Adoption of an improved growing or business practice by 10% of Vietnamese growers per year.

Given that the baseline for the above statements was recorded as 0 (only 2 Vietnamese growers were aware of vegetablesWA's programs prior to the project), the Outcomes have been very successfully achieved. At least 90 of the 225 growers adopted new innovations (40%) and through the Vietnamese Field Extension Officers' 700 face to face visits alone (not including collaborative projects and magazine translations) the knowledge of the national R&D system has increased by at least 50%.

It is widely recognised by vegetablesWA and the Department of Agriculture and Food WA that the level of involvement of Vietnamese vegetable growers in R&D projects increased as a result of the Vietnamese Field Extension Officer inputs. Within the Vietnamese grower group of 225, a total 133 innovation adoptions were recorded during the 3-year project, in which 22 growers improved irrigation efficiency; 54 applied safer and more efficient chemical application; 16 applied innovations in consumers and markets; 34 biosecurity, hygiene and virus minimisation; and 8 biting stable fly management.

Significant numbers of Vietnamese growers adopted various types of improved practices during the project implementation. Different stages of the adoption process such as awareness, interest, evaluation, trial and adoption of good practices were observed among Vietnamese farmers who benefited from the services of the Vietnamese Field Extension Officer when participating in the R&D projects that he was involved with, or from having face-to-face contact with him.

These outcomes (described in detail below) have been evaluated through ongoing monitoring and reporting undertaken by the Field Extension Officer as part of the project delivery as outlined in Table 3 below.

Table 3. Description of how each output has been monitored throughout the project.

Outputs	Monitoring methods	Frequency
Maintaining Vietnamese growers contacts	Staff meeting Direct report to VegWA CEO Report from 2 Vietnamese growers members in CoM Visit growers with extension officer COM report, HIA Report, APV-VPC report	Fortnightly Weekly Quarterly Randomly Quarterly
Engaging in R&D programs	Direct report to VegWA CEO Direct feedback from program coordinator Feedback from co-workers/program partners CC of email exchanges	After every mission Occasionally Occasionally On basis of activities schedules
Building industry partnerships and connecting people	Direct report to VegWA CEO CC of email exchange relatives to connecting	Weekly On basic of activities schedules
Contribute articles to VegetablesWA magazine	Number of Publications COM reports, , HAI Report, APV- VPC report	Quarterly

Provide language assistance	Direct report to VegWA CEO Feedback from co-workers/program partners	After the event
Promoting adoption of good practice	Direct report to VegWA CEO Report from 2 Vietnamese growers members in CoM COM reports, HIA Report, APV-VPC report	Weekly Quarterly Quarterly
Feedback and representation	Report from 2 Vietnamese growers members in CoM Direct talk to growers Field trips	Quarterly Occasionally Occasionally
Reporting and communication with vegetablesWA	Direct report to VegWA CEO Staff meeting COM reports, HIA Report, APV-VPC report	Weekly Fortnightly Quarterly

1. Increased understanding of the Vietnamese vegetable grower community

1.1 The database updated

As resulted from routine visits and other visits responding to grower request, the database is up-to-date and has taken into account those growers who switch between strawberry and vegetable production with changes of growers' status such as farm owner, lessor, lessee, and share farmer.

So far 225 Vietnamese grower households are recorded of which 34, 17, and 54 householders in Carnarvon, Geraldton and Perth suburb respectively are farm owners. The record of lessee's and share farmers greatly varies which are around 80 to 120 households a season.

Based on the established database, an attempt is being made in collaboration with other colleagues at vegetablesWA to add more information to each case such as change of crops grown, production and business problems, needs and possible relevant assistance available.

1.2. Vietnamese growers' characteristics

The Vietnamese Field Extension Officer has developed a strong understanding on the attitudes, practices and community dynamics as well as establishing a degree of social integration with the Vietnamese grower community:

- (i) Vietnamese vegetable grower members are mostly first generation Vietnamese refugees who are in their 50s and above, have poor English literacy (also Vietnamese literacy in some cases), and poor knowledge of industry characteristics and government policy. There is no quantitative study to the number of first generation Vietnamese growers however the face-to-face contact with them in the last three years gave an idea that the ratio of young (below 40s)/aged grower (above 50s) is about 20% in Carnarvon, 30% in Geraldton and less than 10% in Perth.
- (ii) Only 12 of vegetable farming businesses are operated by second generation family members who integrate better into the main stream industry using English. These are early innovation adopters having a relatively significant influence in term of making changes in the community. For example, most members of the management committees of the Vietnamese community in Carnarvon are the second generation.
- (iii) Over 90% of Vietnamese vegetable growers operate small scale market gardens (<10 ha) and have been strongly tied to self-learned techniques. This has started to change in recent years when they have been approached with new information and technologies which were facilitated by the Vietnamese Field Extension Officer.

Lack of cooperation. Vietnamese growers socialise for common culture and language but maintain production and business management practices in secrecy. The cooperation between farm owner and share farmers is the most common form of cooperation observed.

- (iv) Focusing on immediate and short term benefits rather than long term sustainable business.
- (v) Vulnerable to changes. Aged Vietnamese growers have limited resource and capability to upgrade farm facility, practices, and certified skills to make their farming businesses compliant to changes. Thus the adoption of material-based technology such as new fertiliser and farming equipment may be possible rather than up taking those knowledge-based innovations such as IPM.
- (vi) Being dependent on technical advice from local suppliers often associated with promotion of sale.
- (vii) Hesitant towards working with English speaking officers and preferred to have Vietnamese language assistance.

This understanding helps industry partners to tailor extension services which are best suited to grower circumstances in different regions as well as helping to better integrate growers into R&D projects.

2. Innovation system involving Vietnamese growers identified

Outputs of the Vietnamese Field Extension Officer activities helped identify the innovation system in which Vietnamese growers are targeted as the innovation adopters and the innovation system characteristics.

- (i) The system comprises diverse government and private contributors and organisations such as Vietnamese growers, local suppliers, market agents, government development officers and project officers mainly of Department of Agriculture and Food WA, and staff of vegetablesWA.
- (ii) Permanent mandates of involved contributors and organisations are not secured but mainly adhered to R&D projects' terms. Thus the size and shape of the innovation system change over time with the entry and exit of contributors and organisation involved with the R&D projects and when they start and end. As a result of this, the linkages among contributors and organisations within this innovation system are not stable.
- (iii) Contributors and organisations involved in this innovation system adhere to sets of interest, practices and incentives defined by R&D projects which do not always coincide with the ultimate goal of increasing innovation adoption.
- (iv) As the public extension service is absent whilst R&D projects' objectives and activities are specific and not always linked to extension, local suppliers are a key extension service provider in innovation systems, as a result the grower – local supplier linkage is stronger. Money is not always required for extension service provided by local suppliers, but to some extent the service charge is hidden in product sale.
- (v) The Vietnamese Field Extension Officer was an important factor in this innovation system. He established linkages and facilitated interactions between the Vietnamese grower and others such as government development officers and project officers. He also facilitated multi-directional flow of information that streams conditioning for change.

3. Increased level of participation of Vietnamese growers in R&D projects

The contribution of the Vietnamese Field Extension Officer has resulted in greater numbers and types of R&D activities such as field days, training workshops, project meetings, which were specifically organised for the Vietnamese growers benefit.

The numbers of Vietnamese participants in each event are presented in section number 2 Engaging in R&D programs. Since there is no quantitative study to show the number of Vietnamese growers that participated in R&D projects before the involvement of the Vietnamese Field Extension Officer there is no comparative data that shows the increase of Vietnamese grower participation. However, there have only been 2 Vietnamese growers who are aware and engaged in vegetablesWA activities prior to this project. Further, anecdotal evidence (over the meetings and discussion with contributors at vegetablesWA and Department of Agriculture and Food WA) revealed that the level of involvement of Vietnamese vegetables grower in R&D projects increased significantly as a result of the Vietnamese Field Extension Officer inputs.

Box 1: Evidence of changes and trying practices towards learning to change for Vietnamese grower

Wednesday 21;

9:00 Thang Van Nguyen
(Mr Wang)

Has adopted a 2 HR per day schedule after march workshop. Would like to irrigate twice, but limited by flow from scheme. No yield data yet, but plants already look healthier than normal. Looking to extend mainline to charge block from middle to increase du. Has concerns about impact of expansion on price of toms/caps

11:00 Kim and Thi. Will look at daily irrigations. Keen to have new property assessed in June. Also keen for JD to complete design advice including pump selection. Showed some struggling blocks of toms on sandy loam soils. Ex citrus orchard. Val and Annie to follow up with soil sampling. Would definitely recommend other growers sign up.

14:00 van lach thach. Suggested daily irrig would be a great if he had the water. 5000 kl house supply and 36,000kl bore on 20 hectares not enough. Val/Tilwin to follow up with Tony... This issue big limitation to productivity in existing area b4 expansion even on line.

16:30 Andrew Nguyen. Share farmers kicked out, so fert in lines shouldn't be an issue anymore. Capital for mainline repair or replace an issue. Bore on lease block hasn't been repaired since flood so not enough water for daily irrig. Truyen has suggested consolidation on the home block in past, but idea met with resistance.

Quec Su Tran: The main benefit he saw was as confirmation that his scheduling(4hrs every day) is resulting in close to optimum WUE(11-14 t/ML). He will provide updated yield data with improved du on his new property. Expecting improvement in yield from 7 kg/plant as he increases DU from 83% to 95...with a system he owns.

Van Hong Pham.: This grower has shifted from 5 hrs every 2,3 or 4 days to 4 hrs every day. I suspect his attendance at both the dry season workshop and march feedback workshop would have lead to this. He was supportive of most of the recommendations, but noted that the logistics of share farming was a significant barrier to application of most of them.

The following statement regarding the impact of the Vietnamese Field Extension Officer was made by Tilwin Westrup, Development Officer, Department of Agriculture and Food, WA.

"The response was very positive for the overwhelming majority, we were able to see changes to schedules from several growers which will have come out of the meetings you helped facilitate in December 2013 and March 2014. Though no yield data was yet available, the anecdotal evidence suggest the plants are looking much healthier than the same time last year. This feedback is reflective of a project that can offer industry and system specific technical advice, but none of which would have made an impact with these growers without your help with communication, or the work in the background fostering relationships and rapport with the VN Grower community in Carnarvon. Well done".

Another positive indicator of the effectiveness of a bilingual extension service was the dominance of 21 Vietnamese growers over 13 English speaking grower participants in the Improving Water Use Efficiency Project in Carnarvon which had not happened in previous projects.

4. Increased adoption of good practice in the Vietnamese grower community.

Significant number of Vietnamese growers and the types of good practices being adopted are observed during the project implementation. Different stages of the adoption process such as awareness, interest, evaluation, trial and adoption of good practices were observed among Vietnamese farmers who benefited from the services of the Vietnamese Field Extension Officer when participating in R&D projects he was involved in and by having face-to-face contact.

Qualitatively, within the Vietnamese grower group of 225, a total 133 innovation adoptions were recorded during the 3-year project, in which 22 growers improved irrigation efficiency; 54 applied safer and more efficient chemical application; 16 applied innovations in consumers and markets; 34 biosecurity, hygiene and virus minimisation; and 8 biting stable fly management.

However it is noted that some advanced growers have made changes by adopting or trying to adopt different techniques whilst some growers were reluctant to change, others adopted more than one innovation.

100 percent of Vietnamese growers in Carnarvon (34/34 farm owners) adopted at least one innovation that was introduced in the projects where the Vietnamese Field Extension Officer has been involved. The adoption of the farm owner securing the following from several share farmers since they depend on the farm owner for technical instructions. Adopted innovations in this area cover all mentioned filed except the biting fly breeding control which is not the problem in the area.

At least 32 growers (56 percent of total farm owners) in Perth metropolitan area are recorded adopters who are certified soil fumigation technicians. Several others innovation adoptions are observed, but no formal survey was carried out to gain quantitative data.

Vietnamese growers in Geraldton showed great intentions to change farm management, particularly in a change of labour sourcing from contracting to permanent/full time. Information regarding this matter was provided to them but low priority was observed since this field of service is not within the Vietnamese Field Extension Officer competency.

On the other hand, 16 Vietnamese growers have upgraded their quality standard of products by resuming the Freshcare certification scheme. They participated in the Freshcare and Auschem training courses and are complying with recommended practices. Six growers have completed the certification process whilst others are preparing for farm audits.

14 applications for the Farm finance concessional loan were submitted by Vietnamese growers to enhance their farming businesses by setting up a windbreak, improving irrigation systems, building up crop protecting canopies of which 3 successful growers are implementing desired changes.

Other types of changes were observed in Vietnamese grower community such as regular monitoring of soil and water pH to maintain this factor at optimum level; Maintaining separate spray equipment for herbicide and other chemicals; timely application of Gypsum to enhance soil fertility; developing business plan and regularly reviewing the plan etc.

5. Industry partnerships built and people connected

Linkages between industry partners and Vietnamese vegetable growers were established.

Many reference groups and meetings have been attended and facilitated by the Vietnamese Field Extension Officer. As result the growers benefit from learning about a wide range of services important to their businesses while industry partners have better access to Vietnamese grower clients.

- (i) Stronger linkage between vegetablesWA with its Vietnamese grower members shows regular contact and quick response to changes occur at the Vietnamese growers end.
- (ii) Links between Department of Agriculture & Food WA and its project contractors with Vietnamese growers in projects like Plan Prepare and Prospect, More Dollars Per Drop project, Farm Finance Concessional Loan Scheme.
- (iii) Links between Vietnamese growers with Gascoyne Food Bowl Initiative, Department of Water and the Carnarvon Ministerial Advisory Committee and Vietnamese growers.
- (iv) Links between Vietnamese growers with private services relative to production and quality standards such as material suppliers and Freshcare and Auschem training providers.
- (v) Stronger link among Vietnamese growers within and at different locations.

Evaluation and Discussion

The project successfully achieved the desired outcomes by increasing knowledge of the national R&D system and outputs amongst Vietnamese growers and enhancing the adoption of improved production or business management practices.

The project allowed for the extension of R&D outputs to be regularly and effectively communicated to Vietnamese vegetable growers. The selection of a suitable Vietnamese Field Extension Officer candidate was a key factor in this success. A strong background in horticultural science and community development together with experience in extension services guaranteed high quality of knowledge and skills required for the implementation of the role.

Effective management of the Vietnamese Field Extension Officer within the project ensured services were tailored to meeting industry needs. Regular, scheduled monitoring and two-way communication enabled the project to stay on track to meet its desired objectives.

The Vietnamese Field Extension Officer made excellent contributions by applying appropriate methods to address problems and to plan and to implement activities in isolation or in collaboration with industry partners which was critical to success. This approach worked to successfully develop trust and maintain relationships between targeted growers and other industry partners. Additionally, the approach created ideal conditions for growers to comfortably join the innovation transfer process, a valuable platform for two-way flow of information to be transferred.

The identification of the structure and characteristic of the Innovation System in which the Vietnamese growers were embedded was essential for the success of the Vietnamese Field Extension Officer project. More tailored extension services enabled better overall performance and a better opportunity for the introduced innovation to be adopted.

Appropriately identifying the innovation system also allowed the Officer to effectively approach contributors when necessary to seek resources, knowledge and information that are essential for him to perform his extension tasks. This also helped in gaining a form of leadership by which the Vietnamese Field Extension Officer could influence other growers' practices towards achieving project outcomes.

Given that there was almost no awareness in the grower group prior to the project (only 2 Vietnamese growers were aware of industry services prior to the project), the outcomes of increased knowledge and improved growing and business practices were very successfully achieved.

At least 90 of the 225 growers adopted new innovations (40%) and through the Vietnamese Field Extension Officers' 700 face to face visits alone (not including collaborative projects and magazine translations) awareness of the national R&D system has increased by at least 50%.

Within the Vietnamese grower group of 225, a total 133 innovation adoptions were recorded during the 3-year project, in which 22 growers improved irrigation efficiency; 54 applied safer and more efficient chemical application; 16 applied innovations in consumers and markets; 34 biosecurity, hygiene and virus minimisation; and 8 biting stable fly management. More details of how this was achieved are under the Outputs section.

During the period of time from September 2012 to June 2015 the Vietnamese Field Extension Officer undertook 369 field trips to conduct about 700 face-to-face discussions with 225 Vietnamese vegetable growers in WA (varying numbers of growers attended each discussion). Most of 369 visits to farms were to metropolitan areas around Perth. 20 trips were made to Carnarvon, a horticultural district 950km North of Perth to conduct 85 face-to-face discussions and 12 trips to Geraldton, a major cucumber production area between Perth and Carnarvon with 36 face-to-face discussions.

The Vietnamese Field Extension Officer also contributed 95 articles for 11 editions of the WA

Grower magazine published during December 2012 to June 2015. These included 37 Vietnamese translations of articles from various authors and 29 of his own articles and their Vietnamese translations. The list of articles are in Appendix A.

Through this project, the Vietnamese Field Extension Officer has successfully ensured that industry development services are now more inclusive and effective. The Vietnamese grower group are now aware of a far greater scope of information and opportunities that they can access in their own language and with the benefit of a trusting relationship with Mr Truyen. The immediate benefits have been clearly demonstrated through the number of innovations adopted through the project and the amount of face to face visits My Truyen has achieved, under the monitoring of the CEO.

It is widely recognised by vegetablesWA and the Department of Agriculture and Food WA that the level of involvement of Vietnamese vegetable growers in R&D projects increased as a result of the Vietnamese Field Extension Officer inputs. This service needs to continue to ensure that national and local research and development outputs can be delivered to the widest group for the greatest benefit to the horticulture industry.

Recommendations

The Vietnamese Field Extension Officer has been the key liaison person between the Vietnamese grower community and government agencies, R&D providers and other industry stakeholders. The role also provides a valuable feedback mechanism so that the research providers and broader industry are kept aware of issues important to Vietnamese growers.

Feedback from Vietnamese growers in WA strongly supports the provision of this role as a means of providing support to adopt best practice on farm and learn about R&D outcomes. The WA Vietnamese community has not had that type of support before this project. Additionally, the industry development services provided by the Vietnamese Field Extension Officer is free from commercial imperatives on which some information providers are reliant and may compromise the perceived integrity of their assistance. Vietnamese growers prefer to receive information in different forms, however the overwhelming feedback indicates that face-to-face interaction using Vietnamese is the most preferred method for a great portion of the Vietnamese grower community.

As such, the Vietnamese Field Extension Officer role is seen by the Western Australian vegetable industry as well as the other entities such as government agencies and research providers as extremely valuable.

Continuing the Vietnamese Field Extension Officer project for the future is considered essential. This service does not only benefit this grower group directly but the vegetable industry as a whole through better practices, efficiency of production and communication.

Acknowledgements

No acknowledgements.

Scientific Refereed Publications

No scientific refereed publications resulted from this project.

Intellectual Property/Commercialisation
No commercial IP generated

Appendix A

List of articles and translations contributed to WA Grower magazines, these are available here [http:// issuu.com/search?q=vegetableswa](http://issuu.com/search?q=vegetableswa)

Vol. 47 No 2. Winter 2012

Vietnamese translations

- 1/ Tomato irrigation trials shows a win for growers. P 107
- 2/ Building a sound vegetables growing business. P 108
- 3/ Growers chew over stable fly. P 110

Vol. 48 No 1. Autumn 2013

Vietnamese translations

- 1/ Stable fly regulation moving forward P 92
 - 2/ Irrigation systems operation & Technology session. P 94 3/ ATO changes. P 95
- Own articles and their Vietnamese translations
- 1/ Grower profile Thing & Thu Van. P 38-40
 - 2/ Grower profile Levan Thang. P 50-52 and P 93.

Vol. 48 No 2. Winter 2013

Vietnamese translations

- 1/ Stable fly regulations update. P 87
 - 2/ More dollars per drop. P 88
 - 3/ Recommendations for irrigating tomatoes using drip on sand. P 89
- Own articles and their Vietnamese translation
- 1/ Nut grass control – a review. P 24-25 and P 90-91
 - 2/ Grower profile Nguyen Hoang Huy. P 44-45
 - 3/ Grower profile Tran Quoc Su. P 52-53

Vol. 48 No 3. Spring 2013

Vietnamese translations

- 1/ New stable fly regulations now in force. P 98
 - 2/ Research shows promise in lowering stable fly number. P 99
 - 3/ Gac – a potential new Asian vegetables for Australian market. P 103
- Own articles and their Vietnamese translation
- 1/ Grower profile Phung Do Tran and Huynh Tuyet Chau. P 50-51 and P.100
 - 2/ A Vietnamese volunteer serves her community in Carnarvon. P. 61and P. 102
 - 3/ Grower’s non-chemical practice to control nut grass. P. 88 - 89 and P.101

Vol. 48 No 4. Summer 2013

Own articles and their Vietnamese translations

- 1/ On-farm hygiene to control pests and diseases. P 23 and P85
- 2/ Thrip control tips. P 26-27 and P 84
- 3/ Grower question. P 27 and P 85
- 4/ Successful collaboration of small scale growers to secure market control and profit. P 64-67 & P 86-87
- 5/ Recipes _ Create Vietnamese fresh spring rolls your way. P 82-83

Vol. 49 No 1. Autumn 2014

Vietnamese translations

- 1/ More insecticide options for stable fly control. P 88
 - 2/ Research shows promising stable fly controls. P 89
 - 3/ Carnarvon Irrigation report card. P 90
 - 4/ Frequent asked question – Farm finance concessional loan scheme. P 91
- Own articles and their Vietnamese translations

- 1/ Modified practices effective in controlling stable fly. P 20 and P 92
- 2/ Meetings and free training workshop for Vietnamese growers in Carnarvon. P 37 and P 93

Vol. 49 No 2. Winter 2014

Vietnamese translations

- 1/ Calculate the decline in value of horticulture plants. P 90
 - 2/ Gascoyne food bowl initiative moving ahead. P 91
 - 3/ Post harvest management for vegetables – facts on preventing losses. P 92-94
 - 4/ Thinking about Expansion. P 94
- Own article and its Vietnamese translation
- 1/ Seasonal worker program Question and answer. P 91

Vol. 49 No 3. Spring 2014

Vietnamese translations

- 1/ Gascoyne food bowl drilling program to begin. P 98
 - 2/ Welcome Dominic Jerkin. P 99
 - 3/ Work health and safety. P 100
 - 4/ Gascoyne river aquifer update. P 101
 - 5/ Farm safety. P 104-105
 - 6/ Getting more dollars per drop in Carnarvon. P 106
- Own articles and their Vietnamese translations
- 1/ Tomato food safety. P 28-29 and P 107
 - 2/ Minister of Water and Forestry meeting with Vietnamese growers in Carnarvon. P 38 and P 99
 - 3/ Farm Finance concessional loan application success story. P 61 and P 102
 - 4/ Freshcare information – Question and answer. P 103

Vol. 49 No 4. Summer 2014

Vietnamese translations

- 1/ Soil moisture tour in Carnarvon. P 109
 - 2/ Harvest trail auditing program underway. P 110-111
- Own articles and their Vietnamese translation
- 1/ Fusarium wilt disease on tomato. P 27 and P 108

Vol. 50 No 1. Autumn 2015

Vietnamese translations

- 1/ Electricity is turn on in Gascoyne. P 105
 - 2/ Gascoyne river aquifer update. P 106 – 107
- Own articles and their Vietnamese translations
- 1/ Grower profile Van and Tien Nguyen. P 42-43
 - 2/ Grower profile Kham and Lin. P 50-52
 - 3/ Farmer cooperatives – What you need to know. P 84

Vol. 50 No 2. Winter 2015

Vietnamese translations

- 1/ Sanitation is critical to prevent plant diseases. P 96
- 2/ Check that load – New “chain of responsibility” laws will impact businesses of all sizes. P 97

Own articles and their Vietnamese translations

1/ Outspread of tomato fusarium wilt in Carabooda. P 28 and P 98

2/ Safer forms of Ethylene source for ripening chambers. P 30

3/ Soil fumigation. P 31-32

4/ Rebuilding Carnarvon vegetable industry. P 52-53 5/ Planning for profit workshop in Carnarvon. P 72