Analysing industry needs to fine tune IPM project activities

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Abstract

As a first step to better target the activities of a project for improving management of western flower thrips *Frankliniella occidentialis* (WFT) in field grown vegetable crops, we surveyed growers, consultants and other agribusiness personnel in two regions of Queensland. Using face-to-face interviews, we collected data on key pests and measures used to manage them; the importance of WFT and associated viral diseases; sources of pest management information; and additional skills and knowledge needed by growers and industry. Responses were similar in the two regions. While capsicum growers in one North Queensland district had suffered serious losses from WFT damage in 2002, in general the pest was not seen as a major problem. In cucurbit crops, the silverleaf whitefly *(Bemisia tabaci* biotype B) was considered the most difficult insect pest to manage. Pest control tactics were largely based on pesticides although many respondents mentioned non-chemical methods such as good farm hygiene practices, control of weed hosts and regular crop monitoring, particularly when prompted. Respondents wanted to know more about pest identification, biology and damage; spray application and the best use of insecticides. Natural enemies were mentioned infrequently. Keeping up to date with available pesticide options, availability of new chemicals and options for a district-wide approach to managing pests emerged as key issues. Growers identified agricultural distributors, consultants, Queensland Department of Primary Industries staff, other growers and their own experience as important sources of information. Field days, workshops and seminars did not rank highly. Busy vegetable growers wanted these activities to be short and relevant, and preferred to be contacted by post and facsimile rather than email. In response to these results, we are focusing on three core, interrelated project extension strategies: (i) short workshops, seminars and farm walks to provide opportunities for discussion, training and information sharing with growers and their agribusiness advisors; (ii) communication via newsletters and information leaflets; (iii) support for commercialisation of services.

SETTING THE SCENE

In the absence of a pest management crisis such as a pest developing resistance to existing chemicals or a new pest incursion, it can be difficult to interest vegetable farmers in taking a proactive, sustainable approach to managing pests. Integrated Pest Management (IPM) projects generally require farmers to make voluntary, often quite complex changes to their current pest management system, and in the absence of a crisis, or some legislative or marketing incentives, farmers, may see little reason to change.

Farmers are not passive recipients of new innovations or information but active business managers who solve problems, evaluate options, assess opportunities and make decisions on a day to day basis to improve their economic and social well being (Vock, 2003). Whether new information, technology or approach is "voluntarily" integrated within a farming system is largely dependent on whether it fits easily within the existing system and helps the farm business manager better achieve his or her goals. As Marsh (1998) states very succinctly, we must: (i) first demonstrate a need or respond to an expressed need; (ii) then demonstrate an observable difference in on farm situations; and (iii) demonstrate a measurable benefit in line with individual objectives. One way to increase our chances of satisfying these three principles is to use a marketing approach to project planning and ask end users what they need or want by doing some market research, often called a needs analysis or industry survey.

Some IPM adoption fundamentals

A quick CAB search of the literature using key words such as 'IPM implementation or adoption', 'training and information needs', 'industry survey' or 'needs analysis' illustrates that asking farmers and the agribusiness community what they need and want either happens infrequently or remains largely unpublished. In contrast, references relating to industry surveys and needs analyses with the health, tourism, economics and marketing disciplines are well represented. It is interesting to note that references on technology transfer were mostly agriculture related. Where studies of the IPM implementation process have been conducted (Wearing, 1988; Leslie and Cuperus, 1993; Biever et al., 1994; Heisswolf and Bilston, 2001), researchers have consistently found that the greatest success comes when the research team has worked intensively with a small number of growers over a period of time. A similar trend is evident within the broader area of environmental sustainability and natural resource management, where researchers cite a participatory approach based on action learning (Kolb, 1986) and adult education (Knowles, 1990) as an important feature for achieving voluntary change when working with landholders (Marsh, 1998; Roling and De Jong, 1998; Vanclay, 2004; Heisswolf et al., 2004).

Despite this now well established body of literature supporting a more collaborative approach to achieving voluntary change, the technology transfer paradigm remains dominant. Questions continue to be asked about the "barriers to IPM adoption" or, translated, "why farmers don't do what we think they should". While the answer is most likely quite complex (Wearing, 1988; Vanclay, 2004), perhaps our first task is to help "filter" information by carefully managing existing and new information so that it adds value rather than overwhelms farmers and their agribusiness advisors. Sadly, some researchers, managers and extension practitioners continue to believe that if they pour enough information over farmers some of the information will be absorbed. This is sometimes referred to as the bucket approach. Usually the opposite occurs. As individuals become saturated with information, they turn off to protect themselves, and turn elsewhere for advice and help. As Vock (2003) explains, information itself does not produce change but must first be converted to knowledge by the process of learning. Thus knowledge, not information, is the fundamental of change. Since knowledge is acquired through learning it cannot be transmitted, however data and information can.

Rather than focusing on technology and information transfer, it may be more fruitful to consider ways of maximising learning opportunities for farmers and their

agribusiness advisors by (i) improving our understanding of the technology, information and training needs of farmers and their industry and (ii) ensuring that end users are involved in developing the technology and information (Vock, 2003). This participatory approach to defining research, development and extension needs was a key feature of the problem specification workshops pioneered in Australia by the Centre for Tropical Pest Management during the 1990s (Kay and Walton, 1994; Deuter and White, 1995; Goodwin and Parker, 1997). These workshops are a good example of a structured approach to planning pest management programs based on defining the problem, clarifying issues, exploring industry needs then drawing up action plans to address these needs. More recently, two major funding organisations for vegetable research in Australia commissioned a national IPM survey to identify priority industry needs (S. McDougall, pers. commun., 2005).

Project aims

The main objective of our project is to ensure that the information and technology developed in previous national projects to manage western flower thrips, *Frankliniella occidentalis* (Pergande), is available to vegetable growers in Queensland. The approach to achieving this involves three strategies: (i) modification of existing technology and information to suit the Queensland situation; (ii) adoption of modified technology and information by Queensland vegetable growers; (iii) commercialisation of services to ensure continued use of information and technology.

Needs analysis objectives

The survey was limited to two regions; the cropping districts in the Bundaberg area of South-east Queensland (SEQ) and those in the Burdekin, Gumlu and Bowen region in North Queensland (NQ). Its purpose was to collect data on three broad areas of enquiry.

1. Issues and needs. This represented the main thrust of the needs analysis. Data collected would identify issues impacting on pest management in vegetable crops in the two target regions and identify grower and industry needs for improving pest management, with emphasis on thrips, in particular western flower thrips (WFT), and associated viral diseases.

2. Target groups. This aspect of the survey focused on identifying and confirming target groups for project activities, collecting contact data for later communication purposes and statistics on crops and areas grown in the two regions.

3. Current pest management practices. Collection of baseline data on current practices and approaches to managing pests serves two functions. It provides a better understanding of the current situation and also provides a baseline for project evaluation purposes.

A fourth aim of the survey was to promote the project and its team members amongst the farming community by visiting farmers and industry personnel early in the life of the project.

SURVEY DESIGN AND SAMPLING METHOD

The process generally referred to as needs analysis is essentially business research, which is a systematic process of enquiry that provides business information on which to make business decisions. There are three broad types of business research – exploratory research, descriptive research and experimental or causal research (Zikmund, 1997 pp 37 to 42). The three types of research are not mutually

exclusive, with our needs analysis combining aspects of exploratory and descriptive business research methods.

Key questions

The primary aim of the needs analysis was to explore current pest management issues for vegetable growers in the two target regions and to gain insights into how we could best assist industry improve their pest management practices within the constraints of our project objectives. There were five key questions that we wanted answers to.

- Who were our target groups and which are the target crops?
- What pests cause the most problems?
- What are people doing now to manage these pests?
- What would help people improve their pest management, particularly for WFT and associated viral diseases?
- How would people most like to receive information about the project?

Interview sequence

We prepared an interview outline consisting of a series of closed and open-ended questions to collect quantitative and qualitative data for answering our five key questions. The type of data sought governed the type of question used and prompts for the interviewer were included in the questioning sequence to help standardise the interview. The draft interview outline was piloted with two growers and one agricultural distributor to check quality and flow of the questions. Since only additional prompts for the interviewers were added after these interview test runs, results from pilot interviews were included in the analysis.

1. General pest management. The interview sequence opened with a series of short questions to collect contact information and data on the type and area of crops grown. The interview then progressed to a series of open-ended questions on the main pests for each crop, what time of the year these pests were a problem and the practices currently used to manage these pests. Interviewer prompts included a reminder about non-chemical methods of control and who made the decisions to apply chemicals. This section of the interview concluded with the question "Where do you get the most useful information on managing pests?" with respondents asked to rate their responses in order of importance, to which the values 3 (most important), 2 (important) or 1 (not so important) for each response were then assigned.

2. WFT management. Respondents were then asked a series of open-ended questions on WFT to determine if the pest and associated viral diseases were seen as a problem, how WFT was being managed at present, if control was adequate, if there were constraints to getting adequate control and what would help improve WFT management. In many instances respondents asked "Is it WFT?" therefore responses in this section of the interview often related to general thrips management rather than WFT specifically. If WFT/thrips was not seen as a problem, we asked respondents for their opinion on what they thought was essential for getting adequate control and for suggestions on how to further improve WFT/thrips management. The last prompt within this section was to explore skills, information needed and what respondents might like to learn about when it came to thrips/WFT management. To conclude this section of the interview, respondents were asked if they were willing to try out any new methods of WFT control. The interview concluded with a mix of closed and

open questions to collect data on how farmers and agribusiness wanted to be kept informed about the project and an invitation for further comments.

For the agribusiness personnel interviews, we used the same interview sequence but adjusted the questions. For example, a reseller would be asked "What practices are currently being used…" instead of "What practices do you use…". Sometimes clarification on whether the respondent was answering for themselves or on behalf of farmers was needed.

Selection of respondents

Working from existing lists of contacts, we enlisted the help of colleagues, local grower associations, consultants, agricultural distributors and other agribusiness contacts to update and expand the number of potential respondents both prior to and during the data collection phase.

The aim was to interview 80% of capsicum growers and agribusinesses that service them in the key district of Gumlu. For Bowen and the Burdekin districts, and the Bundaberg region our aim was to interview a representative mix of large and small growers producing our target crops, growers who use consultants and those that do not, as well as staff from most major agribusinesses likely to have influence on pest management issues and decision-making in the region. A small number of specialist tomato and melon growers were also interviewed since, although they are not part of the target population for the project, they do have an impact on pest management within the target districts.

Gathering the data

Eighty-nine people took part in interviews over a six-month period from late July 2004 to mid February 2005. With the exception of one phone interview, all interviews were face to face either on farm, at agribusiness premises or at the respective interviewer's place of work. In total, owners of 50 vegetable growing enterprises and in-house agronomists/managers of a further 4 enterprises were interviewed. Figure 1 shows that we almost reached our target for Gumlu and illustrates the range of vegetable crops grown by growers interviewed. Personnel from 20 agribusinesses were interviewed, comprising staff and owners of three independent consultancy firms, staff of nine agricultural distributors, two seed company staff and owners/staff of six commercial vegetable seedling nurseries.

DATA ANALYIS AND INTERPRETATION

For each sample group, data from interviews were collated against the questions and prompts of the interview outline. A theme analysis approach was used to collate and analyse the qualitative data gathered with open-ended questions. This was an evolving process with trends emerging as responses were collated, categorised and reorganised into potential themes. Where strong trends emerged in the data, quantification of results against themes was attempted.

The survey indicates that the main target crops affected by thrips in both regions are capsicums, chillies and eggplant. In NQ, capsicum growers at Gumlu experienced major losses through WFT damage during winter/spring of 2002, less so in 2003, but did not consider WFT a major problem at present providing fipronil and spinosad were available for control. Tomato spotted wilt virus and capsicum chlorosis virus, were mentioned by a number of respondents. In the Bundaberg district, the survey indicates that growers were aware of thrips and associated viral diseases but

also did not consider them a major problem at present. Most felt they were managing thrips with monitoring and insecticide applications, but there were concerns over re-infestation and the potential for the development of insecticide resistance. Silverleaf whitefly (*Bemisia tabaci* Gennadius biotype B) and heliothis (*Helicoverpa* spp.) were considered the key insect pests for vegetable crops in both regions.

1. Insecticides used. Growers were using a range of strategies to manage pests but relied heavily on insecticides, particularly in NQ districts. As illustrated in Figure 2, insecticides mentioned most frequently by growers to control key insect pests include methomyl, methamidophos, various synthetic pyrethroids, imidacloprid, mineral oils, spinosad and fipronil.

2. Non-chemical control methods used. While pest control tactics were largely based on insecticide sprays, many respondents mentioned non-chemical control methods such as good farm hygiene practices, controlling weeds, regular monitoring/checking of crops and farm layout. Natural enemies were mentioned infrequently. Thirty-five percent of NQ growers interviewed employed the services of an independent consultant, but with the exception of one grower, said that they made the final decision on what insecticide to spray. There appeared to be two main strategies for managing pests, the "soft options and reduce spraying" approach used by a small number of growers and the "keep on top of pests by spraying regularly" approach employed by the majority of growers interviewed.

3. Sources of pest management information. Growers nominated consultants, their own experience, other growers, state government staff, printed and electronic information, and agricultural chemical company staff and their distributors as their main sources of information. As Figure 3 illustrates, the importance of each of these sources of information varied between districts and this is most likely due to the profile and accessibility of staff within the various sectors of the industry in each district. What is noteworthy is that meetings and courses did not rate as a major source of information in any district. Agribusiness respondents also did not consider meetings and courses as important sources of information for managing pests. Peers, their own research and experience, printed media, compact discs and the internet were considered important, although a wide range of other sources also were mentioned.

4. Skills, information and tools needed. Respondents provided an abundant and colourful description of what skills and information they and their industry needed to better manage pests including thrips and WFT in particular. It included information on thrips identification, thrips life cycle, biology and ecology, symptoms and damage, insecticides and resistance, information on natural enemies, viral diseases and thrips' activity through the district. Growers and agribusiness personnel wanted better knowledge of pests, diseases and disorders in general with some suggesting colour leaflets and booklets as identification tools. Many said that they found it difficult to keep up to date with chemical registrations, with current information on all aspects of chemical use and spray application seen as useful. There was some interest in alternatives to chemical control including biological controls, a better understanding of alternative weed hosts and potential for area-wide approaches to managing pests (early warning systems, coordinating planting dates, insecticide resistance management, cleaning up dirty farms).

5. Keeping growers and industry informed. Figure 4 shows grower and agribusiness responses to the question "Would you be interested in attending any field days, workshops and seminars?". While the majority said Yes, these activities were not named as the most useful means for obtaining pest management information

in an earlier question (see 3. above) suggesting that, in practice, growers are less likely to attend workshops, field days and seminars than their response suggests. The discrepancy could in part be due to poor past experiences with these activities, with respondents finding that they are not an efficient way for obtaining information. Some growers said they expected their consultants to attend on their behalf. Respondents were clear about extension activities needing to be short, topical and relevant. While agribusiness sees email and mail as the best method for being kept informed about activities and the project, the majority of growers prefer fax and mail (Figure 5). This includes growers who are comfortable using email and the internet but do not do so on a daily basis.

CONCLUSIONS AND RECOMMENDATIONS

The survey has identified major issues impacting on pest management in vegetable crops in the two target regions. We also have useful data on industry needs for improving management of pests including thrips, in particular WFT, and associated viral diseases. These will allow us to better target project activities. Target groups for the project have been identified and these highlight that all agribusiness sectors need to be included within the commercialisation strategy. The survey results provided valuable data on crops and hectares grown and information for improving the effectiveness of communication activities.

We do have some useful information on current pest management practices for project evaluation purposes but the data collected will probably only serve to measure major changes in grower attitude and approach to managing pests and trends on practices. The needs analysis interviews did raise the profile of the project as well as employ a preferred information gathering strategy for growers – one on one interaction.

How do needs analysis results impact on project activities?

The needs analysis results confirmed that, in the absence of a WFT management crisis, it would be a challenge to match grower needs with our project needs without making some major modifications to our approach. Some general conclusions that can be drawn from the results are that (i) unless WFT becomes difficult to manage, it will not engage grower interest but SLW and heliothis might; (ii) it is also unrealistic to expect a large proportion of growers to attend seminars and workshops in the absence of a pest management crisis; (iii) keeping growers informed on chemical issues will help build credibility and goodwill for the project; (iv) there are opportunities for building skills and capacity and developing activities to target specific grower and agribusiness interests; and (v) we need to target agricultural distributors with training and support consultants in developing services since both are important sources of information for growers. Finally, there are unanswered questions with regard to distribution, alternative hosts and best control options for WFT within the target districts of Queensland with major modification, testing and adapting of existing technology and information required so that the project team has capacity to provide specific answers to local questions.

The results have confirmed that the best method of extension is multiple methods (Vanclay, 2004) and that our approach needs to remain flexible and responsive to changing grower and industry needs. After discussion with project team members and the project funders, we have broadened the project brief to take a more integrated, multi-pest approach, for example by building strong links to a SLW

project. We clearly need to target not only growers but also consultants, in-house agronomists and agricultural distributors as they are the main sources of information for growers.

To provide targeted information and training and to maximise learning opportunities for growers, agribusiness staff and the project team, we are focusing our efforts on three core, interrelated extension strategies:

1. Workshops, seminars and farm walks. While these activities are not a major source of information for our target groups, they do provide opportunities for discussion, skills development and information sharing amongst the project team, a proportion of growers and agribusiness personnel in particular. However less emphasis will be placed on these activities as the primary extension strategy. Our intention is to tailor sessions so they address identified and emerging industry interests, stay focused, on time and link in with other pest issues. Some sessions and training materials will target specific groups. For example, short WFT/SLW seminars were held earlier this year in each district with one session organised specifically for agricultural distributors.

2. Communication. The main purpose of the newsletter and information leaflets is to keep in touch and keep our target groups informed about project progress, particularly those that are unlikely to participate in workshops and seminars. In response to identified grower needs, the newsletter contains a regular chemical update and regional round up section. Short reports on project trials, topics covered at workshops, seminars and a regular advisory leaflet from one of the consultancy firms are also included. While there is some overlap, fax and mail are used to communicate with growers, email for agribusinesses contacts.

3. Commercialisation of services. While the project contained a commercialisation component at the outset and the two major consultancy firms in our target regions are formal collaborators in the project, the needs analysis shows that we need to think more broadly about supporting one-on-one interactions between growers and their key sources of information. Staff from these two consultancy firms have completed an intensive training workshop to build local capacity for thrips identification already and they are conducting valuable on-farm trial and survey work as part of the project. However, we intend to further explore opportunities for supporting consultants, in-house agronomists, agricultural resellers, seedling nurseries and others with training and information, so that all sectors of the agribusiness community have expanded capacity for servicing growers. For example, basic pest identification workshops are planned for early next year and discussions are underway on best options for improving spray application assessments.

Some final comments

The needs analysis process has been useful as it has not only provided valuable insights on issues and grower needs for improving pest management but also confirmed some previously held ideas. By using a more formal approach to identifying issues, needs and preferences, these become more difficult to overlook, for example, not staying focused on key messages at extension activities or within print media. The sample size used was reasonable as similar trends soon developed across districts with some respondents having little knowledge and understanding of fairly basic principles, other being very knowledgeable. We are confident that results are generally representative of grower and industry needs in the two regions targeted.

Conducting the needs analysis has underlined the importance of (i) good question design; (ii) having a sampling plan so as to obtain a good mix of respondents; (iii) taking clear, precise notes; (iv) being patient and ensuring full answers are provided; and (v) allowing enough time as personal interviews are time consuming.

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Figures

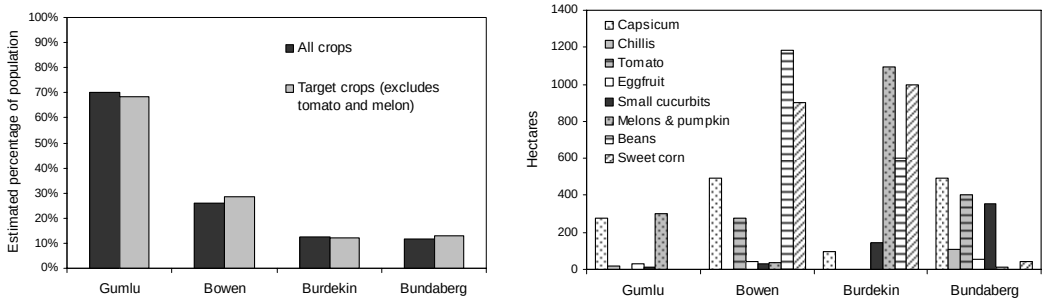

Fig. 1. Estimated percentage of growers interviewed in the four target districts (left) and acreage of vegetable crops produced by these growers (right).

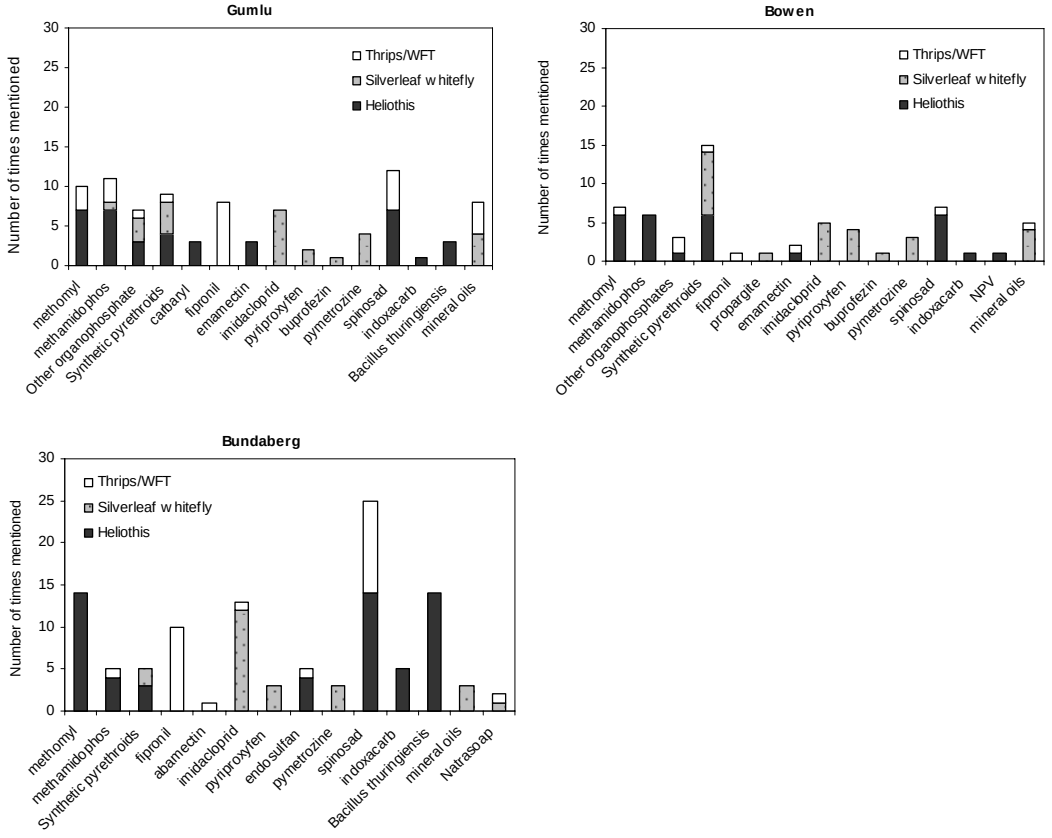

Fig. 2. Insecticides mentioned most frequently by growers in Gumlu (top left), Bowen (top right) and Bundaberg (bottom) to control specific pests.

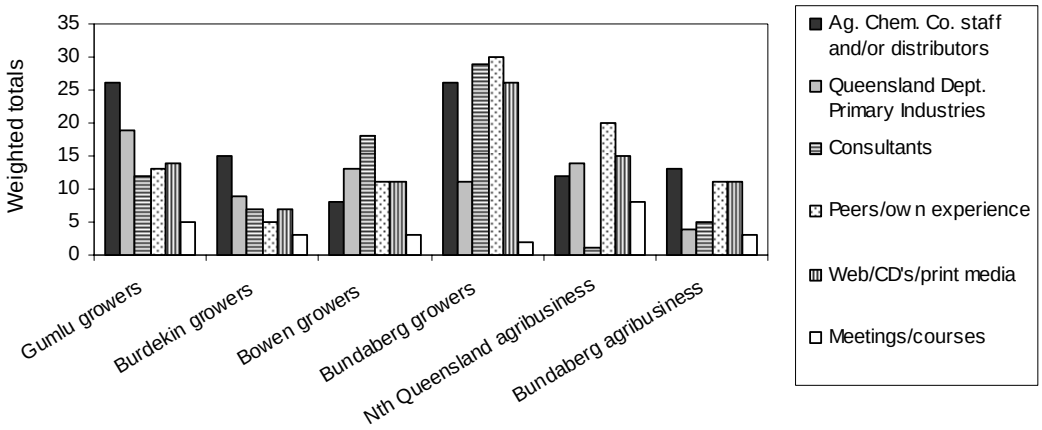

Fig 3. Sources of useful information for managing pests for vegetable growers and agribusiness personnel interviewed.

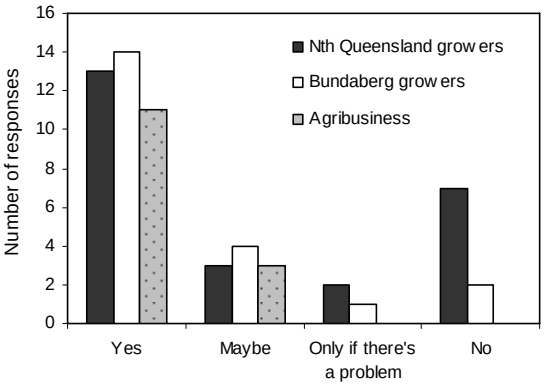

Fig. 4. Interest in attending field days, workshops or seminars about the project - responses from vegetable growers and agribusiness personnel.

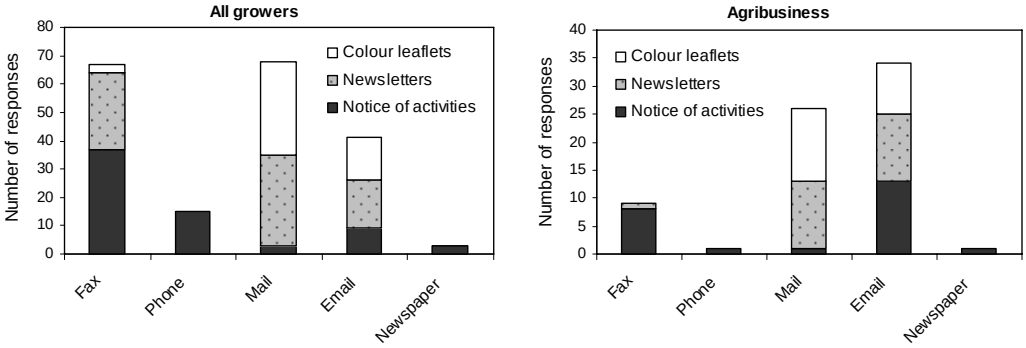

Fig. 5. Keeping you informed about the project – what's best? Combined responses from North Queensland and Bundaberg growers (left) and agribusiness (right).