RECORDING AND REPORTING PESTICIDE USE IN THE ONION AND BRASSICA INDUSTRIES

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ABSTRACT

Understanding how growers monitor their own pesticide use helps determine the most appropriate tools for recordkeeping. To investigate pesticide recording and reporting in the onion and brassica industries, a telephone survey of 122 farmers was conducted in July 2008. Most respondents were recording pesticide use (n=118, 97%). There were significant differences between domestic- and export-focussed growers. Export-focussed growers were more likely to have electronic systems for recording pesticide use and were more likely to use the information for calculating and reducing production costs. Approximately 90% of growers indicated that records were useful to help meet regulatory requirements and provide information for residue or spray drift queries. The ability to trace pesticide use to individual properties was considered important by 90% of growers as long as there was industry control over access to that information. These results have implications for the design and implementation of Decision Support Systems for pesticide use. **Keywords:** pesticide recording, pesticide reporting, Decision Support Systems, onion, brassica, pesticide use.

INTRODUCTION

Spray diary records from individual pesticide users are the building blocks for a comprehensive and consistent system for pesticide use recording (Cameron 2007; Manktelow et al. 2005). In an environment of increasing concern about pesticide use, reporting requirements have been and will continue to increase (Frisvold 2000). Currently there is some variation in the recording of pesticide use between industries within New Zealand. The review of pesticide use in New Zealand by Manktelow et al. (2005) concluded that the most comprehensive pesticide use data tend to be linked to industry sectors with fresh produce exports. These sectors often had a system to collect individual spray diary records and collate them into total pesticide use data. The kiwifruit and apple industries are examples of this with Good Agriculture Practice (GAP) systems in place that include mandatory collection and auditing of spray diary information for export clearance. In the vegetable industry there is less of an influence from overseas market requirements through exporting, although local requirements have begun to reflect more stringent requirements from overseas (Cameron 2007). For example, more than 80% of all New Zealand domestically grown produce is compliant with an approved supplier programme called 'New Zealand GAP', which was launched in 1999. New Zealand GAP includes specific management requirements for agrichemicals to ensure traceability and food safety.

To gain more of an understanding of the current pesticide recording and reporting systems within the vegetable industry, research was undertaken to ascertain whether there were differences between growers who were export-focussed and those who supplied the domestic market.

MATERIALS AND METHODS

The onion and brassica industries were chosen for the contrast provided between export and domestic focuses and for their product homogeneity, i.e. both are fresh market crops. Within the onion industry there is a mix of domestic and export growers, while most brassica growers are domestic growers. Horticulture New Zealand Fresh Vegetable Product Group provided a list of names and contact details, comprised of 85 onion growers and 106 brassica growers. The target sample size was calculated as 80 onion growers and the same number of brassica growers, giving a total target sample size of 160 growers. This represented approximately 60% of onion growers and 30% of brassica growers within New Zealand (Horticulture New Zealand, 2007a, 2007b).

Survey questions were designed in collaboration with researchers and vegetable industry personnel. They were pilot tested on six brassica growers. A copy of the survey can be obtained, on request, from the corresponding author. The survey had four parts. The first part focussed on demographics. Part two consisted of a series of questions about recording pesticide use practices. Part three of the survey focussed on how the information collected on pesticide use was utilised. In part four growers were asked about their attitudes and views on sharing pesticide use information. Growers who did not record pesticide use information were directed to a series of questions designed to determine their views on sharing information on pesticide use. Statistical analysis of the data collected was undertaken using Minitab, a statistical software package, to determine whether there were differences between domestic- and export-focussed growers across the two industries (t-test or chi-squared test as appropriate).

The survey was administered by telephone over a 3-week period in July 2008 by a consultant experienced in phone surveying farmers. A total of 122 growers completed the survey, less than the target of 160. A number of growers on the list did not complete the survey because: they had left the industry (21 in total), they were not confident speaking in English (10 in total), or they were not able to be contacted after several attempts to phone them.

RESULTS

Response and demographics

A total of 122 growers completed the survey. Sixty-five percent of respondents ($n=79$) grew product for the domestic market and had done so for an average of 24 years (ranging from 3 to 60 years). The remaining 35% ($n=43$) grew for export markets and had done so for an average of 24 years (ranging from 5 to 78 years) (see Table 1).

There were significant differences between domestic and export growers. Domestic growers had on average a smaller area in vegetables (67 ha compared to 253 ha; $P=0.013$), and had on average fewer farms than exporters (three compared to nine; $P=0.043$).

Recording pesticide use

Ninety-seven percent ($n=118$) of respondents were recording their pesticide use. There were significant differences in the way in which domestic and export growers recorded their pesticide use ($P<0.05$). In Table 2 the different types of recording systems used are outlined.

Use of information recorded on pesticide use

Respondents who were recording pesticide information ($n=118$) indicated they were using the information for a range of purposes. In Table 3 the range of uses is outlined. The most common reasons for recording pesticide use information was to meet regulatory requirements and to provide information in residues or spray drift. There were some differences between export- and domestic-focussed growers. As would be expected, export growers were more likely to indicate that they provided information to ensure export market requirements were met ($n=41$, 95%, compared to $n=7$, 9% amongst domestic growers; $P<0.001$). Although this question was designed to be answered for either onions or brassicas as the main crop, the few domestic growers who indicated they needed to ensure export market requirements were met also grew other crops (e.g. avocados, sweet corn) for export, which could have caused some confusion when answering this question. In addition, there was a significant

TABLE 1: Type and number of respondents contacted during the survey.

Type of grower	n	%
Total domestic growers	79	65
Onion	17	
Brassica	62	
Total export growers	43	35
Onion	29	
Brassica	2	
Combination of crops ¹	12	
TOTAL	122	100

¹A combination of crops indicates that growers had a mix of both onions and brassicas (with one or more crops exported).

TABLE 2: The number of growers using various types of recording system for keeping information about their pesticide use.

Type of grower	No recording system	Paper	Notebook	Computer	Total n
Domestic	3	5	58	13	79
Export	1 ¹	-	19	23	43
Total	4	5	77	36	122

¹It appears this grower had been growing onions for a wholesale market that could go onto export and so was listed as an export grower.

TABLE 3: Number and percentage of growers indicating the range of ways in which pesticide use information is utilised.

Pesticide use information utilised for:	Total n	% domestic	% export	% total
Meet regulatory requirements	110	92	95	93
Provide information on residue/spray drift	107	89	93	91
Managing use of pesticides	102	83	93	86
Produce summaries of pesticide use	97	80	86	82
Meet OSH ¹ requirements	95	80	81	81
Help calculate and reduce production costs	84	63	86	71
Forecast chemical usage	54	42	52	46
Information for export requirements	48	9	98	41

¹OSH = Occupational Safety and Health.

difference between domestic and export growers in terms of whether they used information for calculating and reducing production costs ($P=0.009$). Export growers were more inclined to use pesticide use information for managing production costs than domestic growers.

Sharing pesticide use information

Approximately half of the respondents who recorded pesticide use shared their spray diaries with other people ($n=56$, 47%). However, exporters were significantly more likely to share records ($n=26$, 71% of exporters, compared with $n=30$, 34% of domestic growers; $P<0.05$).

Respondents were evenly split on whether they would be comfortable allowing pesticide use information to be made available to others. There was no statistically significant difference detected between domestic and export growers in terms of whether they felt comfortable about sharing pesticide use information with others. Those growers who were comfortable sharing information felt that being accountable was important. They stated that it was acceptable to share information as long as there was control over who had access to that information. Those growers who were not comfortable sharing information felt that it was 'their business' what pesticides were used, that they did not want to share due to the information being commercially sensitive, and that there was market advantage in not sharing this information.

TABLE 4: Number and percentage of growers indicating they were comfortable sharing records with particular groups.

Comfortable sharing pesticide use records for:	Total n	% total
Providing consumers/market with information	59	100
Researchers to develop best management practices	58	98
Marketing New Zealand as a whole	55	93
Policy makers to determine national levels of pesticide use	48	81
Other countries to assess New Zealand sustainability	46	78

Growers were also asked about traceability, control and anonymity of pesticide use information. Traceability, growers control over access to pesticide information and industry control over access to information were important to growers (see Table 5). There were no statistically significant differences between domestic and export growers.

TABLE 5: Number and percentage of respondents who rated the following statements in terms of sharing pesticide use information as important or very important

Elements for sharing pesticide use information	Total n	%
Traceability of pesticide use information	106	90
Industry control over access to pesticide use information	96	81
Grower control over access to pesticide use information	85	72
Anonymity (pesticide use information cannot be traced to individual properties)	18	15

DISCUSSION

The results of this research indicate that recording pesticide use is common practice amongst the two vegetable industries surveyed. However, there were significant differences between those growers who were focussed on the domestic market and those who exported. In comparison to domestic growers exporters had a larger area in vegetables, had more farms, were more likely to have electronic systems for recording pesticide use and were more likely to use the information for calculating and reducing production costs. Record keeping appears to be a critical requirement for exporting because of the current reliance on Quality Assurance schemes (Campbell et al. 2006). These are becoming more important for the domestic market as well, which suggests that, over time, the difference between domestic- and export-focussed growers outlined here, will decrease. The success of Decision Support Systems (DSS) such as software for recording and reporting pesticide use amongst exporters is understandable given the requirements to be met. Promotion of the use of DSS amongst exporters has the most potential for uptake (McCown 2002).

The picture presented through these results, i.e. comparing export and domestic fresh produce growers, supports Manktelow et al.'s (2005) view that the most comprehensive and reliable pesticide use data can be found in industry sectors with fresh produce exports compared to those industries with domestic production only. However, it was also clear that the majority of domestic growers surveyed here regarded pesticide use information as useful to their business and collected this information diligently albeit in a notebook or diary as opposed to computer software. This suggests that development of a system designed to report pesticide use data for industries with a significant domestic focus would need to ensure that the use of a notebook/diary for record keeping could continue to be recognised as a viable and effective process. If the records kept by growers in this form were found to be hard to interpret by those auditing or seeking information from these records (e.g. industry or researchers), a standardised notebook could be designed to help growers collect pesticide use information in a more uniform fashion. Further research is needed to determine the most effective means of standardising written material in order to ensure that the information recorded is uniform throughout an industry, and that it is easy for others to interpret if needed. Further research would also be required to generate detailed suggestions on how to promote greater use of software amongst growers.

ACKNOWLEDGEMENTS

This project was funded by the Foundation for Research, Science and Technology (C02X0303). Thanks to Sonia Whiteman at Horticulture New Zealand for help and support with the project, and to all the growers took part in the survey. Thanks also to Chikako van Koten for analysis of the survey results.

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