Lettuce Integrated Pest Management (IPM) Survey 2006

Summary

An industry wide telephone survey of lettuce growers was conducted to determine their pest management strategies. 117 growers from Tasmania, Victoria, New South Wales (NSW), South Australia (SA), Queensland (Qld) and Western Australia (WA) were contacted, with 79 growers willing to respond to the survey. Of these 79 growers, 48 considered themselves to be IPM growers, whilst 31 were non IPM growers. The most important IPM strategies were crop monitoring, the use of biological insecticides and monitoring for beneficial insects. Non IPM growers managed their pest problems by using newer generation chemicals, weekly sprays and crop monitoring.

Crop monitoring was used by 72 of the 79 growers surveyed. The majority of growers monitored their crops themselves however crop consultants and chemical resellers were also used. Generally most lettuce crops were monitored weekly or twice weekly. Hydroponic growers usually monitored daily when they were harvesting. The number of lettuces checked varied greatly (10 to 5000 plants), depending on the production system in place. Only 81% of growers who monitored their crops felt it was cost effective in decreasing the number of insecticides applied.

Newer generation insecticides were used by 63 growers, the most popular being Success®, followed by Avatar®, Bts and Proclaim®. The most common fungicides sprayed were Ridomil®, Rovral® and Filan®. Kerb® was by far the most frequent herbicide sprayed by growers for weed control.

Currant-lettuce Aphid (*Nasonovia ribisnigri* (Mosley)) is becoming established in many lettuce growing regions of Australia. This pest is a big concern for all growers even where it has not been detected. Where the aphid is established Confidor®, *Nasonovia* (Nas) resistant lettuce varieties, native aphid predators and other chemical strategies have been implemented as control measures. Similarly where it has not been detected growers will or are using Confidor®, Nas resistant lettuce varieties and other chemical strategies to combat this problem.

Growers also commented on the advantages and disadvantages of lettuce IPM strategies. The major benefits of IPM to growers were decreased insecticide usage and cost and better pest control. Threats to IPM were also identified and related to insect contamination of product and new pest occurrences. Some local barriers to adoption of IPM were also recognised.

The usefulness of the lettuce project was revealed by asking growers to rate specific publications and the lettuce conferences. The Lettuce Leaf Newsletter, Ute/Field Guide and Lettuce IPM Information Guide were all rated good to excellent publications. The growers that did attend the Lettuce Conferences also rated them good to excellent. However, the conference proceedings were not rated highly because they were too technical.

Introduction

A telephone survey of lettuce growers was conducted in April and May of 2006. The aim of the survey was to ascertain the pest management strategies of lettuce growers and to determine their level of uptake and understanding of Integrated Pest Management (IPM). The survey form was very similar to the IPM survey form used by Andrew Creek in October 2005 (Appendix 1). Additional questions were added which included the use of fungicides and herbicides on lettuce crops, control of sclerotinia, the presence of currant-lettuce aphid (CLA) (*Nasonovia ribisnigri* (Mosley)) and local barriers that inhibit the uptake of IPM.

The telephone survey was completed by Kathryn Bechaz - Technical Officer for Lettuce at The Vegetable Industry Centre, Yanco. Lettuce growers from Tasmania, Victoria, NSW, SA, Qld and WA were surveyed. A list of potential survey candidates from Tasmania and Victoria was compiled by Lionel Hill (Researcher) and Patrick Ulloa (Industry Development Officer), respectively. John Duff an Entomologist from Qld, Sonia Broughton also an Entomologist from WA and Greg Baker a Researcher from SA, surveyed growers from their particular states. Other lettuce growers contacted from NSW and some from SA, Vic and WA were selected randomly from a list of growers compiled by NSW DPI throughout the lettuce IPM project.

Telephone surveys can be difficult because they require people to take time out to participate. However, of the 117 growers that were contacted, 79 (68%) chose to complete the survey. This included the 20 growers that had previously responded to the survey in 2005, who were contacted first to answer the additional questions (Appendix 2). The 38 growers who did not respond were either not interested in participating in the survey or no longer grew lettuce. Of the 79 growers who participated in the survey, 29 were from NSW, 17 were from Victoria, 12 were from Tasmania, 9 were from SA, 6 were from Qld and 6 were from WA.

Although this survey only reflects the opinions of a small cross section of growers from the Australian lettuce industry, it does however give an indication of the pest management strategies that lettuce growers are currently using. The survey also reveals the attitude towards and the uptake of IPM.

The Lettuce IPM Survey Results

Of the 79 lettuce growers who choose to take part in the survey, 59 were field growers, 15 were hydroponic growers, 2 were organic growers and there was 1 seedling, transplant and non grower. The non grower who participated had been a consultant for many years and was very knowledgeable with the pest management trends in their area.

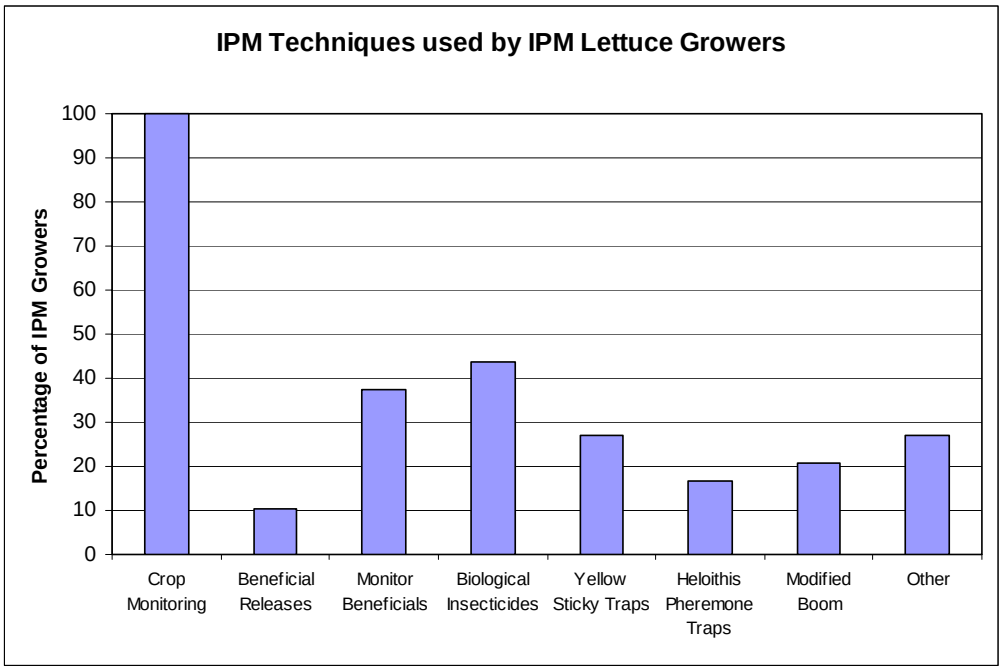
The Pest Management Strategies of Lettuce Growers

IPM strategies were used by 48 of the 79 (61%) growers who responded to the survey, in the production of lettuce. The other 31 growers (39%) believed they only used traditional techniques to produce lettuce. However, most of these growers used some techniques as part of their lettuce crop management that could be interpreted as an IPM strategy. These techniques included crop monitoring, the use of yellow sticky

traps, chemical rotations to avoid resistance, ploughing in old crop residues and only spraying when necessary. More than likely these growers felt that because they were spraying weekly with either traditional or newer generation insecticides that they were not practising IPM strategies.

Crop monitoring was the most important component of IPM, with all of the growers who indicated they used an IPM strategy implementing this technique as part of their crop management (Figure 1). The use of biological insecticides and the monitoring of beneficial insects also rated highly, with 44% and 38% of lettuce growers indicating they utilised these techniques, respectively. Other IPM techniques that growers mentioned they used but were not listed included ploughing in old crop residues, only spraying when necessary, the use of newer generation insecticides, chemical rotations, removing suspect plants, waste, debris and weeds, washing insects off plants and using mosquito netting and birds to deter pests.

Figure 1. The IPM techniques that growers indicated they used as part of an IPM strategy in lettuce production.

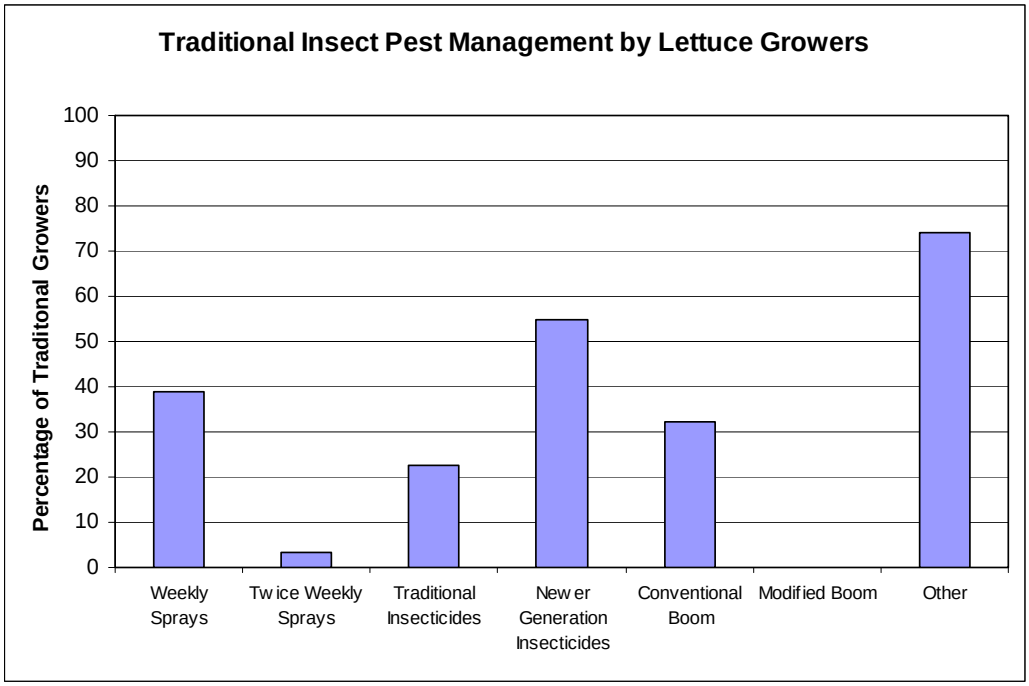


The majority of growers (28) who indicated they use IPM strategies have been doing so for 1 to 5 years. The remaining 20 growers adopted IPM strategies more than 5 years ago. The reason some growers adopted IPM strategies was to decrease chemical use (thereby saving money and reducing chemical resistance) and to meet the quality standards set out by the buyers of lettuce. Other growers adopted IPM for sustainability and better pest management for western flower thrips (*Frankliniella occidentalis*) (WFT) and heliothis (*Heliocoverpa armigera*). Increasing beneficial insect numbers was also an important factor in adopting IPM strategies. Finally health reasons were high on the list for some growers. Paul Horne (IPM Technologies) was a major reason why many Victorian growers adopted IPM strategies due to his knowledge and encouragement.

The majority of growers (55%) who did not use an IPM strategy indicated that they used newer generation insecticides such as Success®, Avatar® and Bts in their

production of lettuce (Figure 2). Weekly sprays (39%), the use of a conventional boom spray (32%) and applying traditional insecticides (23%) were also popular amongst non IPM growers. Other techniques employed by non IPM growers included crop monitoring, the use of yellow sticky traps, chemical rotations to avoid resistance, ploughing in old crop residues, only spraying when necessary, taking advice from an agronomist and using Confidor® treated seedlings.

Figure 2. Techniques that non IPM growers use to manage insect pests in lettuce production.



The non IPM growers were asked "What would it take for you to adopt an IPM strategy?" to which they responded:

- A guarantee that IPM will work 100% of the time. Growers can't afford to loose crops as they may forfeit their contracts/markets
- A market demand for IPM produced lettuce and compensation for the extra cost of implementing IPM (eg crop monitoring and expensive insecticides)
- Greater financial return for IPM produced lettuce
- An acceptance by retailer's and consumers of IPM lettuce, otherwise product will be routinely rejected based on low levels of insect contamination (including beneficial insects)
- More information and consultation is needed from the experts so IPM can be confidently adopted, although it appears that some growers are adopting IPM strategies in most regions
- IPM is time consuming, more time is needed to implement and maintain the strategy
- IPM strategies need to control currant lettuce aphid (*Nasonovia ribisnigri* (Mosley)) (CLA), therefore decreasing the use of Confidor®
- Beneficial insects that control Rutherglen bug (*Nysius vinitor* (Bergroth)) would be valuable
- Commercially available beneficial insects that are reasonably priced

- If IPM is required by Quality Assurance legislation
- As part of the contract with buyers (eg Woollies and Coles)

Crop monitoring was a large part of the growers crop management, with 62 (91%) of the growers surveyed indicating they monitored their lettuce crops (Figure 3). Crop monitoring involved 47 of the 48 IPM growers and 25 of the 31 non IPM growers, respectively. The consultant was included in the survey, however crop monitoring was non applicable due to the consultant only giving advice.

It was obvious from the survey that the majority (74%) of the growers monitored their lettuce crops themselves (Figure 4). Crop consultants (28%) and chemical resellers (6%) were also employed to monitor lettuce crops. Growers used other sources to help with crop monitoring, including farm mangers, staff, family members, IPM technicians and trainees and Department of Primary Industries (DPI) staff.

Figure 3. The number of lettuce growers that use crop monitoring as part of their crop management.

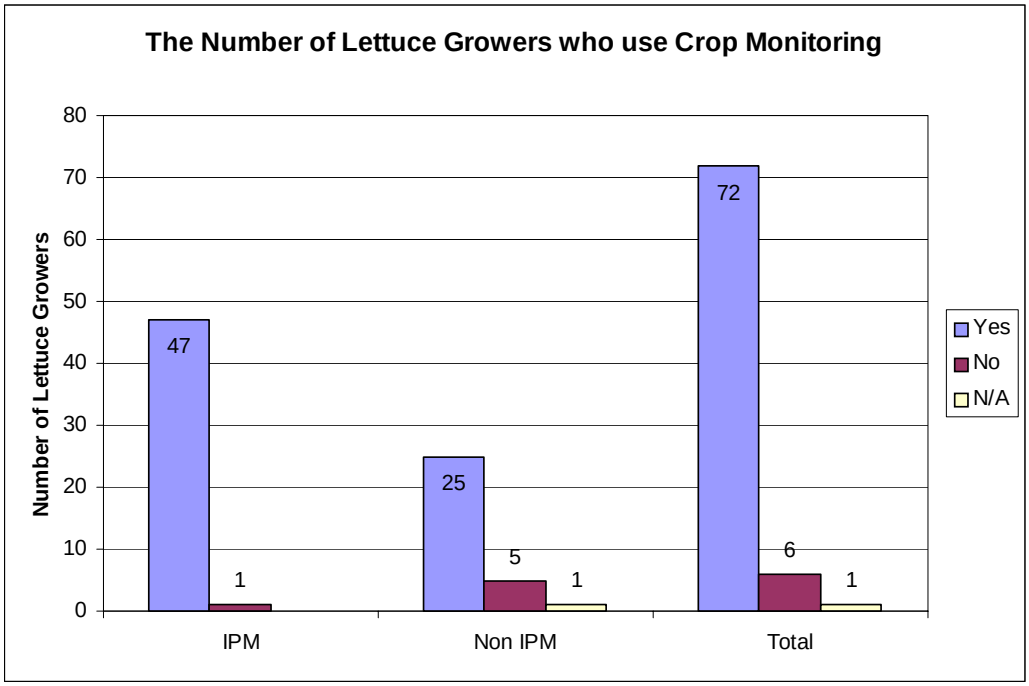
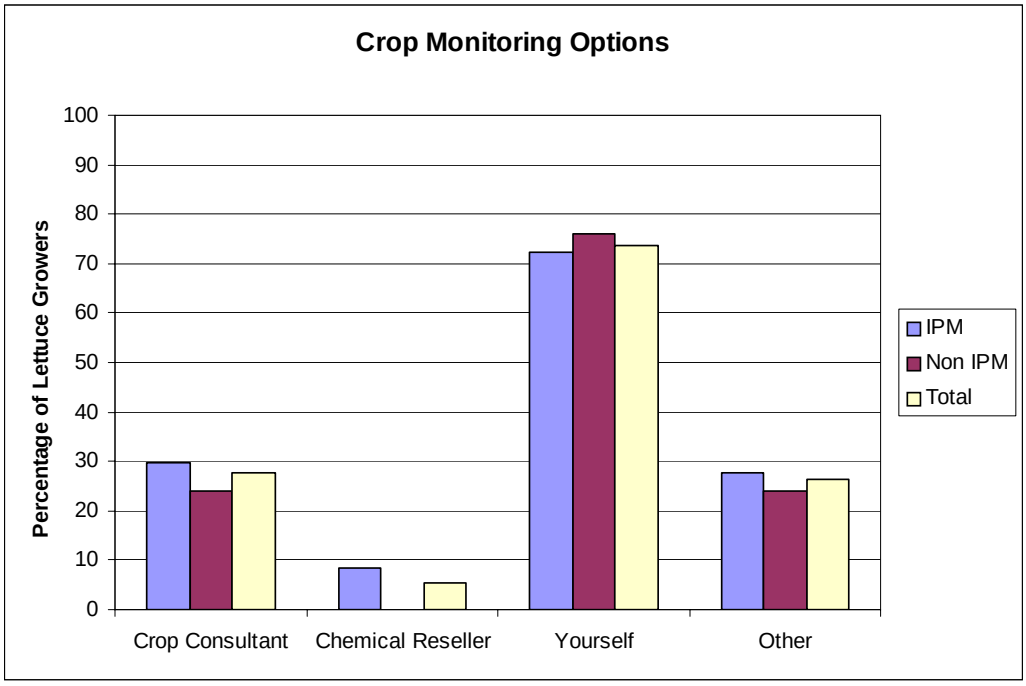


Figure 4. The individuals who crop monitor lettuce growers' fields.



Generally most lettuce crops were monitored weekly by the growers themselves or another individual. Some crops were monitored twice weekly depending on pest pressure and season. Hydroponic growers monitored daily while harvesting took place. Other monitoring regimes included 3 or 4 times a week, every 4 to 5 days, fortnightly and as often as possible.

The monitoring protocols varied greatly between lettuce growers and whether or not they were IPM or non IPM growers. Most non IPM growers checked 20 to 100 lettuce plants every time they monitored their crop. The range for IPM growers was large and depended on what type of lettuce grower they were. Field growers tended to check less than organic and hydroponic growers. This was mainly due to the fact that most hydroponic and organic growers monitored their crops daily. Field growers generally checked between 10 and 200 lettuce plants or observed the pest pressure. Most hydroponic and organic growers checked their lettuce crops daily and monitored between 1000 to 5000 plants. The hydroponic and organic growers also indicated that yellow sticky traps were very useful tools for crop monitoring.

The growers that did not use crop monitoring decided on spray programs by using their experience and knowing what times of the year pest pressures were highest. Observing moth activity at night and seasonally adjusting spray programs to suit this activity also proved useful. One grower checked his lettuce crop whilst doing other crop management activities such as fertilising, irrigating and weeding.

Only 81% of growers that used crop monitoring as part of their lettuce crop management felt that it was cost effective in reducing the number of insecticides applied. Some IPM growers thought that the costs increased due to employing crop consultants to do the crop monitoring. It was also felt by some growers that during times of high pest pressure, monitoring was ineffective, since you had to spray anyway.

Chemical Use and the Management of Chemicals used by Lettuce Growers

Of the growers surveyed, 63 of the 79 used newer generation insecticides. Success® proved to be the most popular newer generation insecticide with 56 of the growers using this product (Table 1). The popularity of Success® is due to the efficacy it displays against the two major insect pests heliothis and WFT. Avatar® (32 growers), Bts and Proclaim® (31 growers each) were also popular choices amongst growers for insect pest management. Other insecticides were sprayed, however did not prove to be as popular as the newer generation insecticides.

Table 1. Newer generation insecticides that lettuce growers have been spraying.

Insecticide	Active Ingredient	IPM Growers	Non IPM Growers	Total Growers
Success®	Spinosad	35	21	56
Avatar®	Indoxacarb	21	11	32
Bts	*Bacillus thuringiensis*	25	6	31
Proclaim®	Emamectin	22	9	31
NPV®/Gemstar®	Helicoverpa NPV	13	3	16
Other*		17	11	28

***Other** includes newer generation chemistry such as Pirimor® and Chess®, as well as older chemistry such as Lannate®, Fastac® and Dimethoate®.

Older insecticide chemistry such as Lannate®, Fastac® and Dimethoate® were still popular choices amongst growers, even though they were also using the newer generation insecticides. At times some growers felt that the conditions did not suit the biological insecticides (Bts) or the Nuclear Polyhedrosis Virus (NPV) and resorted to the older insecticides that work.

Only 16 of the 79 growers surveyed did not use the newer generation insecticides. Interestingly one IPM grower does not use newer generation insecticides due to the poor efficacy of biological insecticides. Other reasons for not using newer generation insecticides were some growers are organic growers and don't use chemicals, some do not spray again once lettuce has been planted, some only use Confidor® and a lack of product knowledge.

The most common fungicides used were Ridomil®, Rovral®, Filan® and Dithane® (Table 2). Ridomil®, Rovral®, Filan® and Dithane® were used by 38%, 35%, 30% and 22% of growers, respectively. These fungicides primarily control sclerotinia and downy mildew, which are two of the major diseases that affect lettuce. Several other fungicides were used less frequently depending on the conditions present and the disease situation. Some hydroponic growers did not use fungicides because in their situation there were less disease problems.

Sclerotinia control in lettuce crops is important, otherwise substantial crop losses will occur. Four fungicides are currently available to control sclerotinia in lettuce crops and they are Rovral®, Filan®, Amistar® and Folicur®. Of these, Rovral® and Filan® are the most popular fungicides amongst the growers who were surveyed (Table 3). The number of applications of each fungicide depended on the presence and severity of disease. Most growers applied the fungicides between 1 and 3 times per crop, with Rovral® being applied at least 4 times in some situations. Some

growers did not control sclerotinia because they considered it to be of minor importance. A few growers were disappointed that the new fungicides available did not seem to work as well as the older fungicide Sumisclex®.

Table 2. The most common fungicides used by lettuce growers.

Fungicide	Active Ingredient	IPM Growers	Non IPM Growers	Total Growers
Ridomil®	Mancozeb/Metalaxl-M	16	14	30
Rovral®	Iprodione	19	9	28
Filan®	Boscalid	17	7	24
Dithane®	Mancozeb	8	10	18
Polyram®	Metiram	9	8	17
Copper®	Copper Hydroxide	12	4	16
Acrobat®	Dimethomorph	6	6	12
Other*		43	22	65
N/A**		8	7	15

***Other** includes fungicides that are sprayed less frequently.
****N/A** those growers who do not use fungicides for various reasons.

Table 3. Fungicides that are used for the control of sclerotinia and the number of applications of each fungicide per crop.

Fungicide	Active Ingredient	IPM Growers	Applications per Crop	Non IPM Growers	Applications per Crop	Total Growers
Rovral®	Iprodione	19	1 to 3	9	1 to 4	28
Filan®	Boscalid	17	1 to 3	9	1 to 3	26
Amistar®	Azoxystrobin	4	1 to 2	3	1	7
Folicur®	Tebuconazole	3	1 to 2	2	1 to 2	5
N/A*		18		16		34

***N/A** those growers who have no need to control sclerotinia for various reasons.

Most growers used herbicides to control a wide range of weed species (both grasses and broadleaf weeds). Kerb® was by far the most popular herbicide with just over half of the growers choosing to use it for their weed management programs (Table 4). Most likely Kerb® is the preferred option because it provides growers with the flexibility of either applying it as a pre – emergent herbicide on direct seeded lettuce crops or straight after lettuce has been transplanted. Kerb® also has the added advantage of offering broad spectrum weed control of grass and broadleaf weeds. Stomp® and RoundUp® (Glyphosate) were other popular herbicides that gave broad spectrum weed control.

Over half of the growers (49) used a conventional boom sprayer to apply their insecticides and fungicides (Table 5). Air assist sprayers were the second most popular method of applying insecticides and fungicides. Three IPM growers have modified their conventional boom sprayer and added short droppers to improve spray coverage. Water application spray rates varied considerably depending on the type of lettuce grower (field or hydroponic), the area of lettuce grown, the growth stage of the lettuce crop and the application method used. The water rates varied from 30L/ha up to 1000L/ha. The most commonly used rates were 400L/ha and 600L/ha.

Table 4. The most common herbicides used by lettuce growers.

Herbicide	Active Ingredient	IPM Growers	Non IPM Growers	Total Growers
Kerb®	Propyzamide	25	18	43
Stomp®	Pendimethalin	8	4	12
RoundUp®	Glyphosate	5	6	11
Other*		13	13	26
N/A**		13	7	20

***Other** herbicides that are used les frequently.
****N/A** either organic or hydroponic growers who do not use herbicides.

Almost the same number (31) of growers tank mixed their older generation insecticides and fungicides as didn't (21) tank mix them. There was a different trend for newer generation insecticides and fungicides with more growers (48) opting to tank mix, than not (20).

Table 5. The method lettuce growers used to apply insecticides and fungicides.

Application Method	IPM Growers	Non IPM Growers	Total Growers
Conventional boom sprayer	28	21	49
Air assist sprayer	10	5	15
CDA sprayer*	0	1	1
Boom sprayer with short droppers	3	0	3
Other**	7	4	11

***CDA sprayer** is a controlled droplet application sprayer.
****Other** is different application methods such as a knapsack sprayer and a hydrostatic sprayer.

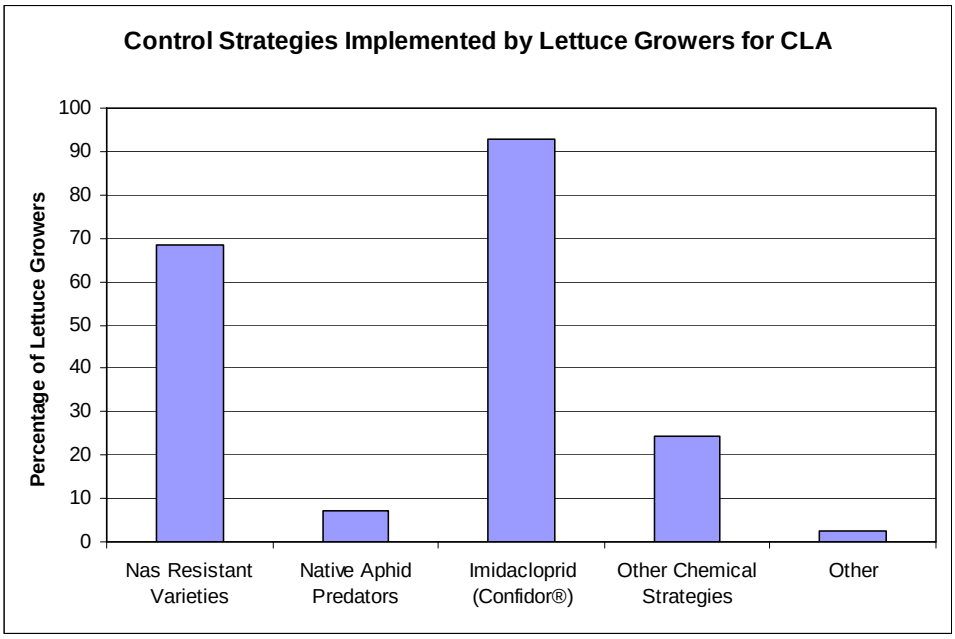
Currant-lettuce Aphid (*Nasonovia ribisnigri* (Mosley))

Currant-lettuce aphid (CLA) is becoming established in lettuce growing areas throughout Australia and is a concern for all growers even where it has not been detected. Of the 79 growers surveyed 41 believed that CLA was established in their growing region, whilst 38 said that CLA was not present. From the survey CLA is present in all of the growing regions in Tasmania, the Sydney basin in NSW and the Werribee and Cranbourne (metropolitan) areas in Victoria. Growers indicated that CLA was not present in the Hay, Bathurst and Northern regions of NSW, country Victoria, Qld, SA and WA. Just recently however, CLA was confirmed in the Bathurst region of NSW and the Northern Adelaide Plains and Adelaide Hills regions of SA. In the areas where CLA was not present most growers believed it was only a matter of time before it arrived.

Where CLA is established as a pest several control strategies have been implemented. Imidacloprid (Confidor®) as either a soil drench or seedling spray is the most popular control method, with 93% of growers opting for it (Figure 5). *Nasonovia* (Nas) resistant lettuce varieties is also a strategy that has proven to be popular with well over half (68%) of the growers utilising this strategy. Native aphid predators and other chemical strategies (Pirimor®, Chess®, Pyrethrum® and Natra Soap®) have

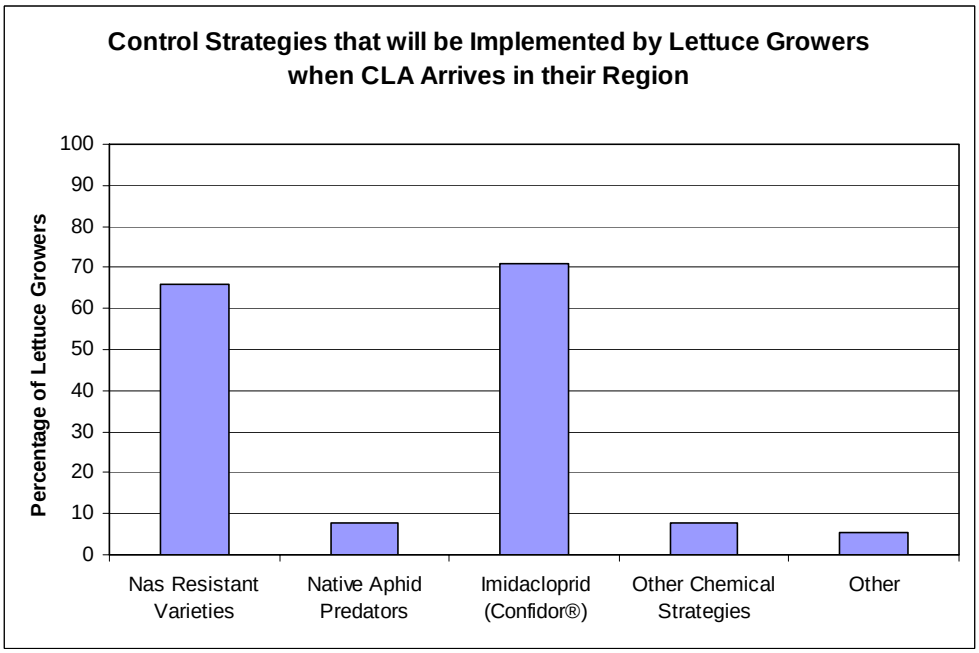
also been tried by some growers. One organic grower believed that CLA was not a problem for him, so chose not to control it.

Figure 5. Control methods implemented by lettuce growers where CLA exists.



In the regions where CLA is not present most growers would either use Imidacloprid (seedling spray or soil drench) or Nas resistant varieties when it did arrive (Figure 6). These trends are similar to the regions where CLA is present, although Imidacloprid is clearly the method of choice by growers in these regions. One grower even thought that he would resort to an older chemistry being Lannate® to control CLA.

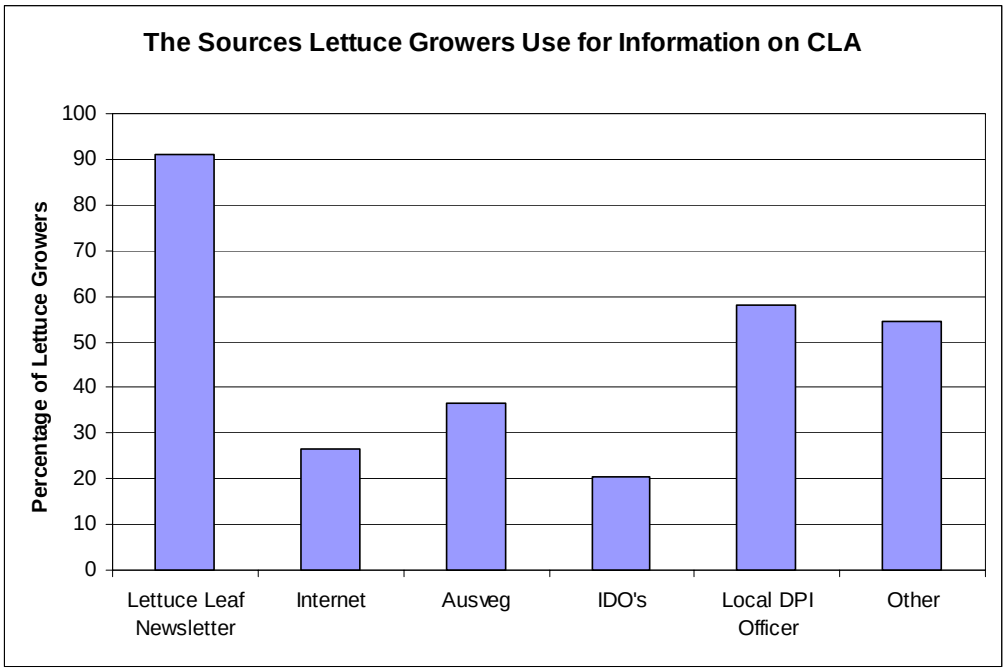
Figure 6. Control methods lettuce growers would implement when CLA is detected in their region.



The information available on CLA was rated very highly as 96% of the growers were happy with it. Growers commented that the information was generally excellent and they were well informed, particularly after the discovery of CLA in Tasmania. However, most growers thought the spread of CLA was inevitable and very hard to stop. Of the three growers that thought the information was lacking, one thought the problem was bigger in Victoria then had been documented, another thought the information could be better and the other wasn't sure why information was lacking.

Several sources were accessed for information on CLA and included the Lettuce Leaf Newsletter, Internet, Ausveg, Industry Development Officers (IDO's), and local DPI officers (Figure 7). The Lettuce Leaf Newsletter was used by 91% of the growers for their information on CLA. Local DPI officers were also popular sources of information with 58% of the growers choosing to use them. Other areas where growers sourced information were from seedling representatives, workshops and meetings on CLA, local agribusiness and chemical resellers, newsletters other than Lettuce Leaf, chemical companies, researchers, local vegetable markets and general discussions with growers and industry representatives.

Figure 7. The sources lettuce growers use to obtain information on CLA.



The Advantages and Disadvantages of IPM Strategies

The growers who adopted IPM as part of their insect pest management strategy experienced many benefits and usually indicated a number of benefits rather than one single benefit (Table 6). The main benefits were related to insecticides and their reduction in both use and costs. Growers also indicated that they had better pest control, a greater understanding of insect pests and had the ability to recognise beneficial insects more easily. Other benefits that growers mentioned included healthier beneficials and increased beneficial number, improved health and environment, cleaner and more acceptable product and timing of sprays to match heliothis egg hatch. Two non IPM growers who had in the past practised IPM also

confirmed that the benefits for them were similar to the main benefits already mentioned.

Table 6. The benefits that growers have found by adopting an integrated approach to insect pest management.

Benefit	IPM Growers	Non IPM Growers*	Total Growers
Better pest control	25		25
Greater understanding of insect pests	22		22
Recognise beneficial insects	21	1	22
Reduced insecticide usage	29	1	30
Reduced costs of insecticides	25	1	26
Other**	20	1	21
N/A***		29	29

***Non IPM Growers** these were the benefits when growers used to practise IPM strategies
****Other** is the benefits to growers that were not listed
*****N/A** the non IPM growers

Growers were asked what they perceived to be the weaknesses of an IPM system to control insect pests of lettuce. They responded with the following:

- Consumer/retail acceptance of product, relating to “zero tolerance” of insect infestation including beneficials
- Cost
- A lack of confidence in IPM, especially when insect pest pressure is high. Growers are afraid that outbreaks may occur
- IPM appears not to work in arid environments (eg Bts break down easily and there is a lack of beneficial insects)
- Some growers are worried that the quality of the end product seems to be poorer
- Vigilance by whole farming area is required for IPM to work because if one grower does not practise IPM then the other growers will find it difficult to maintain IPM strategies
- CLA and Confidor® (more of a threat to IPM though)
- Rutherglen Bug is the hardest insect to manage using IPM, chemical strategies are still needed to control this pest
- At times information about the effects of chemicals on beneficial insects is lacking
- Sometimes you are limited to what control method is effective, especially if you are an organic grower
- Reliance on advise from crop consultants
- Isolation because the support and guidance is often not readily available
- Unforseen problems such as a new pest situation

The most common weakness or fear was the lack of confidence in IPM when the insect pest pressure is high. Growers can't afford insect outbreaks resulting in crop losses, as their established markets may be lost. Despite this, some growers thought there were no weaknesses with an IPM system and were pleased with the results.

Techniques and tools that lettuce growers would like to see developed to enhance a lettuce IPM strategy included:

- A fail proof IPM system so that growers have full confidence in it
- Educational workshops to train and inform growers of IPM strategies, techniques available to use, chemicals that are compatible to an IPM situation and pest and predator identification tools
- Control options and research on CLA
- More work on the quality of Nas resistant lettuce varieties
- Strategies for effective Rutherglen bug and thrips management
- Development of nurseries and research into crop rotations/alternate hosts to build up the beneficial insect population
- Biological insecticides that are effective in high UV and temperature regimes
- The hydroponics growers want research into disease resistant varieties, root systems, better organic products and application of biological agents through irrigation water
- Smaller growers would like better netting options as an IPM tool
- An update every year on newer generation chemicals
- A "Preventative Prediction Tool" based on climatic and growing factors to predict pest build up and time to control them

Growers indicated several threats to the ongoing success of lettuce IPM. Their greatest concern was beneficial insect contamination of lettuce, since growers cannot afford to loose established markets. The growers believed that the retailers and consumers had a lack of awareness of IPM and therefore needed to be educated about IPM. Many retailers and consumers have a "zero tolerance" policy regarding insect contamination and must accept that lettuces grown with an IPM strategy may have some insects present.

CLA was also an important threat to lettuce IPM identified by growers. The use of Confidor® and the likelihood of resistance concerned the growers. Work on developing new Nas resistant lettuce varieties and other control strategies for CLA is important for the continuing success of lettuce IPM. Another concern was the state legislation concerning CLA, where for example in Victoria interstate trade restrictions prevent marketing of lettuce grown using IPM strategies in some states.

Other factors that growers recognised as threats to the ongoing success of lettuce IPM were:

- The cost effectiveness of lettuce IPM and the fact that no premiums are paid for the extra effort of using IPM strategies
- Low beneficial insect populations and their survival
- Resistance to newer and older generation chemistries
- Use of older chemistries by neighbours
- Rutherglen bug and thrips management

- Compatibility of chemicals in an IPM situation
- New pest occurrences and how to control them
- Ignorance of IPM by the general public

Several local barriers identified by growers affecting the adoption of lettuce IPM were similar to the threats that were mentioned above. These included CLA and spraying Confidor®, the use of older chemistries by neighbours, beneficial insect contamination, cost effectiveness and price premiums and low beneficial insect populations. Growers also identified host weeds and other host crops of pests and their control options, local council legislation, cultural problems, high insect pest pressure due to neighbouring crops such as corn, the delay in death of insects when using newer chemistries and large scale (regionally based) implementation of IPM as local barriers affecting the adoption of IPM. Growers from the Hay region in NSW were concerned about biological insecticides not having the same efficacy as in other regions due to the hot and dry conditions. Some of these insecticides require humidity to work which is not a feature in Hay. Around the Gatton region in Qld, processors are not accepting IPM grown lettuce due to insect contamination and have banned the use of the biological insecticide Bt, because of a perceived health risk.

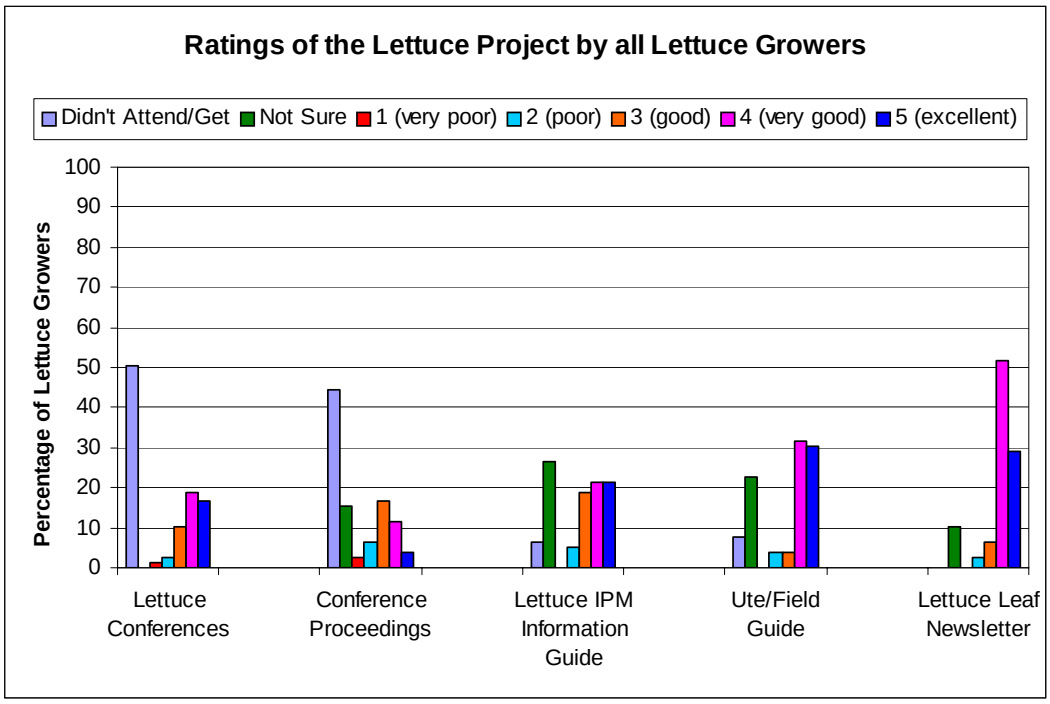
Usefulness of the Lettuce Project

Growers were asked to rate specific publications and the lettuce conferences to ascertain the usefulness of the lettuce project. The Lettuce Leaf Newsletter was rated very good to excellent by 81% of the growers surveyed (Figure 8). A lot of the growers mentioned that the newsletter is very interesting and has up to date information which keeps them informed of important issues relating to lettuce. The majority of growers also thought that the Ute/Field Guide was a valuable publication with 62% of the growers rating it as very good to excellent. The Ute/Field Guide assisted the growers with quick identification of important pests, diseases, disorders and beneficials. The Lettuce IPM Information Guide was rated slightly less than the Lettuce Leaf Newsletter and Ute/Field Guide, however 63% of growers still rated it a good to excellent publication.

The Lettuce Conferences were only attended by 49% of the growers surveyed (Figure 8). Some growers didn't attend because of the distance they had to travel, whilst hydroponic growers thought the conferences were more related to field based lettuce growers. However, of the growers that did attend the conferences, 92% felt they were good to excellent and were well organised. Generally most growers considered the conferences to be an opportunity to network with fellow growers and industry representatives. The rotation of lettuce conferences around the lettuce growing regions was thought to be a good idea. This would allow growers to experience the different regions and growing conditions that lettuces are subjected to in Australia.

The Lettuce Conference Proceedings was the publication that wasn't rated highly with only 57% of the growers that received the proceedings believing it was good to excellent. Generally growers thought the conference proceedings were too technical and they did not have the time to read them thoroughly. Being brief and less technical publications this may be the reason why the Lettuce Leaf Newsletter and Ute/Field Guide were rated so highly by growers.

Figure 8. Ratings of Specific Publications and the Lettuce Conferences by all Growers.



Growers were finally asked to make some general comments on the lettuce industry as a whole. The responses can be categorised by the following:

- Prices for lettuces fluctuate to much
- The quality of a lettuce will always rule supreme over the quantity
- IPM is very useful, but more factual information needs to be forwarded to the growers through educational workshops/training days/seminars
- Initially it is difficult to convert to IPM however with the right guidance anything can be achieved
- Consumer and retailer awareness of IPM products is important
- Chemical misuse is still a problem within lettuce production
- Some growers are interested in organic programs
- There is a thought that too many little growers are in the lettuce industry making it difficult for the bigger growers
- Value added lettuce products will be important in the future
- Salad fresh lettuce sales for restaurants have increased at the expense of iceberg lettuce
- The information on variety choices and most aspects of lettuce production is good

Generally most growers were of the opinion that the lettuce industry is heading in the right direction. Growers and nurseries appear to be working together for a better future and the contact between industry and researchers is improving.

Conclusion

This survey of Australian lettuce growers (predominately NSW and Victorian) has demonstrated that the growers are genuinely interested in alternative pest management strategies. More than 60% of growers considered themselves to be IPM growers and used a range of techniques as part of their pest management strategies for lettuce. Crop monitoring was the most popular technique followed by monitoring beneficial numbers and the use of biological insecticides. The non IPM growers (39%) believed they were managing their pest situations traditionally by spraying weekly with older and newer generation chemistries. Despite this, most non IPM growers are using some techniques that are considered to be IPM strategies such as crop monitoring, the use of yellow sticky traps, only spraying when necessary, chemical rotations and ploughing in crop residues.

Regular crop monitoring was a pest management strategy used by 91% of all growers surveyed. In total 74% of the growers monitored their own lettuce crops, whilst consultants and chemical resellers did 34% of the monitoring. Monitoring protocols and frequency varied greatly amongst the growers. This depended on whether they were IPM or non IPM growers and if the lettuces were grown in the field, hydroponically or organically. Those growers that did not monitor their crops relied on their experience, pest pressure at the time and moth activity at night to make their spray decisions. Most growers thought that crop monitoring was cost effective in reducing the number of chemicals sprayed.

The majority of growers have used newer generation insecticides, with Success® the most popular. However, older chemistries such as Lannate®, Fastac® and Dimethoate® were still sprayed because at times growers felt that the conditions suited them better. Dithane®, Filan®, Ridomil® and Rovral® were the fungicides of choice for growers to control downy mildew and sclerotinia. Kerb® was by far the most popular herbicide chosen by growers to manage both grass and broadleaf weeds. Growers' tank mixed both newer and older generation chemicals according to their compatibilities, which decreased costs somewhat.

Conventional boom sprays were used by 49 of the 79 growers surveyed to apply chemicals to their lettuce crops. Three IPM growers modified their conventional boom spray and added short droppers to improve spray coverage. Air assist sprayers were the second most popular method of applying chemicals. Water application rates ranged from 30L/Ha up to 1000L/Ha, depending on the lettuce growers' situation. However, the most commonly used rates were 400L/Ha and 600L/ha.

CLA was the major insect pest concern to come out of the surveys. Most growers believed that CLA was the biggest pest threat to the ongoing success of lettuce IPM and were very happy with the available information on this pest. CLA has been found in Tasmania, the Sydney basin in NSW and the Werribee and Cranbourne (metropolitan) areas in Victoria. Just recently CLA was found in the Bathurst region of NSW and the Northern Adelaide Plains and Adelaide Hills regions of SA. Nearly all of the growers thought that it was only a matter of time before CLA spread to most lettuce growing areas in Australia. Confidor® and Nas resistant lettuce varieties are the growers' choice for controlling CLA.

Several benefits of adopting IPM were identified by growers. The main benefit was related to insecticides and the reduction in use and cost. Better pest control, a greater understanding of insect pests and the ability to recognise beneficials were other important benefits. Along with the benefits, weaknesses were also identified with the most common being a lack of confidence in IPM when the pest pressure is high. Growers indicated that with educational workshops the fear of failure may not be as great.

Coupled with CLA being a threat to lettuce IPM is the use of Confidor® to control the aphids. Growers are worried about the implications of spraying Confidor® and resistance problems. As well as CLA being an ongoing threat to the success of lettuce IPM, Rutherglen bug and thrips were other major pest concerns. To enhance lettuce IPM the management of Rutherglen bug and thrips is considered to be important by the growers. This is especially the case when consumers and retailers have a "zero tolerance" for any sort of insect contamination (including beneficials) on product. Many growers cannot afford to loose markets through contamination and are therefore worried about the lack of awareness of retailers and consumers.

Local barriers limiting the adoption of IPM were very similar to the threats. More specifically, Hay lettuce growers were worried that the biological insecticides lacked efficacy in their region due to hot and dry conditions. These insecticides need humidity to work successfully which is not a feature in the Hay region. Around the Gatton region in Qld processors are not accepting IPM lettuces due to insect contamination and have banned the use of the insecticide Bt because of perceived health risks. Other regionally based barriers included high insect pressures from neighbouring crops through to local council legislation.

The growers who were surveyed had a very high opinion of the publications that have been a part of the lettuce project. The Lettuce Leaf Newsletter, Ute/Field Guide and Lettuce IPM Information Guide were all rated good to excellent publications. The bimonthly Lettuce Leaf Newsletter was very popular because it was brief and supplied relevant and interesting information. The Lettuce Conferences were also rated highly by those who attended. The conference proceedings were rated lower than other publications because the growers deemed them to be too technical. Overall it would appear that the lettuce project has proven to be very useful for the growers. Most think that the lettuce industry is heading in the right direction and continued contact between growers, researchers and industry representatives is essential for a sustainable future.

Acknowledgements

The author would like to thank the growers who willingly participated in this survey, without their support it would have been difficult to complete. This project was funded by NSW DPI, the AUSVEG levy, Horticulture Australia Limited and a voluntary contribution from South Pacific Seeds and Convenience Foods.