

A SURVEY OF PESTS AND PESTICIDE USE IN  
CANTERBURY AND SOUTHLAND

by

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## CONTENTS

	Page
LIST OF TABLES	ii
ACKNOWLEDGEMENTS	iii
CHAPTER 1 INTRODUCTION	1
1.1 Background	1
1.2 Purpose	2
1.3 Survey Description	3
1.4 General Farm and Respondent Information	5
CHAPTER 2 SURVEY RESULTS	8
2.1 Pests	8
2.2 Pesticides	17
2.3 Attitudes to Pests and Pesticides	27
CHAPTER 3 DISCUSSION	31
3.1 Farmers	31
3.2 Chemical Suppliers	32
3.3 Information Suppliers	33
3.4 Policy Makers	34
APPENDIX 1 The Questionnaire	35

## LIST OF TABLES

Table No.		page
1.	Numbers in the Sample, and Valid Responses	4
2.	Farm Size	7
3.	Property Type	7
4.	Weeds Treated	9
5.	Insects Treated	12
6.	Plant Diseases Treated	13
7.	Types of Pests Treated by Crop	14
8.	Estimates of % Losses from Pests	16
9.	Pesticide Use by Farm Type	18
10.	Spray Equipment Owned and Contract Application	19
11.	Expenditure on Pesticides	21
12.	Estimated Pesticide Returns for Users	22
13.	Estimated Benefit/Cost Ratios for Pesticide Users	23
14.	Satisfaction with Pesticides	24
15.	Relative Importance of Advice Sources	25
16.	Attitudes to Economics of Pesticides	27
17.	Attitudes to Ecological Aspects of Pesticides	27
18.	Attitudes to Social Aspects of Pesticides	28
19.	Objectives Related to Pesticides	28
20.	Significance of Pest Control	29



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## PREFACE

Agricultural chemicals have become increasingly important in New Zealand farming systems over the past two decades. This is evidenced by the increasing physical inputs of agricultural chemicals to farms over this period.

This report presents results of a mail survey of Canterbury and Southland farmers regarding pests and pest control. The study was carried out and the report written by John Mumford, post doctoral fellow in the Department of Entomology at Lincoln College.

Detailed information on pesticide use as contained in this report is not readily available elsewhere. Hence, this report has been published by the AERU in an endeavour to disseminate more widely the information contained within.

J.B. Dent  
DIRECTOR



## CHAPTER 1

## INTRODUCTION

This is a report on a survey of agricultural pests and pesticide use conducted in Canterbury and Southland in mid-1979. A broad definition of pests is used, so that weeds, insects, and plant diseases are all included. Similarly, pesticides are considered to include herbicides, insecticides, and fungicides. Veterinary problems and animal health products were not included in the study.

1.1 Background

Pests and pesticide use are the objects of increasing interest and concern at present, for both ecological and economic reasons. The environmental effects of DDT and other chlorinated hydrocarbon insecticides were much publicised in the 1960's. Currently, use of the herbicide 2,4,5-T is under review due to alleged harmful side-effects to man and stock. Furthermore, in addition to possible harmful effects on non-target organisms, many pests are becoming resistant to the chemicals intended to kill them. These problems have arisen in many cases due to the widespread and indiscriminant use of pesticides, and much research in crop protection is now directed at methods to apply safer chemicals in more precise doses and only when actually needed.

Agricultural pests can dramatically reduce revenue and production. With the increasing cost of inputs in farming there may be growing pressure to protect investments in crops and pastures from varying losses due to pests. Both losses and costs vary considerably, and while average expenditures on pesticides may be relatively low compared to many other inputs, in individual cases crop protection costs can be very high. On the other hand, if pesticides are needlessly or incorrectly applied, resources are wasted and longer term problems may arise.

In the past, little, if any, information has been generally available on New Zealand farmers' subjective concern about pests, or on their use of pesticides. This survey was undertaken to gather such information and to make it publicly available. Such knowledge should be useful in planning research, advisory, and commercial programmes to more appropriately meet the needs of New Zealand farmers.

## 1.2 Objectives

The survey attempted to answer the following questions:

1. What pests are of concern to South Island farmers?
2. How serious do farmers consider the pests?
3. What chemicals are used to control the pests?
4. How much is spent on these pesticides?
5. How effective do farmers consider their pesticides?

6. Who advises farmers on the use of pesticides?
7. What are farmers' attitudes to pests and pesticides?

### 1.3 Survey Description

A postal survey of farmers in the southern half of Canterbury and in Southland was conducted during June and July of 1979. The postal survey technique was used so that information could be obtained economically from a large number of farmers, although limitations were recognised in the depth of information obtainable by this method. Because of the diverse climate and agricultural pattern in New Zealand as a whole, there are quite wide variations in pest problems from region to region. The survey was therefore limited to the Canterbury Plain and Southland. These two areas were chosen because they are principal agricultural regions where pesticides are commonly used. In addition, they allow a limited but practical comparison of two regions in which pests could be expected to differ in intensity due to distinctly different climatic conditions.

The sample was chosen from the valuation rolls of Ashburton, Ellesmere, and Strathallan Counties (Canterbury), and Southland County (Southland). A sample of approximately 7 percent of the agricultural holdings in each area (based on numbers from the Department of Statistics' Agricultural Statistics Report) was selected. Selection was random, with the following qualifications: holdings of less than 10 ha and more than 2500 ha were excluded (to eliminate small holdings, residential properties, and high country

runs, on which pest control is unlikely to be important); holdings owned by public authorities, charitable trusts, etc, were excluded; if a holding randomly selected was owned by a woman, adjacent holdings were examined, and where possible the husband's name was found and the questionnaire was addressed to him (while many farms are managed by husband and wife in partnership, it was felt that generally the husband would be responsible for pest control).

Table 1 shows the number of questionnaires involved in the survey. Each questionnaire was sent with a covering letter and stamped return-addressed envelope; a post card reminder was sent a week later. Disruptions to mail service during part of the period made time of return date uninformative.

TABLE 1

Numbers in the Sample, and Valid Responses

	Number sent	Valid replies	% response <sup>a</sup>
Canterbury			
Ashburton	106	54	55
Ellesmere	47	28	60
Strathallan	78	45	58
	—	—	—
	231	127	57
Southland			
Southland	250	131	54
	—	—	—
Total	481	258	55

<sup>a</sup> % response excludes 8 questionnaires returned by the Post Office in both Canterbury and Southland (occupiers had moved since publication of the valuation rolls).

A pilot survey comprising 50 questionnaires sent out in Ashburton County by an identical process was conducted in March, 1979. It also had a 55 percent response rate. Results from the pilot survey are not included in this report.

As with all postal surveys, bias in the response is a concern. In this case it was important not to have a bias towards or away from pesticide users. The covering letter sent with the questionnaire stressed the importance of return even if the farmer felt that pests were not a problem or no pesticides were used. Since the response rate was similar to that of other recent postal surveys, and was the same in both regions (where pests and pesticides use might be expected to differ), it is unlikely that any undue response bias has occurred. This is further discussed in the next section.

A copy of the questionnaire is reproduced as Appendix 1.

#### 1.4 General Farm and Respondent Information

Tables 2 and 3 present general information on respondent farm size and type. The median farm size was 162 ha, and the distribution was very similar in both regions. Four farms were smaller than the 10 ha limit used for selection from the valuation rolls, due to sale or rental of some of the land of the farmer listed on the rolls. Virtually all respondents were individual owner-operators or (usually family) partners. The median

range for age of respondents was 36-45 years, with the distribution again very similar in both regions.

Because the pattern of response in both areas was so nearly identical in ownership, age, and size structure, these factors can be dismissed when considering regional differences revealed in pest perceptions, pesticide use, etc.

The type of farms occupied by respondents in the two provinces did differ considerably, and in many cases responses are presented separately for farm types that could be expected to have different pest problems. Farms were classified according to three main types: cropping/mixed, including intensive cropping, and mixed cropping and stock farms on which cropping was a significant enterprise; stock, farms principally keeping sheep/beef; and dairy, either wholly or partly dairying, though with the possibility of limited cropping. The majority of respondents reported at least some crops on the farm.

TABLE 2  
Farm Size

Farm Size	Canterbury		Southland		Both	
	Number of Respondents	(%)	Number of Respondents	(%)	Number of Respondents	(%)
100 ha or less	41	(32)	43	(33)	84	(33)
101 - 200 ha	41	(32)	42	(32)	83	(32)
201 ha or more	45	(35)	46	(35)	91	(35)
Range (ha)	2 - 1055		2 - 1790		2 - 1790	
Median (ha)	164		162		162	

TABLE 3  
Property Type

Type of Farm	Canterbury		Southland		Both	
	Number of Respondents	(%)	Number of Respondents	(%)	Number of Respondents	(%)
Cropping/ Mixed	80	(63)	35	(27)	115	(45)
Stock	31	(25)	83	(63)	114	(44)
Dairy	13	(10)	11	(8)	24	(9)
Other	3	(2)	2	(2)	5	(2)
No. reporting at least some cropping	102	(80)	84	(64)	186	(74)

## CHAPTER 2

## SURVEY RESULTS

Results from the survey are reported in three subsections, dealing with pests, pesticides, and attitudes to pests and pesticides.

2.1 Pests

Respondents were asked to list the pesticides they used during the previous twelve months (the 1978-1979 growing season) and to state what pests these had been used against. Tables 4,5 and 6 list the pests named, with the number of farmers reporting them in each region. It should be noted that these are the pests which were not necessarily present, but which farmers applied pesticides to control. Consequently, they can be considered as principal pests in the farmers' view. The relative frequencies with which they are named give some indication of their importance, but a few points should be kept in mind when comparing them: the proportion of land in crops is much greater in Canterbury, which would make crop pest reports generally more frequent there, and the proportion of specific crops differs between the provinces as well, affecting the reporting of pests that are specific to certain crops only. Thistles are the most important group of weeds, and aphids the most important insect pests. Most of the unspecified aphids mentioned were associated with lucerne, and therefore were probably blue-green lucerne aphids.

TABLE 4  
Weeds Treated

Weed	Canterbury		Southland	
	Number of Farmers Reporting each Weed	(%)	Number of Farmers Reporting each Weed	(%)
fat hen	37	(29)	21	(16)
gorse	23	(18)	30	(23)
thistles (unspec.)	26	(20)	23	(18)
general weeds	31	(24)	9	( 7)
Californian thistle, Canadian thistle, kellies	18	(14)	23	(18)
nodding thistle	30	(24)	4	( 3)
barley grass	15	(12)	12	( 9)
grasses (unspec.)	15	(12)	1	( 1)
wild oats	16	(13)	-	-
cornbind	13	(10)	1	( 1)
cutty grass	-	-	13	(10)
broom	6	( 5)	6	( 5)
docks	9	( 7)	-	-
Scotch thistle	3	( 2)	7	( 5)
flat weeds, broadleaf weeds, dandelion	12	( 9)	3	( 2)
wireweed	10	( 8)	-	-
willow weed	8	( 6)	1	( 1)
twitch (couch <sup>a</sup> )	9	( 7)	-	-
blackberry	6	( 5)	2	( 2)
wild turnip	1	( 1)	5	( 4)
redshank (redroot)	-	-	6	( 5)
storks bill	6	( 5)	-	-

Table 4 continued

Weed	Canterbury		Southland	
	Number of Farmers Reporting each Weed	(%)	Number of Farmers Reporting each Weed	(%)
chickweed	-	-	4	( 3)
shepherds purse	2	( 2)	2	( 2)
ragwort, ragweed	-	-	4	( 3)
spurrey, yarr	2	( 2)	7	( 5)
sorrel	3	( 2)	-	-
previous crops	1	( 1)	1	( 1)
stinging nettle	1	( 1)	1	( 1)
poa annua	1	( 1)	1	( 1)
tares (vetch)	2	( 2)	-	-
clovers (unspec.)	2	( 2)	-	-
yarrow	2	( 2)	-	-
stinking mayweed	2	( 2)	-	-
trefoil	2	( 2)	-	-
fumitory	2	( 2)	-	-
cutleaf	2	( 2)	-	-
goose grass	+	-	1	( 1)
red clover	1	( 1)	-	-
hedge mustard	1	( 1)	-	-
cultivation prepara- tion <sup>b</sup>	1	( 1)	-	-
field pansy	1	( 1)	-	-
chamomile	1	( 1)	-	-
ribgrass, plantain	2	( 2)	-	-
onion twitch	1	( 1)	-	-
browntop	1	( 1)	-	-

Table 4 continued

Weed	Canterbury		Southland	
	Number of Farmers Reporting each Weed	(%)	Number of Farmers Reporting each Weed	(%)
hogweed (twin cress)	1	( 1)	-	-
buttercup	1	( 1)	-	-
hawthorn	1	( 1)	-	-
red dead nettle	1	( 1)	-	-
geranium	1	( 1)	-	-
wild onion	1	( 1)	-	-
suckling clover	1	( 1)	-	-
daisy	1	( 1)	-	-
mouse ear chickweed	1	( 1)	-	-
unknown/ unnamed weeds	10	( 8)	17	(13)
weeds not treated	15	(12)	32	(24)

<sup>a</sup> Names in brackets are the probable common name. Common names used generally agree with those listed in "Standard common names for weeds in New Zealand", 1969, N.Z. Weed and Pest Control Society.

<sup>b</sup> This response was the reason for treating weeds rather than the name of the weed .

TABLE 5  
Insects Treated

Insect	Canterbury		Southland	
	Numbers of Farmers Reporting each Insect	(%)	Numbers of Farmers Reporting each Insect	(%)
grass grub	25	(20)	8	( 6)
aphids (unspec.)	24	(19)	5	( 4)
springtails	21	(17)	4	( 3)
blue-green lucerne aphid	14	(11)	1	( 1)
porina	5	( 4)	3	( 2)
clover casebearer	8	( 6)	-	-
nysius	5	( 4)	-	-
Argentine stem weevil	4	( 3)	-	-
pea aphid	1	( 1)	-	-
grain weevil	1	( 1)	-	-
white butterfly	1	( 1)	-	-
turnip greenfly (aphids)	1	( 1)	-	-
other insects	4	( 3)	1	( 1)
insects not treated	64	(50)	114	(87)

TABLE 6  
Plant diseases treated

Disease	Canterbury		Southland	
	Number of Farmers Reporting each Disease	(%)	Number of Farmers Reporting each Disease	(%)
powdery mildew	4	( 3)	-	-
eyespot	-	-	2	( 2)
barley leaf rust	2	( 2)	-	-
potato late blight	2	( 2)	-	-
smut	-	-	1	( 1)
chocolate spot (bean)	1	( 1)	-	-
Other diseases	6	( 5)	3	( 2)
diseases not treated	116	(91)	125	(95)

Table 7 shows the types of pests treated on the principal crops grown in Canterbury and Southland. Weeds were treated in most of these crops, insects given less attention (with the exception of brassicae and lucerne), while fungal diseases were treated largely on cereals.

TABLE 7  
Types of Pests Treated by Crop

Crop	No. growing crop	Weeds		Insects		Diseases		Untreated	
		No.	(%)	No.	(%)	No.	(%)	No.	(%)
autumn wheat	45 C	15	(33)	4	(9)	3	(7)	28	(62)
spring wheat	25 C	9	(36)	1	(4)	-	-	16	(64)
	24 S	18	(67)	-	-	5	(21)	5	(21)
barley	71 C	47	(66)	1	(1)	1	(1)	23	(32)
	23 S	12	(52)	-	-	3	(13)	11	(48)
lucerne	48 C	20	(42)	23	(48)	-	-	13	(27)
	11 S	7	(64)	3	(27)	-	-	11	(48)
clover seed	39 C	26	(41)	13	(33)	-	-	19	(49)
ryegrass seed	32 C	8	(25)	3	(9)	-	-	24	(75)
brassicae	42 C	9	(21)	26	(62)	-	-	12	(29)
	59 S	23	(39)	6	(10)	-	-	33	(56)
peas	33 C	25	(76)	1	(3)	-	-	8	(24)
pasture	124 C	53	(43)	25	(20)	-	-	62	(50)
	126 S	46	(37)	10	(8)	-	-	75	(60)

Note: Responses for Canterbury (C) and Southland (S) are shown only for crops reported by 8 or more farms in each area.

Losses from pests can differ from crop to crop and place to place, and farmers in the survey were asked to estimate the losses on their own crops only. Two estimates were sought: average losses, and the worst possible loss they would expect from each class of pest. Average losses give an indication of the estimated long term drain on profitability due to pests, while the worst possible losses perceived by farmers may prompt consideration of insurance treatments. Since relatively little loss was expected by farmers from fungal diseases, these are not included in Table 8, which shows median estimates for losses due to weeds and insects on the major crops. These figures are farmers' estimates and expectations, not an objective appraisal of actual crop losses in the regions. They do, however, reflect farmers' concern for pests and such estimates are fundamental to the decision to use pesticides.

TABLE 8

Estimates of % Losses from Pests  
(median responses for average and worst possible losses)

Crop	No. of Farms growing crop	Weeds		Insects	
		Average Loss	Worst Possible Loss	Average Loss	Worst Possible Loss
		%	%	%	%
autumn wheat	45 C	1	5	0	2
spring wheat	25 C	4	19	0	1
	24 S	2	16	0	0
barley	71 C	2	11	0	1
	23 S	4	20	0	0
lucerne	48 C	4	10	8	40
	11 S	6	22	9	52
clover seed	39 C	1	4	2	18
ryegrass seed	32 C	0	1	0	1
brassicae	42 C	2	18	2	25
	59 S	5	21	0	0
peas	33 C	2	26	0	0
pasture	124 C	0	0	0	0
	126 S	0	0	0	0

Notes: medians are rounded to the nearest %; responses are only shown for crops reported grown on 8 or more farms in each area; in most cases the maximum estimate for average loss was 20-30%, and for worst losses, 80-100%; median loss estimates for disease were 0% for all crops (avg.) and 2% or less for all crops (worst).

## 2.2 Pesticides

The survey also investigated pesticide use in Canterbury and Southland. It is clear that pesticides, particularly herbicides, are widely used; 90 percent of the farmers responding from Canterbury and almost 80 percent from Southland used some pesticide in the 1978-1979 season (Table 9). With only individual exceptions, all respondents using insecticides or fungicides also used herbicides, but many others applied herbicides only. Other data available from the survey, but not reported here include details of the specific chemicals used and what they are used on and against.

Most of the respondents had a field scale chemical applicator, and almost all had at least a hand sprayer (Table 10). Possession of spray equipment did not differ significantly among farm types, or between the regions. Approximately half the respondents used a contractor to apply some pesticide, though in many cases they applied some chemicals themselves and some by contract.

TABLE 9  
Pesticide Use by Farm Type

% Respondents using:		Cropping/ Mixed	Stock	Dairy	All Farms
Herbicide	C	92	81	77	88
	S	86	74	73	77
Insecticide	C	59	29	39	49
	S	17	13	9	14
Fungicide	C	11	0	0	7
	S	14	1	0	5
Herbicide + insecticide	C	58	29	31	48
	S	17	11	9	12
Herbicide + Fungicide	C	11	0	0	2
	S	14	1	0	5
Insecticide + Fungicide	C	8	0	0	5
	S	3	1	0	2
Herbicide + Insecticide + Fungicide	C	8	0	0	5
	S	3	1	0	2
Pesticides not used	C	6	19	15	10
	S	14	24	27	22

TABLE 10

## Spray Equipment Owned and Contract Application

	Spray Equipment							
	None		Hand Sprayer Only		Field- scale Applicator		Contract Application	
	No.	(%)	No.	(%)	No.	(%)	No.	(%)
Canterbury								
Cropping/ mixed	7	(9)	10	(12)	63	(79)	48	(60)
Stock	4	(13)	6	(20)	20	(67)	14	(45)
Dairy	-	-	1	(8)	12	(92)	8	(62)
Southland								
Cropping/ mixed	5	(14)	3	(9)	27	(77)	20	(57)
Stock	9	(11)	16	(20)	57	(70)	34	(41)
Dairy	2	(18)	3	(27)	6	(55)	5	(46)

Note: number using contract application refers to use on at least one crop; other crops, or chemicals, may be self-treated or self-applied. There appeared to be no significant relationship between possession of spray equipment and use or non-use of contract applicators.

Pesticide expenditure for all three classes of chemical was greatest on cropping, and mixed cropping and stock farms, as might be expected. Table 11 reports median and maximum expenditures by chemical and farm type. In many cases the amounts spent are quite substantial, especially for such programmes as large scale gorse control.

Respondents estimated the returns they thought resulted from the use of pesticides on their farm (Table 12), and by combining their estimated returns and reported costs, an estimated benefit/cost ratio was calculated (Table 13).

Along with spending more on pesticides, cropping or mixed farmers expected more from them in return from reduced pest loss. Insecticides had a higher estimated benefit/cost ratio than herbicides, possibly reflecting the more discriminant use of insecticides on problems with relatively high perceived threat, compared to the more general use of herbicides, often against weeds under statutory control where little benefit was expected to arise.

Very few farmers considered their pesticides to be unsatisfactory, most replying that they always or usually work (Table 14).

Table 15 shows the relative importance of advice sources on pest control problems. The three most important sources are all part of the pesticide sales and application industry. By the nature of their business they are naturally most likely to be contacted about pest control problems, but conflict of interest is possible with these sources of advice.

TABLE 11

Expenditure on Pesticides: Median Annual Costs  
for users 1978/79 (\$) (maximum in parentheses)

Canterbury	Herbicide	Insecticide	Fungicide	Total
Cropping/mixed	1050 (12000)	300 (2000)	214 (2600)	1550 (12900)
No. respondents	69	44	8	67
Stock	505 (3000)	253 (2000)	-	554 (3150)
No. respondents	22	8		22
Dairy	300 (500)	90 (656)	-	182 (1156)
No. respondents	5	4		6
Southland				
Cropping/mixed	454 (1900)	200 (200)	286 (800)	488 (2500)
No. respondents	22	1	5	22
Stock	250 (3400)	120 (500)	116 (116)	260 (3400)
No. respondents	52	9	1	53
Dairy	250 (400)	33 (33)	-	250 (400)
No. respondents	5	1		5

TABLE 12

## Estimated Pesticide Returns for Users:

Median return estimates (\$)  
(range in parentheses)

	Herbicides	Insecticides	Fungicides
Canterbury			
Cropping/mixed	2013 (0-25000)	1988 (0-20000)	700 (0-10000)
No. respondents	43	29	6
Stock	98 (0-2500)	450 (0-3000)	-
No. respondents	11	6	
Dairy	1000	-	-
No. respondents	1		
Southland			
Cropping/mixed	611 (0-10000)	500 (500)	800 (200-2000)
No. respondents	12	1	3
Stock	210 (0-4000)	200 (0-1500)	-
No. respondents	26	4	
Dairy	1500 (56-2000)	400 (400)	-
No. respondents	3	1	

TABLE 13

Estimated Benefit/Cost Ratios for Pesticide Users:  
Median estimates (with range)

	Herbicides	Insecticides	Fungicides
Canterbury			
Cropping/mixed	1.9 (0-4.9)	3.3 (0-21.9)	4.2 (0-10.0)
No. respondents	43	29	6
Stock	0.3 (0-5.0)	1.2 (0.5-15.0)	-
No. respondents	11	6	
Dairy	3.3 (3.3)	-	-
No. respondents	1		
Southland			
Cropping/mixed	2.1 (0-6.2)	2.5 (2.5)	2.5 (2.2-2.7)
No. respondents	12	1	3
Stock	1.4 (0-6.0)	0.7 (0-6.0)	-
No. respondents	26	4	
Dairy	3.8 (0.2-8.0)	12.1 (12.1)	-
No. respondents	3	1	

Note: the estimated average benefit/cost ratio for insecticide is significantly greater ( $P < 0.01$ ) than that for herbicides (all cases combined).

TABLE 14

## Satisfaction with Pesticides: Numbers Responding

	Unsatis- factory	Sometimes work	Usually work	Always work
Herbicides (both regions)	5	37	124	34
Insecticides (both regions)	4	13	52	26
Fungicides (both regions)	-	6	13	4
Canterbury	-	5	9	-
Southland	-	1	4	4

Notes: satisfaction with herbicides and insecticides did not differ significantly between regions, but fungicide satisfaction was greater in Southland ( $P < 0.02$ ); within each region satisfaction with the three types of pesticide did not differ significantly, except that in Canterbury fungicides were viewed as less satisfactory than herbicides or insecticides ( $P < 0.05$ ).

TABLE 15  
Relative Importance of Advice Sources

Source	No. of times mentioned as most important	% frequency <sup>a</sup>
1. Local chemical stockist	68	(26)
2. Chemical application contractor	58	(22)
3. Chemical company sales or technical representative	55	(21)
4. MAF advisors	30	(12)
5. Neighbours	27	(10)
6. Farm press	20	(8)
7. Miscellaneous sources	17	(7)
8. Private farm advisors	10	(4)

<sup>a</sup> Percentages do not add to 100 as some respondents gave more than one source as most important.

### 2.3 Attitudes to Pests and Pesticides

Farmers were asked to state agreement, or disagreement, with a series of statements to indicate their attitudes to economic, ecological, and social aspects of pesticides, their objectives related to pest control, and their opinions regarding significance of pest control (Tables 16-20).

Within the five attitude areas, the strongest attitude revealed was the positive economic inclination to pesticide use, that is, a feeling that pesticides pay. The strongest responses to individual statements, in addition to those mentioned in Table 16, were the agreement to the need for pesticide regulation, the desire for a steady income (as opposed to high profits), and the need for more pest control information.

TABLE 16

	% Respondents		
	Agree	Neutral	Disagree
5. Pesticides are a profitable input	60	22	12
6. Pesticides are essential to remain competitive <sup>a</sup>	64 (72 C) (55 S)	19 (14 C) (24 S)	11 (8 C) (14 S)
15. Pests would cause serious financial setback if pesticides not used	62	18	14

<sup>a</sup> Responses to statement 6 differed significantly between the regions; more Canterbury farmers were in agreement with the statement ( $P < 0.02$ )

TABLE 17

	% Respondents		
	Agree	Neutral	Disagree
1. Pesticides upset the balance of nature ...	38	41	16
2. Present use of pesticide may cause man harm in the future	51	29	16
7. Good cultural practices can make pesticide use unnecessary	30	27	38

TABLE 18

	% Respondents		
	Agree	Neutral	Disagree
3. Farmers using pesticides should be held responsible for any consequent harm ...	19	22	54
4. Farmers benefit more than end users from pesticides	42	23	28
9. Pesticide use must be controlled by regulation for everyone's protection	80	10	5

TABLE 19

	% Respondents		
	Agree	Neutral	Disagree
8. Worst losses are more important than average losses in deciding to use pesticide	40	24	28
10. Steady income is more important than a high profit	68	12	14
12. If unsure a pest will be bad enough to cover the cost of a pesticide it is better to be safe and spray	26	21	47

TABLE 20  
Significance of Pest Control

	% Respondents		
	Agree	Neutral	Disagree
11. Pesticide decisions are easier than other farm management decisions	35	23	36
13. Farmers need more information to be completely happy with their pesticide decisions	64	19	10
14. Pesticide expenditure is a relatively insignificant part of farm expense <sup>a</sup>	40 (41 C) (38 S)	17 (11 C) (22 S)	36 (41 C) (32 S)

<sup>a</sup> response to statement 14 differed significantly between the regions; more Canterbury farmers disagreed with the statement ( $P < 0.05$ ).

## CHAPTER 3

## DISCUSSION

In Section 1.2 a number of questions about pests and pesticides use were posed which this study has, in part, attempted to answer. The importance of each question and the implications of the information here provided vary among the different groups interested in pests and pest control. The following discussion briefly outlines major considerations relevant to each of four groups: farmers, chemical suppliers, information suppliers, and policy makers.

3.1 Farmers

The principal value of this study to the individual farmer is in providing a norm with which to compare his own pest control activities, expectations of loss, etc. For instance, he can compare his expenditure on pesticides with those on similar farms, and bearing in mind the size of the operation, decide if he is in line with others. If not, he may be able to reappraise his current practices or perceptions.

For farmers as a group, the study confirms that pesticide use is a widespread activity, and that many specific pests are of general concern. Pest control costs, particularly for herbicides, to some individuals

are considerable. With increasing investment and any intensification of production there may be additional pressure to protect crops and pasture with chemicals at further expense. Pests and pest control are clearly important or potentially important to the farming community and both public and private support should be encouraged to help farmers deal with pests.

### 3.2 Chemical Suppliers

This study provides pesticide suppliers with information on current concerns and practices, which can be used both to identify market areas in which they can provide needed and profitable services, or other areas that could be expanded by appropriate sales pressure. The chemical industry is the major source of advice to farmers on pest control, and with sales potential being naturally related, there may be value in emphasising information services, as part of an overall commercial programme. This is particularly so in view of the strong desire on the part of respondents to have more information. However, such services should be seen to be highly responsible, due to potential concern about conflict of interest and the farmers' general agreement that pesticides should be regulated.

### 3.3 Information Suppliers

Advisors, researchers, educators and the press can also benefit from being aware of farmers' thoughts on pests and their pest control measures. The survey showed that farmers, in general, wanted more information to help improve their pest control decisions, and reveals which pests are causing problems according to farmers. This should help specialists to respond accordingly with further appropriate advice and research. In some cases the objective view of scientists and advisors may conflict with that of the farmers regarding pest threats. In these cases it may be useful to provide advice to counter particular notions on the threat or control of some pests. The overwhelming use of the industry sources for pest control information must be recognised by other independent advisors. Greater effort may be required to make independent advice available directly to farmers. On the other hand, researchers, and others could concentrate on supplying information indirectly, through industry advisors, to increase their effectiveness.

The wide use of pesticides also requires good educational coverage, as in press reports or agricultural demonstrations on pests and pesticides. Particularly important would be the assessment of need for chemical treatments of pesticides. Research should be directed with the farmers' objectives of economic gain and risk avoidance in mind. For example, potential strategies

(such as the substitution of monitoring information for preventative spraying where possible) that meet these objectives with reduced expense and pesticide hazard should be encouraged.

### 3.4 Policy Makers

Policy makers, largely governmental, must decide what products to make available by approval schemes and whether to encourage their use (as, for example, by subsidy). The list of chemicals used by farmers in this study reveals a large number of products, many of which serve identical needs. It may be wise to consider not only whether a product is safe and effective in granting it approval, but also whether it has a useful, unique function. The general agreement by farmers to the regulation of pesticides should provide support to the policy maker when he is considering firm and clear cases for regulation.

Weeds under statutory control provide examples of some of the highest pesticide expenditures and lowest estimates of benefit from control. The advantages of such statutory control may require more publicity, or reassessment, particularly considering that the controversial herbicide, 2,4,5-T, is the main chemical used.

Finally, policy makers are confronted with broader social issues than special interest groups, and the former may find it left to themselves to offset the imbalance between farmers' economic and ecological attitudes to pest control by chemicals.

## APPENDIX 1 : THE QUESTIONNAIRE

LINCOLN COLLEGE  
 ENTOMOLOGY DEPARTMENT  
 PEST AND PESTICIDE SURVEY  
 1979

PART A: GENERAL FARM INFORMATION

1. What is the total area you farm? \_\_\_\_\_ acres or  
 \_\_\_\_\_ hectares

2. How would you classify your position?

2.1 Owner operator

2.2 Lessee manager

2.3 Manager in consultation with owner

2.4 Share milker (\_\_\_%)

2.5 Other (please state) \_\_\_\_\_


3. How do you classify your property?

3.1 Mixed cropping and stock

3.2 Intensive fattening

3.3 Intensive cropping

3.4 Store lamb production

3.5 Dairying

3.6 Other (please state) \_\_\_\_\_


4. Do you have any crop spraying equipment on the farm?

Tractor,  
Truck etc  
sprayer

Pesticide  
granule  
applicator

Hand  
Sprayer

None



PART C: PESTICIDE USE

In this section please write the following:

- (a) the chemicals you used in the last season,
- (b) the area on which each was used,
- (c) the crops on which each was used,
- (d) the weeds, insects, or diseases they controlled,
- (e) and tick if a contractor applied the chemical.

1. Weedicides      Area      Crops      Target Pests      Tick if by  
                          Treated


2. Insecticides


3. Fungicides


1. How much did you spend on pesticides in the last 12 months and how much do you estimate they saved, on the farm as a whole?

1.1 Weedicides	Cost \$ _____	Estimated Saving \$ _____
1.2 Insecticides application)	_____	_____
1.3 Fungicides	_____	_____

2. How satisfactory do you find the pesticides you use?

	Weedicides	Insecticides	Fungicides
Unsatisfactory *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Sometimes work *	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Usually work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Always work	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

\* If unsatisfactory or only sometimes work can you say why?

3. Do you receive advice or information on weed and pest control from any of the following? (Number those used in order of importance)

3.1 M.A.F.	<input type="checkbox"/>	3.5 Spray contractor	<input type="checkbox"/>
3.2 Private farm advisor	<input type="checkbox"/>	3.6 Neighbours	<input type="checkbox"/>
3.3 Local chem. stockist	<input type="checkbox"/>	3.7 Farm press	<input type="checkbox"/>
3.4 Chemical co. rep.	<input type="checkbox"/>	3.8 Other	<input type="checkbox"/>

PART D: GENERAL PESTICIDE QUESTIONS

Please tick if you agree with, are neutral about, or disagree with the statements in the following section.

	Agree	Neutral	Disagree
1. The use of pesticides upsets the balance of nature between soil, plants, animals and man.			
2. The present use of pesticides may cause harm to man in the future.			
3. Farmers using pesticides should be held responsible for any consequent harmful effect to plant, animal, or human life			
4. The farmer benefits more than the end user from pesticide use.			
5. Pesticides are a profitable input in the farmer's operation.			
6. Pesticides are essential for the farmer who wants to remain competitive.			
7. Good cultural practices can make pesticide use unnecessary.			
8. It is more important to consider the worst possible loss than the average loss pests cause when deciding to use pesticides.			
9. Pesticide use must be controlled by regulations for everyone's protection.			
10. It is more important to provide a steady income from the farm than to go after a high profit.			
11. Decisions on when or whether to use pesticides are relatively easy compared to other farm management decisions.			
12. If you're not quite sure a pest problem will be bad enough to cover the cost of a pesticide it is better to be safe and spray.			

	Agree	Neutral	Disagree
13. Farmers need more information to be completely happy with their pesticide decisions.			
14. Pesticide expenditure is a relatively insignificant part of total farm expenses.			
15. Weeds, pests, and diseases would cause a serious financial setback on the farm if pesticides were not used.			

PART E: PERSONAL

1. Your age (Circle) 18-25 26-35 36-45 46-55  
56-65 66+

2. Your name and correct address \_\_\_\_\_

- 
3. Please add any further comments you have on pest control and problems related to weeds and pests:

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