

Pesticide Distribution and Use Patterns in the Okanagan and Similkameen Valleys of British Columbia

TD 227 B74 OK92-1

Environmental Conservation Pacific & Yukon Region Vancouver, B.C.



374 0592-1

# PESTICIDE DISTRIBUTION AND USE PATTERNS IN THE OKANAGAN AND SIMILKAMEEN VALLEYS OF BRITISH COLUMBIA

PREPARED FOR:

INLAND WATERS DIRECTORATE.

PACIFIC AND YUKON REGION

**ENVIRONMENT CANADA** 

1992

PREPARED BY:

AIM ECOLOGICAL CONSULTANTS LTD. BOX 2426, 100 MILE HOUSE, B.C. VOK 2E0

243

# TABLE OF CONTENTS

Table of Contents.		i
List of Tables		ii
List of Figures		ii
1.0 INTRODUCT	ΠΟΝ	1
2.0 METHODS		2
	S OF THE PREDOMINANT PESTICIDES USED IN THE	
OKANAC	GAN AND SIMILKAMEEN VALLEYS	17
	CTICIDES	
	AZINPHOS-METHYL	
	CARBARYL	
	CARBOFURAN	
	CHLORPYRIFOS	
	DIAZINON	
Γ.	DIMETHOATEDNOC	20
Ē	NDOSULFAN	20
	MALATHION	and the second second
	METIRAM	
	MINERAL OIL	
F	PARATHION	22
•	GICIDES	
	BENOMYL	
	CAPTAN	
N	MANCOZEB	24
	RIFORINE	
4.3 HERE	BICIDES	25
	2,4-D	
$\overline{I}$	AMITROLE	25
	ATRAZINE	26
Ī	DICAMBA	26
I	DICLOFOP-METHYL	27
	DIFENZOQUAT	
	GLYPHOSATE	
	МСРА	
	FRIALLATE	
7	rifluralin	30
4.4 RODE	ENTICIDES	31
	STRYCHNINE	31
5.0 TOXICITY OF	PESTICIDES	32
6.0 LITERATURE	CITED	38
Appendix 1:	Study Terms of Reference	
Appendix 1: Appendix 2:	B.C. Pesticide Control Branch List of Licenced Vendors, 1990	
Appendix 3:	Companies Removed from Distributors List	
Appendix 4:	Insecticides Distributed in the Okanagan and Similkameen Valleys, 1990	
Appendix 5:	Fungicides Distributed in the Okanagan and Similkameen Valleys, 1990	•
Appendix 6:	Herbicides Distributed in the Okanagan and Similkameen Valleys, 1990	
Appendix 7:	Rodenticides Distributed in the Okanagan and Similkameen Valleys, 1990	
Appendix 8:	Insecticide Application Rates for Major Crops in the Okanagan and Similkame	en Valleys, 1990
		•

# LIST OF TABLES

TABLE 1:	QUANTITY OF INSECTICIDE ACTIVE INGREDIENT DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 199011-12
TABLE 2:	QUANTITY OF FUNGICIDE ACTIVE INGREDIENT DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 199013
TABLE 3:	QUANTITY OF HERBICIDE ACTIVE INGREDIENT DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 199014-15
TABLE 4:	QUANTITY OF RODENTICIDE ACTIVE INGREDIENT DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 199016
TABLE 5:	ACUTE ORAL TOXICITY OF INSECTICIDES TO MAMMALS, BIRDS [LD50 mg/kg] AND FISH [LC50 24 HOUR]
TABLE 6:	ACUTE ORAL TOXICITY OF FUNGICIDES TO MAMMALS, BIRDS [LD50 mg/kg] AND FISH [LC50 24 HOUR]
TABLE 7:	ACUTE ORAL TOXICITY OF HERBICIDES TO MAMMALS, BIRDS [LD50 mg/kg] AND FISH [LC50 24 HOUR]
TABLE 8:	ACUTE ORAL TOXICITY OF RODENTICIDES TO MAMMALS [LD50 mg/kg]37
	LIST OF FIGURES
FIGURE 1:	SURVEY QUESTIONNAIRE
FIGURE 2:	CATEGORIES OF PESTICIDES USED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990
FIGURE 3:	RELATIVE SALES OF INSECTICIDES IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990
FIGURE 4:	RELATIVE SALES OF FUNGICIDES IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990
FIGURE 5:	RELATIVE SALES OF HERBICIDES IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990
FIGURE 6:	RELATIVE SALES OF RODENTICIDES IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990

# 1.0 INTRODUCTION

Pesticide use in the Okanagan and Similkameen valleys has been difficult to assess in recent years. The most detailed pesticide use records have been kept for applications most likely to pose conflicts (i.e. application permits for forestry operations, highways, hydro, parks). The least amount of information has been available for agricultural pesticides which are purchased and applied without any record of the type of chemical, location or quantity of application.

AIM Ecological Consultants Ltd. was requested by Inland Waters Directorate to conduct a pesticide use study for the Okanagan and Similkameen valleys of British Columbia; terms of reference for the study are appended (Appendix 1).

The study objectives were:

- to identify the major existing pesticide retail outlets in the Okanagan and Similkameen valleys;
- to identify and quantify all pesticides sold in the Okanagan and
   Similkameen valleys according to active ingredient and total product;
- to identify for the various pesticides:
  - crops protected,
  - target species, and
  - application methods.

The scope of the study was to include all agricultural uses of pesticides within the Okanagan and Similkameen valleys. No attempt was made to obtain information concerning possible pesticide purchases in the United States for use in British Columbia.

# 2.0 METHODS

In order to accomplish the study objectives, a questionnaire concerning pesticide sales was prepared for licensed distributors to complete (Figure 1). The list of licenced pesticide distributors was obtained from the Ministry of Environment (MOE), Pesticide Control Branch [Appendix 2]. Since the MOE does not distinguish between commercial, residential or agricultural sales it was necessary to contact each of the distributors to determine the volume of their agricultural sales. Many of the distributors are involved in sales of small quantities of pesticides for residential and hobby farm use. Those distributors which were not serving commercial farming operations were excluded from the study [Appendix 3].

A letter was sent out to each of the distributors informing them of the study, its purpose and the individual who would be contacting them. The distributors were then contacted by telephone to arrange meetings for completion of the questionnaire. In many cases, the distributors indicated they were not prepared to fill in the questionnaire themselves but did allow us access to the necessary information at their offices. In some cases, the information had already been summarized by the distributors for their pesticide vendor licence renewal. This information was obtained from the Ministry of Environment.

Additional information on pesticide characteristics and toxicities was obtained from a variety of literature sources. Of particular use were various Crop Production Guides produced by the B.C. Ministry of Agriculture and Fisheries and the B.C. Ministry of Environment's "Handbook for Pesticide Applicators and Dispensers" which provided details concerning crops, application rates, and pesticide characteristics.

#### FIGURE 1: SURVEY QUESTIONNAIRE

# Inland Waters Directorate -- Environment Canada

Okanagan Similkameen -- Pesticide Inventory Distributor Questionnaire

### **CONFIDENTIAL**

NAME OF DISTRIBUTOR		
ADDRESS	· ·	
		POSTAL CODE
		TELEPHONE
MANAGER/SUPERVISOR NAME	•	
RESPONDENT'S NAME (if different fro	om above)_	
TYPE OF FIRM (Formulator, Distributor	, Retailer, C	Contractor, etc.)
WHICH SECTOR DO YOU PRIMARIL	Y SERVE (	(AGRICULTURE, HOME & GARDEN, INDUSTRY, ETC.)?
WHICH GEOGRAPHIC AREAS DO YO	OU SUPPL'	
WHAT QUANTITY OF PESTICIDES D	O YOU DI	DISTRIBUTE ANNUALLY (weight or volume estimate)?
Algicides, avicides, bacter	TH ricides, f	EETS REGARDING THE PRODUCTS YOU DISTRIBUTE. HIS INCLUDES: fungicides, herbicides, insecticides, miticides, cides, piscicides, and rodenticides.
MAY WE HAVE YOUR COMMENTS (	OR SUGGE	SESTIONS REGARDING THIS QUESTIONNAIRE.
,		
	<del> </del>	
IF YOU HAVE ANY QUESTIONS OR I CONTACT:	REQUIRE .	E ASSISTANCE WITH THIS QUESTIONNAIRE, PLEASE

OR

ANNE MOODY
(604) 397-2649
AIM ECOLOGICAL CONSULTANTS LTD.
BOX 2426,
100 MILE HOUSE, B.C. VOK 2E0

FRED MAH
(604) 666-8000
ENVIRONMENT CANADA
INLAND WATERS DIRECTORATE
224 W. ESPLANADE
NORTH VANCOUVER, B.C. V7W 3H7

Inland Waters Directorate, Environment Canada

Okanagan/Similkameen -- Pesticide Inventory -- Distributor Questionnaire

PAGE OF DATE	
BRANCH OR LOCATION	PESTICIDE INVENTORY AND DISTRIBUTION SUMMARY
RESPONDENT	

INTENDED USE																						
PRODUCT SOURCE																			•			
WT. OR VOL. DISTRIBUTED																						
ACTIVE INGREDIENT												,										
PCP NO.								,					,									
SIZE																						
PRODUCT NAME																				,		

# 3.0 RESULTS

Results from the individual distributors were entered on a master computer list together with Pest Control Products (P.C.P.) Act numbers and active ingredients. These results were pooled to provide a summary of all the active ingredients distributed in the Okanagan and Similkameen valleys and quantities distributed in 1990. It must be noted that these figures only represent what was sold, not necessarily applied. Information gathered from the distributors was converted to standard units, and summarized to provide a perspective on regional pesticide use. The results of sales from individual distributors are not shown in this report to protect the confidentiality of those reporting to us.

In 1990 there were 607,097 kg of pesticide active ingredients distributed in the Okanagan and Similkameen valleys. The pesticides were segregated into 4 major categories: insecticides, herbicides, fungicides and rodenticides (Figure 2). The proportion of sales for each of these categories was as follows: insecticides represented approximately 62% of the pesticide active ingredient purchased; fungicides and herbicides represented 27% and 12% respectively of the pesticide active ingredient purchased; and rodenticides accounted for less than 0.1% of the total pesticide sales. Of the insecticides sold, 68% was represented by mineral oils. Nine active ingredients (azinphos-methyl, carbaryl, diazinon, endosulfan, DNOC (dinitro-o-cresol), phosmet, phosalone, methidathion, and dimethoate) accounted for a further 30% of insecticides sold (Figure 3). Ten fungicides made up 92% of the fungicide active ingredient purchased. Sulfur at 27% was the largest proportion of sales, followed by metiram (20%), captan (13%), mancozeb (9%), and ziram (7%) (Figure 4). Two herbicides, glyphosate (24%) and sodium metaborate (21%), represented 45% of herbicide sales. Eight active ingredients represented a further 39% of herbicides sold (Figure 5). Three active ingredients, zinc phosphate (64%), strychnine (34%), and diphacinone (2%) represented all of the rodenticides distributed in these areas (Figure 6). A complete list of pesticide products distributed in the Okanagan and Similkameen valleys is presented in Appendices 4-7.

The information in Tables 1-4 summarizes the information collected from 21 B.C. distributors.

Figure 2: Categories of Pesticides Used in the Okanagan and Similkameen Valleys 1990

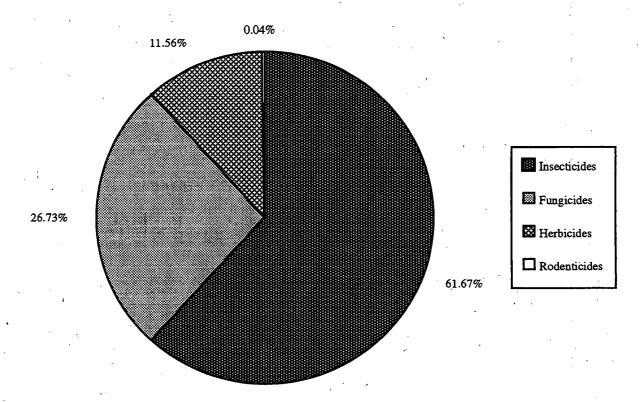


Figure 3: Relative Sales of Insecticides in the Okanagan and Similkameen Valleys, 1990

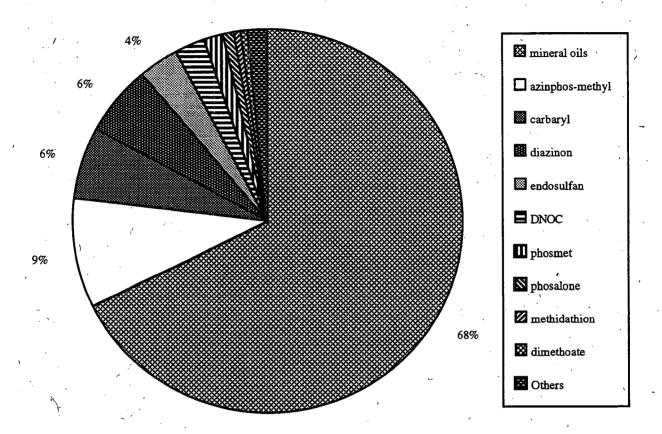
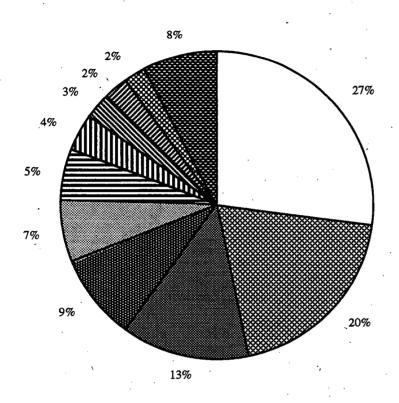


Figure 4: Relative Sales of Fungicides in the Okanagan and Similkameen Valleys, 1990



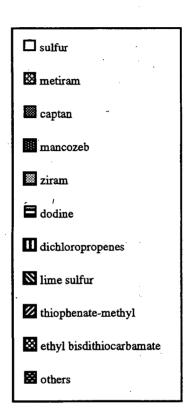
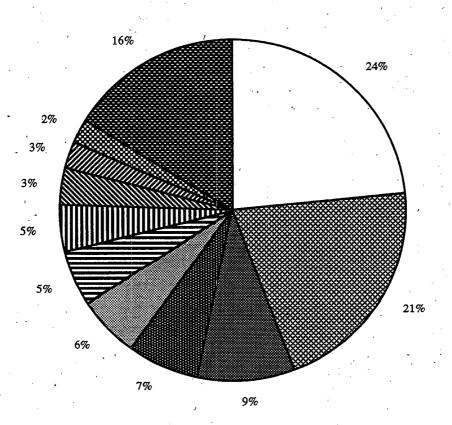


Figure 5: Relative Sales of Herbicides in the Okanagan and Similkameen Valleys, 1990



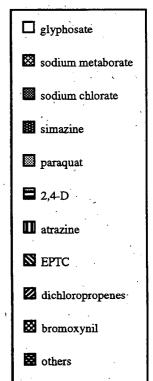


Figure 6: Relative Sales of Rodenticides in the Okanagan and Similkameen Valleys, 1990

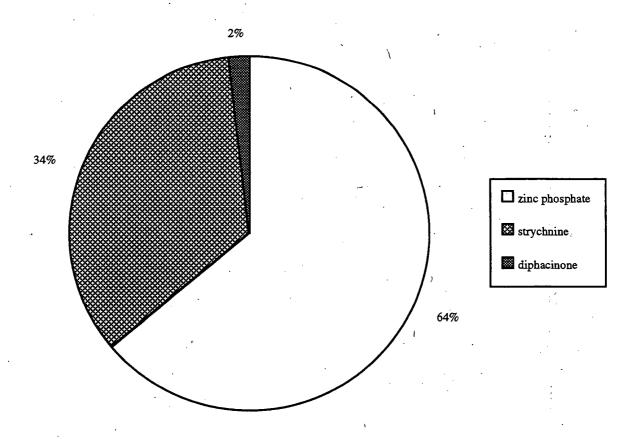


TABLE 1: QUANTITY OF INSECTICIDE ACTIVE INGREDIENTS
DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN
VALLEYS, 1990.

Active Ingredient -	Pesticide Use	Total active	Rating	Percentage	Percentage
Active lingietient	resticiae osc	ingredient	according to	of total	of
			quantity	pesticide	insecticide
		(kg)		1 -	• - 1
		·.	distributed	active	active
·				ingredient	ingredient
azinphos-methyl	I	35232	2	5.6	9.41
Bacillus thuringiensis	I	0	47	<0.1	<0.1
bendiocarb	I	0	48	<0.1	<0.1
boron equivalent	I	70	26	<0.1	<0.1
carbaryl	I,M	22238	3	3.5	5.9
carbofuran	I	80	23	<0.1	<0.1
chinomethionat	I,M,F	884	12	0.1	0.2
chlorpyrifos	I	91	22	<0.1	<0.1
ćoumaphos	I,M	0	49	<0.1	<0.1
crotoxyphos	I	1	44	<0.1	<0.1
cypermethrin	I	` 8	35	<0.1	<0.1
D-trans allothria	I	0	50	<0.1	<0.1
deltamethrin	I	. 76	24	<0.1	<0.1
di-N-prop	I	. 0	51	<0.1	<0.1
diazinon	I	21530	4	3.4	5.8
dicarboximide	I	0	52	<0.1	<0.1
dichloropropenes	N	1'12	20	<0.1	<0.1
dichlorvos	I	-5	41	<0.1	<0.1
dicofol	M	213	17.	<0.1	0.1
dienochlor	M	7	_38 .	<0.1	( <0.1
dimethoate	I,M	1949	10	0.3	0.5
disulfoton	I	12	34	<0.1	<0.1
DNOC	I,F	9268	6	1.5	2.5
endosulfan	I	13446	5	2.1	3.6
ethion	I,M	942	11	0.2	0.3
fenbutatin oxide	M	-16	32	<0.1	<0.1
fensulfothion	I	14	33	<0.1	<0.1
fenthion	I,Av	8	36	<0.1	<0.1
fenvalerate	I	29	30	<0.1	<0.1
fonofos	Ī	71	25	<0.1	<0.1
formetanate	M	67	27	<0.1	<0.1
hydrochloride	[ ·	] ".			
2 furaldehyde	I	<1	56	<0.1	<0.1
lindane	I	42	28	<0.1	<0.1

ΓK	ey to Abbreviations of Pesti	cide Use Categories		
Animal Repellent	AR	Aquatic Herbicide	AH	
Fungicide	F	Fumigant	FUM	
Herbicide	Н	Insecticide	1	
Miticide	M	Molluscicide	Mo	
Nematicide	N	Plant Growth Regulator	PG	1
Rodenticide -	R			**

TABLE 1 (con't): QUANTITY OF INSECTICIDE ACTIVE INGREDIENTS DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990.

Active Ingredient	Pesticide Use	Total active	Rating	Percentage of	Percentage of
Active ingredient	resuciue ose		-		
ŀ		ingredient	according to	total	insecticide
	٠.	(kg)	quantity	pesticide	active
		i	distributed	active	ingredient
·				ingredient	
malathion	I,M	779	13	0.1	0.2
metaldehyde	Мо	8	37	<0.1	<0.1
methamidophos	Ι .	348	15	0.1	0.1
methidathion	I	2134	9	0.3	0.6
methomyl	I	17	. 31	<0.1	<0.1
methydaley	Мо	<1	57	<0.1	<0.1
mineral oils	I,M	253888	1	40.3	67.8
muscalure	I	0	.53	<0.1	<0.1
N octyl bicycloheptene	I .	1	45.	<0.1	<0.1
dicarboxidimide		`			,
naled	I,M	0 1	54	<0.1	<0.1
nicotine	I	3	43	< 0.1	<0.1
oxamyl	I,N	6	40	<0.1	<0.1
parathion	I	233	16.	<0.1	0.1
pentachlorophenol	I	92	21 `	<0.1	<0.1
permethrin	I	40	29	<0.1	<0.1
Petroleum oil	I,M	<1	58	<0.1	<0.1
phorate	I	176	18	<0.1	0.1
phosalone	I,M	3763	8	0.6	1.0
phosmet	I,M	5315	7 .	0.8	1.4
piperonyl butoxide	I	5.	42	<0.1	<0.1
pirimicarb	I	579	14	0.1	0.2
propoxur	I	169	19	<0.1	0.1
pyrethrins	I,M	7 -	39	<0.1	<0.1
rotenone	I,P	<1	59	<0.1	<0.1
soap	I,M,AR	448	55	<0.1	0.1
tedion	M	<1	60	<0.1	<0.1
trichlorfon	I	. 1	46	<0.1	·<0.1
z-9 tricosene	Ι.	<1	61	<0.1	<0.1
Total		374,424		59.4	100.0

Ke				
Animal Repellent	AR	Aquatic Herbicide	AH	
Fungicide	F	Fumigant	FUM	
Herbicide	Н	Insecticide	1	
Miticide	M	Molluscicide	Мо	
Nematicide	N	Plant Growth Regulator	PG	
Bodenticide	R	,		

TABLE 2: QUANTITY OF FUNGICIDE ACTIVE INGREDIENTS DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990.

Active Ingredient	Pesticide Ûse	Total active ingredient (kg)	Rating according to quantity	Percentage of total pesticide	Percentage of insecticide active
· 	٠.	· .	distributed	active ingredient	ingredient
anilazine	F	6	31	<0.1	<0.1
benomyl	F	1,323	15	0.2	0.8
captan	F	21,465	- 3	3.4	13.3
carbathiin	F	13	· 28	<0.1	<0.1
chloropicrin	Fum	348	18	0.1	0.2
chlorothalonil	F	247	20	<0.1	0.2
copper	F	<1	. 40	<0.1	<0.1
copper oxychloride	F	2,228	11	0.4	1.4
coppers (fixed)	F -	1,834	13	0.3	1.1
coppers sulphate	F	1,320	16	0.2	0.8
dazomet	F,Fum,H,N	78	23	<0.1	<0.1
dichlone	F	1,952	12	0.3	1.2
dichloran dichloran	F	54	. 24	<0.1	<0.1
dichloropropenes	Fum, N,FI,H	6,431	7	1.0	4.0
dinocap	F	223	21	<0.1	0.1
dodemorph-acetate	F	1	37	<0.1	<0.1 ′
dodine	F	(8,578	6	1.4	5.3
ethazol /	F	5	32	<0.1	<0.1
ethyl bisdithiocarbamate equivalent	F	3,705	10	0.6	. , 2.3
fenaminosulf	F	2	35	<0.1	<0.1
ferbam	F	1,339	14	0.2	0.8
folpet	F	30	26	<0.1	<0.1
iprodione	F	1029	17	0.2	0.6
lime sulfur	F,M,I	4,444	8	0.7	2.7
mancozeb	F	14,335	4	2.3	8.9
	F	251	19	<0.1	0.2
maneb metalaxyl	F	34	25	<0.1	- <0.1
	F	31,815	23	5.0	19.6
metiram N-alkyl	F	51,615	33	<0.1	<0.1
		5	34	<0.1	<0.1
oxine benzoate	F		38	<0.1	<0.1
oxycarboxine	F	2	36	<0.1	<0.1
quintozen	F	0	39	<0.1	<0.1
streptomycin sulphur	F,I,M	44171	1	7.0	27.3
thiophanate-methyl	1 -	3851	9	0.6	2.4
thiram	F	19	27	<0.1	<0.1
triadimefan	F	12	29	<0.1	<0.1
triforine	F	93	22	<0.1	0.1
zineb	F	11	30 1	<0.1	<0.1
ziram	F	10724	5	1.7	6.6
Total		162,281		25.7	100.0

, K	ey to Abbreviations of Pe	sticide Use Categories		
Animal Repellent	AR	Aquatic Herbicide	AH	
Fungicide	F	Fumigant	FUM	
Herbicide	Н	Insecticide	1	
Miticide	M	Molluscicide	Mo	
Nematicide	N	Plant Growth Regulator	PG	
Rodenticide	R			

TABLE 3: QUANTITY OF HERBICIDE ACTIVE INGREDIENTS DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990.

Active Ingredient	Pesticide Use	Total active ingredient	Rating according to	Percentage of total	Percentage of herbicide
		(kg)	quantity	pesticide	active
	,	(Kg)	distributed	active	ingredient
		,	distributed	1	mgredient
	ļ	2607		ingredient	5.0
2,4-D	H	3687	6 28	0.6 <0.1	5.2 0.2
2,4-D amine	H	171			
2,4-D ester	H	330 758	24 15	<0.1	0.5
2,4-DB	H		31	0.1 <0.1	0.2
amitrol	H,AH	134	<del></del>		
ancymidol	PG	·<1	68	<0.1 0.5	<0.1
atrazine	H	3183	1		4,5 <0.1
bentazon	H	25	, 40	<0.1	
benzyladenine	PG	2	65\	<0.1	<0.1
bromoxynil	H	1558	10	0.3	
chloramben	H	<1	69	<0.1	<0.1
chlormequat	PG	100	37	<0.1	0.1
chloroxuron	H	572	18	0.1	0.8
chlorsulfen	H	7	61	<0.1	<0.1
clopyralid	Н	8	58	<0.1	<0.1
cyanazine	H	211	27	<0.1	0.3
daminozide	PG	115	33	<0.1	0.2
dicamba	H	779	14	0.1	1.1
dichlobenil	H	402	21	0.1	0.6
dichloropropenes	Н	1826	9	0.3	2.6
dichlorprop	Н	14	54	<0.1	<0.1
diclofop-methyl	H	331	23	0.1	0.5
difenzoquat	H	101	36	<0.1	0.1
dimethyl tetrachloroterephthalate	H H	626	16	0.1	0.9
dinoseb	Н	1	67	<0.1	<0.1
dinoseb general	H	393	22	0.1	0.6
diphenamid	H	9	57	<0.1	<0.1
diquat	H,AH	55	: 42	<0.1	0.1
diuron	Н	77	40 ′	<0.1	0.1
EPTC	Н	2400	8	0.4	3.4
ethephon ethephon	PG	530	20	0.1	0.8
fenoxaprop-ethyl	H	<1	70	<0.1	<0.1
flamprop-methyl	1H	2	. 66	<0.1	<0.1
fluazifop-butyl	H	102	35	<0.1	0.1
gibberellic acid	PG	3	64	<0.1	<0.1
glyphosate	Н	16634	1	2.6	23.6
linuron	† <del>H</del>	51	43	<0.1	0.1
шишоп	111	1 31	1 43	1 (0.1	1 0.1

TABLE 3 (cont'd): QUANTITY OF HERBICIDE ACTIVE INGREDIENTS DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990.

Active Ingredient	Pesticide Use	Total active	Rating	Percentage	Percentage
		ingredient	according to	of total	of herbicide
		(kg)	quantity	pesticide	active
		(3'5)	distributed	active	ingredient
			distributed	ingredient	I mgr curent
MCPA	H	838	12	0.1	1.2
	H	21	48	<0.1	<0.1
MCPA Amine	H	121	32	<0.1	0.2
MCPA (K or Na)	H	25	47	<0.1	<0.1
МСРВ					
mecoprop	H	996	11	0.2	1.4
metalaxyl	H,AH	5	63	<0.1	<0.1
metolachlor	H	559	52	0.1	0.8
metobromuron	H	16	19	<0.1	<0.1
metribuzin	H	79	39	<0.1	0.1
monolinuron	H	32	45	<0.1	0.1
MSMA	H	18	50	<0.1	<0.1
napropamide	H	616	17	0.1	0.4
naptalam	H	.10	56	<0.1	<0.1
napthaleneacetica acid	PG	794	13	0.1	1.1
oxyfluorfen	H	6	62	<0.1	<0.1
paraquat	H,AH	4116	5	0.7	5.8
parafin based oil	H	83	.38	<0.1	0.1
picloram	H	150	30	<0.1	0.2
prometryne	H	13.	55	<0.1	<0.1
propyzamide	H	16	53	<0.1	<0.1
sethoxydim	H	103	34	<0.1	0.2
simazine	H,AH	4793	4	0.8	6.8
sodium chlorate	H	6498	3	1.0	9.2
sodium metaborate	H	14520	2	2.3	20.6
tebuthiurion	H	8	59	<0.1	<0.1
terbacil	Н	- 8	60	<0.1	<0.1
triallate	H	229	26	<0.1	0.3
triazine	H	73	41	<0.1	0.1
triazinetrone	Н	19	49	<0.1	<0.1
trifluralin	Н	294	25	0.1	0.4
vernolate	Н	160	29	0.1	0.2
water soluble dyes	AH	17	51	<0.1	<0.1
zinc sulphate	Н	34	44	<0.1	0.1
Total		70,463		11.17	100

	Key to Abbreviations of Pes			
Animal Repellent	AR	Aquatic Herbicide	AH	
Fungicide	F	Fumigant	FUM	
Herbicide	Н	Insecticide	·	·
Miticide	M	Molluscicide	Mo	····
Nematicide	N	Plant Growth Regulator	PG	
Bodenticide	. В			

TABLE 4: QUANTITY OF RODENTICIDE ACTIVE INGREDIENTS DISTRIBUTED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS, 1990.

Active Ingredient	Pesticide Use	Total active ingredient (kg)	Rating according to quantity distributed	Percentage of total pesticide active ingredient	Percentage of rodenticide active ingredient
brodifacoum	R	<1		<0.1	<0.1
bromadiolone	R	<1		<0.1	<0.1
chlorophacinone	R ·	<1		<0.1	<0.1
diphacinone	R	4	3	<0.1	1.7
strychnine	R	79	<b>∂ 2</b>	<0.1	34.1
sulfaquinoxaline	R	<1	`	<0.1	<0.1
warfarin	R	<1		<0.1	<0.1
zinc phosphate	R	148	1	<0.1	64.1
Total	(	231		3.7	100

K				
Animal Repellent	AR	Aquatic Herbicide	AH	
Fungicide	F	Fumigant	FUM	
Herbicide	H	Insecticide	············	
Miticide	M	Molluscicide	Мо	
Nematicide	N	Plant Growth Regulator	PG	
Rodenticide	R			

# 4.0 - PROPERTIES OF THE PREDOMINANT PESTICIDES USED IN THE OKANAGAN AND SIMILKAMEEN VALLEYS

In order to gain a better understanding of the chemicals used in the Okanagan and Similkameen valleys, the formulations, application rates, target species, crops protected and special properties of active ingredients representing the majority of pesticide sales have been summarized.

#### 4.1 INSECTICIDES

#### **AZINPHOS-METHYL**

TRADE NAME:

Guthion

Formulations:

- wettable powder: Guthion 50% active ingredient

- water soluble concentrate: Guthion SC 24% active ingredient (a.i.)

Application Rate:

- 0.72 - 1.625 kg a.i./ha

Application Method:

- spray

Application Time: Target Species:

throughout growing periodcontrol of wide range of insects

Properties: Toxicity:

- long residual action, bioaccumulative in waterfowl

Mammalian LD50:18 mg/kg

Avian LD<sub>50</sub>:136 mg/kg (mallard), 75 mg/kg (pheasant)

- highly toxic to bees, fish and wildlife

**Crops Protected:** 

- apples, apricots, cherries, peaches, pears, prunes and plums, grapes, alfalfa, clover, field crops, bush fruits and berries, strawberries, walnuts,

potatoes, tomatoes, cole crops and nursery plants.

#### **CARBARYL**

TRADE NAME:

Sevin

Formulations:

- bait, dust, granule, suspension, wettable powder, and pressurized spray

Application Rate:-

4.33 kg Sevin 50% WP/hectare - various

Application Method: Application Time:

post bloom thinning

Target species:

- leaf rollers

Properties:

- carbamate compound

- long residual action on foliage

- residues persistent in soil for months after application

- moderate mammalian acute toxicity

**Toxicity** 

- <u>Mammalian oral</u> LD<sub>50</sub>: 307-986 mg/kg

- Fish LC50 (96hr): 4.34 mg/L(trout)

- <u>Avian</u> LD50: >2000 mg/kg (mallard)

highly toxic to honey beesHoney Bee LD50: 1.34 µg/bee

relatively low solubility in water

Crops Protected

- effective on all varieties of apples

#### **CARBOFURAN**

**TRADE NAME:** 

Furadan

Formulations:

- granular: Furadan 10G, 10% active ingredient - flowable, Furadan 4.8F 48% active ingredient

Application Rate:

- 0.28 - 2.016 kg a.i./ha

Application Method:

- foliar spray or soil incorporated granules

Application Time:

various

Target Species: Properties:

- weevils, carrot rust fly, aphids, flea beetles, leafhoppers, root maggots

- systemic insecticide

Toxicity:

- highly toxic

Mammalian LD50: 5 mg/kg

Avian LD50: 0.4 mg/kg (mallard), 4.2 mg/kg (pheasant), 5 mg/kg (quail)

<u>Crops Protected:</u> onions,

- granular systemic for control of specific insects in corn, potatoes, turnips and rutabagas

- liquid systemic for control of specific insects on potatoes, alfalfa, corn,

green peppers, turnips, rutabagas, sunflowers, raspberries and strawberries.

- liquid systemic for control of grasshoppers on various field and legume crops, and pastures.

#### **CHLORPYRIFOS**

TRADE NAME:

Lorsban

Formulations:

- emulsifiable concentrate: Lorsban 4E, 48% active ingredient wettable powder: Lorsban 25 WP, 25% active ingredient -0.24 - 1.152 kg a.i./ha.

Application Rate:
Application Method:

- spray, dust, granules, pellets

Application Time:

various

Target Species:

- effective on adult and larval mosquitos, cutworms, rootworms, maggots

Properties: Toxicity:

organophosphate compound with residual effect
toxic to fish, moderately toxic to mammals

Mammalian LD50: 82 mg/kg

Avian LD50: 112 mg/kg (mallard), 8.41-17.7 mg/kg (pheasant) onions, corn, potatoes, tomatoes, strawberries, and cereal crops

Crops Protected:

- lawn and turf applications

Miscellaneous Uses:

- residential, commercial and industrial insect control

- mosquito and tent-caterpillar control

NOTE:

- Currently being promoted as an alternative to carbofuran, less toxic and more effective against certain pests.

#### **DIAZINON**

TRADE NAME:

**Basudin** 

Formulations:

- wide range (Eg. granular, powder, liquid)

**Application Rate:** 

- Diazinon or Basudin 5G (5% active ingredient) - 0.2-0.9 g/1000 m row

- Diazinon or Basudin (50% active ingredient) - 0.2 - 2.75 kg a.i./ha

Application Method: Application Time: variousvarious

Target Species:

- broad-spectrum

Properties:

organophosphate compoundbroad-spectrum contact poison

moderate residual action

**Toxicity:** 

- moderate mammalian toxicity but high avian toxicity

Mammalian LD50: 76-108 mg/kg

Avian LD50: 3.5 mg/kg (mallard), 4.3 mg/kg (pheasant)

Crops Protected:

- all tree fruits, various vegetables, most berry crops and forage grasses.

- control of specific insects in turf

- control of grasshoppers along fencelines, ditches and non-croplands

Miscellaneous Uses:

- domestic, farm, kennel, industrial/commercial building insect control

NOTE:

- Diazinon has been implicated in a number of bird kills

#### **DIMETHOATE**

TRADE NAME:

Lagon

Formulations:

- emulsifiable concentrate: Lagon 48 EC 48% active ingredient

Application Rate:
Application Method:

- 0.192 - 1.056 kg a.i./ha - sprav

Application Time:

- various

Target Species:

- mites and sucking insects, grasshoppers, spruce budworm, pine shoot

moth, seed and cone insects

Properties:

- organophosphate systemic compound

- phytotoxic to many plant species

Toxicity:

highly toxic to mammals and bees
 Mammalian LD50: 185-245 mg/kg

Avian LD50: 41.7 mg/kg

Crops Protected:

- apples, cherries, beans, cole crops, lettuce, peas, potatoes, and various

field crops (cereals, grasses, and legumes).

DNOC.

(dinitrocresol)

TRADE NAME:

**Elgetrol** 

Formulations:

- emulsifiable concentrate and soluble powder (19.5%)

**Application Rate:** 

- 2.5 kg a.i./ha

Application Method: - spray

Application Time: Target species:

- during dormant period - aphid eggs, rust mites, scale insects on fruit trees, fungi, apple

blossom thinning

Properties:

- dinitrophenol compound used as a herbicide, insecticide and

fungicide

phytotoxic to foliage

DNOC applied at 50 mg/L persisted in soil for 7 days

**Toxicity:** 

- high acute toxicity to mammals

Mammalian oral LD50: 10 -50 mg/kg (rat)

Avian LD50: 22.7 mg/kg (mallard) Fish LC50 (24 hr): 210 ppb (trout)

Crops Protected:

- cherries, peaches, raspberries, apples, mushrooms

#### **ENDOSULFAN**

TRADE NAME:

Thiodan

Formulations:

WP

- emulsifiable concentrate: Thiodan 4 E.C. 40% active ingredient,

Thiodan E.C. 40% active ingredient,

wettable powder: Thiodan 50 WP 50% active ingredient, Thionex 50

50% active ingredient

**Application Rate:** 

- 1.1-3.25 kg/ha; 1.1-2.75 L/ha

Application Method:

- spray, dust

**Application Time:** 

applied throughout spring and summer

Target Species: Properties:

- aphids, rust mites, whiteflies organochlorine compound

- fumigant action

- relatively persistent, stable in sunlight

Toxicity:

- highly toxic to mammals and fish but not to bees

Mammalian LD50: 18 mg/kg

Avian LD50: 33 mg/kg (mallard), 80-160 mg/kg (pheasant)

**Crops Protected:** 

- all tree fruits, cole crops, celery, eggplant, lettuce, peppers, potatoes,

tomatoes, and strawberries

#### **MALATHION**

TRADE NAME:

Cythion, Malathion

Formulations:

emulsifiable concentrate: Malathion 500 E.C. 50% active ingredient.

Malation 85 E.C. 85% active ingredient solution: cythion 100% active ingredient

wettable powder: Malathion 25% WP 25% active ingredient

**Application Rate:** 

- 0.7-2.75 kg a.i./ha

Application Method: Application Time:

- bait, dust, spray

Target Species:

- various

Properties:

- aphids, beetles, springtails, caterpillars, thrips, leaf weevil, pea weevil

organophosphate contact insecticide

Toxicity:

low mammalian toxicity, but toxic to fish and bees

Mammalian LD50: 1000 mg/kg

Avian LD50: 33 mg/kg (mallard), 80-160 mg/kg (pheasant)

**Crops Protected:** 

apples, cherries and pears, asparagus, beans, cole crops, celery, curbits,

lettuce, onion, peas, cereal crops, and all berry crops

Domestic Uses:

flea powders, mosquito sprays, home and garden sprays

#### **METIRAM**

TRADE NAME:

Polyram 80 D.F., Polyram 7% dust

Formulations:

dry flowable: Polyram 80 D.F. 80% active ingredient

dust: Polyram 7% dust 7% active ingredient

**Application Rate:** 

- 6.0 kg/ha (apple),

Application Method:

- spray, dust

**Application Time:** 

spring application when apple bud is in the green to tight cluster stage

Properties: Toxicity:

non systemic fungicidal activity Mammalian LD50: >10,000 mg/kg Fish LC50 (24hr): 22 mg/L (trout)

Target Species:

early and late blight, downy mildew, apple scab,

Crops Protected:

apples, prunes, grapes, potatoes, tomatoes, asparagus, carrots, celery and

sugar beets

#### MINERAL OIL

TRADE NAME: Formulations:

**Dormant oil** - oil sprays

Application Rate:

- 45-901 Dormant oil (200-220vis)/ha

Application Method: - spray

Application Time: - spi

spring application prior to bud opening
kill by suffocation and are phytotoxic

Properties: Toxicity:

- low mammalian toxicity

- low hazard to fish and wildlife

Target species:

- European red mite, San Jose scale, European fruit scale

Crops Protected:

- apple, prunes, plums, pears, cherries, apricots

#### **PARATHION**

TRADE NAME:

Parathion 9.6 EC, Parathion 960 liquid solution,

Parathion 15 WP

Formulations:

- emulsifiable concentrate: Parathion 9.6 EC 76% active ingredient

- liquid: Parathion 960 liquid solution

- wettable powder: Parathion 15 WP 15% active ingredient - Parathion 9.6EC (960 g/L active ingredient) - 0.35-1 L/ha

Application Rate:
Application Method:

<u>od:</u> - spray

Application Time:

- spring and summer application

Target Species:

- caterpillars, cabbage seed pod weevil, carrot rust fly, onion maggot

Properties:

organophosphate compoundphytotoxic to certain plants

Toxicity:

- highly toxic, for commercial use only

Mammalian LD50: 3-30 mg/kg

Avian LD50: 1.9-2.1 mg/kg (mallard)

Crops Protected:

- cole crops, carrots, onions, peas, spinach, cranberries, strawberries and

grass forage crops.

#### 4.2 FUNGICIDES

#### **BENOMYL**

**TRADE NAME:** 

Benlate, Benolin, Gammasan

Formulations:

- wettable powder: Benelate 50% active ingredient - dry flowable: Benelate 50% active ingredient

- dust: Benolin 6% active ingredient, Gammasan 6% active ingredient

Application Rate:

- 0.55 - 0.425 kg a.i./ha

Application Method:

spray, dustapplied from early spring to late summer

Application Time: Target Species:

- apple scab, powdery mildew, brown rot

Properties:

**Toxicity:** 

- broad spectrum fungicide used for leaf, seed, soil or turf\_

benzimidazole compoundlow mammalian acute toxicity

- toxic to fish

Mammalian LD50: 9,600 mg/kg

**Crops Protected:** 

wide variety, including apples, apricots, cherries, peaches, plums, grapes

#### **CAPTAN**

TRADE NAME:

Captan

Formulations:

- wettable powder: Captan 50 WP 50% active ingredient, Captan 80 WP

80% active ingredient

Application Rate:

- 1.625 - 3.00 kg a.i./ha

Application Method:

- foliar and soil application by spray, dust or in mixture with other

fungicides and insecticides

**Application Time:** 

Target Species:

- various

- leaf spots, blights, rots, scabs, blotches, seed and soil-borne diseases

fruit rots of berry crops, tree fruits, and grapes

Properties:

- dicarboximide compound

- broad-spectrum protectant and eradicant fungicide

**Toxicity:** 

- toxic to fish

- low mammalian acute toxicity, but has chronic effects

Mammalian LD50: 8,400 mg/kg Avian LD50: >5,000 mg/kg (mallard)

Crops Protected:

- wide variety, including apples, apricots, cherries, peaches, grapes

#### **MANCOZEB**

TRADE NAME:

Dithane DG, Dithane 80 WP, Manzate DF, Manzate 75 WP,

Manzate 200, Dikar WP

Formulations:

- wettable powder: Dithane 80 WP 80% active ingredient, Dikar WP 72%

active ingredient

- dry flowable: Manzate DF 75% active ingredient - dry granular: Dithane DG 75% active ingredient - granular: Manzate 200 80% active ingredient

**Application Rate:** 

- various - various

**Application Method: Application Time:** 

- various

Target Species: Properties:

- broad spectrum - carbamate fungicide - foliage protectant

**Toxicity:** 

- very low acute mammalian toxicity Mammalian LD50: 7,500 mg/kg

**Crops Protected:** 

- vegetables, tree fruits, ornamentals

#### **TRIFORINE**

TRADE NAME:

Funginex 190 EC

Formulations:

- emulsifiable concentrate, 19% active ingredient

Application Rate:

- 0.475 kg a.i./ha

Application Method: - spray **Application Time:** 

various

Target Species:

- mummyberry, cottonball, blossom blight, powdery mildew, black spot

Properties:

- systemic, piperazine fungicide

- foliage protectant

Toxicity:

- low toxicity to mammals, fish and bees

Mammalian LD50: 6,000 mg/kg

Crops Protected:-

peaches, cherries, plums, blueberries, cranberries, roses, ornamentals

#### 4.3 HERBICIDES

2,4-D (2,4-dichlorophenoxyacetic acid)

TRADE NAME: 2,4-D, 2,4-D LV ester, 2,4-D amine

Formulations: - soluble granule SG, 80% active ingredient

- solution 2,4-D amine, 47% active ingredient

- emulsifiable concentrate 2,4-D LV ester, 60% active ingredient

Application Rate: - 0.420-0.880 kg a.i./ha

Application Method: - spray

Application Time: - post emergence

<u>Target Species:</u> - broadleaf species, most dicots, specific weeds in turf, woody plants

<u>Properties:</u> - leaching is not a problem under normal conditions

- in alkaline soil breakdown occurs rapidly, in acid soil or water persists

up to one month

<u>Toxicity:</u> - 2,4-D has a moderate acute toxicity to mammals

Mammalian LD50: of various formulations range from 300 to 1000

mg/kg

Avian LD50: 1,000 mg/kg (mallard), 472 mg/kg (pheasant)

- amine and acid formulations more toxic than salt and ester formulations

- some formulation can be toxic to fish

<u>Crops Protected:</u> - wheat, barley, rye, corn, oats, grass seed crops and pastures

Miscellaneous Uses: - control of woody plants and weeds along roadsides, fence rows,

commercial lands, right-of-ways.

#### **AMITROLE**

TRADE NAME: Amitrol-T

Formulations: - water soluble solution, 0.20% active ingredient

Application Rate: - 2.6-4.4 kg a.i./ha
Application Method: - ground spray

Application Time: - during growing season

<u>Target Species:</u> - perennial weeds (quackgrass, Canada thistle, cattails)

Properties:
- non-selective, systemic triazole
- absorbed by plant roots and foliage

- disrupts formation of chlorophyll

<u>Toxicity:</u> - low mammalian toxicity, minimal dermal irritation for humans

persistence in soil up to 7 weeks

Mammalian LD50: 1,100 mg/kg

Avian LD50: >2,000 mg/kg (mallard)

Fish LC50 (48 hr): 3,250 mg/L (salmon)

not to be used on crops a non-selective

<u>Crops Protected:</u> - not to be used on crops - non-selective <u>Miscellaneous uses:</u> - roadsides, ditchbanks, fencerows, marshes

#### **ATRAZINE**

TRADE NAME: Aatrex liquid 480, Aatrex liquid, Aatrex plus liquid solution,

Nine-O, Atrazine 600, Atrazine 480 EC, Atrazine 45 EC

Formulations: - granular: Aatrex Nine-O 86% active ingredient

- liquid: Aatrex liquid 480 48% active ingredient, Aatrex liquid 50%

active ingredient,

- suspension: Aatrex Plus Liquid solution 38% active ingredient,

Atrazine 600 60%

- emulsifiable concentrate: Atrazine 480 EC 48%, Atrazine 45 EC 45%

**Application Rate:** 

- 0.9-3.3 kg a.i./ha

Application Method:

- various

**Application Time:** 

- pre-plant, preemergence, or postemergence, soil incorporated

- perennials, grasses, broadleaves Target Species:

Properties: - selective herbicide absorbed by plant roots (some foliar absorption)

- persistent up to 1 year in soil

- low mammalian toxicity Toxicity:

Mammalian LD50:1,780 mg/kg

Avian LD50: >2,000 mg/kg (mallard) Fish LC50 (48 hr): 12,600 ppb (trout)

Crops Protected - corn, peas

#### **DICAMBA**

Banvel, Dyvel, Kil-mor, Target TRADE NAME:

Formulations: - diethylamine salt, or mixed with 2,4-D, MCPA or mecoprop

- used in various mixes Application Rate:

• Banvel - 480 - 0.11- 2.1 kg a.i./ha;

• Dyvel - 0.54 kg a.i./ha

• Kil-mor - 0.42-0.87 kg a.i./ha; • Target - 0.40 - 0.60 kg a.i./ha

Application Method: - spray

Application Time: - throughout growing season, depending on crop phenology

- broad range of weeds (particularly Polygonum spp), some perennials Target Species:

such as Canada thistle and a variety of brush

- legume crops are affected -

- benzoic acid compound Properties:

primary action through foliage persists one to three months

volatile

- low acute mammalian toxicity Toxicity:

Mammalian LD50: 2,900 mg/kg (rat) Avian LD50: 673 mg/kg (pheasant)

Fish LC50: (96 h) 135 mg/L

Crops Protected: all three products protect wheat, oats, barley

Banvel is also used to protect pastures, non-crop areas, rangeland, field

corn, rye, canaryseed and creeping red fescue

#### **DICLOFOP-METHYL**

**TRADE NAME:** 

Hoe-Grass II. Hoe-Grass 284

Formulations: 8%

emulsifiable concentrate: Hoe-Grass II 23% diclofop-methyl,

bromoxynil, Hoe-Grass 284 28.4% diclop-methyl

Application Rate:

- Hoe-Grass II 1.08 kg a.i./ha

- Hoe-Grass 284 1.0 kg a.i./ha for dry beans, potatoes, soybeans, sugar beets and 0.7-0.8 kg a.i./ha for all

other field crops

Application Method: -

- spraying using ground equipment

Application Time: Target Species:

- during growing season (most effective on young weeds)

- both products control wild oats, volunteer corn, barnyard grass,

persian darnel, yellow and green foxtail

Hoe-Grass 284 also controls fall panicum and witch grass
 Hoe-GrassII also controls knawel, night-flowering catchfly,

scentless chamomile, lamb's-quarters, Russian thistle, tartary buckwheat, lady's-thumb, green smartweed, kochia, common groundsel, cow cockle, wild mustard, stinkweed, red-root

pigweed

Properties:

- diphenyl ether compound

- contact as well as systemic action

- uptake is primarily through the leaves, but if soil is sufficiently

moist uptake through the roots is possible

- some movement in soil if sufficient moisture is present

**Toxicity:** 

- toxic to fish

- Hoe-Grass 284:

Mammalian LD50: 2235 mg/kg Fish LC50 (96 hr): 0.42 mg/L (trout)

Hoe Grass II:

Mammalian LD50: 2350 mg/kg

Fish LC50 (96 hr): 1.0 mg/L (trout)

Crops Protected:

- Both products protect wheat (spring, semi-dwarf, durum), barley

(except Klages and Betzes), triticale, flax, spring rye

- Hoe-Grass 284 also protects lentils, mustard, peas, peas, fall rye,

soybeans, sugarbeets, sunflowers, fababeans, rapeseed,

buckwheat, dry beans, alfalfa, bromegrass, red clover, sweet clover, creeping red fescue, crested wheat grass, intermediate

wheatgrass, Russian wild rye grasses.

#### DIFENZOOUAT

TRADENAME:

Avenge 220-C, Avenge 280-C, Avenge 640

Formulations:

- aqueous solution: Avenge 220-C 20% active ingredient

- liquid: Avenge 280-C 28% active ingredient - dry flowable: Avenge 640 64% active ingredient

**Application Rate:** 

-0.70-0.85 kg a.i./ha

Application Method:

Application Time:

- applied prior to the 6-leaf stage of barley, wheat, or canary seed - wild oats

Target species: Properties:

- systemic herbicide which is absorbed by all leaf and stem surfaces

- not to be applied in the Brown Soil Zone

- recommended only for soils with a pH of 7.5 or lower

**Toxicity:** 

- non-toxic to bees

Mammalian LD50: 470 mg/kg

Crops Protected:

- barley, wheat, rye, triticale, canary grass

#### **GLYPHOSATE**

**TRADE NAME:** 

Roundup

Formulations:

- aqueous solution, 35.6% active ingredient

Application Rate:

- 0.83-4.3 kg a.i./ha

Application Method:

**Application Time:** 

- pre-emergence and post-emergence herbicide depending on crop - annual and deep-rooted perennial weeds (Canada thistle, sow thistle,

Target Species:

grass, field bindweed) brush species

quack Properties:

- contacts foliage and is a systemic herbicide translocated to roots

- rapidly deactivated in soil

- non-selective

**Toxicity:** 

- low toxicity to mammals, birds, fish and honeybees

Mammalian acute oral LD50: 4,320 mg/kg

Avian LD50: 4,300 mg/kg (mallard)

Crops Protected:

- barley, wheat, oats, corn, legumes, grasses, fall stubble treatment and

summerfallow

**MCPA** 

((4-chloro-2-methylphenoxy)-acetic acid)

TRADE NAME:

MCPA (amine, ester, salts)

Formulations:

- most commonly dimethylamine salt, 50% active ingredient

Application Rate: **Application Method:** 

dimethylamine salt 50%: 0.35 to 0.88 kg a.i./ha

Application Time:

applied from early spring through to late summer

Target Species:

American dragonhead, biennial wormwood, bluebur, cocklebur, common burdock, flixweed, goat's beard, goosefoot, hairy galinsoga, lamb's-quarters, mustard, peppergrass, pigweed purslane, ragweed, stinkweed, thyme-leaved spurge, annual smartweed, buckwheat, Canada thistle, hemp-nettle, field horsetail, knapweed, leafy purge, plantain, pigweed, shepard's

purse, sow-thistle, tall buttercup, wild radish

Properties:

systemic herbicide absorbed by all leaf and stem surfaces not to be used in porous soil, subject to leaching near wells or potable

water bodies

Toxicity:

low to moderate toxicity to humans and animals

Mammalian LD50: 800 mg/kg (rat) Fish LC50 (48 hr): 1.5 mg/L(bluegill)

**Crops Protected:** 

- wheat, barley, oats, flax, corn, grasses, rye, peas, red clover, alsike

clover, white clover

- chlorophenoxy compound

#### <u>TRIALLATE</u>

TRADE NAME:

Avadex, Avadex BW

Formulations:

- granular: Avadex 10% active ingredient - liquid: Avadex 40% active ingredient

**Application Rate:** 

- 1.1- 2.2 kg a.i./ha - various, soil incorporated

Application Method: **Application Time:** 

selective pre-plant or pre-emergence herbicide, applied in the spring and

Target species:

wild oats, green and yellow foxtail

Properties:

carbamate

negligible movement in soil

may remain in soils one year after treatment at levels of 25% or more of the applied rate (Grue et al. 1986)

rainfall is required for activation of Avadex

Toxicity:

Mammalian LD50: 20 g/kg

does not appear to be absorbed through human skin

Crops Protected:

wheat (spring and durum), barley, flax; forage legumes (alfalfa, red clover, alsike clover, white clover, sweet clover, bird's foot trefoil

underseeded to rapeseed, peas, mustard

#### TRIFLURALIN

TRADE NAME:

Treflan, Rival

Formulations:

- emulsifiable concentrate: Treflan E.C. 54.5% active ingredient

- liquid: Rival 50% active ingredient

- granular: Treflan QR5 5% active ingredient

**Application Rate:** Application Method: - soil incorporated

- 0.6-1.1 kg a.i./ha

Application Time:

- pre-plant

Target Species: Properties:

- annual broadleaf and grassy weeds

- selective herbicide

- acts on growing tips in root and shoot by inhibiting cell division

- not for use in muck or wet soils, or those with >15% organic matter

**Toxicity:** 

- low acute mammalian toxicity Mammalian LD50: >10,000 mg/kg

- toxic to fish

Fish LC50 (24 hr): 0.21 mg/L (trout) Avian LD50: >2,000 mg/kg (mallard)

Crops Protected:

Canola-rapeseed, mustard, fababeans, peas, lentils, flax, sunflowers,

and sovbean are protected by all three products. alfalfa is protected by Treflan E.C. and Rival

#### 4.4 **RODENTICIDES** \

### **STRYCHNINE**

TRADE NAME:

Gopher Getter, Gopher poison, Rodent bait, Gopher kill

Formulations:

baits, pellets (0.35%)1 - 2.25 kg/ha

**Application Rate:** 

- placed in burrows

Application Method:
Application Time:
Target Species:

- various

Properties:

pocket gophersbotanical compound

Toxicity:

- highly toxic to humans, domestic animals and wildlife

Mammalian LD50: 1 mg/kg

#### 5.0 TOXICITY OF PESTICIDES

Pesticide toxicity may manifest itself as environmental effects or may affect an organism by acute, chronic, or behavioural effects. Exposure to pesticides may occur from ingestion of foods treated with pesticides, direct ingestion of granular pesticides, direct skin contact or inhalation of airborn materials near treated areas (Bloom and Degler, 1969).

Pesticide persistence in the environment or transport from the site of application via the air, water, soil and in living organisms may result in harm to organisms. Aerial movement of pesticides depends on the physical state of the pesticide, its chemical composition, application methods and atmospheric conditions. It has been observed that 60 to 90 % of an aerial spray application may never reach its target (Fyfe, 1971). Soil moisture and climate influence pesticide transport into the aquatic environment. The solubility or suspendability of the formulation in water, the physical and chemical characteristics of the water and the presence of biological organisms influence the distribution of the pesticide in the aquatic environment.

Persistence depends on the pesticide, soil type, soil moisture and temperature, air movements, cover crops, rate of application, formulation and micro-organisms (Bloom and Degler, 1969). Pesticides may adsorb or adhere to the foliage of plants, or they may be translocated to underground organs. Organophosphate and carbamate pesticides can persist in the soil up to several months, but have not been found to cause long-term soil residue problems (Bloom and Degler, 1969). Herbicides which have a relatively short life in soil do not present problems for either direct contact or transport from the site. Some, however, persist in the soil for months or even years after application and may injure subsequent crops (Bloom and Degler, 1969). For example triallate and trifuraling may remain in soils one year after treatment at levels of 25 % or more of the applied rate (Grue et al. 1986).

Acute effects of pesticides are those which occur in response to a single exposure, (respiratory, oral or dermal) or repeated exposure to the chemical within a short time period. Toxicity tests of various chemicals are conducted to determine the concentration of chemical which would kill an organism. The LD50 value refers to the concentration in a single dose (LD = lethal dose) which would kill 50 percent of the test population of animals. In contrast the LC50 (median lethal concentration) refers to the concentration of a substance that kills half of a group of test organisms during a specified exposure period (e.g. 96h LC50).

Acute toxicity is associated with direct ingestion of highly toxic chemicals or in cases where poisoned insects or birds are consumed by other species in relatively large quantities. Ingestion of sprayed foliage and dermal or respiratory exposure is more often associated with chronic effects. Chronic effects, such as a loss of appetite, behavioural abnormalities, organ damage, and weakness, are poorly understood and documented. Organophosphorous insecticides and some herbicides have been associated with high chronicity values. The speed with which a pesticide is metabolized is an important factor in considering chronic effects. Water soluble pesticides and those which are quickly metabolized by the animal are not as likely to have chronic effects as those which are retained in fat cells, those which take a long time to pass through the animal and those which are constantly present in the animal's environment. Carcinogenic, teratogenic and mutagenic effects from pesticides are poorly understood at present.

Insecticides as a group represent some of the most toxic pesticides in use. Herbicides and fungicides in general have a low mammalian and avian toxicity; however, their sub-lethal effects may be significant. Fungicides also tend to be highly toxic to fish.

In order to gain a perspective on the relative toxicities of the different pesticides to the various vertebrates, a list of vertebrates and the acute oral toxicities of various pesticides has been prepared (Table 5-7). These tables have been assembled primarily from Pimentel (1971) and Hudson et al. (1984). The information available for fish is quite fractured. Results are not consistently available for the same species of fish or for the same experimental conditions. Toxicity can vary widely depending on the water temperature or length of exposure. We have attempted to cite the 24 hour LC50 for salmonids; however, these figures were not always available and where specified other values were substituted. This information is presented with the intention of providing a basis of comparison between species.

TABLE 5: ACUTE ORAL TOXICITY OF INSECTICIDES TO MAMMALS, BIRDS [LD50 mg/kg] AND FISH [LC50 24 hour mg/L].

Active Ingredient	Mammal		T	Birds [LD <sub>50</sub> mg/kg]		Fish 24 hour LC <sub>50</sub> mg/L]	
	Rat	Mule Deer	Mallard	Pheasant	Quail	Salmonids	
azinphos-methyl	18	32-64	136 <sup>-</sup>	74.9	60-120	0.049	
bendiocarb	179		· · · · · · · · · · · · · · · · · · ·				
carbaryl	540	200-400	2179	>2000	2290	0.8-4.4	
carbofuran	11		0.40	4.2	5.0		
chinomethionat	1100						
chloramben	3500				>700		
chlorpyrifos	135		35-161	3-25	10-115		
cyhexatin	180-820				195		
cypermethrin	251	· ·					
deltamethrin	128					_	
diazinon	76-108		3.5	4.3		0.38	
dichlorvos	25-170		7.8	1	298		
dicofol	700		1700-1900	2100-2300	1400-1500		
dimethoate	185-245	200	41.7			19	
disulfoton	12.5	2.5-5	6.5	11.9			
DNOC	26-30		22.7	25-80		0.210	
endosulfan -	100 .		33.0			0.013003	
ethion	96		>2560	1297	,	0.7	
fensulfothion	2-10		0.75	1.34	1.19-1.68		
fenthion	200-300		5.9	17.8	10.9		
fonofos	8		16.9				
lindane	88-200		2000			0.03	
malathion	480-1500		1,485	1167		0.079	
methamidophos	13		8.48				
methidathion	25		23.6	33.2			
methomyl	17-24	11-22	15.9	15	T		
mevinphos	608		4.6	1.4		0.034	
naled	430	200	52.2			0.240-1.300	
nicotine	50-60		587	1200-2000	530		
parathion	4-30	22-44	1.9-2.1	12.4	6.0	2	
permethrin	>4000						
phorate	1.6		0.6-2.6	7.1	373	<1 .	
phosalone	82						
phosmet	147-299		1830		501		
pipoeronyl butoxide	6150			,			
propoxur	100	,	11.9	20	28.3	1	
pyrethrins	820-1870		>10000		>5000		
rotenone	132	T	>2000	>1414	1882	0.15	

TABLE 6: ACUTE ORAL TOXICITY OF FUNGICIDES TO MAMMALS, BIRDS AND FISH.

Active Ingredient	Mammals [LD <sub>50</sub> mg/kg]				Fish [24 hour LC <sub>50</sub> mg/L]
	Rat	Mallard	Pheasant	Quail	Salmonids
anilazine	2700				`\
benomyl	>9600				
captan	9000	>5000	2000-5000		
carbathiin	3200	,			
dazomet	320				
dichloran	1500				
dichlone	1300	>2000			0.34
dinocap :	980				/
dodine	1000	J			
ferbam	17000	,*			
folpet	>10000	>2000		``	1.6-2.5
iprodione	3700				
mancozeb	7500				
maneb	1000				
metalaxyl	670	,			
metiram	6200				22
oxycarboxin	2000				
thiophanate methyl	· 7500				
thiram	780	>2800	673		0.79
zineb	5200	>2000	>2000		
ziram	1400	reported harm	less to birds at reco	mmended dosag	ges 1

TABLE 7: ACUTE ORAL TOXICITY OF HERBICIDES TO MAMMALS, BIRDS AND FISH.

Active Ingredient	Mammals [LD <sub>50</sub> mg/kg]	Birds [LD <sub>50</sub> mg/kg]		Fish [24 hour LC <sub>50</sub> mg/L]	
	Rat	Mallard	Pheasant	Quail	Salmonids
2,4-D	300-670	1,000	472	668	1-250
2,4-D amine	300	,			
2,4-D ester	620				
2,4-DB	500				•
amitrole	1100	2000	5000	>5000	3250
atrazine	1780	2000	5000	700-800	12.6
bentazon	1100				
bromoxynil	260-440	200	4000		64
chloroxuron	3700	>2000			>50
chlorsulfuron	5545	5,000			250 [96hr]
clopyralid	5000			•	
cyanazine	182	>2400	445	•	
dicamba	1000	673-800			135 [96hr]
dichlobenil	3160	>2000	1189		
diclofop-methyl	563				0.42 [96 hr]
difenzoquat	270				
dinoseb ·	37	27	26		
diphenamide	700	·			•
diquat	215-440	564			12-90
diuron	3400	>2000			16
EPTC	1630	,		•	
ethephon	4229				
fenoxaprop-ethyl	2680	•		· · · · · · · · · · · · · · · · · · ·	
fluazifop-butyl	3328				
glyphosate	4300		3850		
linuron	4000				
MCPA	700				
МСРВ '	680-700				
mecoprop	650-930				
metribuzin	2200-2345				
paraquat	100	144-276			400-840
picloram	8200	2000	2000		2.5-230
sethoxydin	2675-3125			,	
simazine	>5000	>5000	>5000		68
triallate	1675-2165				,
trifluralin	>10000	>2000	>2000		0.21
vernolate	1800				- 6.2

TABLE 8: ACUTE ORAL TOXICITY OF RODENTICIDES TO MAMMALS.

Active Ingredient	Mammals [LD <sub>50</sub> mg/kg]
	Rat .
brodifacoum	0.27
bromadiolone	1.1
chlorophacinone	20
diphacinone	2
sulfaquinoxaline	1,000
strychnine	1.
warfarin	185
zinc phosphate	46

Acute toxicity levels to birds and fish are not available.

#### 6.0 LITERATURE CITED

Adams, R.W. 1987. Handbook for Pesticide Applicators and Dispensers, 5th ed. Ministry of Environment and Parks, Pesticide Control Branch, Victoria, B.C.

Agriculture Canada. Compendium of Pest Control Products Registered in Canada.

Environment Canada and British Columbia Department of Recreation and Conservation. 1975. Biocides. Fish and Wildlife Concerns.

Bloom, S.C. and S.E. Degler. 1969. Pesticides and Pollution. Bureau of National Affairs Inc., Wash., D.C.

Brown, A.W.A. 1978. Ecology of Pesticides. John Wiley and Sons, New York.

Fyfe, R. 1971. Pesticides and Wildlife. <u>In</u>: Pesticides and Wildlife. Canadian Wildlife Service. pp. 4-13.

Grue, C.E., L.R. Deweese, P. Mineau, G. A. Swannson, J.R. Foster, P.M. Arnold, J.N. Huckins, P.J. Sheehan, W.K. Marshall and A.P. Ludden. 1986. Potential impacts of agricultural chemicals on waterfowl and other wildlife inhabiting prairie wetlands: an evaluation of research needs and approaches. <u>In:</u> Trans. 51<sup>st</sup> N. A. Wildl. and Nat. Res. Conf. McCabe, R. E. (ed.) pp. 357-383.

Hudson, R. H., R.K Tucker, and M.A. Haegele. 1984. Handbook of Toxicology of Pesticides to Wildlife. United States Department of the Interior, Fish and Wildlife Service. Resource Publication 153. Washington, D.C. 90 pp.

Ministry of Agriculture and Fisheries. 1987. Berry Production Guide. Victoria, B.C.

Ministry of Agriculture and Fisheries. 1990. Field Crop Guide to Weed, Disease, Insect, Bird and Rodent Control for Commercial Growers. Victoria, B.C.

Ministry of Agriculture and Fisheries. 1987. Grape Production Guide. Victoria, B.C.

Ministry of Agriculture and Fisheries. 1987. Greenhouse Vegetable Production Guide. Victoria, B.C.

Ministry of Agriculture and Fisheries. 1987. Nursery Production Guide. Victoria, B.C.

Ministry of Agriculture and Fisheries. 1987. Tree Fruit Production Guide for Interior Districts., Victoria, B.C.

Ministry of Agriculture and Fisheries. 1987. Vegetable Production Guide. Victoria, B.C.

Ministry of Forest and Lands, Protection Branch. 1987. Handbook for Pesticide Applicators and Dispensers: Forestry Supplement. Victoria, B.C.

Pimentel, D. 1971. Ecological Effects of Pesticides on Non-Target Species. Executive Office of the President. Office of Science and Technology. Washington D.C. 220 pp.

Royal Commission of Inquiry into the Use of Pesticides and Herbicides. Final Report of the Commissioners May 30, 1975. Province of British Columbia.

Rudd, R. L. 1964. Pesticides and the Living Landscape. The University of Wisconsin Press, Madison, Wisconsin.

### Appendix 1: Study Terms of Reference

#### Title:

Development of a Pesticide Use Pattern for the Okanagan and Similkameen Valley and the Peace River Region of British Columbia.

#### Background:

Agricultural chemicals are used extensively in fruit production in the Okanagan and Similkameen Valley and for grain crops in the Peace River Region of British Columbia. A comprehensive listing of the types and quantities of pesticides used in these areas have never been compiled. Many of these chemicals are highly toxic to aquatic life and may have impacts on fish in sloughs or nearshore areas of the Okanagan, Similkameen, and Peace Rivers or their tributaries. An accurate assessment of the types and volumes of pesticides used, and the specific areas of application of these chemicals are important to developing long term strategies in pesticide management in these areas of British Columbia.

#### Area:

Okanagan Valley - Armstrong to Osoyoos Similkameen Valley - Keremeos to U.S. Border Peace River - Chetwynd east to Alberta Border and north to 57° Lat.

#### Objectives:

- a) To identify the major existing pesticide retail outlets in the Okanagan, Similkameen and Peace River areas.
- b) To identify and quantify all pesticides sold in these areas according to active ingredient and total product.
- c) To identify, for pesticides having significant usage, crops protected, target species, types of application and geographical areas of application.

#### Statement Of Work:

The posticide use pattern will be developed as described below:

- 1. The information will be collected via a questionnaire designed in consultation with the Scientific Authority. Comments from pesticide regulatory and advisory authorities will be incorporated where appropriate into the final format. The Scientific Authority and the consultant will also review the questionnaire with appropriate agricultural associations in the province.
- 2. A list of retailers of pesticide products will be compiled from various sources (government, industry associations). Data collection will involve mailing and completion of the questionnaire by retailers and compilation and tabulation of the data in an appropriate format. If necessary the contractor will visit the retailers in person to compile and tabulate the data.
- 3. A master list of trade names with Pesticide Control Products Act number, volumes of total product and volumes of active ingredient will be produced. The general geographical area of use of each active ingredient in the three areas will be identified including rates and methods of application. The protected crops and target species will also be identified.
- 4. The contractor will prepare a report outlining the results of the study.

#### M1 lestones

Assuming a starting date of January 2, 1991, the contractor will provide a
progress report on February 28, 1991.

#### Reporting

A final report divided into three sections based on the areas surveyed must be submitted by March 31, 1991. Nine copies of the final report should be submitted.

NOTE: Due to SENSITIVITY OF THIS INFORMATION all data collected will be classified as PROTECTED. Contractor shall not reveal any information collected from one retailer to another.

# APPENDIX 2: B.C. PESTICIDE CONTROL BRANCH LIST OF LICENCED VENDORS, 1990

Company	Address	City
United Feeds	RR#3, C-62 Pallisades	Armstrong
Buckerfield's Ltd.	Railway Ave.	Armstrong
Daystar Farm Services Ltd.	2120 Wood Ave.	Armstrong
Van Waters & Rogers Ltd.	#5 - 1651 Kirschner Rd	Kelowna
Buckerfield's Ltd.	103 -1889 Springfield Rd.	Kelowna
Growers Supply Co. Ltd.	421 Cawston Ave.	Kelowna
Okanagan Similkameen Coop Growers Assn.	10th Ave.	Keremeos
Similkameen Farm Supplies	603 -7th Ave.	Keremeos
South Valley Sales	7th Ave & 7th St.	Keremeos
Naramata Co-operative Growers Exchange	2nd St.	Naramata
Okanagan Similkameen Coop Growers Assn.	9th St. E.	Oliver
Oliver Farm Supplies Ltd.	East 2nd Ave.	Oliver
South Valley Wholesale & Man Co. Ltd.	26664 - 83rd St.	Oliver
Monashee Co-operative Growers Assn.	12617 - 87th St.	Osoyoos
Okanagan Similkameen Coop Growers Assn.	76th Ave & 81st St.	Osoyoos
Greenacres Pumps & Equipment Ltd.	2100 Dartmouth Rd.	Penticton
Growers Supply Co. Ltd.	288 Dawson Ave.	Penticton
Growers Supply Co. Ltd.	8911 Jubilee Rd.	Summerland
Okanagan North Growers Cooperative	2601 - 32nd St.	Vernon
Briteland agricultural Services	3208 - 28th St.	Vernon
Westbank Packers Ltd.	3630 Brown Rd.	Westbank

## APPENDIX 3: COMPANIES REMOVED FROM DISTRIBUTORS LIST

Company	Address	City
Peoples Drug Mart	3300 Smith Drive	Armstrong
Shepherds Hardware Ltd:	3525 Hill St.	Armstrong
Roots & Fruits Country Market	Hwy 97 South	Kaleden
Revelstoke Home Centre	2300 Leckie Rd.	Kelowna
West-Wind Nursery Ltd.	2169 Benvoulin Rd	Kelowna
Art Knapp Plantland	1994 Springfield Rd.	Kelowna
Beaver Lumber	1850 Spall Rd.	Kelowna
Burnett & Sons Nurseries Ltd.	2180 Ethel St.	Kelowna
Bylands Garden Centre	1600 Byland Rd.	Kelowna
Canadian Tire	1655 Leckie Rd	Kelowna
Greenery Holdings Ltd.	1007 Rutland Rd.	Kelowna
Kelowna Home Hardware	1650 Springfield Rd.	Kelowna
London Drugs	#100 - 1950 Harvey Ave.	Kelowna
Bigelow's Hardware	2060 Shuswap Ave.	Lumby
O.K. Falls Hardware	940 Main St.	Okanagan Falls
Oliver Home Hardware	Box 730	Oliver
Osoyoos Home Hardware	8501 -76th Ave.	Osoyoos
Castle Lumber	8702 - 76th Ave.	Osoyoos
Bob's Market	5836 Beach Ave.	Peachland
Woodwards Stores Ltd.	2111 Main St.	Penticton
Woolco	275 Green Ave. West	Penticton
Art Knapp Plantland	670 Hastings Ave.	Penticton
Beaver Lumber	1575 Fairview Rd.	Penticton
Canadian Tire	250 Winnipeg St.	Penticton
Home Hardware Building Centre	200 Carni Ave.	Penticton
Shop Easy	10108 Jubilee Rd.	Summerland
Summerland 5 to \$1.00 Store	Main St.	Summerland
Summerland Farm and Garden Center	13202 North Victoria Rd.	Summerland
Swan Valley Fruit & Garden Centre	7920 Hwy 97 North	Vernon
Art Knapp Plantland	6325 Highway 97	Vernon
Beaver Lumber	4601 - 27th St.	Vernon
Canadian Tire	4510 - 27th St.	Vernon
Fisher's hardware (1982) Ltd.	3300 Coldstream Ave.	Vernon
K-Mart Canada Ltd.	Village Green Mall	Vernon
Kal Nursery	307 - 24th St.	Vernon
Westbank Home Hardware	2448 Main St.	Westbank
Dogwood Nursery	Shannon Lake Rd.	Westbank
Lake Country Builders Mart Ltd.	3223 Woods Lake Rd.	Winfield

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	a.i	Total a.i. (kg)
	A.P.M.	azinphos-methyl	I ·	2.00	50%	59.0
	Agrox D-L Plus	diazinon	I '	0.05	15%	0.4
		lindane	I	0.05	25%	0.7
	Agrox D-L Plus Powder	diazinon	I,M		15%	0.5
		lindane	I	:	25%	0.8
. 14882	Ambush 500 EC (1 1)	permethrin	I	1.00	50%	39.8
	Ambush 50EC	permethrin	I	0.05	50%	0.0
16412	APM 50 WP	azinphos-methyl	I	-	. 50%	20,427.0
	Back rubber	malathion	I,M	1.00	50%	7.0
	Barn & L'Stock Liquid Soln	diclorvos	I		0%	0.2
17,422	Dan et Dotter Dique com	pip-butoxide	Ī		0%	0.1
		pyrethrins	Ī		0%	0.0
	Basudin	diazinon	Ī	2.00	50%	1.0
	Basudin 50EC	diazinon	Î	. 2.00	50%	2.0
	Basudin 50 WP	diazinon	I.		50%	4,155.0
	Baygon L.C.(41)		I	4.00	18%	168.7
		propoxur	I	1.00	30%	
	Belmark 30 EC(1 l)	fenvalerate		1.00		27.4
	Carazol	formetanate hydrochloride	M		92%	6.9
	Carazol WP	formetanate hydrochloride	M		92%	60.3
	CIODRIN 200	crotpxyphos	1	1.00	20%	1.0
	CIOVAP	crotpxyphos	I ·	10.00	1%	0.1
9448	Cudvap liquid	crotoxyphos	I		1%	0.2
		dichlorvos	I		0%	0.1
	Cymbush (12.5 wp)	cypermethrin	I		13%	3.1
	Cymbush 250 EC(1 l)	cypermethrin	I	1.00	25%	4.0
	Cythion 1000-10l	malathion	I,M	10.00	100%	40.0
	Dasanit 7.2 E (S.C) (10 l)	fensulfothion	I	10.00	72%	14.4
17305	Decis 2.5 EC(1 l)	deltamethrin	I -	1.00	25%	75.5
19386	Della Dairy Spray II- liq	pip-butoxide	I		1%	0.2
		pyrethrins	I		0%	0.0
	·	dichlorvos	I		0%	0.1
21549	Della Dairy Spray-liq	pip-butoxide	Ĭ / .		0%	0.1
		pyrethrins	I '		0%	. 0.1
15176	Della Fly Bait granules	methomyl	Î		1%	0.1
102.10	·	muscalure	Ī		0%	0.0
21550	Della Mist-aerosol	pip-butoxide	Ī		4%	0.3
21330		pyrethrins	Ī		. 5%	0.4
21556	Della Zap- aerosol	d-trans allothria	Ī		1%	· 0.0
21330	Della Zap- acrosor	pip-butoxide	Ī		4%	0.1
0510	Di Syston granualar 15G	disulfoton	I		15%	12.0
	Diazinon	diazinon	Ī	1.00	13%	0.4
	Diazmon	diazinon	I	2.00	50%	1.0
					50%	70.5
	Diazinon 50 WP	diazinon	I,M	1.00	50%	1,273.0
	Diazinon 50 WP	diazinon	I,M	1.00		
	Diazinon 500 E.C. (101)	diazinon	I,M	10.00	50%	1,096.0
	Diazinon 500 E.C. (41)	diazinon	I,M	4.00	50%	1,158.0
	Diazinon 50EC	diazinon	I,M		50%	517.0
	Diazinon 50EC	diazinon	I,M	4.00	50%	2.0
	Diazinon 50W 2 kg	diazinon	I,M	2.00	50%	13,232.8
12538	Diazinon 5G Granular	diazinon	I,M		5%	20.0
7442	Dibrom 8E liq sol'n	naled	I,M		1%	0.1
10455?	Dimethoate 480 EC (1 l)	dimethoate	I,M	1.00	48%	17.3
10455	Dimethoate 480 EC (101)	dimethoate	I,M	10.00	48%	288.0
10455	Dimethoate 480 EC (3.78·1)	dimethoate	I,M	3.78	48%	134.5
10455	Dimethoate 480 EC (4 I)	dimethoate	I,M	4.00	48%	271.2
11252	Dipel 10 kg	Bacillus thuringiensis	I	10.00		0.0
11252	Dipel WP 500 gm	Bacillus thuringiensis	I,	0.50		0.0
	Disvap	n-octyl bicycloheptene dicarboxi	r I	2.00	1%	0.0
		pip-butoxide	Ī .	2.00	1%	1.4
		pyrethrins	I,M	2.00	5%	0.3
17250	Disvap spray - aerosol	n-octyl bicycloheptene dicarboxi	<del>                                     </del>	2.00	1%	
11230	www.ap spray - acrosor	pip-butoxide	I		1%	0.0
		<del>                                     </del>	I		5%	0.1
	D	pyrethrins		204.75		
	Dormant Oil	petroleum oil	I,M	204.75	100%	0.0
					4000	
	Dormant Oil	mineral oils	I,M	1 drum	100%	0.0
	Dormant Oil Dormant Oil	mineral oils	I,M I,M	2.00	100%	18.0
•	Dormant Oil	<del></del>	I,M			18.0 23.0

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT			a.ř.	Total a.i. (kg)
	Dormant Oil 1101	mineral oils	I,M	110.00	100%	37,575
	Dormant Oil 200 l	mineral oils	I,M	200.00	100%	90,577
	Dormant Oil Kit 11	mineral oils	I,M	1.00	98%	41
	Dri kill	rotenone	I	0.45	0%	. 0
	Dri kill	rotenone	I	0.90	0%	0
10043	Dri-kil [4 kg]	rotenone	I		2%	. 0
10043	Dri-kil [900g]	rotenone	I		2%	0
10636	Dursban 2E lig sol'n	chlorpyrifos	I	1	24%	· 0
9061	Dusting Powder	carbaryl	I,M		5%	0
	Dyfonate	fonofos	Ī	20.00	10%	4
, 10609	Dyfonate 10 G (20 kg)	fonofos	Ī	20.00	10%	67
16286	Ectiban	permethrin	Ť .		5%	0
	Ectiban	permethrin	Ť .	0.50	5%	. 0
	Ectiban	permethrin	T	0.28	5%	0
	Elgetrol 3.75 l	DNOC	ĪF	3.75	20%	9,267
	Ethion 25 W 2 kg	ethion	I.M	2.00	25%	942
	Fly bait pellit	methomyl	T /	- 2.00	1%	. 942
	Fly bait pellit	muscalure	II.	-	0%	, 0
			1	500	0%	
	Frigate	pip-butoxide	I	5.00		0
	Frigate	pyrethrins	I,M	5.00	0%	0
10491	Frigate (5 I) 800 EC	pip-butoxide	1	7.00	0%	1
	Frigate (5 I) 800 EC	pyrethrins	I,M	5.00	0%	- 0
	Furadan 10 G	carbofuran	1	-	10%	. 16
	Furadan 4.8 F (S.C.) (41)	carbofuran	1	4.00	48%	35
	Furdan	carbofuran	ĮI	20.00	48%	28
	Gallex liq sol'n	malathion	I,M		10%	C
	Gallex liq sol'n	trichlorfon	I		8%	C
15176	Golden Malrin	methomyl	I		1%	
	Golden Malrin	z-9 tricosene	I	0.68	0%	
	Golden Malrin	methomyl	Ι.	0.68	1%	(
	Golden Malrin	z-9 tricosene	I	1.82	0%	. (
	Golden Malrin	methomyl	Ι	1.82	1%	. (
	Golden Malrin	z-9 tricosene	I '	10.00	0%	0
	Golden Malrin	methomyl	I	10.00	1%	
	Golden Malrin	z-9 tricosene	I	2.00	0%	0
	Golden Malrin	methomyl	I	2.00	1%	C
	Golden Malrin	z-9 tricosene	I	0.90	0%	
	Golden Malrin	methomyl	Ī	0.90	1%	(
····	Golden Malrin	z-9 tricosene	Ī	1.00	0%	. (
	Golden Malrin	methomyl	Ť	1.00	1%	. (
	Grubex	trichlorfon	T	1.00	8%	
	Guthion 50 W.P.	azinphos-methyl	<del> </del>	<del>- </del> -	50%	989
	Guthion 50 W.P. (2 kg)	azinphos-methyl	Ī .	2.00	50%	13,423
	Guthion 50W Solupak (2 kg)	azinphos-methyl	Ī.	2.00	50%	338
		phosmet	I,M	2.00	50%	14
. 0729	Imidan 50 WP			2.00	50%	5,30
	K.R.S.	_ IA	I,M	0.45	20%	
		coumaphos	I,M	0.45		(
	Kelthane 35 WP	dicofol	M	1 22	35%	21
	Kelthane E.C. (81)	dicofol	M	8.00	19%	14:
6374	Kelthane EC	dicofol	<u>M</u> ·		19%	39
	Konk	pip-butoxide	I	0.21	1%	
		pyrethrins	I,M	0.21	1%	
	Konk 409	n octyl bicycloheptene dicarbox	i I		3%	
	Konk 408	pip-butoxide	I		2%	(
	Konk 408	pyrethrins	I,M		1%	
•	Konk 409	n-octyl bicycloheptene dicarbox	i I	0.21	3%	
	Konk 409	pip-butoxide	I		2%	
	Konk 409	pip-butoxide	I	0.21	2%	
20547	Konk 409	pyrethrins	I,M		21%	1.
	Konk 409	pyrethrins	I,M	0.21	21%	
20778	Konk Pro	dicarboximide	I	1	3%	
	Konk Pro	dicarboximide	Ī	0.21	3%	
	Konk Too	d-trans allothria	Ī	.(	1%	
	Konk Too	d-trans allothria	ī	0.69	1%	
	Konk Too	pip-butoxide	ī	1-0.03	1%	
	Konk Too	pip-butoxide	Ī	0.69	1%	
				: 17.03	170	,
	Lagon 48 EC	dimethoate	I,M	- 0.05	48%	

11705	TRADE NAME  Lannate L liq sol'n	ACTIVE INGREDIES methomyl	NT USE	SIZE	a.i 22%	Total a.i. (kg) 16
			<u>1</u>	0.50		
	Lindane	lindane	<u>1</u>	0.50	11%	0.
	Lindane		1		11%	0.
	Lindane	lindane	1	4.00	11%	0.
	Lindane 25% WP	lindane	<u> </u>	700.00	25%	24.
	Lindane e.c	lindane	<u>l</u>	500.00	10%	0.
	Lorsban	chlorpyrifos	<u> </u>		25%	5.
11315	Lorsban 25 WP	chlorpyrifos	I		25%	0
	Lorsban 4E (18.93 l)	chlorpyrifos	I	18.93	48%	36
	Lysoff	fenthion	I	1.70	8%	1
	Lysoff	fenthion	I	1.70	8%	0
	Malathion ·	malathion	I,M	4.00	50%	4
	Malathion 25 WP	malathion	I,M		25%	2
10132;19364	Malathion 500 E.C.	malathion	I,M	10.00	50%	497
10132	Malathion 500 E.C.	malathion	I,M	4.00	50%	183
8372	Malathion 85EC	malathion	I,M		85%	40
12287	Monitor	methamidophos	I	10.00	48%	. 348
	Monobar Chlorate Gran.	boron equivalent	I	50.00	7%	70.
	Morestan 25 WP	chinomethionat	I,M,F	2.00	25%	883
	Niag Dormant oil	mineral oils	I,H		100%	98,810
	Nicotine Sulphate 40%	nicotine			40%	3
	NM Dual Drill box T - dust	Lindane	Ī		50%	4
	Parathion 15 W	parathion	Ť		15%	0
	Parathion 9.6 E	parathion	T T	19.00	76%	195
	Parathion 960 liq sol'n	parathion	- I <del>-</del>	15.00	96%	36
	Penta 1-10 liq	pentachlorophenol	T		35%	82
	Penta RTU Liq Sol'n	pentachlorophenol	I	-	5%	9
	Pentac 50 WP	dienochlor	M ~		50%	0
		dienochlor	M		38%	6
	Pentac aquafow liq sol'n		T T	1.00		
	Pirimor 50 W	pirimicarb	1	1.00	50%	578
	Plant Fume	dichlorvos	<u> </u>		5%	0
	Plant-Fume DDVP Fumigant	dichlorvos	<u>L</u>		5%	1
	Plant-Fume Nicotine Fumigant	nicotine			1%	. 0
	Plant-Fume Parathion Fumigant	parathion	I		7%	0
	Prem Dormant oil	mineral oils	I,H		99%	5,500
	Pro-L'stock Spray	pip-butoxide	I		1%	0
	Pro-L'stock Spray	pyrethrins	I,M		1%	0
	Quik-Kill	dichlorvos	I	1.00	19%	0
	Ripcord liq sol	cypermethrin	I		40%	0
14669	Safer's soap liq sol'n	soap	I		51%	448
17422	Sanex	dichlorvos	I	4.00	0%	. 0
	Sanex	pip-butoxide	I	4.00	0%	0
	Sanex	pyrethrins	. I	4.00	0%	0
	Sevin	carbaryl	I,PG	1.50	50%	' 1
	Sevin 5 WP	carbaryl	I.PG	2.00	5%	、 0
6839;14706	Sevin 50 W	carbaryl	I,PG	2.00	50%	21,576
	Sevin 50 W	carbaryl	I,PG	20.00	50%	0
	Sevin 50 WP	carbaryl	I,PG	25.00	50%	12
	Sevin 50%	carbaryl	I,PG		50%	0
	Sevin 50% LV	carbaryl	I,PG	1.50	50%	, 0
	Sevin 50% LV	carbaryl	I,PG	2.00	50%	2
	Sevin Dust	carbaryl	. I,PG	10.00	85%	76
	Sevin flowable	carbaryl	I,PG	10.00	42%	205
	Sevin XLR	carbaryl		10.00	43%	
			I.PG	10.00		
	Sevin XLR 43 liq susp.	carbaryl	I.PG		43%	
	Sevin XLR EC	carbaryl	I,PG	10.00	48%	
	Shell Dorm oil	mineral oils	I,M		100%	20,003
	Slug killer liq sol'n	metaldehyde	Мо		50%	
	Spider killer	chlopyrifos	I	0.50		(
	Spotton	fenthion	I .	0.50	20%	
	Spotton	fenthion	I	2.84	20%	
<del></del>	Spray'n Repel	2 furaldehyde	I	٠ 0.50	0%	
	Spray'n Repel	dicarboximide	I	0.50	0%	, , , , , , , , , , , , , , , , , , , ,
	Spray'n Repel	pip-butoxide	I .	0.50	2%	
	Spray'n Repel	pyrethrin	I,M	0.50	0%	
14583	Starbar Back Rubber liquid	malthion	Ī		50%	
	Super Zone	methydaley	Мо	4.00	0%	
		,	,1-10	7.00		

P.C.P.#	TRADE NAME	ACTIVE INCREDIENT	USE	SIZE	a i	Total a.i. (kg)
	SuperWipe	pyrethrins	I,M	1.00	0%	0.0
13336:18550	Supracide 240 EC	methidathion	I	10.00	24%	2,128.3
	Supracide 240 EC	methidathion	I	5.00	24%	6.0
	Supracide 240 EC	methidathion	I	1.00	- 24%	0.0
	Telone C17 R	dichloropropene	N 17	20.00	92%	112.2
	Thirmet 15 G	phorate	I ·	25.00	15%	176.0
15747	Thiodan 4 E.C.	endosulfan	I	10.00	40%	352.0
15821	Thiodan 50 W	endosulfan	I	2.00	50%	• 4,239.5
	Thiodan 50 WP	endosulfan	I		. 50%	8,085.0
	Thiodan EC	endosulfan	I.		40%	84.0
15333	Thionex 50 WP	endosulfan	I		50%	685.0
	Thuricide HPC liq sol'n	Bacillus thuringienses	I .			0.0
	Torque 48 EC	fenbutatin oxide	M		48%	1.9
	Torque 55% liq	fenbutatin oxide	M		55%	3.9
	Trumpet	bendiocarb	I	0.75		0.0
	Vendex 50W	fenabutatin oxide	M		50%	10.2
	Vet-Tek	carbaryl -	I,PG	0.75	- 5%	0.3
	Vitavax	lindane	I	1.50	19%	8.1
	Vitavax dust	lindane	I		19%	2.8
	Vydate liq sol'n	oxamyl	I.N ·		24%	5.7
	Weed & Pave liq sol'n	chlorpyrifos	I		2%	48.3
	Wipe combined under above	di-propyl isocinchroneronate	I	4.00	0%	\ 0.1
	Wipe combined under above	pip-butoxide	I	4.00	1%	. 0.2
18523	Wipe combined under above	pyrethrin	I .	4.00	2%	. 0.4
	Wipe on	dichlorovos	I	1.00	20%	2.6
	Wipe-on	dichlorvos	I	1.00	0%	0.3
	Zolone	phosalone	I,M	5.00	0%	` 0.1
	Zolone	phosalone	I,M	2.00	50%	. 5.0
	Zolone Flowable 51	phosalone	I,M	5.00	50%	3,758.0
•		TOTAL				374,423.0
	,		Key to Abbreviat	ions of Pes	ticide Use	Catagories
			They to ribble ria	long of t d	Tionac osc	- Compositor
			,	AR .	Animal R	epellant
, , , , , , , , , , , , , , , , , , , ,				F	Fungicide	
		1.		Н	Herbicide	
		•,		i	Insecticid	
				Мо	Moluscici	
		<b> </b>		PG		wth Regulator
	4.			AH	Acquatic	Herbacide
	5.1			FUM	Fumigant	
				M	Meticide	
					Nematicio	le.
					Rođentici	
		**		<u> </u>		
		1				
		<del>'</del>	<del>1 </del>			<del> </del>

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	a.s.	Total a.i. (kg)
	Agrox D-L Plus	captan	F	0.05	15%	0.4
	Agrox D-L Plus Powder	captan	F	ļ ļ.	15%	0.5
	Agrox NM	maneb	F	0.45	50%	1.4
	Agrox NM	maneb	F	1.30	50%	1.3
	Agrox NM	maneb .	F	1.00	50%	47.5
	Agrox NM Powder	maneb	F		50%	90.0
13431	Arrest 75W	carbathiin	F		20%	0.3
		oxycarboxine	F .		5%	0.1
	·	thiram	F		50%	0.8
15032	Basamid	dazomet	F,FUM,H,N	, ,	98%	78.4
18804	Bayleton	triadimefan	F	1.00	50%	12.0
	Benelate	benomyl	F	2.00	50%	· 2.0
11062	Benelate .		F	2.00	50%	1,321.0
	Botran 75 W	dichloran	F		75%	54.0
	Bravo 500	chlorthalonil	F	10.00	40%	242.8
14950	Bravo liquid	asphalt solids	F		49%	1.0
	Captan	captan	F	2.00	50%	1.0
	Captan 50	captan	F	2.00	50%	5.0
5371	Captan 50 WP	captan	F		50%	4.5
4559	Captan 50 WP	captan	F	15.00	50%	1,820.0
	Captan 50 WP	captan	F	2.00	50%	19,521.3
	Captan 80 WP	captan	F		80%	112.0
	Copper 50 wp	copper oxychloride	F.		50%	795.0
	Copper Oxychloride	coppers (fixed)	F	2.00	50%	1,572.0
132.5	0.0000000000000000000000000000000000000	copper sulphate	F .	25.00	50%	1,319.
	Copper Oxychloride 50WP	coppers (fixed)	F	25.00	50%	262.0
	Copper Spray	copper	F	2.00	-5070	0.0
	Cyprex	dodine	F	2.00	65%	3,490.5
	Dikar WP	dinocap	F	2.00	4%	68.7
10493	DIKAL WI	mancozeb	F		72%	1,124.6
9556	Dithane 45 80 WP	mancozeb	F	<del> </del>	80%	3,558.4
	Dithane DG	mancozeb	F	10.00	75%	4,342.5
	Dithane DG	·	F		75%	
		mancozeb sulfur		20.00	2%	15.0 0.8
<del></del>	Dormant Oil Kit		F,I,M	1.00		
	Dyrene 50W	anilazine	F F	50.00	50%	6.0
	Easout 70 WP	thiophenate-methyl		1.60	70%	3,801.4
	Easout Potato Seed Piece	thiophenate-methyl	F .	1.50	10%	49.5
	Equal Equal	dodine	F	2.00	65%	27.3
15608		dodine	F F	2.00	65%	5,060.3
	Exotherm-Termil Fumigant	chlorothalonil			20%	4.3
	Ferbam 76WDG	ferbam	F	0.07	76%	. 39.7
	Ferbam WDG		F	2.27	76%	1,299.1
	Fixed copper 50WP	copper oxychloride	F	<del> </del>	50%	1,433.0
	Folpet 50WP	folpet	F	<b> </b>	50%	. 30.0
	Funginex 190 EC	triforine	F	4.00	19%	92.9
	Germex	N-alkyl	F	4.00	20%	4.8
	Karathane WD	dinocap '	F	2.00	18%	154.0
	Kumulus	sulphur	F	25.00	30%	52.5
	Kumulus S	sulphur	F	25.00	80%	44,007.2
9763	Lesan 35% WP	fenaminosulf	F		35%	. 2.1
	Lime Sulphur		F,M,I	1.00	22%	4,444.:
10526	Manzate 200	ethyl (bis)dithiocarbamate equ	F	2.00	62%	194.
		mancozeb	F	2.00	80%	240.0
10526	Manzate 200	mancozeb	F	10.00	80%	3,518.4
	,	ethyl (bis)dithiocarbamate equ	F	10.00	62%	2,695.
10526	Manzate 200	ethyl (bis)dithiocarbamate equ		20.00	62%	375.
		mancozeb	F	20.00	80%	500.
21057	Manzate 75 WP	maneb	F		75%	108.
	Manzate 80 WP	ethyl (bis)dithiocarbamate equ	F ·	20.00	62%	439.0
				<del></del>		
		mancozeb	F	20.00	80%	566.4

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	a.i.	Total a.s. (kg)
	Meltatox liq sol'n	dodemorph-acetate	F		40%	1.2
	Micro-niasul 92 WP	sulfur	F		92%	110.4
	Monobar Chlorate Gran.	sodium chlorate	F	50.00	30%	300.9
10662	NM Dual Drill box T - dust	maneb	F		38%	3.0
	No Damp liq	oxine benzoate	F		3%	4.0
	Phygon WP	dichlone	F	<del>                                     </del>	50%	/ 1,935.0
	Phygon XL	dichlone	F	2.00	50%	17.0
	Plant-Fume 103 Fumigant	oxine benzoate	FUM		1%	0.7
	Plant-Fume Tedion V18	tedion	FUM		2%	0.0
	Polyram	metiram	F	10.00	80%	176.0
	Polyram 7% Dust	metiram	F	20.00	7%	45.5
	Polyram D.F.	metiram	F '	20.00	80%	3,776.0
	Polyram D.F.	metiram	F	10.00	80%	27,408.0
	Pro-Gro WP	carbathiin	F		30%	0.7
		thiodan	F		50%	1.2
11425	Quintozene 75WP	quintozene	F		75%	2.0
17274	Ridomil 240 E.C.	metalaxyl	F	1.00	24%	33.
17300	Ridomil MZ 72W	mancozeb	F		64%	468.
15213	Rovral 50 WP	iprodione	F	1.00	·50%	1,028.
10305	Streptomycin 17 WP	streptomycin	F	1		. 0.0
1	Telone C17 R	chloropicrin	FUM	110.00	17%	327.
	Telone C17 R	chloropicrin	FUM	20.00		20.:
13368	Telone IIB	dichloropropene	Fum, N,F,I,H	205.00	92%	6,430.
	This flowable sulphur	sulfur	F			0.
	Truban 30 WP	ethazol	F	ļ	30%	5
6453	Vapam Liq sol'n	metiram	Fum,F,H,N	1.50	38%	409.
	Vitavax	carbathiin	F	1.50	20%	
		thiram	F,AR,R	1.50		12.0
15537	Vitavax dust	carbathiin	F	ļ	20%	3.
		thiram	F		29%	4.:
	Zineb 80 WP	zineb	F	10.00	80%	11.
14773	Ziram	ziram	F F	2.00		3,026.
15170	Ziram	ziram	F	2.00	85%	7,697.
154/3	Ziram 85 WP	ziram		-	83%	162,281.
			<u> </u>		· · ·	102,281.
<del></del>						
<del></del>			Key to Abbrevia	tions of Pe	sticide Use	Categories
<del></del>		<u> </u>	itey to Proofe via	- College		Carogorius
			<del>                                     </del>	AR	Animal R	epelant
· · · · · · · · · · · · · · · · · · ·					Fungicide	
			<u> </u>	H	Herbicide	
			,	1	Insecticid	
				Mo	Molluscio	
				PG		wth Regulator
	, .			AH /	Aquatic I	
		1		FUM	Fumigant	١.
		1		М	Miticide	•.
			1.	N .	Nematici	
				R	Rodentic	
				1		
			<del> </del>			
<del></del>				1		· .
					,	

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	2.1.	Total a.i. (kg)
	2,4-D 500		H	10.00	47%	9.4
,	2,4-D 600	2,4-D	H	10.00	56%	11.3
	2,4-D Amine		H	10.00	50%	85.0
	2,4-D Amine	2,4-D amine	H .	10.00	48%	47.5
	2,4-D Amine 500	2,4-D amine	H	10.00	48%	38.0
	2,4-D amine 500		Н	10.00	47%	2,016.8
	2,4-D ester		Н	10.00	60%	252.0
	2,4-D ester		Н	10.00	56%	11.3
	2,4-D ester 600		H	10.00	56%	28.2
16428	2,4-D Ester 600 liq sol'n		H	10.00	60%	384.0
10420	2,4-D LV 600		H	10.00	60%	126.0
	Atrazine 600		H	10.00	80%	64.0
	A-Rest liquid solution		PG	10.00	3%	0.3
	Aatrex .	atrazine	H	10.00	50%	10.0
	Aatrex 480	atrazine	H	10.00	48%	72.0
			H		50%	420.0
	Aatrex liquid			10.00	48%	729.6
	Aatrex liquid 480	atrazine	H			
14842	Aatrex Nine-0	atrazine	H	5.00	86%	344.0
	·	triazines	H	5.00	5%	18.0
14979	Aatrex Plus liquid solution	atrazine	Н	ļ	38%	125.4
		parafin based oil	H		25%	82.5
		triazine	Н	,	2%	6.6
21027	Acclaim 9 EC	fenoxaprop-ethyl	H		1%	0.0
11904	Activol	giberellic acid	PG	0.00	9%	1.1
15671	Afesin	monolinuron	H	20.00	20%	32.0
16244	Alanap	naptalam	H	10.00	24%	⊸ 9. <del>€</del>
11905		daminozide	PG		85%	110.5
	Ambien	chloramben	H	20.00	0%	, 0.0
13167	Amid Thin W	naphthaleneacetamide	PG	0.11	8%	215.6
	Amitrol	amitrole	H,AH	1.00	20%	1.0
	Amitrol	amitrole	H,AH	1.00	20%	0.2
7162	Amitrol "T"	amitrole	H,AH	1.00	20%	1.2
16548	Amitrol "T"	amitrole	H,AH	1.00	24%	99.1
	Amitrol "T"	amitrole	H,AH	10.00	20%	32.0
	Aqua Shade	water soluble dyes	AH	4.00	26%	16.6
	Atrazine	atrazine	H	10.00	48%	4.8
16447			Н	10.00	50%	20.0
	Atrazine 45 EC	atrazine				1,041.6
	Atrazine 480 EC	atrazine	H		48%	
11045	Atrazine 600	atrazine	H		60%	0.0
	Avadex	triallate	H	22.70	10%	34.1
	Avadex [granular]	triallate	H		10%	22.7
8167	Avadex [liquid]	triallate	H		40%	172.:
	Avenge	difenzoquat	H	10.00	28%	100.8
17599	B-Nine SP WP	daminozide	PG		85%	4.3
	Banvel	dicamba	H	5.00	45%	2.3
	Banvel	4!	TT .	F 00	48%	7.2
	Danver	dicamba	Н	5.00	7070	
		dicamba	H H	5.00	40%	6.0
	Banvel Banvel - 480 g/l					
8631	Banvel	dicamba dicamba	H H	5.00	40%	6.0 110.4 36.1
8631	Banvel - 480 g/l Banvel - 480 g/l	dicamba dicamba dicamba	H H H	5.00 5.00 9.50	40% 48% 48%	110.4 36.5
8631 12221	Banvel Banvel - 480 g/l Banvel Basagran	dicamba dicamba dicamba bentazon	H H H	5.00 5.00 9.50 10.00	40% 48% 48% 48%	110. 36. 9.
8631 12221 12221	Banvel Banvel - 480 g/l Banvel Basagran Basagran	dicamba dicamba dicamba bentazon bentazon	H H H H	5.00 5.00 9.50	40% 48% 48% 48% 48%	110. 36. 9. 15.
8631 12221 12221 17901	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n	dicamba dicamba dicamba bentazon bentazon cyanazine	H H H H H	5.00 5.00 9.50 10.00	40% 48% 48% 48% 48% 48%	110. 36. 9. 15. 211.
8631 12221 12221 17901	Banvel Banvel - 480 g/l Banvel Basagran Basagran	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters	H H H H H	5.00 5.00 9.50 10.00 7.00	40% 48% 48% 48% 48% 48%	110. 36. 9. 15. 211. 14.
8631 12221 12221 17901 16724	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop	H H H H H H	5.00 5.00 9.50 10.00 7.00	40% 48% 48% 48% 48% 48% 35% 35%	110. 36.: 9.0 15. 211.: 14.0
8631 12221 12221 17901 16724	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil	H H H H H H H	5.00 5.00 9.50 10.00 7.00	40% 48% 48% 48% 48% 48% 35% 35% 28%	110. 36. 9. 15. 211. 14. 14. 13.
8631 12221 12221 17901 16724	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA	H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28%	110. 36. 9. 15. 211. 14. 14. 13.
8631 12221 12221 17901 16724	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil	H H H H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28%	110. 36. 9. 15. 211. 14. 14. 13. 392.
8631 12221 12221 17901 16724 18022	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M Buctril M	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil MCPA	H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28% 28%	110. 36. 9. 15. 211. 14. 14. 13. 392. 365.
8631 12221 12221 17901 16724 18022 18022	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M Buctril M Butyrac 400 2,4-D liq, sol'n	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil MCPA 2,4,-DB	H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00 8.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28% 28% 40%	110. 36. 9.0 15. 211. 14.0 13. 13. 392.0 365. 28.0
12221 12221 17901 16724 18022 18022 16736 12533	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M Buctril M Butyrac 400 2,4-D liq, sol'n Casoron G-4	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil MCPA 2,4,-DB dichlobenil	H H H H H H H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00 8.00 8.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28% 28% 40% 4%	110.4 36.5 9.0 15.4 211.2 14.0 13.4 13.4 392.0 365.1 28.0 401.3
12221 12221 17901 16724 18022 18022 16736 12533 17001	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M Buctril M Butyrac 400 2,4-D liq, sol'n Casoron G-4 Cycocel	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil MCPA 2,4,-DB dichlobenil chlormequat	H H H H H H H H H H H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00 8.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28% 28% 40% 40%	110.4 36.5 9.0 15.4 211.2 14.0 13.4 13.4 392.0 365.1 28.0 401.1
8631  12221 12221 17901 16724  18022 18022 16736 12533 17001 12828	Banvel Banvel - 480 g/l Banvel Basagran Basagran Bladex Liquid Sol'n Brushkiller LV 700 liq. sol'n Buctril M Buctril M Butyrac 400 2,4-D liq, sol'n Casoron G-4	dicamba dicamba dicamba bentazon bentazon cyanazine 2,4-D esters dichlorprop bromoxynil MCPA bromoxynil MCPA 2,4,-DB dichlobenil	H H H H H H H H H H H H H H H H H H H	5.00 5.00 9.50 10.00 7.00 8.00 8.00 8.00 8.00	40% 48% 48% 48% 48% 35% 35% 28% 28% 28% 40% 4%	110.4 36.5 9.0 15.4 211.2 14.0 13.4 13.4 392.0 365.1 28.0 401.3

P.C.P.#	TRADE NAME	ACTIVE INCREDIEN		SIZE	a.ı.	Total a.i. (kg)
	Devrinol 50 W	napropamide	H	1.80	10%	73.2
	Devrinol 50 WP	napropamide	H	1.80	50%	543.1
16290	Dinitro General	dinoseb general	Н	10.00	50%	392.5
	Dinoseb	dinoseb	H	1.00	50%	0.5
14999	Dual Liquid Solution	metolachlor	H		96%	, 192.0
16545	Dyvel EC	dicamba	H		8%	30.2
		MCPA (K or Na)	H		. 34%	121.0
	Embutox	2,4-DB	Н	8.00	63%	20.0
6747	Embutox 625	2,4-DB	Н	8.00	63%	710.0
	Enide 50 WP	diphenamid	H		50%	9.0
	Eptam 8 E	EPTC	H	10.00	80%	752.0
	Eradicane	EPTC	Н	10.00	80%	160.0
	Eradicane 8E	EPTC	H	10.00	80%	1,488.0
	Ethrel	ethephon	PG	10.00	24%	529.
16027	Fruit Fix	napthaleneacetic acid	PG	3.78	7%	369.9
	Fruitone	napthaleneacetic acid	PG	114.00	4%	180.0
	Fusilade	fluazifop-butyl	H	8.00	25%	102.0
	Gesaguard WP		H	8.00	78%	12.0
112/4	Gesaguard WP	prometryne				
·	Ch.	triazine	Н		2%	0.4
10000	Glean	chlorsulfen	H	0.50	75%	6.8
	Glowon liq sol'n	MSMA	Н		45%	18.0
18777		oxyfluorfen	H	9.50	19%	6.3
	Gramoxone	paraquat	H,AH	1.00	20%	2.0
8661	Gramoxone	paraquat -	H,AH	5.00	20%	3,894.2
	Granular Ureabor	bromacil	H ·	22.70	2%	0.3
·	•	sodium chlorate	H	22.70	30%	6.8
		sodium metaborate	Η -	22.70	67%	15.3
	Hoegrass	diclofop-methyl	H	10.00	28%	5.
	Hoegrass	bromoxynil	· H	20.00	80%	560.0
	Hoegrass	diclofop-methyl	H	20.00	28%	132.
	Hoegrass 284	diclofop-methyl	H .	20.00	28%	22.
11018	Hoegrass II	bromoxnil	H	20.00	24%	8.0
	Hoegrass II	diclofop-methyl	Н	20.00	-23%	9.:
	Hoegrass II	diclofop-methyl /	Н	20.00	23%	161.0
	Hoegrass II	bromoxynil	H	20.00	80%	32.0
	Karmex	diuron	Н	2.00	8%	18.3
	Karmex	diuron	Н	25.00	8%	49.
	Kerb 50 WP	propyzamide	Н	7	38%	16.0
	Killex	2,4-D	H	4.00	19%	3.0
	Killex	dicamba	H	4.00	18%	2.9
	Killex	тесоргор	H	\4.00	10%	1.0
	Killex	2,4-D	H	10.00	19%	49.4
	Killex	dicamba	H	10.00	18%	46.
	Killex					
17071		mecoprop	H H	10.00	10%	26.0
169/1	Killex 500 liquid	2,4-D		-	29%	43.:
	IZTHEX 200 HAMA	dicamba	H		2%	3.0
	Killex 500 liquid	mecoprop	H		8%	12.0
9811	Killex liquid	2,4-D	H.		19%	480.
	Killex liquid	dicamba .	Н		18%	455.4
	Killex liquid	mecoprop	H		10%	253.
20981	Killex Summer F. liq sol'n	2,4-D	H	10.00	14%	38.0
	Killex Summer F. liq sol'n	dicamba	H	10.00	3%	7.
•	Killex Summer F. liq sol'n	mecoprop	H	10.00	15%	40.
	Kilmor	2,4-D	H	10.00	30%	5.9
	Kilmor	dicamba	Н	10.00	11%	2.:
	Kilmor	тесоргор	Н	10.00	8%	1.0
8885	Kilmor liq sol	2,4-D	Н		31%	31.
8883	Kilmor liq sol	dicamba	Н	<del>                                      </del>	11%	11.
	Kilmor liq sol	тесоргор	H		8%	8.
		Imooohioh			J 70	0.
15050		metrihuzin	u		750	14
	Lexone DF	metribuzin	H		75%	16.
15544		metribuzin linuron triazinetrone	H H H		75% 40% 93%	16.

	TRADE NAME			SIZE	8.i.	Total a.i. (kg)
	Lorox EC	linuron dicamba	H	9.50	48% 13%	9.0 55.2
	Marksman Marksman	atrazine	H	9.50	26%	107.0
			H	9.50	5%	2.
	Matavan 52.5 g/l EC	flamprop-methyl		10.00		
	MCPA	MCPA	H.	10.00	30%	3.0
	MCPA	МСРА	Н	10.00	60%	6.0
	MCPA	МСРА	H	10.00	50%	55.0
	MCPA - Amine 500	MCPA	H	10.00	50%	0.:
	MCPA - Amine 500 - 50EC	MCPA	H		50%	50.0
	MCPA 500	MCPA	H	10.00	50%	10.0
	MCPA 500 liq sol'n	MCPA	H		50%	322.
	MCPA Amine	MCPA Amine	H	10.00	30%	21.0
	Месоргор	mecoprop	Н	10.00	15%	6.0
9554	Mecoprop 300 liquid	mecoprop	H		15%	15.0
10915	Mecoprop 300 liquid	тесоргор	H		15%	3.
	Mecoturf Plus 2,4-D	mecoprop	Н,	8.00	15%	135.
	Monobar Chlorate Gran.	sodium metaborate	H	50.00	68%	682.
	Pardner	bromoxynil	H	8.00	23%	139.
	Patoran	metobromuron	Н	10.00	40%	16.
17502		sethoxydim	Н	7.00	18%	74.
	Poast EC	clopyralid	Н		18%	7.
	Poast EC	sethoxydim	H	+	20%	8.
	Poast/Merge	sethoxydim	H	14.00	18%	20.
	Prem Lawn Wd Kill liq sol'n	2,4-D	H	14.00	12%	1.
	Prem Lawn Wd Kill liq sol'n		H	+	13%	1.
		mecoprop	H	10.00	1%	12.
	Primextra	triazines	H	10.00	20%	
	Primextra	atrazine		10.00	30%	244. 367.
	Primextra	metolachlor	H	10.00		
	Princep 90 WG	simazine	H,AH	1.50	90%	1.
	Princep Nine -T	simazine	H,AH	1.50	89%	2,504.
	Princep Nine -T	triazines	H	1.50	1%	7.
	Princep Nine -T	triazines _	H	5.00	1%	0.
16370	Princep Nine -T	simazine	H,AH	1.50	89%	680.
	Princep Nine -T	simazine	H,AH	5.00	89%	17.
	Princep Nine -T	triazines	H	1.50	1%	28.
16636	Promalin Liq	benzyladenine	PG		2%	1.
	Promalin Liq	gibberellic acid	PG	'	2%	1.
9512	Regione "A"	diquat	H,AH	10.00	20%	55.
7639	Regione liq sol'n	metalaxyl	H,AH		8%	4.
18612	Rival 500 EC	trifluralin	H	1.00	50%	117.
	Rival 500 EC	trifluralin	Н	9.00	50%	4.
	Round up	glyphosate	Н	1.00	36%	3.
	Round up	glyphosate	H	4.00	36%	19.
	Roundup	glyphosate	H	10.00	36%	12,669.
	Roundup	glyphosate /	. Н	1.00	36%	56.
	Roundup	glyphosate	H	10.00	36%	402.
	Roundup	glyphosate	H	1.00	36%	1,346.
	Roundup	glyphosate	H	4.00	36%	139.
			H	4.00	50%	139.
	Sencor 500 flowable powder	metribuzin		2.00		
	Sencor D.F.	metribuzin	H	3.00	75%	· 60.
	Simadex flowable	simazine	H,AH		50%	100.
	Simazine 80 W	simazine	H,AH	-	80%	477.
	Simazine 80WP	simazine	H,AH		80%	175.
	Simazine Flowable	simazine	H,AH	5.00	50%	49.
	Sinbar	terbacil	H	0.50		0.
	Sinbar WP	terbacil	H		80%	8.
	Spike	tebuthurion	H	7.00	5%	1.
	Spike G	tebuthurion	H		5%	0.
15001;18031	Spike 5G	tebuthurion	H	7.00	5%	7.
14756		naphthalenacetic acid	PG ·	1.20		29.
	Summer Killer	2,4-D	Н	10.00	14%	2.
	Summer Killer	dicamba	Ĥ	10.00	3%	0.
i						

CP#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	<b>a.</b> i.	Total at (kg)
	Surpass	vernolate	H	20.00	80%	160
	Target	dicamba -	H.		6%	(
	Target .	MCPA	H		28%	(
	Target	тесоргор	H		6%	(
	Target EC	dicamba	Н		6%	
	Target EC	MCPA	H ·		28%	1.
	Target EC	тесоргор	Н		6%	
	Telone C17 R	dichloropropene	Н	110.00	92%	1,82
	Telone C17 R	paraquat	Н	110.00	10%	, 219
	Telone C17 R	simazine	H,AH	110.00	40%	78
	Tenoran	chloroxuron	H	2.75	50%	. 57
	Terraklene	paraquat	H,AH	5.00		
. 17177	Tordon	picloram	H	2.00	24%	· · · · · · · · · · · · · · · · · · ·
9005	Tordon 24 EC	picloram	H	2.00	24%	14
	Tota-col Liquid	diuron	H		30%	
	Treflan 545 E.C.	trifluralin	H	8.50	55%	17
	Tri-Kil Turf Liq sol'n	2,4-D	H	6.50	19%	7
	Tri-Kil Turf Liq sol'n	mecoprop	H		20%	7
			Н	8.00	3%	
	Tropotox + Tropotox +	MCPA MCPB	H ·	8.00	38%	· · · · · · · · · · · · · · · · · · ·
			H	10.00	3%	
	TTOPOX	MCPA		10.00		1
	Tropox	MCPB	H	10.00	38%	
	Turfrite 2+2 liquid	2,4-D	H	,	20%	41
19391	Turfrite 2+2 liquid	mecoprop	Н	50.00	· 20%	41
	Ureabor	sodium chlorate	H	50.00		6,18
14517	Ureabor	bromacil	H	50.00		41
	Ureabor	sodium metaborate	H	50.00		13,82
	Weed & Pave liq sol'n	2,4-D esters	H	<u> </u>	1%	2
	Weednite	· · · · · · · · · · · · · · · · · · ·	H	10.00	0.60	
20862	Wrangler	glyphosate	H	10.00	36%	1,99
	Zinc 50	zinc sulphate	H	22.50	50%	3
	Zinc sulphate	zinc sulphate	<u> </u> H	ļ		
		TOTAL	<u> </u>			70,16
<u> </u>		<u> </u>				
				L	L	
		, 1	Key to Abbreviat	ions of Pes	ticide Use	Catagories
						·
				AR	Animal R	
				F	Fungicide	
				H	Herbicide	
`w*	3			<u> </u>	Insecticid	le '
;			L		Molluscio	
• •				PG	Plant Gro	wth Regulator
				AH	Aquatic F	lerbicide .
			,	FUM	Fumigant	:
		`		M	Miticide	
				N	Nematicide	
<del></del>		· · · · · · · · · · · · · · · · · · ·		R	Rodentici	
				<del>                                     </del>		
		<del></del>		<del> </del>		
•	<u> </u>	<del> </del>	<del> </del>	<del> </del>	<del>  </del>	
				1	, ,	
		· · · · · · · · · · · · · · · · · · ·	-	<u> </u>		
				<u> </u>		

P.C.P.#	TRADE NAME	ACTIVE INGREDIENT	USE	SIZE	a.s.	Total a.r. (kg)
	bar bait	sulfaquinoxaline	R	0.45	0%	0.0
	bar bait	warfarin	R	0.45	0%	0.0
	barn bait	sulfaquinoxaline '	R		0%	0.0
14203	barn bait	warfarin	R		0%	0.0
	Bromone pellets	bromadiolone	R	0.50	0%	0.0
12408	Gopher Getter	strychnine	R	2.30	0%	43.9
12409	Gopher Getter	strychnine	R	0.45	35%	23.2
	Gopher Getter	strychnine	R	2.30	0%	0.7
	Gopher Getter	strychnine	R	4.50	35%	1.6
	Gopher Getter	strychnine	R	0.45	0%	0.0
	Gopher Getter	strychnine	R	18.20	0%	2.5
	Gopher Getter	strychnine	R	1.00	35%	0.7
	Gopher Getter	strychnine	R	0.28	2%	0.0
14806	Gopher Poison Liq Sol'n	strychnine	R		2%	6.4
	Gopher Poison Liq Sol'n	strychnine	R	2.30	2%	0.0
15591	Liquid Lighting	chlorophacinone	R		0%	. 0.0
	Mouse bait	zinc phosphate	R	2.00	2%	4.4
	Mouse bait	zinc phosphate	R		2%	50.4
18776	Mouse station wax block	brodifacoum	R		0%	0.0
	Rabbit Repel	thiram	AR	0.91	12%	0.0
	Ramik Brown coated bait	diphacinone	R		1%	3.9
	RATAK	brodifacoum	R	0.20	0%	0.0
	RATAK	brodifacoum	R	0.05	0%	0.0
	Ratak	brodifacoum	R	0.40	0%	0.0
16064	Ratak +	brodifacoum	R	0.20	0%	0.0
	Ratak with Blok coated bait	brodifacoum	R		0%	0.0
	Waxed mouse bait	zinc phosphide	R		2%	83.6
	Waxed mouse bait	zinc phosphide	R		2%	10.0
		TOTAL				231.5
				ļ <u>.</u>		
· · · · · · · · · · · · · · · · · · ·						
			Key to Abbrevia	ions of Pe	sticide Us	Catagories
				AR /	Rodenti	-ida
<u> </u>			,	R		Repelent
					· minat	
;						
		<u> </u>				

## APPENDIX 8: INSECTICIDE APPLICATION RATES FOR MAJOR CROPS IN THE OKANAGAN AND SIMILKIMEEN VALLEYS, 1990

Common Name	Trade Name	Apple	Apricot	Cherry	Peach	Pear	Plum
azinphos-methyl	Glution 50%WP	1.4-2.75 kg/ha	1.4-2.75 kg/ha	2.75 kg/ha	2.75 kg/ha	2.75 kg/ha	3.25 kg/ha
Bacillis thuringensis	Dipel WP	2.25 kg/ha	2.25 kg/ha	2.25 kg/ha	2.25 kg/ha	2.25 kg/ha	2.25 kg/ha
carbaryl	Sevin X.L.R.			10 L/ha			1 -
chinomethionate	Morestan 25% WP	3.25 kg/ha	3.25 kg/ha	3.25 kg/ha	3.25 kg/ha	4.5 kg/ha	3.25 kg/ha
clofentazine	Apollo 50% SC	.30 kg/ha			į		
cyclohexatin	Plictran 50%WP	1.1 kg/ha			1.5 kg/ha	1.5 kg/ha	
cypermethrin	Cymbush 12.5%WP	.80 kg/ha				.80 kg/ha	
deltamethrin	decis 2.5%EC				.40 l/ha	.40 l/ha	
diazinon	Diazinon 5G	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2:25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha
*	Basudin 50EC	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha	2.25-5.5 kg/ha
dicofol	Kelthane 18.5EC	4.4 kg/ha				4.4 kg/ha	
dinitrocreosol	Elgetol 19.5%SL	,		12.75 L/ha			
	Thiodan 50% EC	3.25-3.40 kg/ha	3.25 kg/ha	3.25 kg/ha	3.25 kg/ha	3.25 kg/ha	3.25 kg/ha
ethion	Ethion 25WP	5.2-9.0 kg/ha			9.0 kg/ha	9.0 kg/ha .	9.0 kg/ha
fenvalerate	Belmark 30EC		•			.225 L/ha	
ferbam	Ferbam	5.0 kg/ha	6.75 kg/ha	6.75 kg/ha	9.0 kg/ha		
formetanate	Carzol	•				1.1 kg/ha	
lime sulphur	Lime sulphur	11			430 L/ha	. 125 L/ha	130 L/ha
malathion	Malathion liq.	2.75 kg/ha			2.75 kg/ha		,
methidathion	Supracide 25EC	5.8 l/ha				;	
metriam	Polyram 80DF	6.0 kg/ha	!				9.0 L/ha
,	Pounce 284EC					1.0 L/ha	
phosmet	Imidan 50% WP	3.25 kg/ha		· • •		3.25 kg/ha	
pirimicarb	Pirimor 50%WP	1.1 kg/ha					
propargite	Omite 30%WP	5.5 kg/ha	5.5 kg/ha	5.5 kg/ha	5.5 kg/ha		5.5 kg/ha