

# PROFILE OF THE GREENHOUSE INDUSTRY IN ALBERTA 2014



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Funded by

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Emmanuel Anum Laate, Dr. Mohyuddin Mirza, G. Nabi Chaudhary and Dr. Kwesi Ampong-Nyarko were involved in preparing the project proposal.

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The project team included:

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## EXECUTIVE SUMMARY

In 2014, Alberta Agriculture and Forestry (AF) in collaboration with Alberta Greenhouse Growers Association (AGGA) conducted a survey to gather current benchmark data on greenhouse crop operations in Alberta. The results show that presently there are 230 greenhouse operations in Alberta. Of the 230 greenhouse operations, 180 completed the survey questionnaire; a response rate of approximately 78 per cent. Data from the remaining 50 growers were gathered through general business information and directories. Institutional facilities of approximately 3.56 acres were not included in the total area. This is the most comprehensive survey of the greenhouse industry in Alberta.

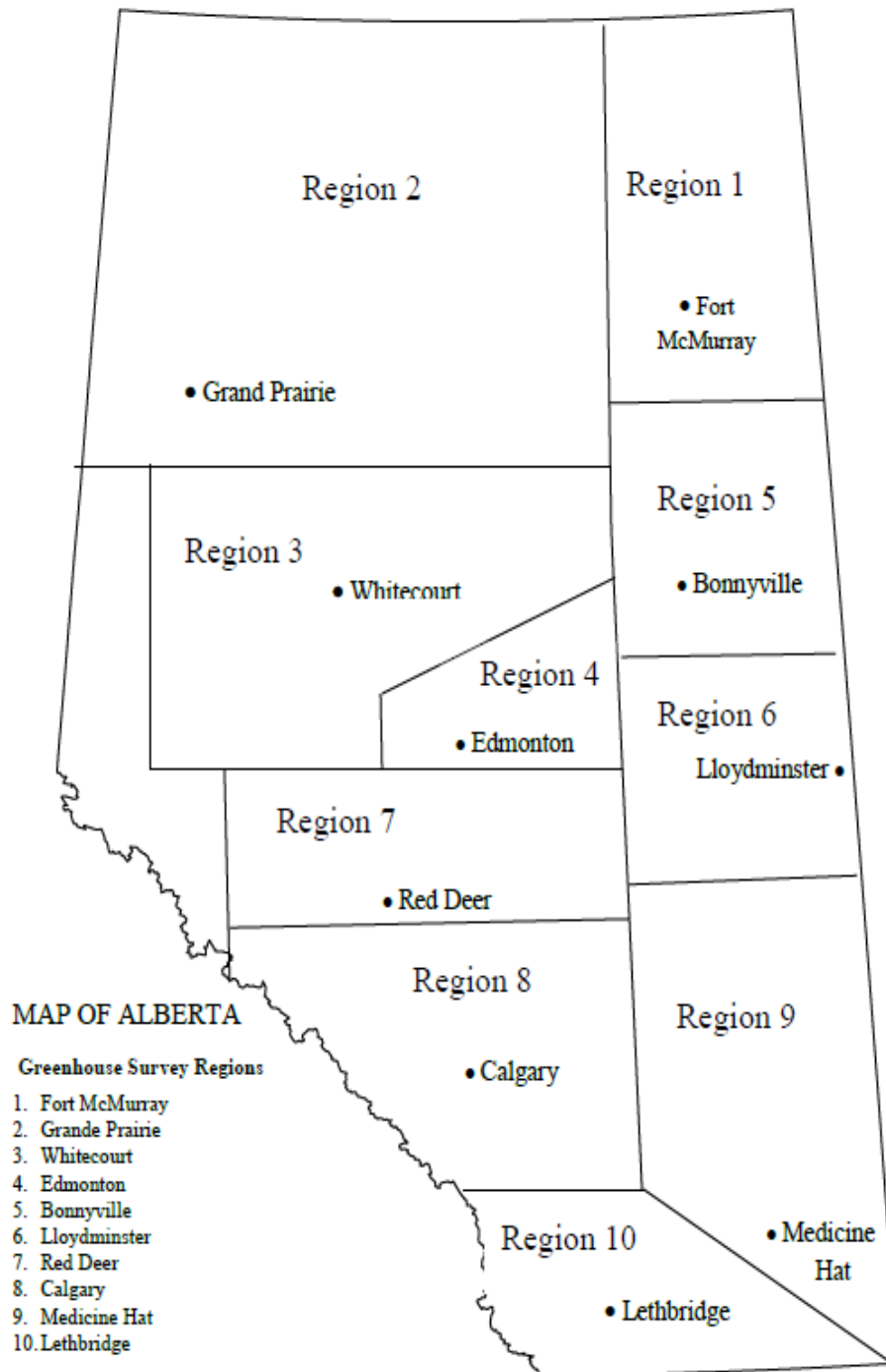
Alberta's greenhouse industry is ranked fourth in the country after Ontario, British Columbia and Quebec. Based on the recent survey, the present size of Alberta's greenhouse crops industry is estimated to be 338 acres, 137 ha, 14.74 million square feet (ft<sup>2</sup>) or 1.37 million square metres (m<sup>2</sup>). The land associated with greenhouse farming is estimated at 8,294 acres or 2,714 ha. Vegetable accounted for about 46 per cent of the total greenhouse area (157 acres), followed by floriculture at 41 per cent or 137 acres and tree seedlings at 13 per cent or 45 acres. Greenhouse institutional facilities of approximately 3.56 acres are not included in the total area.

The greenhouse area in the province is divided into ten regions, ranging from Region 1 (Fort McMurray) to Region 10 (Lethbridge). Compared to the 2010 survey results, the maximum growth in greenhouse area occurred in the Medicine Hat area that includes Redcliff (from 41 per cent in 2010 to 45 per cent in 2014). Area under 10,000 ft<sup>2</sup> increased from 24 per cent in 2010 to 30 per cent in 2014, while area over 40,000 ft<sup>2</sup> decreased to 32 per cent from 36 per cent in 2010. Double poly greenhouses accounted for about 85 per cent of total area followed by glass at 13 per cent. Approximately 36 per cent of greenhouses are year-round and 64 per cent are seasonal in nature. The industry employs over 1,600 full-time and over 2,500 part-time workers. Growers have used federal and provincial government programs to bring in foreign workers.

Natural gas continued to be the fuel of choice for heating greenhouses. No major shift has occurred in the use of alternate fuel like coal, wood or others. Based on survey responses, average heating cost in 2014 was estimated at \$12.54 per sq. m. or 1.16 per sq. ft. This translates to total greenhouse industry heating expenditure of approximately \$17.17 million. While use of personal computers (57 per cent) was similar to the 2010 survey results, use of environmental control computers increased slightly. Ninety-three per cent of growers were aware of environmentally friendly crop management practices and are changing in that direction. Eighty-five per cent of growers do recycle plastic materials and compost their plant material. About 30 per cent practice On Farm Food Safety and 28 per cent have taken Environmental Farm Plan courses.

The majority of growers are anticipating business threats such as higher energy costs, markets/prices, labour shortages, import competition, taxes and regulation and currency fluctuations in the next three to five years. Growers indicated that in the next three to five years the buy local movement, non-traditional products, organic or green products and export markets would serve as opportunities for expansion. Majority of the growers surveyed are aware of AGGA and its services. Other comments, issues and concerns provided by survey participants are listed in Appendix I and the survey questionnaire is presented in Appendix II.

**Figure 1: Map of Alberta Illustrating Regions and Major Centres**



## SECTION I

### Introduction

The Alberta greenhouse industry survey was initiated by the AGGA to develop a profile of the industry. The main purpose is to provide benchmark information on greenhouse vegetables, floriculture and tree seedlings grown in Alberta. The greenhouse industry has developed similar data every four to six years since 1980. The last survey completed in 2010, was based on 2009 data.

This 2014 profile study was completed by AF in collaboration with the AGGA with funding from Growing Forward 2, a Federal-Provincial-Territorial initiative. Two field surveyors and Dr. Mirza Consultants Inc. were retained to work on the project.

### Objectives of the Study

The main objectives of study were to develop benchmark data on the state of greenhouse crop operations in Alberta. This includes size, distribution in different regions within the province, heating systems, water and energy use trends, labour, as well as opportunities and issues related to financing, environment, business climate and regulation, competitiveness with imports, and other benchmarks and future trends.

### Methodology and Survey Response

A detailed survey questionnaire was prepared by AF and AGGA (Appendix II). The survey was mailed to 300 growers (both members and non-members of AGGA). One hundred and eighty surveys were completed; a response rate of approximately 78 per cent. Data on location and size from additional 50 growers were gathered through general business information and directories. Thus data from a total of 230 growers was collected.

**Note:** To preserve confidentiality, the results for Region 1 (Fort McMurray) have been suppressed in this report because the number of growers was less than three.

## SECTION II

### Greenhouse Industry Survey by Regions

For comparison purposes, the province was divided into ten regions, which make up the survey area. The city chosen to name the region was used for one or both of the following two reasons:

1. It is the dominant centre due to population
2. It has a central position relative to the region.

The borderlines were drawn according to regional centres, individual greenhouse placements and also to encompass populated areas in a simple manner (Figure 1 on page 2).

### Actual Land Associated, Greenhouse Area, and Number of Growers in Alberta

Table 1.1 presents land associated with greenhouses and greenhouse areas for each region. The data provided in this table is based on 230 greenhouse operations in Alberta. The area outside the regional centres in each region is also listed in Tables 1.2 and 1.3.

**Table 1.1: Actual Land Associated, Greenhouse Area, and Number of Growers in Alberta**

Region	Land Area		Greenhouse Area			Number of Growers by Region
	Acres	Hectares	(sq. ft.)	(sq. m.)	Per cent of Total	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	541	192	803,437	74,642	5.4%	18
3. Whitecourt	781	250	210,066	19,516	1.4%	21
4. Edmonton	1,853	564	1,324,036	123,007	9.0%	43
5. Bonnyville	40	7	974,410	90,526	6.6%	11
6. Lloydminster	79	29	330,496	30,704	2.2%	14
7. Red Deer	3,007	1,140	2,283,922	212,184	15.5%	43
8. Calgary	1,159	460	1,004,641	93,334	6.8%	22
9. Medicine Hat	367	2	6,670,955	619,753	45.2%	42
10. Lethbridge	394	40	1,109,244	103,052	7.5%	15
<b>Total</b>	<b>8,294</b>	<b>2,714</b>	<b>14,743,207</b>	<b>1,369,690</b>	<b>100.0%</b>	<b>230</b>

**Note:** sq. ft. = square feet

sq. m. = square metre

**Total Greenhouse Area:** 14,743,207 sq. ft. = 1,369,690 sq. m. = 338 acres = 137 hectares

**Conversion rate:** One Hectare = 2.47 Acres    One Square metre = 10.7639 sq. ft.

**Table 1.2: Land and Greenhouse Area in Regional Centres**

Region	Land Area		Greenhouse Area		Number of Growers by Region
	Acres	Hectares	(sq. ft.)	(sq. m.)	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	401	162	142,000	13,192	3
3. Whitecourt	0	0	30,000	2,787	2
4. Edmonton	351	59	270,040	25,088	8
5. Bonnyville	28	6	489,946	45,518	3
6. Lloydminster	0	0	40,000	3,716	1
7. Red Deer	26	4	276,056	25,646	8
8. Calgary	6	2	313,633	29,137	5
9. Medicine Hat	51	2	1,139,354	105,850	8
10. Lethbridge	18	7	225,600	20,959	5
<b>Total</b>	<b>955</b>	<b>272</b>	<b>2,958,629</b>	<b>274,866</b>	<b>44</b>

**Conversion rate:** One Hectare = 2.47 Acres    One Square metre = 10.7639 sq. ft.

**Table 1.3: Land and Greenhouse Area in Region (Less Regional Centres)**

Region	Land Area		Greenhouse Area		Number of Growers by Region
	Acres	Hectares	(sq. ft.)	(sq. m.)	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	140	30	661,437	61,450	15
3. Whitecourt	781	250	180,066	16,729	19
4. Edmonton	1,502	505	1,053,996	97,920	35
5. Bonnyville	12	0	484,464	45,008	8
6. Lloydminster	79	29	290,496	26,988	13
7. Red Deer	2,981	1,136	2,007,866	186,537	35
8. Calgary Total	1,153	458	691,008	64,197	17
9. Medicine Hat	316	0	5,531,601	513,903	34
10. Lethbridge	376	33	883,644	82,093	10
<b>Total</b>	<b>7,339</b>	<b>2,442</b>	<b>11,784,578</b>	<b>1,094,824</b>	<b>186</b>

**Conversion rate:** One Hectare = 2.47 Acres    One Square metre = 10.7639 sq. ft.



## Number of Greenhouses in Regional Centres and Outside Regional Centres

Table 1.4 lists the greenhouse operations surveyed in each region. Of the 230 greenhouses, 44 were in the regional centres and 186 were outside of the regional centres. This shows that most of the greenhouses are located in rural areas.

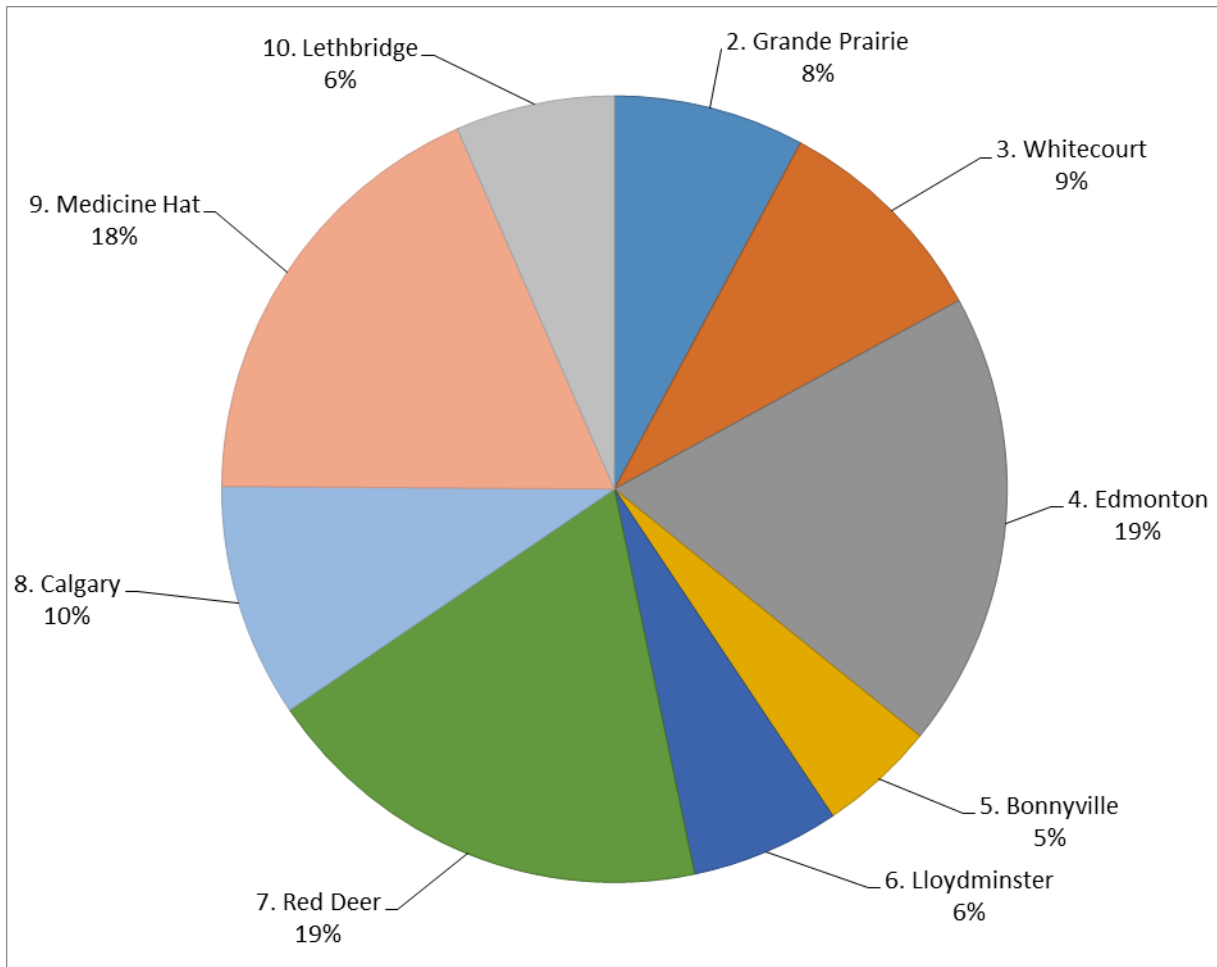
**Table 1.4: Number of Greenhouses in Regional Centres and Outside Regional Centres**

<b>Region</b>	<b>Greenhouses Surveyed</b>	<b>Number of Greenhouses in Regional Centres</b>	<b>Number of Greenhouses Outside Regional Centres</b>
1. Fort McMurray	-	-	-
2. Grande Prairie	18	3	15
3. Whitecourt	21	2	19
4. Edmonton	43	8	35
5. Bonnyville	11	3	8
6. Lloydminster	14	1	13
7. Red Deer	43	8	35
8. Calgary	22	5	17
9. Medicine Hat	42	8	34
10. Lethbridge	15	5	10
<b>Total</b>	<b>230</b>	<b>44</b>	<b>186</b>

## Number of Greenhouses by Region

Figure 2 represents the percentage of the number of greenhouses located in each region. Based on the survey responses, Edmonton and Red Deer regions have 19 per cent each of the total number of greenhouses, followed by Medicine Hat region at 18 per cent.

**Figure 2: Number of Greenhouses by Regions**



## Size of Greenhouse Operations in Alberta

Based on the survey responses, approximately 32 per cent of the greenhouse operations are larger than 40,000 sq. ft. (0.9 acres). About 38 per cent range from 10,000 sq. ft. to 40,000 sq. ft. (i.e. 0.2 acres to 0.9 acres) and the remaining 30 per cent have less than 10,000 sq. ft. or 0.2 acres. Table 1.5 shows the grouping of the various sizes of greenhouse operations by region in Alberta.

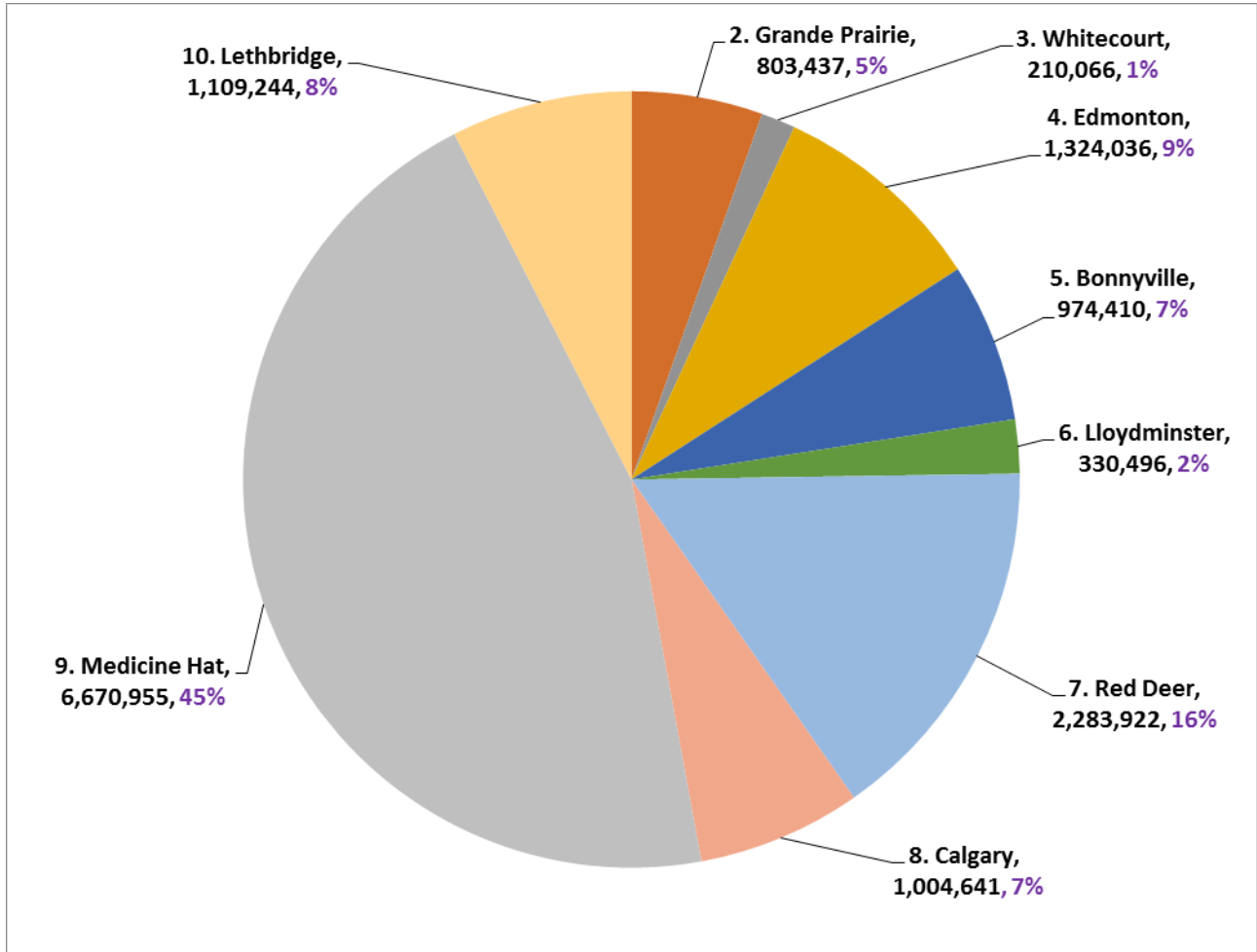
**Table 1.5: Size of Greenhouse Operations in Alberta**

Region	Greenhouse Area (sq. ft.)				Number of Growers by Region
	< 10,000	10,000 to 19,999	20,000 to 40,000	> 40,000	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	7	6	1	5	19
3. Whitecourt	10	10	2	0	22
4. Edmonton	14	11	11	9	45
5. Bonnyville	5	3	1	3	12
6. Lloydminster	8	2	3	1	14
7. Red Deer	19	10	6	9	44
8. Calgary	8	3	8	5	24
9. Medicine Hat	2	0	3	37	42
10. Lethbridge	7	3	2	5	17
<b>Total</b>	<b>70</b>	<b>48</b>	<b>38</b>	<b>74</b>	<b>230</b>
Per cent of Total	30%	21%	17%	32%	100%

### Greenhouse Area by Region

Figure 3 presents the per centage of greenhouse area in each region. The Medicine Hat region had 45 per cent of the total greenhouse area followed by Red Deer at 16 per cent, Edmonton at 9 per cent and others.

**Figure 3: Greenhouse Area by Region in Square Feet**



## SECTION III

### Type of Greenhouse Businesses in Alberta

Based on survey responses, Table 2.1 indicates that 53 per cent of the greenhouse operations are registered as family businesses and 24 per cent as incorporated and limited type businesses.

**Table 2.1: Type of Business of Greenhouse Operations**

Region	Type of Business			Number of Growers by Region
	Family	Incorporated	Limited	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	6	2	1	9
3. Whitecourt	9	2	1	12
4. Edmonton	17	10	6	33
5. Bonnyville	4	1	1	6
6. Lloydminster	6	0	0	6
7. Red Deer	17	7	8	32
8. Calgary	6	2	5	13
9. Medicine Hat	4	7	7	18
10. Lethbridge	5	2	3	10
<b>Total</b>	<b>74</b>	<b>33</b>	<b>33</b>	<b>140</b>
Per cent of Total	53%	24%	24%	100%

## Years of Experience of Greenhouse Operators in Alberta

Table 2.2 presents the range of experience (from less than five years to more than 20 years). Fifty five per cent of the operators indicated they have more than 20 years of experience, while 10 per cent reported having five years or less experience. The remaining 36 per cent of operators have six to 20 years of experience in the industry.

**Table 2.2: Years of Experience of Greenhouse Operators in Alberta**

Region	Operators Experience (Years)					Number of Growers by Region
	< 5	6 to 10	11 to 15	16 to 20	> 20	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	1	2	2	2	2	9
3. Whitecourt	1	0	0	0	10	11
4. Edmonton	3	3	6	3	15	30
5. Bonnyville	2	0	0	1	3	6
6. Lloydminster	1	1	1	0	3	6
7. Red Deer	4	2	4	6	15	31
8. Calgary	0	1	3	3	4	11
9. Medicine Hat	0	1	3	1	14	19
10. Lethbridge	1	0	0	2	6	9
<b>Total</b>	<b>13</b>	<b>10</b>	<b>19</b>	<b>18</b>	<b>73</b>	<b>133</b>
Per cent of Total	10%	8%	14%	14%	55%	100%

## Education Level of Greenhouse Operators in Alberta

Table 2.3 lists the education level of greenhouse growers in Alberta. Of the 145 respondents, 40 growers (28 per cent) had grade 12 or less, 72 growers (49 per cent) were either Olds College graduates or had taken courses in horticulture, 29 growers (20 per cent) had completed their Bachelor of Science degree, and the remaining four growers (3 per cent) had post-graduate education (M.Sc. or higher degree).

**Table 2.3: Education Level of Greenhouse Operators in Alberta**

Region	Education Level of Greenhouse Operators					Number of Growers by Region
	Grade 12 or less	Olds College	Other College / Courses	B.Sc.	M.Sc. or higher	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	4	2	3	1	0	10
3. Whitecourt	8	1	2	2	0	13
4. Edmonton	9	3	11	11	0	34
5. Bonnyville		1	3	1	1	6
6. Lloydminster	3	2	0	1	0	6
7. Red Deer	4	9	11	9	1	34
8. Calgary	1	4	3	3	1	12
9. Medicine Hat	7	7	4	0	1	19
10. Lethbridge	4	1	4	1	0	10
<b>Total</b>	<b>40</b>	<b>31</b>	<b>41</b>	<b>29</b>	<b>4</b>	<b>145</b>
Per cent of Total	28%	21%	28%	20%	3%	100%

## SECTION IV

### Construction of Greenhouse Facilities in Alberta

Table 3.1 presents the number of greenhouses constructed by region. Based on survey responses, the majority of greenhouse construction took place between 1991 and 2000 (29 per cent), followed by 25 per cent from 1981 to 1990 and 25 per cent in 1980 and prior. Fifteen per cent of the area was built between 2001 and 2010 and six per cent of the area was built between 2011 and 2014.

**Table 3.1: Construction of Greenhouse Facilities in Alberta**

Region	Year(s) Greenhouse was Built					Number of Growers by Region
	1980 or Prior	1981 to 1990	1991 to 2000	2001 to 2010	2011 to 2014	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	2	2	3	0	2	9
3. Whitecourt	8	8	2	1	0	19
4. Edmonton	5	5	11	6	2	29
5. Bonnyville	2	2	2	0	1	7
6. Lloydminster	5	5	0	0	0	10
7. Red Deer	7	7	16	9	0	39
8. Calgary	4	4	4	1	0	13
9. Medicine Hat	5	5	6	4	2	22
10. Lethbridge	1	1	1	1	2	6
<b>Total</b>	<b>39</b>	<b>39</b>	<b>45</b>	<b>23</b>	<b>9</b>	<b>155</b>
Per cent of Total	25%	25%	29%	15%	6%	100%



## Greenhouse Structure and Area in Alberta

Table 3.2 presents the structure of greenhouses and their corresponding areas. Based on survey responses, the double poly greenhouses account for about 85 per cent of total area followed by glass at 13 per cent.

**Table 3.2: Greenhouse Structure and Area**

Region	Greenhouse Structure and Area (sq. m.)			Total Area by Region
	Glass	Double Poly	Other	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	1,394	62,639	10,609	74,642
3. Whitecourt	279	18,657	580	19,516
4. Edmonton	3,326	117,752	1,929	123,007
5. Bonnyville	-	90,247	279	90,526
6. Lloydminster	-	30,353	351	30,704
7. Red Deer	41,234	168,936	2,014	212,184
8. Calgary	-	87,927	5,407	93,334
9. Medicine Hat	65,661	544,312	9,780	619,753
10. Lethbridge	64,289	36,627	2,137	103,052
<b>Total</b>	<b>176,183</b>	<b>1,160,423</b>	<b>33,084</b>	<b>1,369,690</b>
Per cent of Total	13%	85%	2%	100%

## History of Greenhouses in Alberta

Table 3.3 describes the number of expansions that took place in different years throughout all regions. Out of the 111 respondents, 3 per cent of the total number of expansions occurred in 2011 to 2014, 14 per cent in 2001 to 2010, 32 per cent in 1991 to 2000, 32 per cent in 1981 to 1990 and 20 per cent in 1980 or prior years.

**Table 3.3: History of Greenhouses in Alberta (Number of Expansions)**

Region	History of Greenhouses (Number of Expansions)					Number of Growers by Region
	1980 or Prior	1981 to 1990	1991 to 2000	2001 to 2010	2011 to 2014	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	1	1	2	0	0	4
3. Whitecourt	2	7	2	1	0	12
4. Edmonton	8	5	8	4	1	26
5. Bonnyville	1	2	2	0	0	5
6. Lloydminster	0	5	0	0	0	5
7. Red Deer	1	6	14	4	0	25
8. Calgary	2	4	2	1	0	9
9. Medicine Hat	5	4	5	3	0	17
10. Lethbridge	2	1	1	1	2	7
<b>Total</b>	<b>22</b>	<b>35</b>	<b>36</b>	<b>15</b>	<b>3</b>	<b>111</b>
Per cent of Total	20%	32%	32%	14%	3%	100%

## Financing of Greenhouse Operations

Table 3.4 shows the number of greenhouses operations that are financed. Of the 137 respondents, 48 per cent had financing and 52 per cent did not.

**Table 3.4: Financing of Greenhouse Operations**

Region	Financing		Number of Growers by Region
	Yes	No	
1. Fort McMurray	-	-	-
2. Grande Prairie	5	4	9
3. Whitecourt	2	10	12
4. Edmonton	12	20	32
5. Bonnyville	3	3	6
6. Lloydminster	2	4	6
7. Red Deer	20	12	32
8. Calgary	5	6	11
9. Medicine Hat	14	5	19
10. Lethbridge	2	7	9
<b>Total</b>	<b>66</b>	<b>71</b>	<b>137</b>
Per cent of Total	48%	52%	100%

### Source of Financing (Loans)

Table 3.5 shows the source of loans obtained by growers. Most growers (61 per cent) obtained their loans from banks, 20 per cent from Farm Credit Canada (FCC), eight per cent from Agriculture Financial Services Corporation (AFSC) and the remaining 11 per cent were self-financed. Some of the growers obtained loans from more than one institution.

**Table 3.5: Source of Financing (Loans)**

Region	Financial Institution				Number of Growers by Region
	FCC*	AFSC**	Bank	Self-Financed	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	1	1	3	0	5
3. Whitecourt	1	0	1	0	2
4. Edmonton	4	2	7	2	15
5. Bonnyville	1	0	2	0	3
6. Lloydminster	0	1	1	0	2
7. Red Deer	3	1	16	2	22
8. Calgary	1	1	2	2	6
9. Medicine Hat	4	0	10	2	16
10. Lethbridge	0	0	2	0	2
<b>Total</b>	<b>15</b>	<b>6</b>	<b>45</b>	<b>8</b>	<b>74</b>
Per cent of Total	20%	8%	61%	11%	100%

\* Farm Credit Canada

\*\* Agriculture Financial Services Corporation

## Operations of Greenhouses by Region

Table 3.6 indicates operation of greenhouses by region. Based on survey responses, 36 per cent operate year round while 64 per cent operate seasonally.

**Table 3.6: Operation of Greenhouses by Region**

Region	Operation		Number of Growers by Region
	Year round	Seasonal	
1. Fort McMurray	-	-	-
2. Grande Prairie	3	9	12
3. Whitecourt	3	10	13
4. Edmonton	12	27	39
5. Bonnyville	3	4	7
6. Lloydminster	2	7	9
7. Red Deer	11	27	38
8. Calgary	6	9	15
9. Medicine Hat	14	6	20
10. Lethbridge	4	7	11
<b>Total</b>	<b>59</b>	<b>106</b>	<b>165</b>
Per cent of Total	36%	64%	100%

### Greenhouse Production Certified as Organic by Region

Table 3.7 indicates greenhouse production certified as organic by region. Only two per cent of respondents indicated that their production is certified as organic.

**Table 3.7: Greenhouse Production Certified as Organic**

Region	Do you have any production certified as organic?		Number of Growers by Region
	Yes	No	
1. Fort McMurray	-	-	-
2. Grande Prairie	0	9	9
3. Whitecourt	0	12	12
4. Edmonton	0	31	32
5. Bonnyville	0	6	6
6. Lloydminster	0	6	6
7. Red Deer	1	31	32
8. Calgary	1	11	11
9. Medicine Hat	0	19	19
10. Lethbridge	1	8	9
<b>Total</b>	<b>3</b>	<b>134</b>	<b>137</b>
Per cent of Total	2%	98%	100%

## Breakdown of Majority of Sales

Table 3.8 shows the breakdown of sales by channel. Leading responses included “own retail shop” at 51 per cent, “wholesale / cooperative” at 19 per cent, and “farmers market” at 12 per cent. Sales to grocery stores, independent garden centres and box stores were reported by 17 per cent of respondents.

**Table 3.8: Majority of Sales Breakdown**

Region	Majority of Your Sales Are To:							Number of Growers by Region
	Own retail shop	Farmers' Markets	Wholesale or Coop	Grocery Stores	Garden Centres	Box Stores	Other Growers	
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	8	1	1	1	0	0	0	11
3. Whitecourt	11	3	0	2	1	0	0	17
4. Edmonton	29	5	2	1	3	0	1	41
5. Bonnyville	4	0	2	0	0	0	0	6
6. Lloydminster	6	1	2	0	1	0	1	11
7. Red Deer	20	9	9	3	3	2	1	47
8. Calgary	7	2	3	2	3	0	0	17
9. Medicine Hat	2	0	14	1	2	2	1	22
10. Lethbridge	6	1	1	1	0	1	0	10
<b>Total</b>	<b>93</b>	<b>22</b>	<b>34</b>	<b>11</b>	<b>14</b>	<b>5</b>	<b>4</b>	<b>183*</b>
Per cent of Total	51%	12%	19%	6%	8%	3%	2%	100%

\* Multiple growers

## Annual Gross Sales of Greenhouse Operations

Table 3.9 presents the annual sales volume of greenhouse operations in Alberta. Based on survey responses, 39 per cent of growers have annual sales of \$100,001 to \$500,000, followed by the “under \$100,000” category with 27 per cent. The “500,001 to \$2 million” category was the third leading response at 21 per cent. Eight per cent of respondents reported annual sales volume of \$2 million to \$4 million and those with over \$4 million accounted for about five per cent of the total number of respondents.

**Table 3.9: Annual Gross Sales of Greenhouse Operations**

Region	What is Your Operation’s Annual Gross Sales					Number of Growers by Region
	Under \$100,000	100,001 to \$500,000	\$500,001 to \$2 M	\$2 M to \$4 M	Over \$4 M	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	3	4	1	1	0	9
3. Whitecourt	5	6	1	0	0	12
4. Edmonton	7	13	7	2	2	31
5. Bonnyville	2	2	1	0	1	6
6. Lloydminster	4	3	0	0	0	7
7. Red Deer	11	14	4	1	1	31
8. Calgary	2	5	3	0	2	12
9. Medicine Hat	1	4	8	6	0	19
10. Lethbridge	2	3	3	0	1	9
<b>Total</b>	<b>37</b>	<b>54</b>	<b>29</b>	<b>10</b>	<b>7</b>	<b>137</b>
Per cent of Total	27%	39%	21%	8%	5%	100%



## SECTION V

### Heating and Environmental Control System

Table 4.1 shows the heating systems used in the Alberta greenhouse industry. Some growers used more than one heating system in their greenhouses. Based on the responses, the majority of growers (52 per cent) use forced air furnaces, 30 per cent hot water and a combined 21 per cent use steam, in floor heating, pipes under the growing media, soil heating and combine heat and power. Of the 52 per cent or 125 growers who use forced air furnaces, 112 or 47 per cent were natural gas furnaces, 12 or five per cent were propane and only one grower used coal.

**Table 4.1: Types of Heating Systems Used in Greenhouses**

Region	Boiler		Forced Air Furnace*	Other Heating				Number of Growers by Region
	Hot Water	Steam		In-floor Heating	Pipe under growing media	Soil Heating	Combine Heat and Power	
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	2	0	9	1	0	0	0	12
3. Whitecourt	5	0	13	2	3	0	0	23
4. Edmonton	13	2	29	6	5	0	3	58
5. Bonnyville	2	0	6	0	0	0	0	8
6. Lloydminster	1	0	6	0	0	0	0	7
7. Red Deer	12	0	26	5	2	2	0	47
8. Calgary	7	0	9	2	1	0	0	19
9. Medicine Hat	15	5	18	2	1	1	1	43
10. Lethbridge	5	0	8	2	0	1	1	17
<b>Total</b>	<b>63</b>	<b>7</b>	<b>125</b>	<b>21</b>	<b>12</b>	<b>4</b>	<b>5</b>	<b>237</b>
Per cent of Total	27%	3%	52%	9%	5%	2%	2%	100%

\*Approximately 112 growers or 47 per cent use natural gas forced air furnaces, 12 growers or 5 per cent use propane and only one grower used coal.

## Fuel Type

Table 4.2 indicates the fuel types used in greenhouses by region in Alberta. Eighty two per cent of growers use natural gas, eight per cent propane, seven per cent coal, three per cent wood and one per cent electricity. None of the respondents had an oil heating system.

**Table 4.2: Type of Fuel**

Region	Fuel Type					Number of Growers by Region
	Natural Gas	Propane	Coal	Wood	Electric	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	12	0	0	1	0	13
3. Whitecourt	11	3	0	0	0	14
4. Edmonton	31	0	4	2	0	37
5. Bonnyville	7	0	0	0	0	7
6. Lloydminster	7	0	1	0	0	8
7. Red Deer	28	7	2	1	1	39
8. Calgary	8	2	1	0	0	11
9. Medicine Hat	30	0	2	0	0	32
10. Lethbridge	10	1	1	1	0	13
<b>Total</b>	<b>144</b>	<b>14</b>	<b>12</b>	<b>5</b>	<b>1</b>	<b>176</b>
Per cent of Total	82%	8%	7%	3%	1%	100%

## Heating Cost of Greenhouse Operations in Alberta

Table 4.3 shows the heating cost of greenhouse operations in Alberta. Approximately 52 per cent (119) of the total number of growers responded to the heating cost question. Average heating cost was estimated at \$12.54 per sq. m. or \$1.16 per sq. ft. This translates into a total heating expenditure for the greenhouse industry in Alberta of approximately \$17.17 million in 2014.

**Table 4.3: Heating Costs per Year**

Region	Heating Costs Per Year		
	Heating costs (\$)	Area Heated (sq. ft.)	Growers
1. Fort McMurray	-	-	-
2. Grande Prairie	259,681	396,275	9
3. Whitecourt	107,250	89,486	9
4. Edmonton	550,992	833,836	27
5. Bonnyville	671,065	658,810	6
6. Lloydminster	95,500	198,464	5
7. Red Deer	2,520,150	1,599,912	27
8. Calgary	432,495	567,441	10
9. Medicine Hat	3,487,716	3,048,162	17
10. Lethbridge	630,000	220,449	8
<b>Total</b>	<b>8,904,849</b>	<b>7,644,835</b>	<b>119</b>
<b>Heating costs/sq. ft.</b>	1.16		
<b>Heating costs/sq. m.</b>	12.54		

## Carbon Dioxide Recovery by Greenhouse Operations

Table 4.4 shows greenhouse operations in Alberta that have a carbon dioxide (CO<sub>2</sub>) recovery system. Based on survey responses, only 11 per cent of the growers in Alberta had a CO<sub>2</sub> recovery system in greenhouses.

**Table 4.4: Recovery of Carbon Dioxide from Greenhouses**

Region	Do you have a CO <sub>2</sub> recovery system?		Number of Growers by Region
	Yes	No	
1. Fort McMurray	-	-	-
2. Grande Prairie	0	8	8
3. Whitecourt	1	10	11
4. Edmonton	0	32	32
5. Bonnyville	0	6	6
6. Lloydminster	1	5	6
7. Red Deer	5	27	32
8. Calgary	0	11	11
9. Medicine Hat	7	12	19
10. Lethbridge	1	8	9
<b>Total</b>	<b>15</b>	<b>120</b>	<b>135</b>
Per cent of Total	11%	89%	100%

## Environmental Control Systems in Alberta Greenhouses

Table 4.5 presents environmental control systems. Most of the growers had more than one environmental control system in their greenhouses. Twenty six per cent reported using ventilation systems, followed by 43 per cent with exhaust fans, and 31 per cent with natural ridge vent systems. Based on a total of 136 survey respondents, approximately of 46 per cent had summer and winter ventilation (fan and jet) while 54 per cent reported none in all regions.

**Table 4.5: Types of Environmental Control Systems**

Region	Environmental Control Systems				Summer and Winter Ventilation (fan and jet)		
	Ventilation	Exhaust fans	Natural ridge vents	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	3	5	4	12	3	6	9
3. Whitecourt	5	9	3	17	5	7	12
4. Edmonton	11	21	15	47	17	15	32
5. Bonnyville	4	5	1	10	2	4	6
6. Lloydminster	2	4	2	8	3	3	6
7. Red Deer	14	22	12	48	14	18	32
8. Calgary	3	7	6	16	7	4	11
9. Medicine Hat	9	13	15	37	8	10	18
10. Lethbridge	3	4	6	13	4	5	9
<b>Total</b>	<b>55</b>	<b>90</b>	<b>64</b>	<b>209*</b>	<b>63</b>	<b>73</b>	<b>136</b>
Per cent of Total	26%	43%	31%	100%	46%	54%	100%

\* Multiple growers

## Horizontal Air Flow Fans, Evaporative Coolers, and Relative Humidity Controls

Table 4.6 reports horizontal air flow fans, evaporative coolers, and relative humidity control system in Alberta. Based on survey responses, 71 per cent have horizontal air flow fans, 11 per cent use evaporative coolers, and 34 per cent use relative humidity control system in their greenhouses.

**Table 4.6: Horizontal Air Flow Fans, Evaporative Coolers, and Relative Humidity Controls**

Region	Do you have horizontal air flow fans?			Do you have evaporative coolers?			Do you have a relative humidity control system?		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	7	2	9	0	9	9	2	7	9
3. Whitecourt	8	4	12	0	12	12	2	10	12
4. Edmonton	19	13	32	1	31	32	5	26	31
5. Bonnyville	5	1	6	1	5	6	1	5	6
6. Lloydminster	5	1	6	1	5	6	1	5	6
7. Red Deer	21	11	32	1	31	32	7	25	32
8. Calgary	8	3	11	1	9	10	13	8	21
9. Medicine Hat	17	2	19	10	9	19	15	4	19
10. Lethbridge	7	3	10	0	9	9	3	5	8
<b>Total</b>	<b>98</b>	<b>40</b>	<b>138</b>	<b>15</b>	<b>121</b>	<b>136</b>	<b>49</b>	<b>96</b>	<b>145</b>
Per cent of Total	71%	29%	100%	11%	89%	100%	34%	66%	100%

## SECTION VI

### Type of Computers used by Greenhouse Growers

Table 5.1 indicates multiple types of computers used by growers. Based on the responses, some used more than one type of computer. Leading responses include “Priva” at 18 per cent and “Argus” at 14 per cent. Eleven per cent of respondents used other systems and 57 per cent used personal computers. While personal computers (PCs) were used for book-keeping, internet use, e-mail, and crop scheduling all other types of computers were used for irrigation and environmental control.

**Table 5.1: Type of Computers Used in Greenhouses**

Region	Type of Computer				Number of Growers by Region
	Priva	Argus	Other	Personal Computers	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	0	1	1	7	9
3. Whitecourt	0	0	3	6	9
4. Edmonton	1	2	3	20	26
5. Bonnyville	0	1	1	4	6
6. Lloydminster	1	0	0	3	4
7. Red Deer	9	2	2	15	28
8. Calgary	0	2	2	7	11
9. Medicine Hat	11	8	0	6	25
10. Lethbridge	0	2	2	2	6
<b>Total</b>	<b>22</b>	<b>18</b>	<b>14</b>	<b>71</b>	<b>125</b>
Per cent of Total	18%	14%	11%	57%	100%

## Computer Use in Greenhouses

Table 5.2 indicates the use of computers. Fifteen per cent of greenhouse growers used computers for environmental control, 12 per cent for crop scheduling, 10 per cent for irrigation control, and 21 per cent each for book-keeping, e-mail, and internet search respectively.

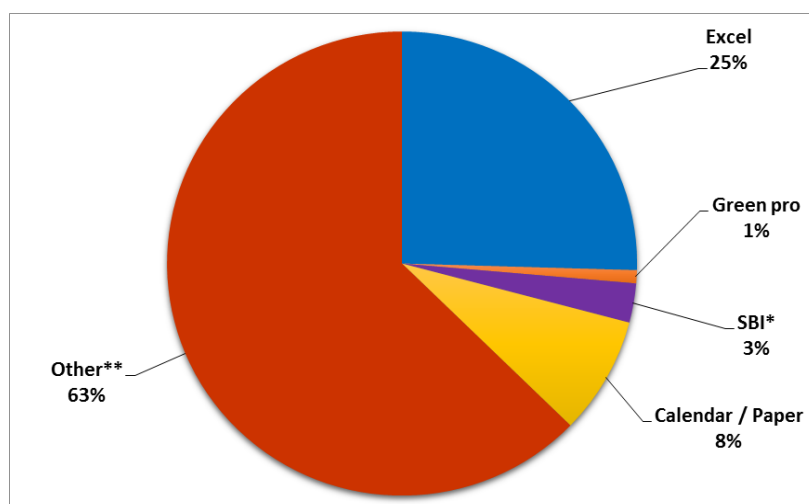
**Table 5.2: Uses of Computers by Greenhouse Growers**

Region	Use of Computer for:						Number of Growers by Region
	Environmental control	Book-keeping	Crop scheduling	Irrigation control	E-mail	Internet search	
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	4	7	3	0	7	6	27
3. Whitecourt	2	7	5	2	6	6	28
4. Edmonton	9	16	7	6	18	17	73
5. Bonnyville	2	3	1	1	3	3	13
6. Lloydminster	2	2	0	0	2	2	8
7. Red Deer	12	19	14	9	19	20	93
8. Calgary	3	8	3	2	7	7	30
9. Medicine Hat	15	8	2	12	7	9	53
10. Lethbridge	4	3	5	4	4	4	24
<b>Total</b>	<b>53</b>	<b>73</b>	<b>41</b>	<b>36</b>	<b>73</b>	<b>75</b>	<b>351*</b>
Per cent of Total	15%	21%	12%	10%	21%	21%	100%

\*Growers using multiple programs.

With regard to crop scheduling, growers were asked to report the programs they use. Figure 4 shows the crop scheduling programs used by greenhouse growers in Alberta.

**Figure 4: Crop Scheduling Programs Used by Growers**



Based on the responses, 25 per cent use Microsoft Excel, eight per cent use calendar and paper, three per cent use SBI software, one per cent use Green pro and 63 per cent use other programs including their own, tree seedling production program, etc.

The regional breakdown of this information is presented in Table 5.3.

\*Small Business Innovation, Inc.

\*\* Own, tree seedling production program, etc.



**Table 5.3: Crop Scheduling Program Used by Greenhouse Growers**

Region	Crop Scheduling Program					Number of Growers by Region
	Excel	Green pro	SBI* software	Calendar / Paper	Other**	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	3	0	0	1	3	7
3. Whitecourt	3	0	0	1	9	13
4. Edmonton	5	0	1	2	17	25
5. Bonnyville	0	0	0	0	3	3
6. Lloydminster	0	0	0	0	4	4
7. Red Deer	7	1	0	2	16	26
8. Calgary	1	0	2	0	7	10
9. Medicine Hat	5	0	0	2	4	11
10. Lethbridge	3	0	0	1	6	10
<b>Total</b>	<b>28</b>	<b>1</b>	<b>3</b>	<b>9</b>	<b>69</b>	<b>110***</b>
Per cent of Total	25%	1%	3%	8%	63%	100%

\*Small Business Innovation, Inc.

\*\* Include own, tree seedling production program, etc.

\*\*\*Multiple growers.

## SECTION VII

### Lighting Systems in Greenhouses

Table 6.1 lists the multiple lighting systems per grower in greenhouses. About 68 growers responded to this question. Seventy one per cent used high pressure sodium (HPS) lights, six per cent photo period lights, 12 Light Emitting Diode (LED) and the remaining 12 per cent reported other lights. The total number of lights in all regions was 50,330 and its corresponding total wattage was 939,320 watts.

**Table 6.1: Lighting Systems in Greenhouses**

Region	Lighting Systems in Greenhouses									
	High Pressure Sodium (HPS)			Photo Period Light			Light Emitting Diode (LED)			Other
	# of Growers	# of Lights	Total watts	# of Growers	# of Lights	Total watts	# of Growers	# of Lights	Total watts	# of Growers
1. Fort McMurray	-	-	-	-	-	-	-	-	-	-
2. Grande Prairie	3	274	93,600	0	0	0	0	0	0	6
3. Whitecourt	4	20	1,600	0	0	0	0	0	0	0
4. Edmonton	12	196	27,950	1	3	250	2	1,050	0	2
5. Bonnyville	4	974	388,000	2	1	0	0	0	0	0
6. Lloydminster	1	3	0	0	100	0	0	0	0	0
7. Red Deer	11	42,266	73,510	0	4,500	0	2	200	60	0
8. Calgary	5	78	11,100	0	0	0	2	15	0	0
9. Medicine Hat	6	247	113,080	1	12	4,800	0	0	0	0
10. Lethbridge	2	377	225,000	0	0	0	1	13	370	0
<b>Total</b>	<b>48</b>	<b>44,435</b>	<b>933,840</b>	<b>4</b>	<b>4,616</b>	<b>5,050</b>	<b>8</b>	<b>1,279</b>	<b>430</b>	<b>8</b>
Per cent of Total	71%	88%	99%	6%	9%	1%	12%	3%	0%	12%

# = Number

## SECTION VIII

### Water Usage by Greenhouse Growers

Table 7.1 shows the source of water used by growers in all regions. Twenty nine per cent of respondents indicated that their water is sourced from dugouts, 25 per cent from wells, 41 per cent from city water and the remaining five per cent from irrigation canals and rivers.

**Table 7.1: Source of Water Used by Greenhouse Growers**

Region	Source of water					Number of Growers by Region
	Dugout	Well	Irrigation Canal	River	City Water	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	4	2	0	0	7	13
3. Whitecourt	5	7	0	1	2	15
4. Edmonton	9	11	0	0	17	37
5. Bonnyville	3	1	0	0	3	7
6. Lloydminster	2	4	0	0	2	8
7. Red Deer	15	11	1	0	7	34
8. Calgary	4	3	2	0	3	12
9. Medicine Hat	5	0	3	0	21	29
10. Lethbridge	2	2	1	0	6	11
<b>Total</b>	<b>49</b>	<b>41</b>	<b>7</b>	<b>1</b>	<b>69</b>	<b>167</b>
Per cent of Total	29%	25%	4%	1%	41%	100%

## Quantity of Water Used by Greenhouse Growers

Table 7.2 shows that only 20 per cent of 136 respondents know the total quantity of water they use. These growers indicated 46,854,724 gallons for 1,914,537 sq. ft. area. It is interesting to note that a large number of growers did not keep records of water use. Water use is generally standard per unit area of the greenhouse. Based on the survey average water use per is estimated at 1.00 m<sup>3</sup> per sq. m. or 24 gallons per sq. ft.

**Table 7.2: Quantity of Water Used by Greenhouse Growers**

Region	Do you know total quantity of water you use			If yes, total quantity of water used			
	Yes	No	Number of Growers by Region	Cubic meter (m3)	Gallon	Area (sq. m.)	Area (sq. ft.)
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	2	7	9	15,030	3,970,475	30,220	325,285
3. Whitecourt	2	10	12	718	189,626	2,062	22,200
4. Edmonton	8	24	32	7,381	1,949,934	25,209	271,345
5. Bonnyville	2	4	6	60,076	15,870,198	42,266	454,946
6. Lloydminster	1	5	6	273	72,000	1,486	16,000
7. Red Deer	9	23	32	86,605	22,878,362	53,413	574,936
8. Calgary	1	10	11	235	62,080	802	8,633
9. Medicine Hat	1	17	18	49	12,860	12,170	131,000
10. Lethbridge	1	8	9	7,000	1,849,190	10,237	110,192
<b>Total</b>	<b>27</b>	<b>109</b>	<b>136</b>	<b>177,366</b>	<b>46,854,724</b>	<b>177,866</b>	<b>1,914,537</b>
Per cent of Total	20%	80%	100%				
Average water use per area = 1.00 m <sup>3</sup> /sq. m. or 24 gallons/sq. ft.							

Note: Conversion rate, One Cubic meter (1.00 m<sup>3</sup>) = 264.17 Gallon

## Collection of Water from Greenhouse Roof and Water Quality

Based on survey responses, 44 per cent of growers collected water from greenhouse roofs while 56 per cent did not (Table 7.3). Regarding water quality, 42 per cent of 134 respondents reported their water was hard while 14 per cent and 44 per cent reported soft and medium water respectively.

**Table 7.3: Collection of Water from Greenhouse Roof and Water Quality**

Region	Collection of Water from Greenhouse Roof			Water Quality			
	Yes	No	Number of Growers by Region	Hard	Soft	Medium	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	2	7	9	2	1	6	9
3. Whitecourt	4	8	12	7	3	2	12
4. Edmonton	17	15	32	15	3	12	30
5. Bonnyville	2	4	6	2	2	2	6
6. Lloydminster	1	5	6	4	0	2	6
7. Red Deer	19	13	32	10	8	13	31
8. Calgary	7	4	11	5	1	5	11
9. Medicine Hat	5	14	19	4	0	15	19
10. Lethbridge	2	7	9	7	1	1	9
<b>Total</b>	<b>60</b>	<b>77</b>	<b>137</b>	<b>56</b>	<b>19</b>	<b>59</b>	<b>134</b>
Per cent of Total	44%	56%	100%	42%	14%	44%	100%

## Water Analyses and Sodium Level

Table 7.4 shows that 83 per cent of respondents have had their water analyzed while the remaining did not. Approximately 62 per cent of the growers knew the sodium level in their water while 38 per cent did not.

**Table 7.4: Water Analyses and Sodium Level**

Region	Have you ever had your water analyzed?			Do you know the sodium level in your water?		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	7	3	10	6	4	10
3. Whitecourt	10	2	12	8	4	12
4. Edmonton	27	5	32	17	15	32
5. Bonnyville	6	0	6	4	2	6
6. Lloydminster	5	2	7	4	3	7
7. Red Deer	27	5	32	26	6	32
8. Calgary	9	1	10	6	5	11
9. Medicine Hat	17	2	19	10	8	18
10. Lethbridge	6	3	9	4	5	9
<b>Total</b>	<b>114</b>	<b>24</b>	<b>138</b>	<b>85</b>	<b>53</b>	<b>138</b>
Per cent of Total	83%	17%	100%	62%	38%	100%

## Water Treatment Used in Greenhouses

Table 7.5 shows that 45 per cent of respondents used filter system for water treatment, 44 per cent used acid mixing; six per cent used reverse osmosis, and three per cent used water conditioning.

**Table 7.5: Water Treatment Used in Greenhouses**

Region	Water Treatment						Number of Growers by Region
	Reverse Osmosis	Distillation	Water Conditioning	Filter System	Acid Mixing	Other	
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	2	6	0	0	8
3. Whitecourt	0	0	0	4	4	0	8
4. Edmonton	1	0	2	11	9	0	23
5. Bonnyville	0	0	0	1	2	0	3
6. Lloydminster	1	0	0	1	1	0	3
7. Red Deer	3	0	0	12	18	1	34
8. Calgary	2	0	0	5	9	1	17
9. Medicine Hat	0	0	0	12	8	0	20
10. Lethbridge	0	0	0	4	4	1	9
<b>Total</b>	<b>7</b>	<b>0</b>	<b>4</b>	<b>56</b>	<b>55</b>	<b>3</b>	<b>125</b>
Per cent of Total	6%	0%	3%	45%	44%	2%	100%

## Irrigation Systems

Table 7.6 shows the types of irrigation systems that growers use. Fifty-one per cent of the respondents used drip irrigation, 22 per cent used overhead sprinklers, 18 per cent used hand-watering systems and eight per cent used flood and or drained benches. Hand-watering is primarily used by seasonal bedding plant growers. Twenty-one per cent recycled greenhouse water while 79 per cent did not. Most of the small growers did not recycle their water.

**Table 7.6: Irrigation Systems and Recycling Water**

Region	Irrigation System					Do you recycle water?		
	Drip Irrigation	Overhead sprinklers	Hand Watering	Flood / Drained Benches	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	5	2	4	0	11	0	9	9
3. Whitecourt	5	2	2	1	10	1	11	12
4. Edmonton	19	9	10	5	43	4	28	32
5. Bonnyville	0	2	1	0	3	1	5	6
6. Lloydminster	2	1	1	0	4	0	6	6
7. Red Deer	22	6	6	4	38	7	24	31
8. Calgary	5	4	1	1	11	1	10	11
9. Medicine Hat	15	4	1	1	21	14	5	19
10. Lethbridge	5	4	2	1	12	1	8	9
<b>Total</b>	<b>79</b>	<b>34</b>	<b>28</b>	<b>13</b>	<b>154</b>	<b>29</b>	<b>107</b>	<b>136</b>
Per cent of Total	51%	22%	18%	8%	100%	21%	79%	100%



## Disposal of Waste Water

Table 7.7 indicates that 49 per cent of respondents disposed their water on the ground or field and 11 per cent through sewerage. Based on survey responses, 40 per cent had no waste water.

**Table 7.7: Disposal of Waste Water**

Region	Disposal of Waste Water			Number of Growers by Region
	Ground / Field	Sewerage	No waste water	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	4	2	3	9
3. Whitecourt	5	1	7	13
4. Edmonton	18	1	13	32
5. Bonnyville	2	1	3	6
6. Lloydminster	1	0	5	6
7. Red Deer	21	2	9	32
8. Calgary	7	0	4	11
9. Medicine Hat	6	8	4	18
10. Lethbridge	4	0	6	10
<b>Total</b>	<b>68</b>	<b>15</b>	<b>55</b>	<b>138</b>
Per cent of Total	49%	11%	40%	100%

## Fertilizer Injector Systems Used in Greenhouses

Table 7.8 shows uses of fertilizer injector systems by growers. Fourteen per cent used Anderson, 37 per cent used Dosatron, and 38 per cent used other systems including Dosmatic, Mixrite, Niagrow, Priva, Smith, Zwart, Argus, SuperDos. Eleven per cent reported that they did not use any kind of fertilizer injector system in their greenhouses.

**Table 7.8: Fertilizer Injection System Used by Greenhouse Operations**

Region	Fertilizer Injection System				Number of Growers by Region
	Anderson	Dosatron	Other	None*	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	0	4	4	0	8
3. Whitecourt	1	6	3	2	12
4. Edmonton	6	14	11	1	32
5. Bonnyville	2	2	0	2	6
6. Lloydminster	1	0	1	3	5
7. Red Deer	3	11	12	5	31
8. Calgary	2	6	3	0	11
9. Medicine Hat	4	3	10	1	18
10. Lethbridge	0	2	6	0	8
<b>Total</b>	<b>19</b>	<b>49</b>	<b>50</b>	<b>14</b>	<b>132</b>
Per cent of Total	14%	37%	38%	11%	100%

\* Dosmatic, Mixrite, Niagrow, Priva, Smith, Zwart, Argus, SuperDos

### Use of Calcium Nitrate as part of Greenhouse Fertilizer Program

Table 7.9 shows number of growers who use calcium nitrate as part of their greenhouse fertilizer program. Of the 137 respondents, 57 per cent indicated “yes” while the remaining 43 per cent indicated “no”.

**Table 7.9: Use of Calcium Nitrate as Part of Greenhouse Fertilizer Program**

Region	Do you use Calcium Nitrate?		Number of Growers by Region
	Yes	No	
1. Fort McMurray	-	-	-
2. Grande Prairie	6	2	8
3. Whitecourt	6	5	11
4. Edmonton	19	13	32
5. Bonnyville	5	1	6
6. Lloydminster	3	3	6
7. Red Deer	15	22	37
8. Calgary	7	4	11
9. Medicine Hat	16	2	18
10. Lethbridge	1	6	7
<b>Total</b>	<b>78</b>	<b>59</b>	<b>137</b>
Per cent of Total	57%	43%	100%

## SECTION IX

### Greenhouse Crops Production by Region

Table 8.1 indicates greenhouse crops area by region. Two hundred and thirty growers used 46 per cent of their greenhouse area for vegetables (157 acres), followed by 41 per cent for floriculture (137 acres), and 13 per cent for tree seedlings (45 acres) in all regions.

**Table 8.1: Greenhouse Crop Area by Region**

Region	Greenhouse Crop Area			Total Area by Region
	Vegetables (sq. ft.)	Floriculture (sq. ft.)	Tree Seedlings (sq. ft.)	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	1,750	329,356	472,331	803,437
3. Whitecourt	10,886	199,180	0	210,066
4. Edmonton	11,611	1,312,425	0	1,324,036
5. Bonnyville	39,292	83,000	891,410	1,013,702
6. Lloydminster	0	291,204	0	291,204
7. Red Deer	766,332	1,474,590	43,000	2,283,922
8. Calgary	64,808	939,833	0	1,004,641
9. Medicine Hat	5,735,761	375,640	559,554	6,670,955
10. Lethbridge	189,852	919,392	0	1,109,244
<b>Total</b>	<b>6,820,292</b>	<b>5,956,620</b>	<b>1,966,295</b>	<b>14,743,207</b>
Per cent of Total	46%	41%	13%	100%

N=230

10.76 sq. ft. = 1 sq. m.

## Cucumber Crop

Table 8.2 shows cucumber growers by region in Alberta. Based on survey responses, 53 per cent of growers produced Long English, 26 per cent Mini, 10.5 per cent Pickle and Salad varieties of cucumber. Some vegetable transplant growers are also included in this table.

**Table 8.2: Variety of Cucumbers Grown by Region in Alberta**

Region	Cucumber				Number of Growers by Region
	Long English	Mini	Pickle	Salad	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	1	0	1	0	2
3. Whitecourt	2	1	1	0	4
4. Edmonton	0	1	0	1	2
5. Bonnyville	0	0	0	0	0
6. Lloydminster	0	0	1	0	1
7. Red Deer	5	5	1	2	13
8. Calgary	0	0	0	1	1
9. Medicine Hat	11	2	0	0	13
10. Lethbridge	1	1	0	0	2
<b>Total</b>	<b>20</b>	<b>10</b>	<b>4</b>	<b>4</b>	<b>38</b>
Per cent of Total	53%	26%	10.5%	10.5%	100%

## Tomato Crop

Table 8.3 shows tomato growers by region in Alberta. Respondents reported multiple varieties. Forty-three per cent of 51 multiple variety growers produced Beefsteak, 25 per cent TOVs, and 31 per cent Cocktail in Alberta. Not all growers reported were commercial growers. Many bedding plant growers produce seedlings.

**Table 8.3: Variety of Tomatoes Grown by Region in Alberta**

Region	Tomatoes			Number of Growers by Region
	Beefsteak	TOVs	Cocktail	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	2	0	2	4
3. Whitecourt	3	0	0	3
4. Edmonton	2	0	2	4
5. Bonnyville	0	0	0	0
6. Lloydminster	1	0	0	1
7. Red Deer	6	6	5	17
8. Calgary	1	0	1	2
9. Medicine Hat	6	6	5	17
10. Lethbridge	1	1	1	3
<b>Total</b>	<b>22</b>	<b>13</b>	<b>16</b>	<b>51</b>
Per cent of Total	43%	25%	31%	100%

## Pepper Crop

Table 8.4 shows pepper growers by region in Alberta. Based on survey responses, 26 per cent out of 39 multiple variety producers grew green, 31 per cent yellow, 31 per cent orange and 13 per cent red varieties of pepper. Bedding plant growers who grew seedlings are also included in this number.

**Table 8.4: Variety of Peppers Grown by Region in Alberta**

Region	Peppers				Number of Growers by Region
	Green	Yellow	Orange	Red	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	1	1	1	0	3
3. Whitecourt	1	1	1	0	3
4. Edmonton	0	0	0	0	0
5. Bonnyville	0	0	0	0	0
6. Lloydminster	0	0	0	1	1
7. Red Deer	5	5	5	3	18
8. Calgary	0	0	0	0	0
9. Medicine Hat	2	4	4	0	10
10. Lethbridge	1	1	1	1	4
<b>Total</b>	<b>10</b>	<b>12</b>	<b>12</b>	<b>5</b>	<b>39</b>
Per cent of Total	26%	31%	31%	13%	100%

## Lettuce and Other Crops Grown by Region in Alberta

Table 8.5 displays lettuce and other crops grown in Alberta. Based on survey responses, 36 per cent of 28 multiple crop growers produced lettuce (butter head and romaine), 29 per cent grew eggplant and 36 per cent reported other crops such as Swiss chard, kale, beans, mantra beans, snap peas, sprouts, basil, strawberries, micro greens etc. Data in the table below includes transplant growers.

**Table 8.5: Lettuce and Other Crops Grown by Region in Alberta**

Region	Lettuce		Other Crops		Number of Growers by Region
	Butter Head	Romaine	Eggplant	Other*	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	0	0	0	0	0
3. Whitecourt	1	0	1	1	3
4. Edmonton	0	0	1	2	3
5. Bonnyville	0	0	0	0	0
6. Lloydminster	0	0	1	1	2
7. Red Deer	4	1	2	3	10
8. Calgary	0	0	0	1	1
9. Medicine Hat	3	1	2	2	8
10. Lethbridge	0	0	1	0	1
<b>Total</b>	<b>8</b>	<b>2</b>	<b>8</b>	<b>10</b>	<b>28</b>
Per cent of Total	29%	7%	29%	36%	100%

Other\* include Swiss chard, kale, beans, mantra beans, snap peas, sprouts, basil, strawberries, micro greens, etc.



## Area and Growing Media Used by Cucumber Growers

Table 8.6 shows area and growing media, raised trough, floor cover (plastic/cloth), and training system. Seventeen per cent of respondents used coir fiber and eight per cent used others such as rockwool, promix, etc. as growing media for cucumber production. Twenty-three per cent of the growers used raised troughs and 23 per cent used plastic as floor cover. Twenty-five per cent used v-shaped and other training systems\*.

**Table 8.6: Area and Growing Media Used by Cucumber Growers**

Region	Cucumber Area (sq. ft.)	Growing Media		Raised Troughs	Floor Cover (plastic / cloth)	Training System (V- Shaped and others*)	Number of Growers by Region
		Coir fibre	Other				
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	1	1	1	1	4
3. Whitecourt	8,300	0	2	1	1	2	6
4. Edmonton	13,615	0	2	2	1	1	6
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	200	0	1	0	1	0	2
7. Red Deer	329,020	5	1	5	5	5	21
8. Calgary	0	0	0	0	0	0	0
9. Medicine Hat	964,720	6	0	6	6	6	24
10. Lethbridge	8,073	0	1	0	0	1	2
<b>Total</b>	<b>1,323,928</b>	<b>11</b>	<b>8</b>	<b>15</b>	<b>15</b>	<b>16</b>	<b>65</b>
Per cent of Total		17%	12%	23%	23%	25%	100%

## Area and Growing Media Used by Tomato Growers

Table 8.7 indicates area and growing media, raised troughs, floor cover (plastic/cloth), and training system. Of the 75 multiple tomato growers, 17 per cent used coir fiber and 15 per cent used other media for growing tomatoes. Seventeen per cent of respondents used raised troughs, 24 per cent used plastic as floor cover and 27 per cent used V-shaped training systems.

**Table 8.7: Area and Growing Media Used by Tomato Growers**

Region	Tomato Area (sq. ft.)	Growing Media		Raised Troughs	Floor Cover (plastic / cloth)	Training System V- Shaped	Number of Growers by Region
		Coir fibre	Other				
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	2	2	2	2	8
3. Whitecourt	2,000	0	3	2	1	3	9
4. Edmonton	15,767	0	2	1	1	1	5
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	50	0	1	0	1	0	2
7. Red Deer	204,682	5	1	3	6	6	21
8. Calgary	0	0	1	1	0	1	3
9. Medicine Hat	958,220	8	0	4	7	6	25
10. Lethbridge	19,375	0	1	0	0	1	2
<b>Total</b>	<b>1,200,095</b>	<b>13</b>	<b>11</b>	<b>13</b>	<b>18</b>	<b>20</b>	<b>75</b>
Per cent of Total		17%	15%	17%	24%	27%	100%

## Area and Growing Media Used by Pepper Growers

Table 8.8 indicates area and growing media, raised trough, floor cover (plastic/cloth) and training system used for growing pepper. Of 42 pepper growers, 17 per cent used coir fiber and 14 per cent used other growing media. Seventeen per cent used raised troughs, 26 per cent used plastic floor covers and 26 per cent used V-shaped training systems their greenhouse.

**Table 8.8: Area and Growing Media Used by Pepper Growers**

Region	Pepper Area (sq. ft.)	Growing Media		Raised Troughs	Floor Cover (plastic / cloth)	Training System V- Shaped	Number of Growers by Region
		Coir fibre	Other				
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	2	2	2	1	7
3. Whitecourt	500	0	1	1	1	1	4
4. Edmonton	0	0	0	0	0	0	0
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	0	0	0	0	0	0	0
7. Red Deer	157,843	4	1	3	5	5	18
8. Calgary	0	0	0	0	0	0	0
9. Medicine Hat	267,681	2	1	1	3	3	10
10. Lethbridge	10,764	1	1	0	0	1	3
<b>Total</b>	<b>436,788</b>	<b>7</b>	<b>6</b>	<b>7</b>	<b>11</b>	<b>11</b>	<b>42</b>
Per cent of Total		17%	14%	17%	26%	26%	100%

## Area and Growing Media Used by Lettuce Growers

Table 8.9 lists area and growing media used by lettuce growers. Fifty per cent of the 18 lettuce growers used rock wool/water as growing media. Twenty-two per cent of the growers used raised troughs and 28 per cent used plastic/cloth floor covers in their greenhouses.

**Table 8.9: Area and Growing Media Used by Lettuce Growers**

<b>Region</b>	<b>Lettuce Area (sq. ft.)</b>	<b>Growing Media*</b>	<b>Raised troughs</b>	<b>Floor Cover (plastic / cloth)</b>	<b>Number of Growers by Region</b>
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	0	0	0	0	0
3. Whitecourt	50	1	1	1	3
4. Edmonton	3,000	1	0	0	1
5. Bonnyville	0	0	0	0	0
6. Lloydminster	0	0	0	0	0
7. Red Deer	10,274	4	2	2	8
8. Calgary	22,808	1	0	1	2
9. Medicine Hat	6,482	2	1	1	4
10. Lethbridge	0	0	0	0	0
<b>Total</b>	<b>42,614</b>	<b>9</b>	<b>4</b>	<b>5</b>	<b>18</b>
Per cent of Total		50%	22%	28%	100%

## Area and Growing Media Used by Egg Plant Growers

Table 8.10 lists area and growing media used by eggplant growers. Nine per cent of the growers used coir fiber while 23 per cent used others including Rockwool as growing media. Fourteen per cent used raised troughs, 27 per cent used plastic floor covers and 27 per cent used V-shaped training systems their greenhouses.

**Table 8.10: Area and Growing Media Used by Egg Plant Growers**

Region	Egg Plant Area (sq. ft.)	Growing Media		Raised Troughs	Floor Cover (plastic / cloth)	Training System V- Shaped	Number of Growers by Region
		Coir fibre	Other				
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	0	0	0	0	0
3. Whitecourt	10	0	1	1	1	1	4
4. Edmonton	0	0	0	0	0	0	0
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	50	0	1	0	1	0	2
7. Red Deer	10,890	1	1	2	2	2	8
8. Calgary	0	0	0	0	0	0	0
9. Medicine Hat	21,160	1	1	0	2	2	6
10. Lethbridge	538	0	1	0	0	1	2
<b>Total</b>	<b>32,648</b>	<b>2</b>	<b>5</b>	<b>3</b>	<b>6</b>	<b>6</b>	<b>22</b>
Per cent of Total		9%	23%	14%	27%	27%	100%

## Area and Growing Media Used by Other Crop Growers

Table 8.11 lists area and growing media used by other crop growers. Other crops included cauliflower, cabbage, beans and spinach. Ten per cent of these other crop growers used coir and 27 per cent used other growing media such as potting soil, Rockwool, etc. Twenty-seven per cent used raised troughs and 27 per cent used plastic as floor cover and 10 per cent used V-shaped training systems in their greenhouses.

**Table 8.11: Area and Growing Media Used by Other Crop Growers**

Region	Other Crop Area (sq. ft.)	Growing Media		Raised Troughs	Floor Cover (plastic / cloth)	Training System V-Shaped	Number of Growers by Region
		Coir fibre	Other				
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	0	0	0	0	0	0	0
3. Whitecourt	60	0	1	1	1	1	4
4. Edmonton	4076	0	3	2	2	0	7
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	600	0	1	0	1	0	2
7. Red Deer	4,239	3	1	4	4	2	14
8. Calgary	0	0	1	1	0	0	2
9. Medicine Hat	23,950	0	1	0	0	0	1
10. Lethbridge	0	0	0	0	0	0	0
<b>Total</b>	<b>32,925</b>	<b>3</b>	<b>8</b>	<b>8</b>	<b>8</b>	<b>3</b>	<b>30</b>
Per cent of Total		10%	27%	27%	27%	10%	100%

## SECTION X

### Bedding Plants

Table 9.1 lists the top ten bedding plants grown by region in Alberta. Based on the responses, the number of petunia growers were 116, followed by geranium with 81, pansy with 68, marigold with 63, begonia with 57, lobelia with 46, bacopa and calibrachoa with 44, tomatoes with 36 and snapdragon with 33. It must be noted that these growers produced multiple crops, with an average of ten crops per operation.

**Table 9.1: Top Ten Bedding Plants by Region in Alberta**

Bedding Plants	Region										Total Number of Growers by Bedding Plants
	1	2	3	4	5	6	7	8	9	10	
Petunia	-	7	13	29	6	8	30	13		2	116
Geranium	-	4	8	25	3	6	19	7	2	6	81
Pansy	-	8	8	14	4	3	21	6	0	3	68
Marigold	-	7	7	15	2	3	17	6	1	4	63
Begonia	-	5	7	17	2	2	11	8	0	4	57
Lobelia	-	6	5	10	3	1	14	3	0	3	46
Bacopa	-	2	4	15	1	3	7	6	2	4	44
Calibrachoa	-	2	4	18	1	3	9	4	0	3	44
Tomatoes	-	2	2	10	3	2	10	3	1	3	36
Snapdragon	-	3	4	8	1	1	9	4	1	1	33
<b>Total Number of Growers by Region</b>	-	<b>46</b>	<b>62</b>	<b>161</b>	<b>26</b>	<b>32</b>	<b>147</b>	<b>60</b>	<b>9</b>	<b>38</b>	<b>588*</b>

\*Multiple crops reported

## Number of Bedding Plant Cell Packs Grown by Region in Alberta

Table 9.2 shows the number of bedding plant cell packs that were grown by region in Alberta. Based on the responses, the top regions were Edmonton with 32 per cent of production, followed by Red Deer with 19 per cent, Lethbridge with 18 per cent and Calgary with 16 per cent. The other regions combined grew the remaining 15 per cent.

**Table 9.2: Number of Bedding Plant Cell Packs Grown by Region in Alberta**

<b>Region</b>	<b>Number of Cell Packs</b>	<b>Percentage of Cell Packs</b>	<b>Number of Growers by Region</b>
1. Fort McMurray	-	-	-
2. Grande Prairie	157,863	4%	5
3. Whitecourt	92,550	2%	9
4. Edmonton	1,324,293	32%	23
5. Bonnyville	26,475	1%	4
6. Lloydminster	29,000	1%	6
7. Red Deer	754,978	19%	22
8. Calgary	638,174	16%	8
9. Medicine Hat	293,000	7%	3
10. Lethbridge	729,000	18%	7
<b>Total</b>	<b>4,075,333</b>	<b>100%</b>	<b>88</b>



## Type of Vegetables Grown in Containers

Table 9.3 shows the type of vegetables grown in containers by region in Alberta. Based on the responses, tomatoes and peppers were the top two vegetables grown in containers.

**Table 9.3: Type of Vegetables Grown in Containers**

Region	Type of vegetables Grown in Containers			
	Tomatoes	Cucumbers	Peppers	Strawberry
1. Fort McMurray	-	-	-	-
2. Grande Prairie	7	7	5	6
3. Whitecourt	10	8	8	8
4. Edmonton	27	20	21	17
5. Bonnyville	4	2	3	4
6. Lloydminster	5	3	4	3
7. Red Deer	23	18	18	20
8. Calgary	9	5	8	5
9. Medicine Hat	3	2	2	1
10. Lethbridge	7	7	7	4
<b>Total</b>	<b>96</b>	<b>73</b>	<b>77</b>	<b>69</b>

### Comparison of 2014 Production to 2013

Table 9.4 shows how last year's production of growers compares with that of 2013. Based on survey responses, last year's production was better than 2013. Of the 86 growers who responded to this question, 69 per cent reported that their production increased while 31 per cent reported that their production decreased.

**Table 9.4: Comparison of 2014 Production to 2013**

Region	Has your production increased or decreased compared to 2013?		
	Increased	Decreased	Number of Growers by Region
1. Fort McMurray	-	-	-
2. Grande Prairie	6	0	6
3. Whitecourt	3	5	8
4. Edmonton	17	5	22
5. Bonnyville	0	1	1
6. Lloydminster	2	4	6
7. Red Deer	15	6	21
8. Calgary	8	2	10
9. Medicine Hat	3	2	5
10. Lethbridge	4	2	6
<b>Total</b>	<b>59</b>	<b>27</b>	<b>86</b>
Per cent of Total	69%	31%	100%

## Hangin**g** Baskets and Hybrid Plant Material

Table 9.5 describes the number of hanging baskets and whether growers are with new hybrid plant materials. Ninety-nine per cent of 108 bedding plant growers were familiar with hybrid plant materials and the remaining one per cent was not. Lethbridge, Calgary, Red Deer and Edmonton were the top regions that produced hanging baskets.

**Table 9.5: Hanging Baskets and Hybrid Plant Material**

Region	Hanging Baskets	Are you Familiar with New Hybrid Plant Material?	
		Yes	No
1. Fort McMurray	-	-	-
2. Grande Prairie	12,650	7	0
3. Whitecourt	14,600	11	0
4. Edmonton	63,065	30	0
5. Bonnyville	3,900	4	0
6. Lloydminster	5,660	6	0
7. Red Deer	91,487	26	1
8. Calgary	106,815	10	0
9. Medicine Hat	43,150	5	0
10. Lethbridge	486,950	7	0
<b>Total</b>	<b>830,777</b>	<b>107</b>	<b>1</b>
Per cent of Growers		99%	1%

## Flowers Grown

Table 9.6 indicates flowers grown in Alberta. Based on responses, 35 per cent of growers produced poinsettia, followed by 26 per cent with hydrangea, 19 per cent with chrysanthemum, 13 per cent with Easter lily and three per cent with azalea and cyclamen.

**Table 9.6: Flowers Grown by Regions in Alberta**

Region	Flowers Grown						Number of Growers by Region
	Poinsettia	Chrysanthemum	Hydrangea	Easter lily	Azalea	Cyclamen	
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	2	0	0	0	0	0	2
3. Whitecourt	1	1	0	0	0	0	2
4. Edmonton	3	2	4	2	0	1	12
5. Bonnyville	0	0	0	0	0	0	0
6. Lloydminster	0	0	1	0	0	0	1
7. Red Deer	1	0	0	0	0	0	1
8. Calgary	1	2	3	2	1	0	9
9. Medicine Hat	0	0	0	0	0	0	0
10. Lethbridge	2	1	0	0	0	0	3
<b>Total</b>	<b>11</b>	<b>6</b>	<b>8</b>	<b>4</b>	<b>1</b>	<b>1</b>	<b>31</b>
Per cent of Total	35%	19%	26%	13%	3%	3%	100%

## Cut Flowers

Table 9.7 indicates cut flowers grown in Alberta. Based on survey responses, 22 per cent produced roses, followed by 33 per cent each with Asiatic and oriental lilies, and the remaining 11 per cent with other flowers.

**Table 9.7: Cut Flowers by Regions in Alberta**

Region	Cut Flowers				Number of Growers by Region
	Roses	Asiatic lilies	Oriental lilies	Other	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	0	0	0	0	0
3. Whitecourt	0	0	0	0	0
4. Edmonton	1	0	0	0	1
5. Bonnyville	0	0	0	0	0
6. Lloydminster	0	1	1	1	3
7. Red Deer	0	0	0	0	0
8. Calgary	1	2	2	0	5
9. Medicine Hat	0	0	0	0	0
10. Lethbridge	0	0	0	0	0
<b>Total</b>	<b>2</b>	<b>3</b>	<b>3</b>	<b>1</b>	<b>9</b>
Per cent of Total	22%	33%	33%	11%	100%

## Culinary or Medicinal Herbs Grown in Alberta

Table 9.8 presents culinary or medicinal herbs grown in Alberta. Of the 104 respondents, 69 per cent produced culinary or medicinal herbs. Of this per centage of growers, 25 per cent grew basil, 18 per cent rosemary, 19 per cent thyme, 13 per cent parsley and 26 per cent other herb crops such as mint, oregano, sage, chives, cilantro, coriander, dill, curry, lemongrass, lemon verbena, lemon balm, lavender and artemisia.

**Table 9.8: Culinary or Medicinal Herbs Grown in Alberta**

Region	Do you grow culinary or medicinal herbs?			If Yes, List type of Herbs					Number of Growers by Region
	Yes	No	Number of Growers by Region	Basil	Rosemary	Thyme	Parsley	Other*	
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	6	1	7	6	3	3	2	6	20
3. Whitecourt	9	3	12	6	7	5	4	6	28
4. Edmonton	20	7	27	17	14	11	7	16	65
5. Bonnyville	4	0	4	3	1	1	0	3	8
6. Lloydminster	2	3	5	1	0	2	0	2	5
7. Red Deer	17	9	26	15	13	13	9	17	67
8. Calgary	9	1	10	7	2	7	6	7	29
9. Medicine Hat	2	4	6	1	2	2	1	2	8
10. Lethbridge	2	4	6	2	0	1	1	2	6
<b>Total</b>	<b>72</b>	<b>32</b>	<b>104</b>	<b>59</b>	<b>42</b>	<b>45</b>	<b>31</b>	<b>62</b>	<b>239</b>
Per cent of Total	69%	31%	100%	25%	18%	19%	13%	26%	100%

**Other\*** include mint, oregano, sage, chives, cilantro, coriander, dill, curry, lemongrass, lemon verbena, lemon balm, lavender, artemisia

## Consideration of Medicinal Marijuana as a Potential Greenhouse Crop

Table 9.9 presents information on whether growers would consider medicinal marijuana as a potential greenhouse crop in Alberta. Of the 112 growers who responded to this question, 33 per cent reported that they would while the remaining 67 per cent would not.

**Table 9.9: Consideration of Medicinal Marijuana as a Potential Greenhouse Crop**

Region	Would you consider Marijuana as a potential greenhouse crop?		
	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-
2. Grande Prairie	3	5	8
3. Whitecourt	5	7	12
4. Edmonton	11	17	28
5. Bonnyville	1	3	4
6. Lloydminster	3	3	6
7. Red Deer	8	20	28
8. Calgary	3	8	11
9. Medicine Hat	2	6	8
10. Lethbridge	0	6	6
<b>Total</b>	<b>37</b>	<b>75</b>	<b>112</b>
Per cent of Total	33%	67%	100%

## Perennials

Table 9.10 lists the top ten perennial bedding plants grown by region in Alberta. Based on the responses, Daylily was number with 70 growers, followed by Hosta with 59 and Sedum with 35. It must be noted that these growers produced multiple crops, with an average of ten crops per operation.

**Table 9.10: Top Ten Perennial Bedding Plants Grown in Alberta**

Perennials	Region										Total Number of Growers by Perennials
	1	2	3	4	5	6	7	8	9	10	
Daylily	-	5	6	25	2	2	19	4	1	4	70
Hosta	-	5	5	19	2	2	15	5	1	4	59
Sedum	-	0	3	11	2	1	11	4	1	2	35
Peony	-	2	4	6	2	2	6	4	1	2	29
Iris	-	1	6	5	2	1	6	4	2	1	28
Bleeding Heart	-	4	5	5	1	1	4	2	0	2	24
Astilbe	-	1	1	7	0	1	7	1	1	0	20
Dianthus	-	0	3	7	1	0	4	2	0	1	18
Delphinium	-	1	2	3	0	0	6	2	1	0	16
Heuchera	-	0	0	2	0	1	2	3	0	3	11
<b>Total Number of Growers by Region</b>	-	<b>19</b>	<b>35</b>	<b>90</b>	<b>12</b>	<b>11</b>	<b>80</b>	<b>31</b>	<b>8</b>	<b>19</b>	<b>310*</b>

\*Multiple growers



## Tree Seedlings

Table 9.11 indicates species, production schedule, and number of seedlings grown in all regions. Based on responses from 16 tree seedling operations, 50 per cent produced pine and the remaining 50 per cent produced spruce and deciduous materials. Sixty per cent have summer storage while 40 per cent have winter storage. In 2014, the number of seedlings grown by all growers was estimated at 77,500,000.

**Table 9.11: Tree Seedlings Grown in Alberta**

Region	Tree Seedling Grown			Production Schedule			Number of Seedlings Grown
	Pine	Spruce and Deciduous Material	Number of Growers by Region	Summer Storage	Winter Storage	Number of Growers by Region	
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	2	2	4	1	1	2	19,000,000
3. Whitecourt	0	0	0	0	0	0	0
4. Edmonton	0	0	0	0	0	0	0
5. Bonnyville	3	3	6	2	1	3	36,500,000
6. Lloydminster	0	0	0	0	0	0	0
7. Red Deer	1	1	2	1	0	1	2,000,000
8. Calgary	0	0	0	0	0	0	0
9. Medicine Hat	2	2	4	2	2	4	20,000,000
10. Lethbridge	0	0	0	0	0	0	0
<b>Total</b>	<b>8</b>	<b>8</b>	<b>16</b>	<b>6</b>	<b>4</b>	<b>10</b>	<b>77,500,000</b>
Per cent of Total	50%	50%	100%	60%	40%	100%	

## How Long Tree Seedlings Stock is Kept

Table 9.12 presents information on how long tree seedling growers keep their stock. Fifty per cent of the respondents kept their stock for one year while the remaining 50 per cent kept it for six months.

**Table 9.12: How Long Seedlings Stock is Kept**

Region	How long do you keep your stock?					Number of Growers by Region
	6 months	1 year	2 years	3 years	5-8 years	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	1	1	0	0	0	2
3. Whitecourt	0	0	0	0	0	0
4. Edmonton	0	0	0	0	0	0
5. Bonnyville	2	1	0	0	0	3
6. Lloydminster	0	0	0	0	0	0
7. Red Deer	0	1	0	0	0	1
8. Calgary	0	0	0	0	0	0
9. Medicine Hat	1	1	0	0	0	2
10. Lethbridge	0	0	0	0	0	0
<b>Total</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>8</b>
Per cent of Total	50%	50%	0%	0%	0%	100%

## Producers' Interest in Participating in a Greenhouse Cost of Production Study

Table 9.13 lists producers' interest in a cost of production study. Out of 131 growers, 22 per cent were interested in a cost of production study while 78 per cent did not want to participate.

**Table 9.13: Participation in a Greenhouse Cost of Production Study**

Region	Would you be interested in participating in a greenhouse cost of production study?		
	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-
2. Grande Prairie	2	7	9
3. Whitecourt	4	8	12
4. Edmonton	7	25	32
5. Bonnyville	0	5	5
6. Lloydminster	2	4	6
7. Red Deer	7	24	31
8. Calgary	3	8	11
9. Medicine Hat	1	15	16
10. Lethbridge	2	6	8
<b>Total</b>	<b>29</b>	<b>102</b>	<b>131</b>
Per cent of Total	22%	78%	100%

## Nursery and Tissue Culture Material

Table 9.14 indicates nursery and specialized tissue culture material. Out of 132 respondents, 28 per cent had nursery material and only four per cent grew specialized tissue culture material.

**Table 9.14: Nursery and Specialized Tissue Culture Material**

Region	Do you have nursery material			Do you grow any specialized tissue culture material		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	6	3	9	0	9	9
3. Whitecourt	4	8	12	1	11	12
4. Edmonton	8	24	32	2	29	31
5. Bonnyville	2	4	6	1	5	6
6. Lloydminster	0	6	6	0	6	6
7. Red Deer	9	22	31	1	31	32
8. Calgary	3	7	10	0	10	10
9. Medicine Hat	1	16	17	0	16	16
10. Lethbridge	3	5	8	0	8	8
<b>Total</b>	<b>37</b>	<b>95</b>	<b>132</b>	<b>5</b>	<b>126</b>	<b>131</b>
Per cent of Total	28%	72%	100%	4%	96%	100%

## SECTION XI

### Crop Problems

Table 10.1 indicates insect problems in all regions. Of the 115 growers who indicated problems, 29 per cent dealt with aphids, 17 per cent with thrips, 16 per cent with fungus gnats, nine per cent with shore flies, 12 per cent with whiteflies and 17 per cent with spider mites.

**Table 10.1: Insect Problems**

Region	Do you have any insect problems?			If yes, what kind?						
	Yes	No	Number of Growers by Region	Aphids	Thrips	Fungus Gnats	Shore flies	Whiteflies	Spider Mites	Others
1. Fort McMurray	-	-	-	-	-	-	-	-	-	-
2. Grande Prairie	8	1	9	8	3	4	2	3	5	0
3. Whitecourt	11	1	12	11	5	6	4	4	5	0
4. Edmonton	25	8	33	25	13	13	4	5	13	0
5. Bonnyville	5	1	6	5	1	3	2	1	2	0
6. Lloydminster	5	1	6	5	3	1	0	1	1	0
7. Red Deer	27	5	32	25	14	14	12	11	15	0
8. Calgary	10	1	11	9	6	4	4	3	4	0
9. Medicine Hat	19	1	20	10	13	11	4	14	14	0
10. Lethbridge	5	4	9	5	3	2	0	0	3	0
<b>Total</b>	<b>115</b>	<b>24</b>	<b>139</b>	<b>103</b>	<b>61</b>	<b>58</b>	<b>32</b>	<b>42</b>	<b>62</b>	<b>0</b>
Per cent of Total	83%	17%	100%	29%	17%	16%	9%	12%	17%	0%

## Practice of Integrated Pest Management (IPM) by Greenhouse Growers

Table 10.2 presents information on the practice of integrated pest management (IPM) activities by region in Alberta. Based on survey responses, 131 of the 137 respondents (96 per cent) have heard of the term IPM. Of these, 79 per cent indicated that they practice IPM. Leading the representation on who most often perform IPM activities were “owners or You” with 67 per cent, “hired employees” with 22 per cent, “consultants” with eight per cent and “extension agents or program scout” with two per cent.

**Table 10.2: Practice of Integrated Pest Management (IPM) by Greenhouse Growers**

Region	Have you heard of the term "IPM"?		Do you practice IPM?		If yes, who most often does this?				
	Yes	No	Yes	No	You (Owner)	Consultant	Hired employee	Extension agent or Program scout	Other
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	9	0	8	1	8	0	1	0	0
3. Whitecourt	12	0	8	4	6	0	1	0	0
4. Edmonton	29	3	24	8	18	1	11	0	0
5. Bonnyville	5	1	4	2	4	0	1	0	0
6. Lloydminster	6	0	3	3	3	0	0	0	0
7. Red Deer	32	0	29	3	26	4	7	0	0
8. Calgary	11	0	9	2	7	0	3	0	0
9. Medicine Hat	19	0	17	2	14	5	4	3	0
10. Lethbridge	7	2	5	4	4	1	1	0	0
<b>Total</b>	<b>131</b>	<b>6</b>	<b>108</b>	<b>29</b>	<b>90*</b>	<b>11*</b>	<b>30*</b>	<b>3*</b>	<b>0</b>
Per cent of Total	96%	4%	79%	21%	67%	8%	22%	2%	0%

IPM = Integrated Pest Management

\* Some questionnaires had multiple responses

## Use and Purchase of Biological Controls

Table 10.3 shows that 63 per cent of the growers used biological control in greenhouses. Twenty-five (25) per cent bought from Biobest, 20 per cent from Koppert, 16 per cent from The Bug Factory, and remaining 39 per cent from others such as Direct Solutions, Professional Gardener Company, etc.

**Table 10.3: Use and Purchase of Biological Controls**

Region	Do you use biological control?			If yes, where do you buy your biological control?				
	Yes	No	Number of Growers by Region	Biobest	Bug Factory	Koppert	Other	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	5	4	9	1	0	0	4	5
3. Whitecourt	7	5	12	1	0	0	5	6
4. Edmonton	17	15	32	3	3	4	6	16
5. Bonnyville	3	3	6	0	0	0	3	3
6. Lloydminster	5	3	8	0	1	0	2	3
7. Red Deer	24	8	32	7	6	6	7	26
8. Calgary	6	5	11	2	1	0	4	7
9. Medicine Hat	20	3	23	6	3	6	1	16
10. Lethbridge	3	7	10	1	0	1	1	3
<b>Total</b>	<b>90</b>	<b>54</b>	<b>144</b>	<b>21</b>	<b>14</b>	<b>17</b>	<b>33</b>	<b>85</b>
Per cent of Total	63%	38%	100%	25%	16%	20%	39%	100%

## Use of Bumble Bees and Pesticide Recommendations

Table 10.4 presents the use of bumble bees and pesticide recommendations. Fifteen per cent of growers used bumble bees for pollination. Thirty-two per cent of growers obtained pesticide recommendations from consultants and other growers, followed by 15 per cent internet sources, nine per cent from professional gardeners, and 44 per cent from others such as Koppert, Direct Solutions, Agrium, etc.

**Table 10.4: Use of Bumble Bees and Pesticide Recommendation**

Region	Do you use bumble bees for pollination?			Where do You get Your Pesticide Recommendation?				
	Yes	No	Number of Growers by Region	Consultants and other Growers	Professional Gardener	Internet	Other	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	0	9	9	2	2	0	4	8
3. Whitecourt	1	11	12	3	2	1	4	10
4. Edmonton	1	31	32	10	2	6	10	28
5. Bonnyville	0	6	6	0	0	0	2	2
6. Lloydminster	0	6	6	2	1	2	2	7
7. Red Deer	7	25	32	12	1	6	13	32
8. Calgary	1	9	10	3	2	2	3	10
9. Medicine Hat	9	10	19	3	0	0	8	11
10. Lethbridge	1	7	8	2	1	1	4	8
<b>Total</b>	<b>21</b>	<b>115</b>	<b>136</b>	<b>37</b>	<b>11</b>	<b>18</b>	<b>51</b>	<b>117</b>
Per cent of Total	15%	85%	100%	32%	9%	15%	44%	100%

\* Others include Koppert, Direct Solutions, Westgro, Evergro, Agrium, etc.



## Disease Problems

Table 10.5 shows disease problems by region in Alberta. Based on survey responses, 59 per cent of producers reported that they have disease problems in their greenhouses. Of these, 19 per cent reported pythium, 51 per cent powdery mildew, 19 per cent grey mold, four per cent tobacco mosaic virus and the remaining seven per cent reported cucumber green mottle mosaic virus and other diseases.

**Table 10.5: Disease Problems in Greenhouse Crops**

Region	Do you have any disease problems?			If yes, what kinds					
	Yes	No	Number of Growers by Region	Pythium	Powdery Mildew	Grey Mold	Tobacco Mosaic Virus	CGMV*	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	6	3	9	0	5	2	1	1	9
3. Whitecourt	6	6	12	1	3	3	2	0	9
4. Edmonton	17	15	32	4	17	4	1	0	26
5. Bonnyville	2	4	6	0	1	1	0	0	2
6. Lloydminster	3	3	6	1	3	0	0	0	4
7. Red Deer	21	11	32	9	16	5	0	2	32
8. Calgary	7	4	11	4	6	4	0	0	14
9. Medicine Hat	16	3	19	7	14	6	1	7	35
10. Lethbridge	3	6	9	0	3	0	0	0	3
<b>Total</b>	<b>81</b>	<b>56</b>	<b>137</b>	<b>26</b>	<b>68</b>	<b>25</b>	<b>5</b>	<b>10</b>	<b>134</b>
Per cent of Total	59%	41%	100%	19%	51%	19%	4%	7%	100%

CGMV = Cucumber Green Mottle Mosaic Virus

\* includes CGMV and others

## Improvement of Integrated Pest Management (IPM) Knowledge

Table 10.6 shows suggestions on how IPM could be improved. The leading responses were “Through workshops” with 36 per cent, “Newsletter” with 30 per cent, and “Grower alerts” with 25 per cent.

**Table 10.6: Improvement of Integrated Pest Management (IPM) Knowledge**

Region	Ways for improving knowledge in IPM				Number of Growers by Region
	Through workshops	Newsletter	Grower alerts	Other	
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	2	4	2	2	10
3. Whitecourt	4	4	4	3	15
4. Edmonton	20	13	10	4	47
5. Bonnyville	4	2	1	0	7
6. Lloydminster	4	4	4	0	12
7. Red Deer	19	15	8	6	48
8. Calgary	7	5	7	1	20
9. Medicine Hat	5	4	8	1	18
10. Lethbridge	2	4	4	0	10
<b>Total</b>	<b>68</b>	<b>56</b>	<b>48</b>	<b>17</b>	<b>189*</b>
Per cent of Total	36%	30%	25%	9%	100%

\* Multiple growers

## SECTION XII

### Manpower Usage in Greenhouses

Table 11.1 shows manpower usage by region in greenhouses. Based on survey responses, 41 per cent or 1,007 of the employees were full time workers and the remaining 59 per cent or 1,434 were part time. Thirty-three per cent of 136 growers employed students from Olds College or a similar institution. Fifty-eight per cent indicated that they have issues with the availability of skilled employees.

**Table 11.1: Manpower Usage in Alberta Greenhouses**

Region	Number of People Employed		Have you employed students from Olds College or a similar institution?			Do you have issues with availability of skilled employees?		
	Full Time	Part Time	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	80	169	2	7	9	7	2	9
3. Whitecourt	21	38	2	10	12	8	4	12
4. Edmonton	178	372	13	19	32	15	17	32
5. Bonnyville	61	53	1	5	6	2	3	5
6. Lloydminster	13	25	1	5	6	4	2	6
7. Red Deer	160	296	9	23	32	17	15	32
8. Calgary	64	70	5	6	11	11	0	11
9. Medicine Hat	306	231	6	12	18	9	8	17
10. Lethbridge	119	174	6	3	9	4	5	9
<b>Total</b>	<b>1,007</b>	<b>1,434</b>	<b>45</b>	<b>91</b>	<b>136</b>	<b>78</b>	<b>56</b>	<b>134</b>
Per cent of Total	41%	59%	33%	67%	100%	58%	42%	100%

## Foreign Workers

Table 11.2 lists the use of foreign workers in Alberta greenhouses. Of 138 growers, 38 per cent or 57 growers employed foreign workers and the remaining 62 per cent or 86 growers did not. Of the 52 growers employing foreign workers, 47 per cent were Mexicans; eight per cent Caribbean, 25 per cent Thailand and the remaining 19 per cent were from Philippines, Chile, New Zealand, China and Korea.

**Table 11.2: Use of Foreign Workers**

Region	Have you employed foreign workers in your greenhouse?							
	Yes	No	Number of Growers by Region	If yes, which country				Number of Growers by Region
				Mexico	Caribbean	Thailand	Other**	
1. Fort McMurray	-	-	-	-	-	-	-	-
2. Grande Prairie	2	7	9	1	0	0	1	2
3. Whitecourt	2	10	12	1	0	0	0	1
4. Edmonton	10	22	32	10	1	0	0	11
5. Bonnyville	3	3	6	2	2	0	1	5
6. Lloydminster	0	6	6	0	0	0	0	0
7. Red Deer	13	19	32	6	0	3	4	13
8. Calgary	5	6	11	5	0	0	0	5
9. Medicine Hat	15	5	20	1	2	12	4	19
10. Lethbridge	1	8	9	1	0	0	0	1
<b>Total</b>	<b>52</b>	<b>86</b>	<b>138</b>	<b>28</b>	<b>5</b>	<b>15</b>	<b>11</b>	<b>59</b>
Per cent of Total	38%	62%	100%	47%	8%	25%	19%	100%

\* include Philippines, Chile, New Zealand, China and Korea

## SECTION XIII

### Environmental Concerns or Trends

Table 12.1 shows that 93 per cent of 136 growers reported their production practices were environmentally friendly.

**Table 12.1: Environmentally Friendly Production Practices**

Region	Are your production practices environmentally friendly?		
	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-
2. Grande Prairie	9	0	9
3. Whitecourt	12	0	12
4. Edmonton	28	3	31
5. Bonnyville	6	0	6
6. Lloydminster	6	0	6
7. Red Deer	28	4	32
8. Calgary	10	1	11
9. Medicine Hat	19	0	19
10. Lethbridge	8	1	9
<b>Total</b>	<b>127</b>	<b>9</b>	<b>136</b>
Per cent of Total	93%	7%	100%

## Recycling Plastics, Use of Landfill for Disposal and Composting of Waste Material

As shown in Table 12.2, 85 per cent of respondents reported recycling plastics and containers, 84 per cent used landfills for plant waste disposal, and 90 per cent composted their waste material.

**Table 12.2: Recycling Plastics, Use of Landfill and Composting of Waste Material**

Region	Do you recycle plastics and containers?			Do you use landfill for disposal?			Do you compost your waste material?		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	9	0	9	7	2	9	9	0	9
3. Whitecourt	12	0	12	9	3	12	12	0	12
4. Edmonton	30	2	32	25	7	32	31	1	32
5. Bonnyville	5	1	6	4	2	6	5	1	6
6. Lloydminster	5	1	6	3	3	6	5	1	6
7. Red Deer	25	7	32	30	2	32	31	1	32
8. Calgary	9	1	10	9	2	11	11	0	11
9. Medicine Hat	12	8	20	19	0	19	9	10	19
10. Lethbridge	8	1	9	9	0	9	9	0	9
<b>Total</b>	<b>116</b>	<b>21</b>	<b>137</b>	<b>115</b>	<b>22</b>	<b>137</b>	<b>123</b>	<b>14</b>	<b>137</b>
Per cent of Total	85%	15%	100%	84%	16%	100%	90%	10%	100%

## Food Safety Issues

Table 12.3 reports that 23 per cent of 132 growers were Hazard Analysis Critical Control Point (HACCP) compliant, 30 per cent had on-farm food safety programs and 28 per cent had environmental farm plans in their greenhouses.

**Table 12.3: Food Safety Issues**

Region	Are you HACCP Compliant?			On Farm Food Safety			Environmental Farm Plan		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	0	9	9	3	6	9	2	7	9
3. Whitecourt	3	9	12	3	8	11	2	10	12
4. Edmonton	2	28	30	5	25	30	8	24	32
5. Bonnyville	0	5	5	1	4	5	1	4	5
6. Lloydminster	0	6	6	1	5	6	0	6	6
7. Red Deer	7	24	31	7	23	30	13	18	31
8. Calgary	2	9	11	2	9	11	3	8	11
9. Medicine Hat	14	4	18	14	4	18	8	11	19
10. Lethbridge	2	7	9	2	7	9	1	8	9
<b>Total</b>	<b>30</b>	<b>102</b>	<b>132</b>	<b>39</b>	<b>91</b>	<b>130</b>	<b>38</b>	<b>97</b>	<b>135</b>
Per cent of Total	23%	77%	100%	30%	70%	100%	28%	72%	100%

## SECTION XIV

### Greenhouse Taxation and Classification Issues

Based on survey responses, Table 13.1 shows that 74 per cent of greenhouses were taxed as farms, 17 per cent as businesses, nine per cent as commercial operations. While 84 per cent of the respondents did not have any taxation or greenhouse classification issues, the remaining 16 per cent complained about high taxes.

**Table 13.1: Greenhouse Classification and Taxation Issues**

Region	How is your operation taxed				Any taxation / greenhouse classification issues?		
	Farming	Business	Commercial	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	7	2	0	9	2	5	7
3. Whitecourt	10	0	2	12	2	8	10
4. Edmonton	19	9	3	31	6	20	26
5. Bonnyville	6	1	1	7	0	3	3
6. Lloydminster	3	2	1	6	1	4	5
7. Red Deer	26	4	2	32	1	21	22
8. Calgary	8	2	3	13	1	9	10
9. Medicine Hat	18	1	0	19	1	8	9
10. Lethbridge	6	2	0	8	1	7	8
<b>Total</b>	<b>104</b>	<b>24</b>	<b>13</b>	<b>140</b>	<b>16</b>	<b>85</b>	<b>101</b>
Per cent of Total	74%	17%	9%	100%	16%	84%	100%

\*Multiple responses

### Greenhouse Insurance Companies

As shown in Table 13.2, 71 per cent of respondents reported that obtaining greenhouse insurance was not an issue; however, 34 per cent of the growers did not buy greenhouse insurance. Of those who purchase insurance, 18 per cent were with Wawanesa, 29 per cent with Western Financial, nine per cent with Cooperators, 13 per cent with Lloyds and 31 per cent with other providers such as Mckillop, ING, Intact, Hub Insurance, etc.



**Table 13.2: Greenhouse Insurance**

Region	Is greenhouse insurance readily available?			Do you purchase greenhouse insurance?								
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region	If yes, which insurance company do you use?					Number of Growers by Region
							Wawanesa	Western Financial	Cooperators	Lloyds	Others*	
1. Fort McMurray	-	-	-	-	-	-	-	-	-	-	-	-
2. Grande Prairie	7	2	9	7	2	9	1	0	0	1	1	3
3. Whitecourt	6	6	12	5	7	12	1	1	1	1	2	6
4. Edmonton	19	12	31	21	12	33	1	3	2	2	3	11
5. Bonnyville	5	1	6	3	3	6	0	2	0	0	0	2
6. Lloydminster	4	3	7	4	2	6	1	1	0	0	1	3
7. Red Deer	19	12	31	18	14	32	4	5	0	0	3	12
8. Calgary	10	1	11	8	3	11	0	1	1	1	1	4
9. Medicine Hat	18	1	19	18	1	19	0	0	0	0	1	1
10. Lethbridge	8	1	9	6	3	9	0	0	0	0	2	2
<b>Total</b>	<b>97</b>	<b>39</b>	<b>136</b>	<b>91</b>	<b>47</b>	<b>138</b>	<b>8</b>	<b>13</b>	<b>4</b>	<b>6</b>	<b>14</b>	<b>45</b>
Per cent of Total	71%	29%	100%	66%	34%	100%	18%	29%	9%	13%	31%	100%

\*Mckillop, ING, Intact, Hub Insurance, etc.

## Main Suppliers of Plant or Plant-Seed Material

Table 13.3 lists the main suppliers of plant or plant-seed material as provided by the survey participants. Twenty-eight per cent of the growers bought from Ball Superior, seven per cent from Bevo Farm, 13 per cent from High Q Greenhouses, 28 per cent from JVK, six per cent from Dentoom and 17 per cent from others such as Proven Winners, Oyen Greenhouses, Terralink, Walters, etc. It was noted some growers bought plant or plant-seed material from multiple companies.

**Table 13.3: Main Suppliers of Plant or Plant-Seed Material**

Region	Who are your main suppliers of plant or plant-seed material?						Number of Growers by Region
	Ball Superior	Bevo Farm	High Q	JVK	Dentoom	Other	
1. Fort McMurray	-	-	-	-	-	-	-
2. Grande Prairie	2	0	1	4	0	2	9
3. Whitecourt	3	0	3	5	1	0	12
4. Edmonton	9	0	3	11	3	5	31
5. Bonnyville	1	0	2	2	0	0	5
6. Lloydminster	2	0	1	1	1	1	6
7. Red Deer	12	2	6	6	2	4	32
8. Calgary	4	0	1	4	1	1	11
9. Medicine Hat	1	7	0	0	0	6	14
10. Lethbridge	2	0	0	2	0	3	7
<b>Total</b>	<b>36</b>	<b>9</b>	<b>17</b>	<b>36</b>	<b>8</b>	<b>22</b>	<b>128</b>
Per cent of Total	28%	7%	13%	28%	6%	17%	100%

## Greenhouse Growers Who Raise Their Own Seedlings

Table 13.4 shows that 81 per cent of respondents raised their own seedlings and the remaining 19 per cent did not. Based on survey responses, growers who produced their own seedlings on average raised 27 per cent of the total seedlings they planted in their greenhouses.

**Table 13.4: Greenhouse Growers Who Raise Their Own Seedlings**

Region	Do you raise your own seedlings?			If yes, what per cent?
	Yes	No	Number of Growers by Region	
1. Fort McMurray	-	-	-	-
2. Grande Prairie	9	0	9	28%
3. Whitecourt	8	4	12	25%
4. Edmonton	25	6	31	31%
5. Bonnyville	4	1	5	27%
6. Lloydminster	6	0	6	15%
7. Red Deer	28	3	31	39%
8. Calgary	11	0	11	30%
9. Medicine Hat	7	11	18	8%
10. Lethbridge	9	0	9	41%
<b>Total</b>	<b>108</b>	<b>25</b>	<b>133</b>	27%
Per cent of Total	81%	19%	100%	

## Membership of Alberta Greenhouse Growers Association (AGGA)

Table 13.5 shows the number of survey participants who were or were not members of AGGA. Of the 137 respondents, 69 per cent or 94 growers were members of the AGGA, while the remaining 31 per cent or 43 growers were not. The top three regions with the highest memberships were Edmonton followed by Red Deer and Medicine Hat. Of those who were not members, 25 per cent indicated the membership fee is too expensive, 19 per cent said they will retire soon and 31 per cent reported that they used to be members.

**Table 13.5: Membership of Alberta Greenhouse Growers Association (AGGA)**

Region	Are you a member of AGGA?			If no, why?					Number of Growers by Region
	Yes	No	Number of Growers by Region	Too costly	Not sure	Not a whole lot of benefits	Will retire soon	Used to be	
1. Fort McMurray	-	-	-	-	-	-	-	-	-
2. Grande Prairie	8	1	9	0	0	0	0	0	0
3. Whitecourt	6	6	12	0	0	0	1	0	1
4. Edmonton	23	9	32	0	2	0	1	1	4
5. Bonnyville	3	3	6	0	1	0	0	0	1
6. Lloydminster	4	2	6	0	0	0	0	0	0
7. Red Deer	21	11	32	2	0	0	0	2	4
8. Calgary	7	4	11	0	1	0	0	1	2
9. Medicine Hat	16	3	19	1	0	0	0	1	2
10. Lethbridge	5	4	9	1	0	0	1	0	2
<b>Total</b>	<b>94</b>	<b>43</b>	<b>137</b>	<b>4</b>	<b>4</b>	<b>0</b>	<b>3</b>	<b>5</b>	<b>16</b>
Per cent of Total	69%	31%	100%	25%	25%	0%	19%	31%	100%

## Use of Greenhouse Consultants

Table 13.6 presents information on whether survey participants employ the services of a greenhouse consultant. Twenty-six per cent reported that they use a greenhouse consultant while the remaining 78 per cent reported that they do not. Of those who do not, 70 per cent indicated that they would become AGGA members if the association provides greenhouse consulting services.

**Table 13.6: Use of Greenhouse Consultants**

Region	Do you employ the services of a greenhouse consultant?			If AGGA provided consulting services, would you become a member?		
	Yes	No	Number of Growers by Region	Yes	No	Number of Growers by Region
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	3	6	9	5	2	7
3. Whitecourt	1	11	12	6	5	11
4. Edmonton	7	25	32	22	4	26
5. Bonnyville	1	5	6	4	1	5
6. Lloydminster	2	4	6	5	2	7
7. Red Deer	6	24	30	15	9	24
8. Calgary	3	8	11	10	0	10
9. Medicine Hat	11	8	19	5	6	11
10. Lethbridge	1	8	9	5	4	9
<b>Total</b>	<b>35</b>	<b>100</b>	<b>135</b>	<b>78</b>	<b>33</b>	<b>111</b>
Per cent of Total	26%	74%	100%	70%	24%	82%

## Usefulness of AGGA to Greenhouse Growers and their Businesses

Table 13.7 shows suggestions of how AGGA could be more helpful to greenhouse operators and their business. Of the 34 respondents, 32 per cent reported that AGGA is already doing a good job, 59 per cent reported more extension, workshops, newsletters and grower alerts and the remaining nine per cent indicated that AGGA should continue to lobby government on legislation issues and programmes that will result in cost savings.

**Table 13.7: Usefulness of AGGA to Your Greenhouse Business**

Region	How could AGGA be more helpful?			
	Already doing a good job	More extension, workshops, newsletters, grower alerts	Lobby government on legislation issues and dollars for cost savings	Number of Growers by Region
1. Fort McMurray	-	-	-	-
2. Grande Prairie	2	1	0	3
3. Whitecourt	1	1	0	2
4. Edmonton	3	5	0	8
5. Bonnyville	0	1	0	1
6. Lloydminster	0	3	0	3
7. Red Deer	2	4	2	8
8. Calgary	0	4	1	5
9. Medicine Hat	2	0	0	2
10. Lethbridge	1	1	0	2
<b>Total</b>	<b>11</b>	<b>20</b>	<b>3</b>	<b>34</b>
Per cent of Total	32%	59%	9%	100%

### Attendance at the Green Industry Show and Conference in Last Five Years

Table 13.8 shows attendance at the Green Industry Show and Conference by growers during the last five years. Of 136 respondents, 83 per cent reported that they have while 17 per cent have not. On average, respondents have attended three times in the last five years.

**Table 13.8: Attendance at the Green Industry Show and Conference in Last Five Years**

Region	Have you attended the Green Industry Show and Conference in the last five years?			If yes, how many times?	
	Yes	No	Number of Growers by Region	Total by Region	Average by Region
1. Fort McMurray	-	-	-	-	-
2. Grande Prairie	7	2	9	16	2
3. Whitecourt	10	2	12	38	4
4. Edmonton	30	2	32	100	3
5. Bonnyville	6	0	6	19	3
6. Lloydminster	6	0	6	19	3
7. Red Deer	27	5	32	90	3
8. Calgary	9	2	11	35	4
9. Medicine Hat	12	6	18	26	2
10. Lethbridge	5	4	9	14	3
<b>Total</b>	<b>113</b>	<b>23</b>	<b>136</b>	<b>361</b>	<b>3</b>
Per cent of Total	83%	17%	100%		

### Business Threats in the Next Three to Five Years

Table 13.9 shows business threats that growers are anticipating in the next three to five years. Seventy-six per cent of 146 respondents reported that they are anticipating business threats and 24 per cent did not. Of those who reported “Yes”, 21 per cent indicated that energy costs and markets/prices are weighing heavily on their minds as they look into the next three to five years. Next is labour shortages with 19 per cent, import competition with 15 per cent, taxes and regulation with 11 per cent, currency fluctuations with eight per cent and the remaining four per cent reported other threats such as recession, succession, urban encroachment/land use issues and pests.

**Table 13.9: Business Threats in the Next Three to Five Years**

Region	Are you anticipating any business threats in the next three to five years?											
	Yes	No	Number of Growers by Region	If yes, what kind?							Number of Growers by Region	
				Labour shortages	Energy costs	Markets / Prices	Import competition	Taxes / regulations	Currency fluctuations	Other*		
1. Fort McMurray	-	-	-	-	-	-	-	-	-	-	-	-
2. Grande Prairie	5	4	9	3	4	2	2	1	2	1	15	
3. Whitecourt	7	5	12	6	6	4	2	4	2	0	24	
4. Edmonton	32	10	42	10	13	12	8	10	4	0	57	
5. Bonnyville	4	2	6	3	3	3	2	0	1	0	12	
6. Lloydminster	3	3	6	2	3	1	2	1	2	6	17	
7. Red Deer	24	8	32	13	14	18	6	8	2	2	63	
8. Calgary	11	0	11	7	5	6	7	6	6	1	38	
9. Medicine Hat	18	0	18	13	12	15	13	2	5	1	61	
10. Lethbridge	6	3	9	1	4	3	2	2	1	0	13	
<b>Total</b>	<b>111</b>	<b>35</b>	<b>146</b>	<b>59</b>	<b>65</b>	<b>64</b>	<b>45</b>	<b>35</b>	<b>26</b>	<b>12</b>	<b>306</b>	
Per cent of Total	82%	26%	108%	19%	21%	21%	15%	11%	8%	4%	100%	

Other\* include recession, succession, urban encroachment/land use issues and pests.



## Business Opportunities in the Next Three to Five Years

Table 13.10 shows business opportunities that growers are anticipating in the next three to five years. Thirty-seven per cent of 138 respondents reported that the buy local movement will continue to have an impact in the next three to five years. Next leading responses include non-traditional crops with 22 per cent, organic or green products with 18 per cent and potential of expanding via export markets.

**Table 13.10: Business Opportunities in the Next Three to Five Years**

Region	Are you anticipating any business opportunities in the next 3-5 years?					Number of Growers by Region
	Buy local	Non-traditional products	Organic or green products	Export markets	Other*	
1. Fort McMurray	-	-	-	-	-	-
2. Grande Prairie	6	3	5	1	1	16
3. Whitecourt	4	2	3	1	1	11
4. Edmonton	9	5	7	2	5	28
5. Bonnyville	1	1	0	0	1	3
6. Lloydminster	3	1	1	0	0	5
7. Red Deer	12	9	3	0	7	31
8. Calgary	4	1	1	0	3	9
9. Medicine Hat	8	7	2	3	5	25
10. Lethbridge	3	1	2	0	1	7
<b>Total</b>	<b>51</b>	<b>31</b>	<b>25</b>	<b>7</b>	<b>24</b>	<b>138</b>
Per cent of Total	37%	22%	18%	5%	17%	100%

\* Succession, urban encroachment/land use issues, etc.

\*\*Multiple responses

## SECTION XV

### **Future Sustainability of the Alberta Greenhouse Crops Industry**

The Alberta greenhouse crops industry is composed of three distinct groups of crops being grown and marketed. One crop is vegetable, the second crop is bedding plants, ornamentals and cut flowers and the third crop is tree seedlings. Vegetable production has two distinct locations with some production scattered around the province. The town of Redcliff has the single largest concentration of vegetable greenhouses marketing through Red-Hat Cooperative and combined with vegetable greenhouses in Medicine Hat, it comprises over 40 per cent of the greenhouse area in the province. Pik-N-Pak Produce Ltd. is another group of vegetable growers near Lacombe in Central Alberta. In addition, there are a few independent vegetable growers in Nanton, Smoky Lake, Lavoy and Evansburg areas.

Greenhouse tree seedling production is also scattered around the province from South to North with a large production and packing facility near Smoky Lake.

Ornamental and bedding plants production has the largest concentration near big cities although there are many smaller, seasonal greenhouses located around the province. Ornamental and bedding plants greenhouses comprise over 40 per cent of the greenhouse industry in Alberta. However, they are not as organized in any marketing cooperatives like vegetables and tree seedling growers, simply due to the diversity of crops grown and geographical locations.

Alberta Greenhouse Growers Association provides an umbrella support to all sectors of the industry. The AGGA celebrated its 25 years of existence and achievements in 2005, meaning that it is 35 years “old” and continues to serve its members.

During the past 35 years the industry has undergone many changes and faced many challenges. In spite of such challenges like increasing input costs, energy and difficulty in finding labour, the greenhouse industry in Alberta has moved forward. AGGA has attempted to conduct a survey of the entire industry every few years in order to identify driving forces or trends that have helped shape the identity of this industry and also look towards the future.

During this recent survey, several growers were asked to share their experiences and thoughts on the future of the industry. A very interesting pattern emerged which is not unusual. There is one group of growers whose greenhouses are paid off and have no more capital loans to look after. This means that they are content with their business performance and are not interested in making any major changes to expand or invest in new technologies. They would sell their greenhouses if a reasonable offer comes along. Some of these growers did not wish to participate in this survey and clearly mentioned that they are happy with their current businesses.

Another group of growers emerged who are in the forefront of making new investments to meet consumer and market demands. They are innovative, travel the world to look at new greenhouses and technologies, prepare business plans, seek funding and then build new greenhouses and capture market share. These growers constantly attend various meetings; participate and contribute to focus groups, diligently fill in the survey forms, share their plans with others, entertain visitors at their greenhouses and showcase their accomplishments. There are many other qualities in these growers

and they can truly be considered the leaders of the industry. These growers are found in all sectors of the industry.

A third group of growers also emerged in the middle. These growers have to make capital and operating loans payments; their businesses are not static. They are diversifying their greenhouse production, seeking new markets, and try to stay in business year round. They attend the workshops, conventions and meetings to learn about new opportunities.

As a result of this survey, the question of the future of the Alberta greenhouse industry came to the forefront and what are the drivers for the change. No one precisely knows about the future. Forecasts and predictions are made by experts based on past experiences and are used for extrapolation and projections. There are generally many qualifying statements like, “if energy prices stay low”, if interest rates stay at the current level” and many other such factors, the future of the greenhouse industry looks promising.

This comprehensive survey has provided some trends that can be discussed and how the industry is going to respond to issues emerging from these trends to maintain profitability which is the key for future growth. There is no doubt that each business has to look at its strategic management plan, if it has one, and make decision as it moves along. Many growers indicated that they do not have such a dedicated plan. It simply means that some growers do not have a plan in place to steer their business towards profitability if things happen in a different way than expected. The following trends, descriptions and analysis may help to charter a future course of action.

Before looking at these trends some remarks have been made about the different sectors of the industry because of their uniqueness within the greenhouse industry. Some issues and trends may be common and some may be different based on the location of the greenhouse, e.g. urban or rural.

## **Vegetables Sector**

The uniqueness of Alberta’s greenhouse vegetable sector is that price is determined by supply and demand scenarios in the U.S., Mexico, Netherlands, B.C. and Ontario. This has been the case since the industry started in the mid-sixties. In spite of expansion, the industry has not reached the position of a price maker; instead it is still a price taker and this is expected to remain in the foreseeable future.

The following highlights the Alberta greenhouse vegetable sector:

- Alberta greenhouse vegetable industry is the fourth largest in Canada and it is expected to stay like this in the foreseeable future.
- Greenhouses in Alberta produce more cucumbers than tomatoes and peppers, whereas tomato is the major crop in Ontario, B.C. and Quebec.
- The size of the greenhouse industry in Alberta, in terms of area, has grown steadily during the last few decades.
- Marketing strength comes from Red Hat Co-operative, Pik-N-Pak and Sunfresh Farms and Farmers’ Markets for some growers.
- Based on survey responses, approximately 73 per cent of vegetable greenhouses are more than 40,000 square feet; approximately one acre. This trend is expected to continue in the future.

Based on the data obtained through this and other surveys, it can be well anticipated that the number of growers is going to decrease and the average size of a greenhouse is going to increase.

- Two of the largest greenhouse units are 15 acres under glass in the Medicine Hat area and 11 acres under plastic in Central Alberta.
- There was more winter production of cucumbers during the past four years.
- Mini cucumber production is increasing compared to regular long English cucumbers. In 2013-2014, mini cucumbers comprised of just over 30 per cent of the regular Long English cucumbers.

Table 14.1 shows how Alberta's greenhouse vegetable acreage compares with that of Canada.

**Table 14.1: Comparison of Alberta 2014 Acreage of Vegetable Greenhouses with Canada**

Benchmark	Alberta	Canada
Size	153 acres (ha 62.0)	3,549 acres (1436 ha)
Distribution of Area by Vegetable		
Cucumber	84 acres (ha 34.0)	855 acres (346 ha)
Tomato	40 acres (ha 16.0)	1,418 acres (574 ha)
Pepper	27 acres (ha 11.0)	1,208 acres (489 ha)
Lettuce and other crops	2 acres (ha 0.8)	40 acres (16 ha)
Annual sales	\$60 million	\$1,286 million
Vegetable Sales Growth, 2010 to 2014 <sup>3</sup>	27%	22%
Greenhouse Operation by Size		
Less than 10,000 sq. ft.	7.7%	NA
10,000 to 19,000 sq. ft.	9.6%	NA
20,000 to 40,000 sq. ft.	9.6%	NA
Greater than 40,000 sq. ft.	73.1%	NA

Alberta is a net importer of greenhouse produce, with the bulk of imports occurring during the winter months. Data from Statistics Canada shows that in 2014 imports of greenhouse vegetables fresh or chilled (cucumbers, lettuce, peppers and tomatoes) into Alberta amounted to \$17.8 million or about 5.7 per cent of the Canadian imports. Tables 14.2 and 14.3 provide details of greenhouse vegetable imports from 2010 to 2014 in Canada and Alberta respectively.

**Table 14.2: Canadian Imports of Fresh Greenhouse Vegetables**

	2010	2011	2012	2013	2014
	Thousands of Canadian Dollars				
<b>Fresh Vegetables - Greenhouse</b>	<b>223,646</b>	<b>236,824</b>	<b>222,788</b>	<b>259,229</b>	<b>310,053</b>
Cucumbers and Gherkins, Fresh or Chilled	27,238	26,469	21,598	28,081	42,000
Tomatoes, Fresh or Chilled	120,078	132,775	123,064	138,271	159,204
Peppers of the Genus Capsicum or Pimenta, Fresh or Chilled	73,250	75,034	77,577	91,886	108,063
Lettuce, Fresh or Chilled	646	443	353	841	674
Cabbage Lettuce, Head Lettuce, Fresh or Chilled	2,435	2,102	197	150	112

Source: Statistics Canada, World Trade Atlas

<sup>3</sup> Source: Statistics Canada. Table 001-0051- Total value of greenhouse products, annual (dollars). Used sales data for greenhouse fruit and vegetables as proxy for estimation.

**Table 14.3: Alberta Imports of Fresh Greenhouse Vegetables**

	2010	2011	2012	2013	2014
	Thousands of Canadian Dollars				
<b>Fresh Vegetables - Greenhouse</b>	<b>14,870</b>	<b>11,731</b>	<b>8,715</b>	<b>14,212</b>	<b>17,793</b>
Cucumbers and Gherkins, Fresh or Chilled	2,284	1,249	1,370	2,834	4,103
Tomatoes, Fresh or Chilled	4,970	3,358	2,764	4,349	5,015
Peppers of the Genus Capsicum or Pimenta, Fresh or Chilled	6,262	5,887	4,457	6,895	8,585
Lettuce, Fresh or Chilled	174	41	62	131	90
Cabbage Lettuce, Head Lettuce, Fresh or Chilled	1,180	1,196	62	5	-

Source: Statistics Canada, World Trade Atlas

The above values are just for greenhouse vegetables imported in Alberta. The value of imported vegetables can be significantly higher as inter-provincial shipments are not included. Import values clearly show that there is room to increase local production of vegetables, especially greenhouse tomatoes and peppers.

### **Trends Identified by the Greenhouse Industry**

The following trends have been identified by growers and other leaders in the industry. These trends are summarized in groups as much as possible with some over-lapping and duplicity.

- Greenhouse building/structures trends.
- Crop management trends, e.g. high wire systems for cucumbers, better growing media, biological controls, etc.
- Marketing trends, e.g., cooperative marketing, direct to consumers, locally grown, one hundred (100) mile food movement, pesticide free and organics.
- Sale and Social trends.
- Business trends, e.g. minimum sustainable greenhouse unit changed uncertainty in the market place, electronic ordering, and use of technologies most beneficial to production.
- Workplace/labour trends, e.g. finding and retaining employees with the skills, experience and motivation needed for the business, use of off-shore labour programs, training of labour, etc. Issues with temporary foreign workers availability and retention.
- Political/regulatory/legislative trends, e.g. laws at every level of the business from municipal, provincial and federal governments.

### **Greenhouse Building/Structures Trends**

The greenhouse design for vegetable growers has changed over the past decade based on research in environmental control. Greenhouses built in the early 1970s to 1980s were primarily of glass as roofing and sidewalls glazing materials. With hailstorms every few years and not able to get insurance for glass structures, a major shift to plastic structures took place. Starting in 2008 due to interest in winter production, two growers built significant sized greenhouses with glass as roof glazing material. Out of 153 acres of vegetable produced, 20 acres (13 per cent) are under special

glass which lets more sunlight diffuse into the greenhouse. The cost is still high for such glass structures. In some areas of British Columbia greenhouse structures are mostly glass. Ontario is expanding into glass structures as well.

There are many types of greenhouses being marketed by different builders and designers. For example, Westbrook Greenhouse Systems Ltd. lists six different types of structures.

- Apex Greenhouses, “if condensation drip is your problem, Westbrook’s Apex greenhouse is your solution”.
- Skyline II Greenhouses, The first North American designed open roof greenhouse.
- Venlo Greenhouses, “Our newest glass house in the traditional Venlo style. Designed and manufactured in Canada for the North American market”.
- Solar Glass Greenhouses, “The world's first curved glass greenhouse. Available in fan and ridge vented models”.
- Solar Poly Greenhouses, “The original Westbrook poly greenhouse. Available in fan and gutter vented models”.
- Free Standing Greenhouses, “The Freestanding Greenhouse offers a sturdy structure at a budget any grower can handle”.

Other companies like Harnois offers several design options for Northern climates.

How is the industry going to respond to this trend in newer design for better environmental control? Growers with older structures are slowly disappearing from the market place. Some are selling the increased valued land and some are investing in these newer structure. Over the next five years, it appears that these older structures will disappear completely. The number of growers will decrease and average size of the greenhouse will increase. This was also evident from the results of this profile study. There are approximately 45 vegetable growers remaining compared to over 60, a decade ago. In 2009 and 2010 two state of the art greenhouses were built in Alberta, units of five acres each. In 2014, one of those growers expanded to 15 acres. These greenhouses have side walls over 21 feet high and this allows for raised troughs for growing cucumbers, tomatoes and peppers. These structures have a much better and efficient environmental control systems. Not every grower will be able to invest in these new structures. Slowly the old inefficient structures will disappear and new, better greenhouses will emerge. There is no doubt that the focus would be on better and more precise environmental controls.

### **Crop Management Trends**

There are many crop management trends that will influence future growth of the Alberta greenhouse industry. Besides having better greenhouse structures, the growers must take advantage of the following trends for higher yields:

- High wire training system for cucumbers. This system of training the plants has shown better production, slightly higher labour costs and better control over generative or vegetative growth of the plant. Even smaller sized growers are reporting good success with this training system.

- Using troughs for production has shown better air circulation, better spacing of plants and stem management. Most of the new growers have adopted raised trough production system in their new greenhouses.
- Better use of plant physiology knowledge, in terms of leaf volume to fruit. There is better research information available now on how many leaves should be left on plants compared to fruit.
- Choice of growing media is a constantly changing trend. Soil cultivation is basically out and soilless cultivation systems are in place. A trend is seen for niche marketing in organic production whereby soil cultivation is used. In the next five to 10 years, as more research becomes available in organic management of vegetables, more management tools will become available for higher production. Watch for newer growing media like Biochar that is being researched in Alberta. It is a charcoal based material, with very desirable characteristics.
- The trend in growing “pesticide free” crops by using biological controls has already taken hold but growers have reported difficulty in using the term “pesticide free”. The authorities responsible for handling such issues do not agree with this term in spite of the fact that growers take random tests and scan for over 400 different types of herbicides, fungicides and pesticides. How is the industry prepared to take advantage of that trend? Until the commercial, wholesale markets are ready to give a better price; this type of production will remain for speciality and direct retail markets.
- Using troughs for tomato production is now standard. All new greenhouses are built with troughs for cultivation.
- Water costs are slowly increasing and water treatment costs are increasing as well. Water recycling that was commonly practiced by vegetable growers is on the decline due to biological filtration systems and issues with fungal disease spread. Sand filtration systems and water disinfection systems have to be considered. Large growers have opted for heat pasteurization systems rather than UV disinfection. Ozone is making a comeback for water treatment.
- Over the past decade there has been a major change in the type of cucumbers, tomatoes and peppers grown. More diversified crops are grown but good research information is lacking on how to manage regular long English cucumbers and mini-cucumbers or beef steak and tomatoes on the vine during winter. To take advantage of these trends, more research information has to be developed. Mini cucumbers constitute just over 30 per cent of cucumber production. Beef steak and heritage tomato varieties are making a comeback.
- The use of consultants has increased over the past decade. In a recent brochure made available by a grower at the occasion of the inauguration of new greenhouse project, 34 project supporters, suppliers and consultants were listed. This shows an inter-disciplinary approach and the support needed to make projects successful.

The point is made that cucumber producers cannot stay at 120 cucumbers/m<sup>2</sup> and be sustainable. Similarly tomato producers must strive for production of over 65kg/m<sup>2</sup> on a consistent basis.

## **Marketing and Business Trends**

Are the Alberta vegetable growers well positioned to take advantage of population changes? There is no doubt that greenhouse vegetable producers are going to remain as price takers and not

price setters. Keeping this limitation in mind how far can this industry take advantage of trends like locally grown, 100 mile diet, organic, pesticide free or reduced, biological controls used, etc. Many similar trends will come before the industry and efforts should be made to stay ahead in marketing research. More partnership marketing has to be developed and encouraged. This is seen as happening when large companies display pictures of local greenhouse growers on the front cover of their brochure. Are we labelling our produce like cucumbers, tomatoes and peppers with such information on picking date, best before date, packaged at and basic nutritional value for calories and minerals, etc.?

On the business side the following trends are worth noting:

- The economic unit in terms of size of an average greenhouse has changed from one half acre in the 1980s to two acres in 2008. This is especially true for the commercial and wholesale markets.
- For direct marketing to smaller retailers in rural areas and farmer's markets, the size could be far less than two acres. Many growers have done it successfully with approximately 6,000 to 10,000 ft<sup>2</sup>. Family members have to contribute more time and energy to make it successful.
- Are you aware of all the components of a good business? It is not just the production of vegetables; it is many other parts of a good business.
- Understand and take advantage of "Millennial" customers. The time of "baby boomers" is slowing down. Millennials will be important not only as consumers and customers but also as employees for your business. Beyond wanting competitive pay and benefits, Millennials expect to feel appreciated for their efforts, see opportunities to advance, be more empowered in the workplace, and also have the flexibility to balance their lives at work and home," said Pam Hein, a partner with communication consulting at Aon Hewitt. "Younger employees want to work in an environment where information flows freely and authentically and where people know they can count on one another. Data shows there is a significant opportunity for employers to offer a more unique and compelling work experience that will match what Millennials want, and in turn increase retention long-term." As a greenhouse business manager you should be aware of these trends.
- Urban Farming Trends: During the past few years Urban Farming has been a hot topic. Many cities in Alberta have dedicated programs. Edmonton has an active Urban Farming and Food Initiative program. How can you as a greenhouse grower be part of such initiatives? Take an active part in these initiatives and you are in a position to supply plants to such initiatives.
- Balcony gardens: Do you know that there is great interest in small space gardening? Balcony gardens are another trend. How can you grow more plant material for balconies? For example, you need to grow smaller hanging baskets or containers that do not need to hang. You need to grow vegetable varieties which are more compact not too vertical growing. Learn how to take advantage of such trends.

The emphasis is to be fully aware of all aspects of your business. Know your product and markets thoroughly.

### **Workplace and Workforce Trends**

There have been many important changes in the workplace and labour market. Can I find and retain employees with the desired skills and motivation needed at salaries I can afford? While conducting



the survey, many growers mentioned that availability of reliable labour at the price they can afford was an issue. At this time it appears that the greenhouse industry has to depend on “off shore” labour for a consistent supply of the workforce. The survey identified that labour is brought in from Mexico, Thailand and the Caribbean. There are many federal and provincial labour programs available but all have a strong, bureaucratic part that many growers have difficulty with. Sometimes it is an issue of greenhouses not being classified as farms by the particular person you are dealing with and other times it is not getting the Labour Market Opinion (LMO) in time. You must be aware of issues involved in importing labour. The laws and regulations are constantly changing due to market changes.

The following points may be helpful:

- Talk to growers who have been getting labour from other countries and have more experience.
- Be a member of the AGGA and other associations who are strongly interested in these types of issues and can guide you in minimizing the problems.
- Have a good working relationship with the labour you bring in. They can become an asset for you.
- Try to develop contacts with key government people with whom you can communicate easily. Invite them to visit your greenhouses. Many times it helps a great deal because they actually know what you are doing.
- Be aware of rule changes. The duration of stay of labour may change and you may not be aware of it. It is not going to be helpful in making decisions.
- Become a member of the Greenhouse Marketing Forum which is an amazing network of greenhouse growers. Its current membership is approximately 180. Many postings from growers share so many aspects of their businesses. To become a member go to <http://groups.google.com/group/greenhouse-marketing-forum>

### **Political/Regulatory and Legislative Trends**

Every day rules and regulations change at municipal, provincial and federal levels that may have a significant impact on the industry. These rules may range from irrigation legislation to taxing your business. Every year many regulatory changes are taking place that appear to be somewhat detrimental to the greenhouse business. For example, a few years ago Alberta Municipal Affairs gave a ruling on the use of plastic on greenhouses where the public is allowed; this was in accordance with building code requirements. One grower was thus forced to use tempered glass resulting in costs going up. A tempered glass greenhouse built in the County of Cyprus was asked to have two doors at the end of each bay by a building inspector. A few years ago an inspector wanted to insulate the heating pipes in the greenhouse because they might accidentally cause burns to workers. These are few examples of what can happen with decisions made at various levels of government.

Some other examples:

- Water and irrigation related legislations issues are expected to increase at county, town, city and provincial levels.

- Insurance rates will increase as the extent of liabilities increases. Change in weather conditions, floods, tornadoes and heavy snow-fall can all affect the business.
- Major changes are taking place in handling and disposal of chemicals and pesticides. It is anticipated that far less chemicals may be available even for integrated pest management.

How are you going to handle these changes? You have to stay active at the association level. The AGGA can play a much bigger role in helping on such issues. Information has to be acquired faster and you have to become more pro-active. Develop your letter writing skills.

### **Bedding Plants and Ornamental Sector**

Bedding plants and ornamentals make up about 41 per cent of the Alberta greenhouse crops industry, while the remainder is shared between vegetables and tree seedlings. Based on the 2014 survey this sector is 72 per cent seasonal in nature and 28 per cent year round. Garden centres and nurseries are integral part of this sector. Issues affecting the future of this sector are basically the same as for vegetable growers but the driving forces may be different.

### **Customers Are Becoming More Sophisticated**

This is an important trend in that customers are demanding knowledge and information on the products they are buying. They are demanding service at all levels so much so that it is becoming difficult for them to wait in the cashier's lineup. Demographic shifts show that more seniors are visiting greenhouses. Millennial customers are and will be increasing in numbers. This is an ambitious group of people who likely want to spend less time in the greenhouse. They prefer making their purchase selection of plants from your website. As a result, they will need a pre-determined combination of plants. So prepare for new realities for the Millennials. This group will also be very interested in balcony gardens and roof top gardens.

Creative advertisements will attract customers to your greenhouse especially if you are located outside the regional centres (cities). Why should they come to your greenhouse that is several kilometres away? For the past few years there is an increased emphasis and demand for container gardening or instant landscaping that have reduced maintenance. Similarly customers will be more interested in alternative landscapes like organic, wild flowers, water gardening. Container gardening will become more popular especially due to weather conditions which we have been experiencing in Alberta for the past few years. Time of actual planting of annuals in gardens is getting less and less due to rain and cold temperatures.

How is the industry going to response to this trend?

Social media is a big seller of product and produce. Bedding plants and ornamental growers are using Face Book, Twitter, Instagram and other social media to connect with their customers in advance. Many growers have standardized their hanging baskets like food menus and attractive names are assigned to these baskets. Customers can order these baskets in advance. Once the basket is sold, the customer's name is placed in those orders. You come to the greenhouse and pick up your basket.

- Create a good website for knowledge and information. This may be included in the advertisement and referred to at the time of sale.
- Seniors may like more written material in larger fonts and pictures; print material accordingly.
- The Millennials will be more interested in scanning the QR codes and getting the information on site.
- Pay attention to your image and reputation in the community.
- Ensure that employees are well trained, courteous and knowledgeable and are willing to answer customer questions.
- Do not leave everything to your employees. Be available to meet and greet people. The role model provided by Mrs. Lois Hole should be a benchmark for service and knowledge. Even as the Lt. Governor of Alberta, she would mingle with customers and answer questions.
- Ensure that it is a pleasant shopping experience. Have a good layout / floor plan. It is always enjoyable to stay for a few minutes to look at the fish, turtles and birds. Make sure you stock the feed as well.
- Use cooperative marketing practices if there are many growers within an area. Edmonton and vicinity have set up good Agri-tourism programs where people can enjoy tours, rides, etc. Many other areas have done similar advertising such as using the passport system. You visit three greenhouses, have your passports stamped and get a hanging basket for free.
- Work collectively as an industry. Become members of AGGA and other organizations.

### **Fast Developing and Improving Communication Technologies**

The survey indicated that the use of computers has increased considerably. Table 5.2 provided details about the use of computers. Among the six major uses of computers identified in the survey questionnaire, email and Internet came at the top. Forty-two per cent of the growers use this communication technology. This has impacted the industry and will keep on impacting it in the future as more information is needed by the growers. The question is how to filter and manage the information for use in the greenhouse. Many times the information is mere testimonial about a product.

The following points may help the industry to respond to the above issues:

- Make sure that computer literacy is widely practiced by you and your staff. Staff should be trained on internet use, creating websites, navigation and ensuring safety of downloaded material. Avoiding virus infections is very important at every level of computer use. Use of cell phones for business dealings and development is increasing. Be aware of all these new tools and how to handle them effectively.
- Use of cell phones with the ability to use credit and debit cards is increasing. Imagine if you carry such units around and when there is a rush at the till, you can process the transactions right where the customer is.
- Also learn how to conduct business on the internet. Many greenhouses order materials and sell through the internet. Make sure there are no typing errors in the orders you place and receive. A follow-up phone call may be needed if something is not clear.
- Filtering the technical information you receive via the internet can be done by examining the rationality and logic supplied in the information. Most commonly, information found about a product stating that it will increase production by 100 per cent or that it will increase plant

growth and other similar aspects have an emotional appeal to people. Instead of good research information, you may find testimonials that are not from reputable sources. Discuss with trusted researchers and extension people before you invest into such technologies or equipment.

- Telephone technologies keep on changing as well. Do you have to go to a central telephone to take your phone call? That is a waste of time and energy. Use cell phones or other wireless means of communication. Also, if using an answering machine then make the messages interesting to listen to and change them occasionally based on the stage of your business when it is open, what is available, timings, etc. Full voice-mail boxes are annoying to customers, so make sure there is enough room for new messages.
- Consider implementing a point of sale system to track customer sales. It will be a valuable database for future.

### **Increasing Concerns for the Environment**

Data obtained from this survey indicated a highly increased consciousness and awareness of the environment. In the greenhouse situation many inputs can be controlled and have the least negative impact on the environment. Take the example of biological controls. More and more bedding plant growers are using less or no chemicals in growing quality plants. Growers use water management to control plant growth rather than growth regulators. Similarly more growers have learned about and use DIF to grow plants. DIF is managing the difference between day and night temperatures to regulate the plant compactness and overall growth.

Other aspects of environment are:

- Availability of chemicals and their use will change. Many pesticides are no longer available in the marketplace. Constantly upgrade your knowledge of new chemicals so you know what is available when you need it.
- In order to meet the demands of customers for environmentally friendly products, use public relation campaigns to help educate them on environmental stewardship. Inform customers that you follow The “Alberta Environmental Farm Plan” guidelines and other “green” programs.
- Efforts to recycle plastic films, trays, and containers will increase and our data showed that growers already have different programs in place to recycle.
- Water conservation effects will affect many aspects of greenhouse environment management.
- Prominently display the information about your composting facility and water recycling practices.
- Offer seminars in environmental stewardship.
- Emphasize recycling of used containers. Many growers do that already and more can be done.

### **Regulatory Concerns are Increasing**

There are many rules and regulations that affect almost all aspects of the greenhouse business and impact the industry. Growers have expressed concerns on many rulings like the non-use of plastic in greenhouses where the public is allowed. This has caused many growers to build tempered glass greenhouses that are far more expensive. Similarly, building code enforcement has caused problems for some growers when the inspector did not recognize the farm classification of greenhouses.

What should be done?

- A concerted effort should be made at the association level to identify such issues and work on them.

Other concerns:

- Irrigation related legislation would increase at all government levels. The industry response should be to become more pro-active and where such legislation is going to affect greenhouse business negatively, letters should be written to concerned authorities about the impact of such regulations.
- Workforce regulations will increase especially when bringing in foreign workers. We should be aware of such regulations in advance, not learn about them when the workers arrive.

The point is that getting involved in associations like AGGA and others is of great benefit in fighting the regulatory concerns.

### **Future of Greenhouse Industry in Relation to Development of Different Technologies**

Questions are constantly being asked about bio-fuels, biogas, Combined Heat and Power (CHP), generating electricity from solar greenhouses and supply to electric grid stations and utilization of waste heat.

The following is some information gathered on these topics from industry sources and specialists:

**Bio-fuels:** Bio-fuels are a wide range of fuels that are in some way derived from biomass. The term covers solid biomass, liquid fuels and various biogases. Bio-fuels are gaining increased public and scientific attention, driven by factors such as oil price spikes, the need for increased energy security, and concern over greenhouse gas emissions from fossil fuels.

Bioethanol is an alcohol made by fermenting the sugar components of plant materials and is made mostly from sugar and starch crops. With advanced technology being developed, cellulosic biomass, such as trees and grasses, are also used as feedstocks for ethanol production. Ethanol can be used as a fuel for vehicles in its pure form, but it is usually used as a gasoline additive to increase octane and improve vehicle emissions. Bioethanol is widely used in the US and Brazil.

Biodiesel is made from vegetable oils, animal fats or recycled greases. Biodiesel can be used as a fuel for vehicles in its pure form, but it is usually used as a diesel additive to reduce levels of particulates, carbon monoxide, and hydrocarbons from diesel-powered vehicles. Biodiesel is produced from oils or fats using transesterification and is the most common biofuel in Europe.

The above information shows that bio-fuels are not cheaper when compared to natural gas, coal and wood. The survey showed that 82 per cent of growers used natural gas as fuel for greenhouse heating. It is possible to use bio-fuels when they become widely available and cost effective. Greenhouse crop waste may be used as feedstock for ethanol production. More research is needed for this purpose.

**Biogas:** There is no commercial application of biogas heating for Alberta greenhouses at this time. Many growers are interested in the use of biogas for this purpose. Initial consultations have taken place between greenhouse growers and some biogas producers.

The following five biogas production facilities have been reported in Alberta:

**Table 14.4: Biogas Facilities in Alberta**

Company, Location	Feedstock	Purpose
Cargill Foods, High River	meat processing wastes	methane replaces some of the natural gas used to operate facility; odour reduction
Lamb Weston, Taber	potato renderings from potato processing	methane replaces some of the natural gas used to operate facility
Highmark Renewables, Vegreville	feedlot manure	electricity for sale to the grid; energy for operating the facility; manure management; biofertilizer
Iron Creek Hutterite Colony, Viking	various types of livestock manure and slaughterhouse wastes	energy for operating the facility; electricity for sale to the grid; manure management; water conservation; odour reduction
Peace Pork, Falher	hog manure	odour reduction; manure management

There is potential to use biogas from such sources but the problem will remain if greenhouses should be located where these sources are available or build biogas plants where greenhouses exist. More feasibility studies are required to look at all aspects of heating greenhouses from such sources. There is no doubt that capital costs will be very high but long term environmental and sustainability factors may be favourable for this type of heating for greenhouses.

Many companies are constantly developing and marketing boilers where biomass and other waste materials are utilized to convert into clean and affordable energy. For example, a company by the name of AgriPower claims to have installed units in Ontario greenhouses to heat and generate power. It appears that many different types of biomass can be utilized with variable moisture contents. There may be other companies around as well ([www.agripower.com](http://www.agripower.com)).

**Combine Heat and Power (CHP):** Cogeneration of heat and power is used by many greenhouses in Ontario and Europe especially in Holland. In Alberta there is no commercial greenhouse using CHP at this time.

**Waste Heat Utilization:** Alberta had many projects where waste heat was utilized to heat the greenhouses. Many oil companies have conducted feasibility studies on the use of waste heat for greenhouses. The projects failed due to different reasons. For example, it was capital expensive to install heat recovery systems and these companies developed these greenhouse projects more from a public relations perspective, rather than from a true greenhouse business. Any future projects may be successful if they are located closer to main population centres and they are developed in consultation with the industry.

## APPENDIX I – Other Comments, Concerns and Issues

The following provides a list of other comments, concerns and issues reported by survey participants.

1.	How can we become more environmentally friendly – by keeping the future in mind (our children and future consumers); educate consumers re insects (biological control).
2.	Need to educate people outside the industry about us - especially those under thirty years old.
3.	Hard to compete with big box stores selling product at lower than their operation's cost of production.
4.	Holding workshops in winter time would be better. Information was not available when really needed and now they are questioning the value of their membership.
5.	Looking into green energy. Energy costs and labour shortage.
6.	Please provide results in square feet as well.
7.	These questionnaires are a good tool for helping growers keep environmentally aware and keeping up with what is going on in the industry.
8.	Greenhouse classification issues as well as labor issues such as overtime.
9.	Greenhouse insurance is not feasible or readily available (will not insure contents and buildings). Insurance has too many stipulations and specifications.
10.	SWAP program is very important to keep up and running. Keep politics to a minimum.
11.	The playing field needs to be level, i.e. Box stores should have to pay the same wholesale price as independent growers for products.
12.	Would like to see more information transfer for smaller operations.
13.	Can AGGA move conference to other locations to accommodate the majority of producers in specific areas (not just Edmonton/Calgary)? Not always feasible.
14.	Industry has really changed - big box stores are really hurting business.
15.	Horticulture industry is nothing like what it used to be - most people are going to box stores for cheap product thus making it harder for small growers trying to make a living in this industry.
16.	We are only going into our second spring season. Our first was very successful and so was our customer base for cut flowers. But our overhead was far too high for our sales/profit margin.
17.	AGGA is doing a great job already by being extremely helpful; keep up the good work. AGGA is very helpful to all in the industry especially new growers; doing a great job
18.	AGGA needs to address the difference in standards between rural versus urban greenhouses (much harder rules for urban).
19.	Operators need more cost of production workshops made available to them and information regarding product pricing.
20.	Farmers markets need to change name to markets. Ban re-sellers that say they are a farm or greenhouse (not producing). Lacombe producers have been wonderful and great mentors.
21.	Hard to hire skilled labour, cannot afford because of product pricing; would like to see AGGA produce costs information transfer and setting of minimum prices.
22.	Labour and pricing - hard to compete with oil patch wages; hard to compete with foreign imports.

23.	Wish that greenhouse producers could benefit from same benefits/tax deductions that farmers are entitled/eligible for.
24.	Dr. Mirza is excellent - thanks for all the help. Enjoyed working with Dr. Mirza! Keep up the good work.
25.	Sending products here that is not compatible with Alberta's climate or at wrong time of season. Regulating imports coming because they are undercutting local growers' costs.
26.	Free trade with BC Ministry of Forests. Open Bid processes not rigged so BC Nurseries only receive seedling contracts. Stop applying penalties to Alberta nurseries who bid.
27.	Good questionnaire. Some of the questions are none of your business.
28.	Need help with foreign labor. AGGA is underutilized; industry is too independent so we need to come together as an industry. Example, willingness to complete this survey for the benefit of all.
29.	Overtime issues in Alberta, we need exemption under "farm".
30.	The big get bigger, small operations phased out!! Competition from larger box stores e.g. Costco. Every major chain store selling product.
31.	The entire industry is excellent in sharing knowledge and helping each other.



## **APPENDIX II – Survey Questionnaire**

### **PROFILE OF THE GREENHOUSE INDUSTRY IN ALBERTA, 2014 SURVEY QUESTIONNAIRE**

Alberta Agriculture and Rural Development (ARD) in collaboration with Alberta Greenhouse Growers Association (AGGA) are undertaking this survey with funding from Growing Forward 2, a Federal-Provincial-Territorial initiative. The purpose of the survey is to gather current benchmark data on greenhouse crop operations in Alberta.

As in previous years:

- Detailed survey results will only be viewed by ARD and AGGA.
- The information, with all personal identifiers removed, may be shared with other research organizations.
- Only aggregated results will be published in a report that will be available to the public.

The survey should be completed by the owner or a key contact with the greatest knowledge of the responding greenhouse operation.

We would like to thank you in advance, for taking the time to complete this survey.

If you have any questions about the survey or how the data will be used, please contact:

Emmanuel Anum Laate  
Senior Crop Economist  
Economics Branch  
Alberta Agriculture and Rural Development  
303 J. G. O' Donoghue Building  
7000 - 113 Street, Edmonton, AB. T6H 5T6  
Phone: (780) 422-4054 Fax: (780) 427-5220  
Email: [emmanuel.laate@gov.ab.ca](mailto:emmanuel.laate@gov.ab.ca)

The personal information you provide on this form, will be used for administration of this survey. It is collected under the authority of Section 33 (c) of the Freedom and Protection of Privacy (FOIP) Act and is subject to the provisions of the Act. If you have any questions about the collection or use of your personal information, please contact the Senior Crop Economist, Economics Branch, ARD, #303, 7000 - 113 Street, Edmonton AB T6H 5T6. Phone: 780-422-4054

Name of Greenhouse:		
Legal Name of Greenhouse:		
Name of Owner/Key Contact:		
Phone Number:	Fax Number:	
Address:.....		
.....		
.....		Postal Code: .....
E-mail Address:	Website:	
Respondent's Education: <input type="checkbox"/> Grade 12 or less <input type="checkbox"/> Olds College <input type="checkbox"/> Other College/Courses <input type="checkbox"/> B.Sc. <input type="checkbox"/> M.Sc. or higher		
Respondent's Years of Greenhouse Experience:		
Type of Business:	<input type="checkbox"/> Family/Sole Proprietorship	<input type="checkbox"/> Incorporated <input type="checkbox"/> Limited
Land Area in Acres:		
Size of Greenhouse (Sq. M.):		
Year(s) Greenhouse was Built:		
Greenhouse Structure and Area:		
<input type="checkbox"/> Glass	Size (Sq. M.)	
<input type="checkbox"/> Double Poly	Size (Sq. M.)	
<input type="checkbox"/> Other (please specify)	Size (Sq. M.)	
Have you ever had any expansion in your operation?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, please indicate year expansion occurred?		
Is your greenhouse operated year round or seasonal?	<input type="checkbox"/> Year round	<input type="checkbox"/> Seasonal
Is your greenhouse operation financed?	<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, please
indicate source of financing (loan):	<input type="checkbox"/> FCC* <input type="checkbox"/> AFSC** <input type="checkbox"/> Bank	<input type="checkbox"/> Self-financed
Do you have any production certified as organic?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, please specify crops and area under organic production.		
Crops:		
Area (Sq. M.):		
Majority of your sales are:	<input type="checkbox"/> Your Own Retail Shop	<input type="checkbox"/> Wholesale/Coop
<input type="checkbox"/> Farmers' Markets	<input type="checkbox"/> Supermarkets/Grocery Stores	
<input type="checkbox"/> Independent Garden Centres	<input type="checkbox"/> Mass Merchandisers/Box Stores	<input type="checkbox"/> Other Growers

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What is your operation's annual gross sale?		
<input type="checkbox"/> Under \$50,000	<input type="checkbox"/> \$50,001 To \$100,000	<input type="checkbox"/> \$100,001 To \$500,000
<input type="checkbox"/> \$500,001 To \$1 Million	<input type="checkbox"/> \$1 Million To \$2 Million	<input type="checkbox"/> \$2 Million To \$3 Million
<input type="checkbox"/> \$3 Million To \$4 Million	<input type="checkbox"/> \$4 Million To \$5 Million	<input type="checkbox"/> Over \$5 Million
<b>HEATING SYSTEM:</b> (please check appropriate category)		
<b>1. Boiler</b>	<b>2. Forced Air Furnace</b>	<b>3. Other Heating</b>
<input type="checkbox"/> Hot Water <input type="checkbox"/> Steam	<input type="checkbox"/> Natural Gas <input type="checkbox"/> Propane	<input type="checkbox"/> In-floor Heating <input type="checkbox"/> Pipe under the growing media <input type="checkbox"/> Soil Heating <input type="checkbox"/> Combine Heat and Power
Type of heating fuel: <input type="checkbox"/> Natural Gas <input type="checkbox"/> Propane <input type="checkbox"/> Coal <input type="checkbox"/> Wood <input type="checkbox"/> Oil <input type="checkbox"/> Electric		
Price of natural gas and other fuels paid (cost per unit):		
Heating costs per year:		
Do you have carbon dioxide (CO <sub>2</sub> ) recovery?		
<b>ENVIRONMENTAL CONTROL SYSTEMS:</b> (please check appropriate category)		
<input type="checkbox"/> Ventilation	<input type="checkbox"/> Exhaust fans	<input type="checkbox"/> Natural ridge vents
Do you have summer and winter ventilation (fan and jet)?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you have any horizontal air flow fans?		<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you have evaporative coolers? (cooling/fogging systems)		<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you have a relative humidity control system?		<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>COMPUTER USE:</b>		
What type of computer do you have in your greenhouse? (please check appropriate category)		
<input type="checkbox"/> Priva	<input type="checkbox"/> Argus	<input type="checkbox"/> Personal Computers <input type="checkbox"/> Others
What do you use your Computer for? (please check appropriate category)		
<input type="checkbox"/> Environmental control	<input type="checkbox"/> Book-keeping	<input type="checkbox"/> Crop scheduling
<input type="checkbox"/> Irrigation control	<input type="checkbox"/> E-mail	<input type="checkbox"/> Internet
Name of crop scheduling program:		
Are you able to take digital pictures and email instantly for diagnostic purposes?		
<input type="checkbox"/> Yes <input type="checkbox"/> No If yes, please specify device.		
<b>LIGHTING SYSTEM:</b> <input type="checkbox"/> High Pressure Sodium <input type="checkbox"/> Photo period light <input type="checkbox"/> Light Emitting Diode (LED)		
How many lights do you have and what wattage?		
<b>WATER:</b>		
Where does it come from? <input type="checkbox"/> Dugout <input type="checkbox"/> Well <input type="checkbox"/> Irrigation Canal <input type="checkbox"/> River <input type="checkbox"/> City Water		

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Do you know the total quantity of water you use?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
If yes, what is the total quantity of water in m <sup>3</sup> ?					
Do you collect water from the roof of your greenhouse?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
What is the quality of the water you use?		<input type="checkbox"/> Hard water	<input type="checkbox"/> Soft water <input type="checkbox"/> Medium		
Have you ever had your water analyzed?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
Do you know the Sodium level in your water?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
Water treatment being used: (please check appropriate category)					
<input type="checkbox"/> Reverse osmosis		<input type="checkbox"/> Distillation	<input type="checkbox"/> Water conditioning <input type="checkbox"/> Filter system		
<input type="checkbox"/> Acid mixing		<input type="checkbox"/> Others (please specify):			
<b>IRRIGATION SYSTEMS</b> (please check appropriate category):					
Type of irrigation:		<input type="checkbox"/> Drip Irrigation	<input type="checkbox"/> Overhead sprinklers <input type="checkbox"/> Hand watering <input type="checkbox"/> Flood/Drained Benches		
Do you recycle your water?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
Disposal of waste water:		<input type="checkbox"/> Ground/Field	<input type="checkbox"/> Sewerage <input type="checkbox"/> No waste water		
<b>FERTILIZERS:</b>					
Fertilizer injector systems:					
Type of fertilizers being used:					
Amount of fertilizers being used:					
Do you use calcium nitrate as part of your fertilizer programme?		<input type="checkbox"/> Yes	<input type="checkbox"/> No		
<b>CROPS BEING GROWN:</b>					
<b>Vegetables</b>					
Cucumbers:		<input type="checkbox"/> LE	<input type="checkbox"/> Mini <input type="checkbox"/> Pickles <input type="checkbox"/> Salad		
Tomatoes:		<input type="checkbox"/> Beefsteak	<input type="checkbox"/> TOVs <input type="checkbox"/> Cocktail		
Peppers:		<input type="checkbox"/> Green	<input type="checkbox"/> Yellow <input type="checkbox"/> Orange <input type="checkbox"/> Other		
Lettuce (types):					
Eggplant:					
Others e.g. ethnic vegetables (please specify):					
	Area for each crop	Growing media	Raised troughs	Floor plastic/cloth	Training system
Cucumbers					
Tomatoes					
Peppers					
Lettuce					
Eggplant					
Others					

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<b>Bedding Plants:</b> List the top 10 bedding plants and number of individual plants you grow.	
1.	6.
2.	7.
3.	8.
4.	9.
5.	10.
How many cell packs of bedding plants do you grow?	
Type of vegetable grown in containers: <input type="checkbox"/> Tomatoes <input type="checkbox"/> Cucumbers <input type="checkbox"/> Peppers <input type="checkbox"/> Strawberry	
Have your production increased or decreased compared to 2013? <input type="checkbox"/> Increased <input type="checkbox"/> Decreased	
<b>Hanging Baskets:</b> How many?	
Are you familiar with the new hybrid plant material e.g., supertunias, Bacopa, etc.? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Flowers Grown:</b> (please check all types that you grow) <input type="checkbox"/> Poinsettias <input type="checkbox"/> Chrysanthemum <input type="checkbox"/> Hydrangeas <input type="checkbox"/> Easter lilies <input type="checkbox"/> Azalea <input type="checkbox"/> Cyclamen	
<b>Cut Flowers:</b> (please check all types that you grow) <input type="checkbox"/> Roses <input type="checkbox"/> Alstroemeria <input type="checkbox"/> Asiatic lilies <input type="checkbox"/> Oriental lilies <input type="checkbox"/> Other flowers (please specify):	
<b>Culinary or Medicinal Herbs:</b> Do you grow any culinary or medicinal herbs? <input type="checkbox"/> Yes <input type="checkbox"/> No If yes, list types of herbs.	
Would you consider medicinal marijuana as a potential greenhouse crop? <input type="checkbox"/> Yes <input type="checkbox"/> No	
<b>Perennials:</b> Please list the top 10 perennials you grow/sell.	
1.	6.
2.	7.
3.	8.
4.	9.
5.	10.
<b>Tree seedlings:</b>	
What species do you grow: <input type="checkbox"/> Pine <input type="checkbox"/> Spruce and deciduous material	
Production Schedule: <input type="checkbox"/> Summer <input type="checkbox"/> Winter storage	
Number of seedlings grown:	
How long do you keep your stock: <input type="checkbox"/> 6 months <input type="checkbox"/> 1 year <input type="checkbox"/> 2 years <input type="checkbox"/> 3 years <input type="checkbox"/> 5-8 years	

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Would you be interested in participating in a cost of production study?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have nursery material:	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you grow any specialized tissue culture material?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If multiple crops, rough idea of space being devoted to each crop:		
<b>CROP PROBLEMS:</b>		
Do you have any insect problems?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, please indicate:	<input type="checkbox"/> Aphids	<input type="checkbox"/> Thrips
	<input type="checkbox"/> Fungus Gnats	<input type="checkbox"/> Shoreflies
	<input type="checkbox"/> Whiteflies	<input type="checkbox"/> Spider Mites
	<input type="checkbox"/> Other (please specify)	
Have you heard the term Integrated Pest Management (IPM)?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Is IPM e.g. monitoring, scouting, etc. practiced in your greenhouse?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, who most often does this?	<input type="checkbox"/> You	<input type="checkbox"/> Independent crop consultant
	<input type="checkbox"/> Hired employee	<input type="checkbox"/> Extension agent or Extension program scout
	<input type="checkbox"/> Other (please specify)	
Do you use biological control agents?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, where do you buy your biological control?		
Do you use bumble bees for pollination?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Where do you get your pesticide recommendation?		
Do you have any disease problems?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
	If yes, what kinds:	
<input type="checkbox"/> Pythium	<input type="checkbox"/> Powdery Mildew	<input type="checkbox"/> Grey Mold
	<input type="checkbox"/> Tobacco Mosaic Virus	<input type="checkbox"/> Cucumber Green Mottle Mosaic Virus
	<input type="checkbox"/> Other	
How could your knowledge base in IPM be improved?	<input type="checkbox"/> Through workshops	
	<input type="checkbox"/> Newsletter	<input type="checkbox"/> Grower alerts
	<input type="checkbox"/> Other (please specify)	
<b>LABOUR:</b>		
Number of people employed:	<input type="checkbox"/> Full Time	<input type="checkbox"/> Part Time
Have you ever employed students from Olds College or a similar institution?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you have issues with the availability of skilled employees?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Have you used foreign workers in your greenhouse?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
If yes, please indicate country:		
<b>ENVIRONMENTAL CONCERNS/TRENDS:</b>		
Do you consider your production practices as environmentally friendly? e.g., organic, reduced pesticide; natural, etc.	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you recycle plastics and containers?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you use landfill for disposal?	<input type="checkbox"/> Yes	<input type="checkbox"/> No
Do you compost your waste material?	<input type="checkbox"/> Yes	<input type="checkbox"/> No

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<b>FOOD SAFETY ISSUES:</b>	
Are you HACCP*** compliant?	<input type="checkbox"/> Yes <input type="checkbox"/> No
On farm food safety:	<input type="checkbox"/> Yes <input type="checkbox"/> No
Environmental farm plan:	<input type="checkbox"/> Yes <input type="checkbox"/> No
<b>OTHER ISSUES:</b>	
How is your operation taxed:	<input type="checkbox"/> Farming <input type="checkbox"/> Business <input type="checkbox"/> Commercial
Any taxation/greenhouse classification issues?	
Is greenhouse insurance readily available?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Do you purchase greenhouse insurance?	<input type="checkbox"/> Yes <input type="checkbox"/> No
Please provide the name of the company you use (Optional):	
Who are your main suppliers of plant material?	
Do you raise your own seedlings?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If yes, what per cent:	
Are you a member of Alberta Greenhouse Growers Association (AGGA)?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If no, please indicate reason:	
Do you employ the services of a greenhouse consultant?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If AGGA provided consulting services, would you become a member?	<input type="checkbox"/> Yes <input type="checkbox"/> No
If no, please indicate reason:	
How could AGGA be more helpful to you and your business?	
Have you attended the Green Industry Show and Conference during the last five years?	
<input type="checkbox"/> Yes <input type="checkbox"/> No	If yes, how many times?
Are you anticipating any business threats in the next three to five years? <input type="checkbox"/> Yes <input type="checkbox"/> No	
If yes, please specify:	
<input type="checkbox"/> Energy costs	<input type="checkbox"/> Labour shortages <input type="checkbox"/> Markets/prices
<input type="checkbox"/> Import competition	<input type="checkbox"/> Taxes/regulations (property, payroll, environmental, etc.)
<input type="checkbox"/> Currency fluctuations	<input type="checkbox"/> Other (please specify)
Are you anticipating any business opportunities in next three to five years?	
<input type="checkbox"/> Buy local movement	<input type="checkbox"/> Non-traditional products <input type="checkbox"/> Organic or green products
<input type="checkbox"/> Export markets	<input type="checkbox"/> Other (please specify)
Any other comments/concerns/issues:	

\*\*\* Hazard analysis and critical control point

**THANK YOU FOR YOUR TIME AND INPUT!**

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