

# Fraser Valley Pest Assessment Inventory - Pest Analysis

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## Introduction

As our climate changes, weather patterns are expected to shift (Beddington *et al.* 2012; Vermeulen *et al.* 2012), which could significantly alter growing conditions and therefore the populations of insects, weeds, pathogens and invasive species across the Fraser Valley (Climate Action Initiative, 2015). These changes are likely to increase the complexity and challenges associated with pest management.

In 2016, an inventory was created that documented pest-related activities in the Fraser Valley, as well as perceived pest threats across 30 agricultural commodities. The pest-related activities included research, outreach, monitoring, and surveillance, and resulted in a list of over 300 projects that have been conducted in the Fraser Valley over the past five years.

In addition to this information, interviews were conducted with specialists, growers and producers to establish top priority pests or pests that were believed to be an increasing threat to each commodity. This is a wealth of information for the region and further analysis would be valuable for identifying key areas for future attention and investment.

The additional analysis of the Fraser Valley Pest Assessment Inventory undertaken below is intended to assist in focusing activities and research to mitigate pest-related impacts on the agricultural community in this region. This initial assessment could provide a platform for a cohesive and coordinated approach to shared pest threats, and will inform a series of fact sheets that will improve the availability of relevant management information for Fraser Valley producers.

This analysis below focuses on the pests of importance that are identified through the inventory. It is important to note that ‘pest’ refers to any living organism that causes economic damage to a crop or livestock commodity, and therefore encompasses diseases, plants, and animals. The objective of the inventory analysis is to identify emerging pest threats, as well as to categorise established pests for which attention is needed. The categories utilized for analysis of the inventory are: pests affecting multiple commodities; pests with potential for cross-commodity research; pests affecting just one commodity; and emerging pests.

Following this analysis, fact sheets on a selected short-list of pests will be created to improve knowledge and promote management. A communications plan has been included with this analysis to ensure that the fact sheets are distributed using the preferred methods of communication that were identified in the inventory.

## **Methodology - Inventory analysis**

### **Pests with potential for cross-commodity research**

Using the 2016 inventory, pests were sorted by the level of concern expressed by interviewees and pests that were identified as being of medium-high or high concern were selected. From this group, further prioritization was focused on pests for which management tools and options were identified as lacking or for when populations were perceived to be increasing. Finally, pests affecting a single commodity were removed from this section and are listed under 'Pests affecting just one commodity' below. Using the project lists created for the 2016 inventory, which documented pest-related activities including research, monitoring/surveillance and management activities, the number of projects already undertaken to address each pest was determined. This list was then matched up with the above short-list of pests, and those with the fewest number of projects were preferentially listed.

Following this process, some key areas for research or attention were highlighted. These were based on additional comments made by interviewees and by analysing existing projects on specific pests to identify gaps that had not been addressed.

### **Pests of highest concern to multiple commodities**

Pests that were identified as being of high concern were selected from the inventory's pest lists for all commodities. Livestock and crop pests were separated as the number of respondents varied considerably, with livestock generally having far fewer respondents than most crop commodities. Selected pests were then sorted by the number of respondents that had listed the pest as being of high concern. Following this, pests were then organised based on the number of commodities they affected, with preference being given to pests affecting multiple commodities. As several non-specific weed categories were listed in the inventory, these were grouped together into a single pest group.

### **Pests affecting just one commodity**

Pests were short-listed for this category if they were of medium-high or high concern, management tools were lacking, and they affected only one commodity.

### **Emerging pests**

Interviews conducted for the 2016 inventory included a specific question about pests that were not yet present in the Fraser Valley, but were expected to arrive or to be introduced. All pests identified in this category were included in the analysis and they were divided into two sections – pests known to currently be present in the Fraser Valley but that are not yet widespread, and pests that are not believed to currently be present in the region.

### **Short-list of pests selected for fact sheets**

A review of pests listed in all the above categories was conducted. Pests that appeared on multiple lists were considered to be a priority. Following that, each pest was considered for fact

sheet suitability using information from the inventory, and additional research. Factors considered included extent of current management options, ability to identify the pest, existing grower understanding of Integrated Pest Management for the pest, and whether steps could be taken that would minimize pest spread. Emerging pests considered to become more of an issue with climate change were given priority.

## **Value of commodities in the Fraser Valley**

Although the Fraser Valley hosts a diverse array of agricultural industries, several commodities top the list in terms of economic value and/or acreage. For crops, greenhouse vegetables and floriculture have the greatest economic value, and blueberries have the most acreage. Potatoes and other field vegetables, and mushrooms, are also significant crop commodities in the region. The dairy industry is the highest value livestock commodity in the Fraser Valley and poultry also has significant economic value. Other livestock commodities in the region are smaller, although some have more production elsewhere the province.

Assessing pests based on the values of the commodities they impact is important in order to gain a perspective on the potential economic impact of the pest on the agricultural sector as a whole. Since some commodities are more valuable, or have greater acreage, pests that affect these commodities are likely to have greater economic impact. However, smaller commodities can lack the resources needed to conduct pest research or other pest-related activities. These factors should be kept in mind when prioritizing pests across multiple commodities of different values and acreages.

## **Inventory analysis**

### **Pests with potential for cross-commodity research**

For some pests, such as helminths and nematodes in livestock, there does not appear to have been any local research, or other pest-related activities, conducted, whereas for other pests, such as aphids, several projects have been undertaken but not in all specific areas of concern (Table 1, Fig. 3). For all the listed pests, the majority of previous research projects focused on conventional product development (Table 1) and there are several other areas in which minimal research activity has been conducted (Table 2).

It is important to acknowledge that research in areas aside from product development can be costly and potential gain is not always as visible to growers. Product development is specifically required for several pests, including horsetail and other weeds, phytophthora root rot, powdery mildew and botrytis, and is an ongoing need for pest management. However, as discussed below, there are significant research gaps in other areas, which provide some guidance for priorities for cross-commodity research.

#### ***i) Pest resistance to products***

The issue of product resistance may become more prevalent with climate change as some pests increase in number and growers increase their management intensity. Two aspects of product resistance in pests need to be addressed. One is improved and consistent education for growers, producers, and commodity experts, so they understand how resistance develops in a pest population and to apply this understanding to their management regimes. The other is to monitor pest populations for resistance to commonly-used products and to act when resistance is identified. Concerns regarding product resistance were identified in relation to several pests, including helminths and nematodes in livestock, some weeds, botrytis, and other diseases (Table 2).

#### ***ii) Species identification and distribution***

Studying the occurrence and distribution of some pest groups in the region is an essential component of the management of these pests. Correct identification of pests is a cornerstone of Integrated Pest Management (IPM), and results in effective management. Options, including timing of sprays or product selection, can be adjusted based on pest species. However, as the climate changes, it will be important to have a good basis of understanding of the pest complexes present in the region so that changes or shifts in populations can be more easily monitored and managed.

A region-wide surveillance project for nematodes is needed, as several species are believed to occur in the Fraser Valley but their distribution is not well-known. Nematodes are a global concern for plant disease transmission and therefore knowing the species that are present will aid in knowing what diseases to expect or to be concerned about.

This gap in research is likely due to limited management tools, as knowing what species are present will not change the fact that management products are very limited. A two-pronged approach is needed to address this problem – firstly, to improve the management options (including a response to deregistration from regulatory bodies) and secondly, to improve information about species identification and distribution.

### ***iii) Pests as vectors of plant pathogens***

In addition to nematodes, other known disease vectors present in the Fraser Valley include thrips and aphids (Table 2). Their effectiveness as vectors of viruses, as well as the diversity of viruses they are capable of transmitting, is not well understood. In addition, there is concern that the species complexes of these pests may shift with climate change, and this may have knock-on effects for the plant viruses that they vector.

An improved understanding of the transmission of plant pathogens would result in better management decisions for both vectors and diseases. Economic thresholds, where known, for pests that are disease vectors, may need updating if new diseases are found to be present in the region. Ongoing screening of vectors, and crops, for transmitted diseases will improve knowledge of the pathogens and strains that are present and provide a base line for future research.

### ***Conclusion***

The pests identified in Tables 1 and 2 were selected to due their effect across multiple commodities, and the potential for collaborative research. Some have been specifically identified as good candidates for cross-commodity research (Table 2). This is not, of course, an exhaustive list of pests requiring research and it is important to keep in mind that pests are constantly changing. The current focus on product development over other types of research (Table 1) is concerning, as with the anticipated changes to pests in the region, an understanding of other aspects of pest biology, as well as ongoing surveillance and monitoring, will be essential for continued, effective pest management.

The inventory reveals that to date, few projects have focused on outreach with growers and producers, although many projects do contain an outreach component. In several places in the inventory, the lack of grower and producer awareness of pest research projects was highlighted, indicating that outreach could be enhanced so that research findings are applied by those who would benefit most.



Table 1: Selected pests with potential for cross-commodity projects, the commodities they impact, and the types of projects that have been done from 2011-2016. Commodities that have conducted projects are denoted with '\*'. Note that projects that fit into multiple categories have been listed multiple times. The total number of projects per pest is in Figure 3.

Pest	Commodities ranked as medium-high or high concern & lacking tools	Other commodities affected	Monitoring & surveillance	Biology	Conventional product development	Other management	Outreach
<b>Helminths &amp; nematodes</b>	Beef, goats, sheep					0	
<b>Birds</b>	Blueberries*, corn, dairy	Barley, beef, beans, pork				2	
<b>Horsetail</b>	Blueberries, nursery*	Cranberries*, floriculture*, potatoes, other berries	1		1	1	
<b>Leafhopper</b>	Greenhouse veg	Floriculture*, grapes*, hops*, nursery*, raspberries			2	1	
<b>Cabbage root maggot</b>	Cole crops*, radishes, rutabaga*		1		1	3	
<b>Downy mildew</b>	Cole crops, floriculture*, greenhouse veg*, hops*, nursery*, onions	Raspberries*			4	0	
<b>Phytophthora root rot</b>	Greenhouse veg, raspberries	Field crops			4	0	
<b>Nematodes</b>	Carrots*, floriculture*, strawberries, raspberries*	Blueberries*, greenhouse veg*, nursery*, potatoes*	1	2	3	2	
<b>Weevils</b>	Blueberries*, floriculture*, nursery	Cranberries, raspberries*, strawberries	3		4	2	
<b>Spotted wing drosophila</b>	Blueberries*, raspberries*, strawberries*, tree fruits	Grapes*	4		3	1	1
<b>Thrips</b>	Barley*, cole crops, floriculture*, nursery*	Field & greenhouse veg*, grapes*, potatoes*, strawberries*	2		5	1	
<b>Weeds - non-specific</b>	Beef, field fruits* & veg*, goats	All field crops & livestock	2		6	5	1
<b>Powdery mildew</b>	Floriculture*, nursery*	Cucurbits, grapes*, greenhouse veg*, hops, strawberries			12	2	
<b>Botrytis</b>	Beans*, raspberries*	Blueberries*, grapes, greenhouse veg - lettuce*, nursery, onions, strawberries*	2	3	8	7	
<b>Aphid</b>	<b>Cole crops, floriculture*</b>	Beans*, blueberries*, cucurbits*, greenhouse veg*, hops*, nursery*, peas*, potatoes*, raspberries*, strawberries*	1	1	10	13	

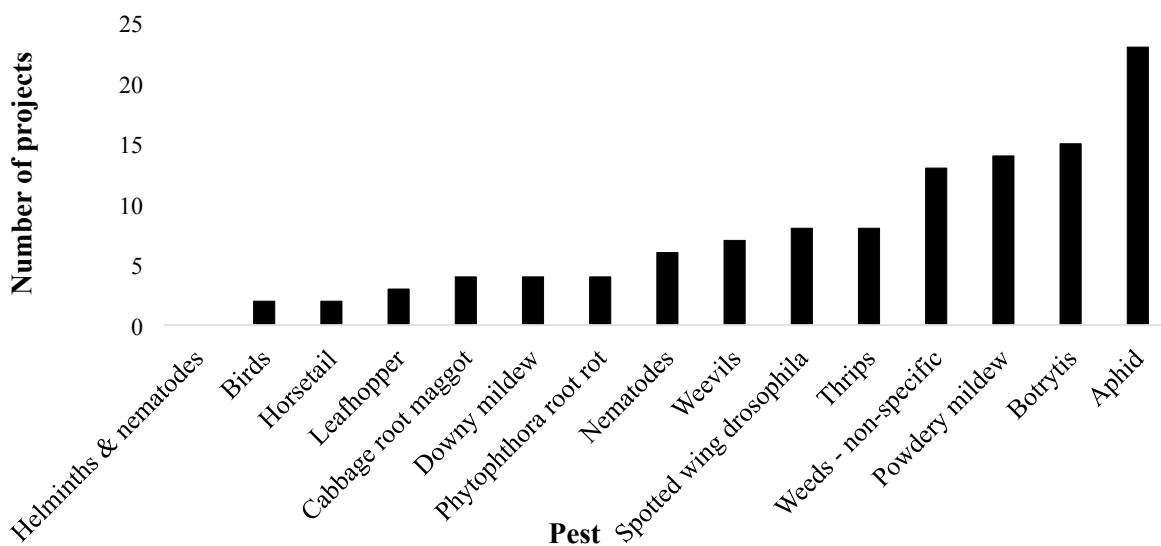


Figure 1: Pests with potential for cross-commodity research or other activities, and the number of projects conducted on those pests between 2011-2016.

Table 2: Cross-commodity pests identified as requiring research, or other related activities, and suggested areas of focus.

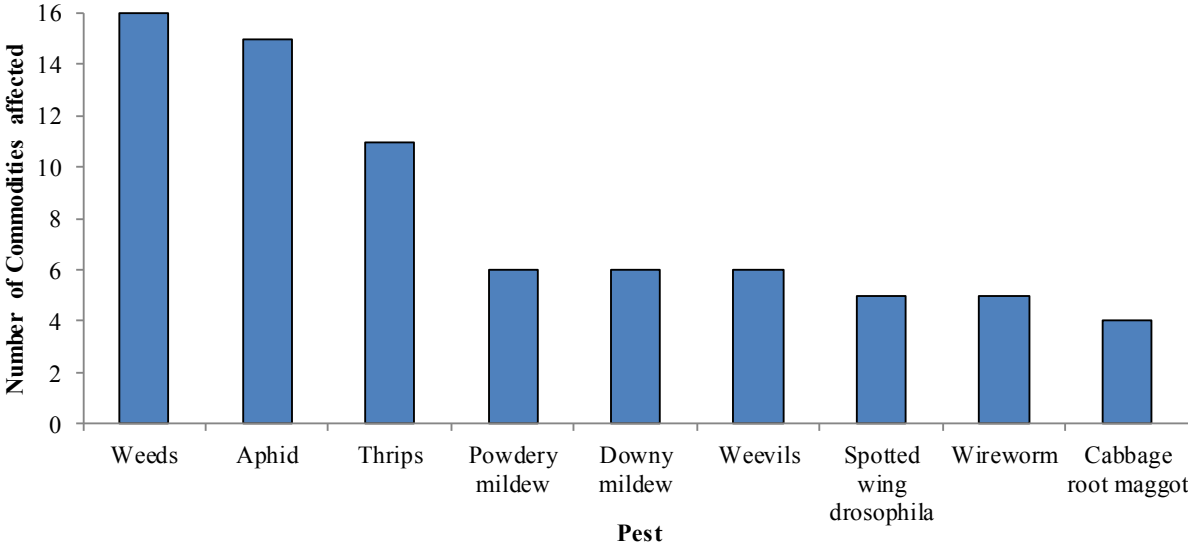
Pest	Pest group	Concerns and/or suggested areas for future focus
Helminths & nematodes	Parasite	Concerns about resistance; increasing in number; believed not to be dying over winter (milder winters)
Birds	Vertebrate	Opportunities for technology advances; good candidate for collaboration across commodities
Horsetail	Plant	Currently, effective products are limited and only work temporarily
Leafhopper	Insect	Increasing issue in greenhouse vegetables, more products needed. Greenhouse and field vegetable industries could collaborate
Cabbage root maggot	Insect	Fresh approach needed to manage this well-established pest; high demand for new tools
Downy mildew	Disease	Unsure if increasing or decreasing; new disease in hops
Phytophthora root rot	Disease	Lack of product options so concerns about resistance; possibility of connection between nematodes and this disease
Nematodes	Nematode	Urgent need for fumigant replacement option; current distribution and species diversity across FV is unknown; issue with transmission of diseases
Weevils	Insect	No effective tools for larval management; sprays are toxic to pollinators so their use is limited; better application/outreach of monitoring techniques would be helpful
Spotted wing drosophila	Insect	More diverse management options needed; possibility of area wide collaboration across commodities and between growers
Thrips	Insect	Concern that it will increase with climate change; affects multiple commodities; potential virus vector

Weeds - non-specific	Plant	Little or no support for identification of weeds, and therefore no attempt to vary management by species; some are invasive and very difficult to remove; widespread misuse of herbicides across commodities; concerns about resistance to commonly-used products
Powdery mildew	Disease	May be increasing; more products in different pesticide groups needed; strain variety unknown
Botrytis	Disease	Potential for widespread resistance; product rotation is essential but many growers may not follow this; more products in different chemical groups needed; call for development of resistant varieties of some crops (e.g. lettuce)
Aphid	Insect	Believed to be increasing in some commodities and some observed a change in species complex; ability to vector viruses; good candidate for cross-commodity research

**Pests of highest concern to multiple commodities**

*Crops-* As expected, weeds are of high concern to the greatest number of commodity types (Fig. 4). Aphids and thrips were also listed as being of high concern by many interviewees, affecting 15 and 11 different commodities in the Fraser Valley respectively. These general pests are good candidates for cross-commodity management initiatives.

There is a noticeable decrease in the number of commodities affected by each pest, as the pests get more specific. However, it is important to note that some of these, such as the mildew diseases, may shift to new commodities with climate change, and could therefore become more widespread in terms of the commodities impacted.



*Figure 4: Pests of highest concern in crops and the number of commodities affected by each pest.*

*Livestock-* As in crops, weeds are also a top concern for livestock producers (Fig. 5). Several different types of weeds (e.g. grasses, broadleaves) were raised as concerns by producers, although many did not list a specific weed and so they have been combined to form this category. Invasive plants should also be considered as contributing to this concern. Helminths and nematodes are another pest that are widespread across livestock commodities, and therefore are a concern to many producers. Birds, coccidiosis and lameness also affected multiple livestock commodities. Many livestock pests are species specific, making it a challenging area to establish collaborations for pest management, however some pests discussed here provide a good opportunity for livestock and crop industries to work together in pest management or research.

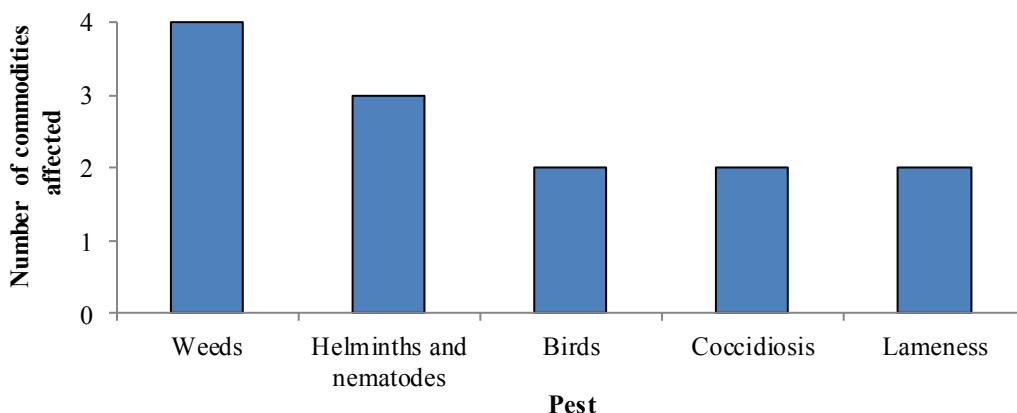


Figure 5: Pests of highest concern in livestock and the number of commodities affected by each pest.

### Pests affecting just one commodity

Several pests are only of concern for one commodity, and therefore have not been selected for other lists. The pests listed in Table 3 are a top concern to individual commodities, and there are limited tools available for their management. Some of these pests, such as Avian influenza and varroa mite, are global concerns and the subject of intense research globally. Others, including blackleg, carrot rust fly, and darkling beetle, are current issues here and would benefit from local attention for research or management. In addition, research projects have not been listed for several of these pests, despite an identified need, indicating that they are neglected pests. Another reason for a lack of research projects may be that the commodities they impact are not large enough to have the capacity to access funding or to conduct research. Increasing the awareness of the funding that is available, and what avenues can be pursued for research, will help to make this a possibility for these commodities.

Table 3: Pests identified as a top concern in one commodity, and lacking tools and research.

Pest	Pest group	Commodity affected
Avian influenza	Disease	Poultry
Beet storage diseases	Disease	Beets
Black dot	Disease	Potatoes
Blackhead (Histomoniasis)	Disease	Poultry
Blackleg	Disease	Potatoes
Carrot rust fly	Insect	Carrots
Club root	Disease	Cole crops
Cranberry fruit rot	Disease	Cranberries
Crazy root	Disease	Greenhouse veg
Crown gall	Disease	Grapes

Darkling beetle	Insect	Poultry
Dearness scale	Insect	Cranberries
Fruitworm beetle	Insect	Raspberries
Onion maggot	Insect	Onion
Rust	Disease	Onion
Sheep tapeworm	Parasite	Sheep
Varroa mite	Arachnid	Apiculture
Whitefly	Insect	Greenhouse veg, nursery

## Emerging pests

During interviews conducted for the 2016 inventory, the following pests were identified by participants as “emerging” in the region. Emerging is defined as either only recently identified in the Fraser Valley (Table 4) or not yet known to exist in the region but expected to appear within the next few growing seasons (Table 5).

Some of the pests listed in the 2016 inventory survey data are species, while others are pest groups that growers and experts felt were becoming more prevalent. Some of the pests, such as brown marmorated stink bug, have a broad host range in other countries, and therefore the industries that they may impact in the Fraser Valley are not yet known (Table 4).

For livestock pests, nine out of ten listed are quarantine diseases that producers are constantly monitoring for or taking measures to avoid. Africanized bees, however, are an invasive species of concern to apiculturists (Table 5, livestock pests). Of the 20 crop pests listed below, 15 of them are insects; this may be due to insects being generally more easily detected and identified than plant pathogens, resulting in a knowledge bias.

*Table 1: Emerging pests that are currently known to be present in the Fraser Valley and the commodities that they impact. 'General' indicates that impacted commodities are not confirmed.*

Pest	Commodity
Brown marmorated stink bug (BMSB)	General
Western corn rootworm	Corn
Downy mildew	General – spreading to new commodities
Mealy bug	Greenhouse vegetables
Nematodes	General
Root weevils from raspberries	Hops
Gypsy moth	Trees and ornamentals
New species of thrips	General
New species/strains of whitefly	General
Sudden oak death, <i>Phytophthora ramorum</i>	Nursery
New weed species	General
Tobacco rattle virus	Potatoes
Emerald ash borer	Nursery

Table 2: Pests not currently known to be present in the Fraser Valley but that are likely to migrate or be introduced, and the commodities they could affect. Pests have been separated into crop pests (top) and livestock pests (bottom).

<b>Pest</b>	<b>Commodity(s) that could be affected</b>	<b>Pest</b>	<b>Commodity(s) that could be affected</b>
<b>Crop pests:</b>			
Blueberry maggot, <i>Rhagoletis mendax</i>	Blueberries	Banana moth	Floriculture
European grapevine moth, <i>Lobesia botrana</i>	Blueberries	Light brown apple moth	Floriculture
Pacific flathead borer, <i>Chrysobothris mali</i>	Blueberries and raspberries	Chrysanthemum white rust	Floriculture
Swede midge	All Brassica crops	Scale insects from the Okanagan	Grapes
Fall webworm	Cranberries	Pepper weevil	Greenhouse vegetables
Spotted fireworm	Cranberries	Viruses transmitted by leafhoppers	Greenhouse and field vegetables
Cucumber beetle	Cucurbits	Beet armyworm, <i>Spodotera exigua</i>	Field vegetables
Japanese hop beetle	Hops	Golden nematode	Potatoes
Colorado potato beetle	Potatoes	Bacterial ring rot	Potatoes
Tuber moth	Potatoes	Zebra chip virus	Potatoes
Bacterial diseases from warmer climates	General		
<b>Livestock pests:</b>			
Bovine viral diarrhoea (BVD)	Beef and dairy	Schmallenburg virus	Sheep
Variant reovirus	Poultry	Johnes' disease	Sheep
Avian influenza	Poultry	Porcine epidemic diarrhoea (PED)	Pork
Bluetongue	General livestock	Africanized bees	Apiculture
Foot and mouth	General livestock	Scrapie	Sheep

## Shortlist of pests for fact sheets

Through careful analysis of the information provided above, the pests listed in Table 6 have been selected as suitable options for development of fact sheets. Those marked with an asterisk, are strongly recommended as being highest priority for fact sheets (Table 6). Suggested fact sheet focus areas have also been listed to facilitate the decision of which pests should be selected. Fact sheets will be grower or producer focused and will be aimed at the affected commodities. When commodity specificity is required, slightly different fact sheets may need to be created.

*Table 3: Shortlist of pests selected for fact sheets, along with suggested areas for focus. Pests considered of high priority, and therefore suggested for selection, are marked with ‘\*’.*

<b>Pest</b>	<b>Suggested fact sheet focus area(s)</b>
Brown marmorated stink bug*	Current distribution in Fraser Valley and British Columbia
Darkling beetle*	Identification and management
Dearness scale	Biosecurity
Downy mildew	Cross-commodity management and management on farms with multiple affected crops
General weed identification, management & use of herbicides*	Basic weed management principles; identification of common weeds in the Fraser Valley; management options for growers of different commodities; herbicide safety and appropriate use; resistance management.
Helminths & nematodes in livestock	Resistance management; IPM.
Himalayan blackberry*	Management near waterways; management in different commodities
Nematodes in vegetable crops and viruses they can vector	Basic vector biology, risks and how to sample for them on your farm
Spotted wing drosophila*	Management timeline through the season and what to do when, alternative management strategies
Thrips	How to identify insect and damage in different commodities; timing of management
Western corn rootworm*	Introducing this new pest to raise awareness
Weevils*	Identification of weevils or feeding damage, timing of different species, how to manage and when.
Wireworms	New management options available to growers

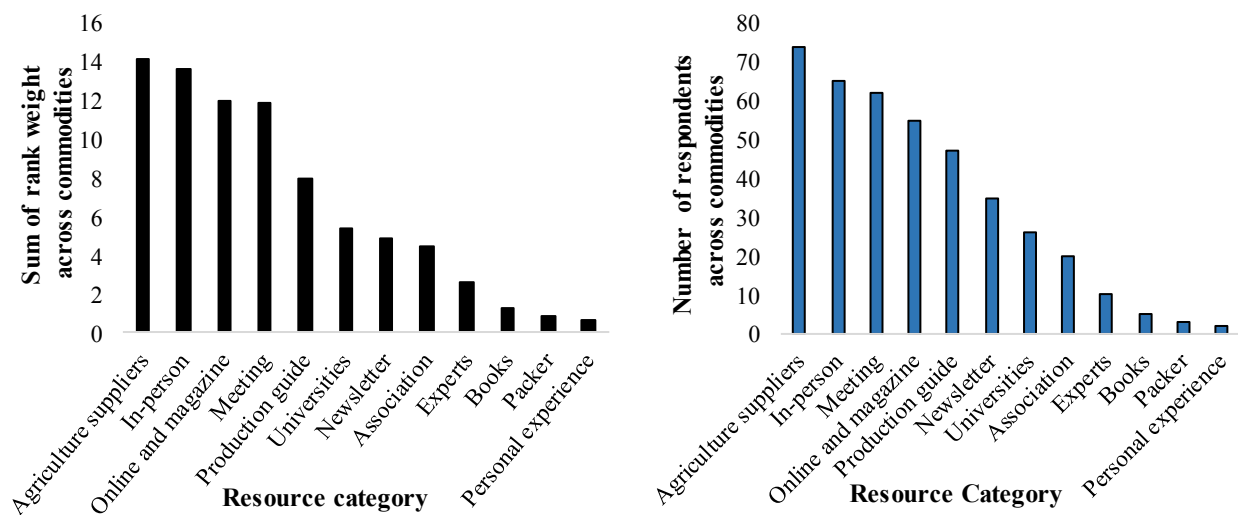


## Communications Plan

Once the fact sheets have been created, the following plan provides some guidelines for their distribution. Following confirmation of the pests that will be selected for fact sheets, the affected commodities can be identified and the relevant associations contacted (Table 7), or additional information gathered if needed.

The information used to create this plan comes largely from the 2016 inventory in which growers, producers and specialists were asked for the resources that they use to gain, or share, knowledge. These data show four key areas that were highly rated and frequently mentioned, which were agriculture supply retailers; in-person conversation (with other growers, producers, or consultants); grower meetings, such as the Lower Mainland Horticulture Improvement Association (LMHIA) Short Course; and online or magazine resources. (Fig. 6).

These areas should be used as primary mechanisms of distribution for fact sheets. Agriculture supply retailers can be contacted to assess their willingness to distribute the fact sheets to their clients. In-person conversations should occur at grower meetings, which are detailed below. Finally, fact sheets should be made available online using association websites, production guide and listserv or newsletter distribution networks.



*Figure 6: The weighted rank of different resource categories across all commodities (left, black bars) and the number of respondents across all commodities that selected each resource category (right, blue bars). The rank was established by weighting each category based on its rank within selected options per commodity and totalling the weighted values across all commodities.*

### **Association contacts and meetings**

Direct in-person communication at important commodity meetings is recommended as a good way to reach a number of producers and increase awareness and effective communication of the

information from the fact sheets. As commodity meetings are often very social events, interpersonal communication is the ideal way to distribute information and is preferable to leaving pamphlets or flyers on tables as a self-distribution tool. Aside from attending meetings, fact sheets can also be distributed at field days or through newsletters or listservs (Table 8).

For some of the smaller associations, these meetings are sometimes the only way to reach growers or producers. Some producers are not well connected with technology, and therefore will not receive the information through digital communications.

*Table 4: List of crop and livestock associations who were interviewed for the Fraser Valley Pest Assessment and/or took part in the 2016 workshop, and contact details. Known meeting dates are included where possible.*

<b>Association</b>	<b>Contact</b>	<b>Email</b>	<b>Meeting Date(s) in 2017/2018 (if known)</b>
B.C. Cattlemen Association	Annette Moore	qfirst@telus.net	AGM in Smithers, BC. May 31-June 2, 2018
BC Blueberry Council	Anju Gill	anju@bcblueberry.com	
BC Broiler Hatching Egg Producers Association	Sarah Loehndorf	sarah@bcbhec.com	
BC Cole Crop Growers Association	Mike Wallis	mowallis@shaw.ca	
BC Cranberry Marketing Commission	Heather Carriere	info@bccranberries.com	August 22, 2017: Cranberry Field Day at Coast Cranberries in Langley, BC. September 2017: Open House - BC Cranberry Research Society Research Farm, Delta, BC.
BC Greenhouse Growers Association	Linda Delli Santi	linda@bcgreenhouse.ca	
BC Hop Growers Association	Samuel Glasgow	samuel@valleyhops.com	
BC Landscape and Nursery Association	Hedy Dyck	hdyck@bclna.com	Booth at CanWest September 27-28, 2017 at Tradex, Abbotsford, BC.
BC Potato and Vegetable Growers Association	Leisa Yee	lyee_pvg@telus.net	Booth at Pacific Agriculture Show January 25-27, 2018 at Tradex, Abbotsford, BC.
BC Poultry	Cristine Koch	koch.c@telus.net	
BC Strawberry Growers Association	Lisa Craig	info@bcstrawberries.com	
BC Turkey Association	Susan Mallory	smallory@bcturkey.com	
BC Winegrape Council	Mary McDermot	mary@township7.com	AGM historically set in April
Flowers Canada	Laura Bryce	laurab@fco.ca	
Fraser Valley Invasive Plant Council	Jeanne Hughes	fvipc@shaw.ca	
Fraser Valley Pea and Bush Bean Growers Association	Trevor Harris	th6@msn.com	

Lower Mainland Horticulture Improvement Association	Sandy Dunn	sandy.dunn@shaw.ca	LMHIA Growers Short Course at the Pacific Agriculture Show, January 25-27, 2017 at Tradex, Abbotsford, BC.
Lower Mainland Sheep Producers Association	Barbara Ydenburg	bydenburg@gmail.com	Meetings on the first Thursday of every month at 9160 Church Street, Fort Langley, BC.
Raspberry Industry Development Council	Lisa Craig	council@bcraspberries.com	
United Flower Growers Co-op	Bob Pringle	bpringle@ufgca.com	Live auctions at 4085 Marine Way, Burnaby, BC. V5J 5E2 on Monday, Tuesday and Thursday.

*Table 5: Agriculture associations of British Columbia and/or the Fraser Valley and known methods of communication with growers or producers. Field days refer to visits to field crops or production facilities, whereas grower meetings are AGM, conference or outreach related with information shared between growers/producers and experts.*

<b>Association</b>	<b>Field day</b>	<b>Newsletter</b>	<b>Grower meetings</b>	<b>Listserv</b>
B.C. Cattlemen Association		●	●	●
BC Bee Breeders				
BC Blueberry Council	●	●	●	●
BC Broiler Hatching Egg Producers' Association				●
BC Chicken Growers' Association				●
BC Cole Crop Growers' Association			●	●
BC Cranberry Marketing Commission	●	●	●	●
BC Dairy Association		●		●
BC Egg Producers' Association				
BC Goat Association			●	●
BC Grain Producers' Association	●			●
BC Greenhouse Growers' Association		●	●	●
BC Honey Producers' Association				
BC Hop Growers' Association			●	●
BC Landscape and Nursery Association		●	●	●
BC Pork Producers' Association			●	●
BC Potato and Vegetable Growers' Association	●	●	●	●
BC Poultry				●
BC Purebred Sheep Association				
BC Sheep Federation				
BC Strawberry Growers' Association				●
BC Sustainable Poultry Farming Group			●	
BC Turkey Association			●	●
BC Winegrape Council				●
Canadian Nursery Landscape Association			●	●
Flowers Canada		●	●	●
Fraser Valley Invasive Plant Council				

Fraser Valley Pea and Bush Bean Growers' Association			●	●
Invasive Species Council of BC	●	●	●	●
Lower Mainland Horticulture Improvement Association	Supports field days		●	●
Lower Mainland Sheep Producers' Association	●		●	●
Processing Vegetable Industry Development Fund			●	●
Raspberry Industry Development Council		●	●	●
United Flower Growers' Co-op				●

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