AgInfomatics

The Value of Neonicotinoids in North American Agriculture:

Value of Insect Pest Management to U.S. and Canadian Corn, Soybean and Canola Farmers

2014

This report series, researched and produced by AgInfomatics, LLC, is a comprehensive analysis of the economic and societal benefits of nitroguanidine neonicotinoid insecticides in North America. The research was sponsored by Bayer CropScience, Syngenta and Valent in support of regulatory review processes in the United States and Canada, with Mitsui providing additional support for the turf and ornamental studies.

AgInfomatics, an agricultural consulting firm established in 1995 by professors from the University of Wisconsin-Madison and Washington State University, conducted independent analyses exploring the answer to the question: *What would happen if neonicotinoids were no longer available?* Comparing that answer to current product use revealed the value of neonicotinoids.

Robust quantitative and qualitative study methods included econometrics modeling of insecticide use, crop yield data and market impacts; surveys of growers, professional applicators and consumers; regional listening panel sessions; and in-depth case studies.

Active ingredients in the study included clothianidin, dinotefuran, imidacloprid and thiamethoxam.

The Value of Neonicotinoids in North American Agriculture

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Estimated Impact of Neonicotinoid Insecticides on Pest Management Practices and Costs for U.S. Corn, Soybean, Wheat, Cotton and Sorghum Farmers

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Value of Insect Pest Management to U.S. and Canadian Corn, Soybean and Canola Farmers

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A Case Study of Neonicotinoid Use for Controlling Silverleaf Whitefly in Ornamentals

Executive Summary

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Executive Summary

The objectives of this research were to assess 1) the value of alternative insect management practices to farmers and 2) how these values relate to nonpecuniary factors such as simplicity, convenience, yield risk, and human and environmental safety. To accomplish these objectives, we conducted telephone surveys in 2014 of corn and soybean farmers in the U.S. as well as corn, soybean and canola farmers in Canada. Corn farmers were queried about their use in 2013 of Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides. Soybean and canola farmers were queried about their use in 2013 of insecticide seed treatments and foliar insecticides. All farmers were queried about their educational background, farming experience, insect pests of concern, sources of insect management information and nonpecuniary factors influencing their insect management decisions. Finally, all farmers were asked about the value they receive from these various insect management practices. Factor analysis was used to better understand the nonpecuniary factors influencing farmer pest management decisions. Also, econometric methods were used to better understand regional difference in pest management practices and the value of these practices as well as how differences in these pest management practices and the value of these practices related to various nonpecuniary factors. Finally, the results of the econometric analysis were used to estimate the value of these different insect management practices to farmers.

The major insect pests of concern noted by corn farmers were the corn rootworm (CRW) and European corn borer (ECB). While U.S. farmers tended to see the CRW as the most important threat in corn, Canadian farmers saw the ECB as the most important threat. U.S. and Canadian farmers both noted that aphids were the biggest threat to soybean production. For Canadian canola farmers, the biggest threat was the flea beetle.

Agricultural retailers and seed or chemical company representatives were the most widely used sources of insect pest management advice for both U.S. and Canadian farmers.

Based on survey responses, Bt corn was the most frequently used management tactic by U.S. and Canadian corn farmers to control insect pests (82.2 percent of U.S. and 90.1 percent of Canadian corn farmers). This was followed by insecticide seed treatments (64.1 percent of U.S. and 79.1 percent of Canadian corn farmers). Soil insecticide use was less common (19.7 percent of U.S. and 3.4 percent of Canadian corn farmers), as was foliar insecticide use (8.2 percent of U.S. and 11.7 percent of Canadian corn farmers). A majority of soybean farmers in the U.S. and Canada used insecticide seed treatments to control insect pests (51.4 percent of U.S. and 73.9 percent of Canadian soybean farmers), while fewer than one in four used foliar insecticides (23.0 percent of U.S. and 14.4 percent of Canadian corn farmers). About nine out of 10 Canadian canola farmers used insecticide seed treatments with only about one in four using foliar insecticides.

There were commonalities in what was important to corn, soybean and canola farmers when making insect pest management decisions. For example, all farmers viewed human and environmental health risks, such as family, worker, public safety, water quality, wildlife and beneficial insect

protection of similar importance for making pest management decisions. There were also interesting idiosyncrasies. For example, corn farmers tended to view the importance of plant performance (e.g., plant health, crop stand and yield protection) and yield risk (e.g., consistent and long-lasting control) differently, while soybean and canola farmers tended to view the importance of plant performance and yield risk more similarly.

A variety of statistically significant differences was evident in farmer responses between the U.S. and Canada, as well as differences within the U.S. and Canada, reflecting geographical differences in production environments. These differences included not only differences in the use of pest management practices, such as Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides by crop, but also in the per acre value of these practices.

Various nonpecuniary factors were found to be related to the pest management practices farmers reported using, the proportion of the crop acres farmers reported managing with the practices, and the reported value of the practices. How these nonpecuniary factors were associated with the use and value of alternative practices varied by crop and management practice.

Two types of values were estimated for each crop: the average value per acre treated with the insect management practice ($ per treated acre) and the average value for all the acres of that crop the farmer planted ($ per planted acre). For example, a practice with a value of $20 per treated acre that is used on 60 percent of a farmer's planted acres has a value of $20 x 60% = $12 per planted acre. Multiplying total planted acres by the value per planted acre for a specific insect management practice then gives the total value of that practice for that farmer.

Table ES1 reports the estimated values on a per acre basis for U.S and Canadian farmers. These values are the additional value for that insect management practice relative to available alternatives. Also, these values are all U.S. dollars, with Canadian values converted to U.S. dollars using an exchange rate of 0.92 U.S. dollars per Canadian dollar.

The estimated value of Bt corn is about $20 per treated acre in both the U.S. and Canada. The estimated farmer value for insecticide seed treatments is $13.38 per treated acre for U.S. corn farmers and about $12 per treated acre for Canadian corn farmers. The estimated value of insecticide seed treatments for soybean differs substantially in the U.S. and Canada: more than $14.50 per treated acre in Canada, but not quite $12 per treated acre in the U.S. The estimated value of insecticide seed treatments is $12.85 per treated acre for Canadian canola farmers, while the estimated value of soil insecticides is almost $13 per treated acre for U.S. corn farmers. The estimated value of foliar insecticides is more than $14 per treated acre for both U.S. and Canadian corn farmers, while the value for Canadian canola farmers is just under $14 per treated acre. Just as for insecticide seed treatments, the estimated value of foliar insecticides for soybean differs substantially for the U.S and Canada: almost $13.50 per treated acre in the U.S., but about $10 per treated acre in Canada.

These estimated values all decrease when expressed on a per planted acre basis, with the largest decreases for those practices used on the fewest

acres (foliar insecticides in corn and soybean) and the smallest decreases for those practices used on the most planted acres (insecticide seed treatments on canola in Canada). However, multiplying the estimated value per planted acre by total planted acres for each crop in 2013 (the survey crop year) and then adding across crops gives the total farmer value for each insect management practice (Table ES2).

The estimated total value of Bt corn in 2013 was $1.25 billion in the U.S. and $56 million in Canada. The estimated total value of insecticide seed treatments in 2013 was $1.13 billion in the U.S. and $301 million in Canada. The estimated total value of soil insecticide treatments in 2013 was $175 million in the U.S. The estimated total value of foliar insecticide treatments in 2013 was $249 million in the U.S. and $57 million in Canada.

Based on these results, neonicotinoid seed treatments were the most valued insect management practice for North American corn, soybean and canola farmers, with a total farmer value of $1.43 billion in 2013. Bt corn was second, with a total farmer value of $1.3 billion in 2013. The total farmer values of foliar and soil insecticides were $306 million and $175 million respectively. Taken as a whole, these results demonstrate that neonicotinoid seed treatments provide substantial value to North American corn, soybean and canola farmers.

Table ES1. Estimated value for Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides for U.S. and Canadian corn, soybean and canola farmer respondents as U.S. $ per treated acre and per acre each farmer planted.

		--U.S. $ Per Treated Acre --		-- U.S. $ Per Planted Acre --	
Insect Management Practice	**Crop**	**U.S.**	**Canada**	**U.S.**	**Canada**
Bt Corn	Corn	$19.78	$20.05	$13.09	$15.18
Insecticide Seed Treatment	Corn	$13.38	$12.02	$7.56	$9.03
	Soybean	$11.93	$14.53	$5.32	$9.62
	Canola	---[a]	$12.85	---[a]	$11.20
Soil Insecticide	Corn	$12.92	---[b]	$1.83	---[b]
Foliar Insecticide	Corn	$14.17	$14.75	$0.85	$0.74
	Soybean	$13.48	$10.06	$2.18	$0.74
	Canola	---[a]	$13.88	---[a]	$2.55

[a] Canola farmers only surveyed in Canada.
[b] Too few survey respondents in Canada reported using soil insecticides to estimate a value.

Table ES2. Estimated farmer value for Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides for U.S. and Canadian corn, soybean and canola in 2013 (U.S. $ million).

Insect Management Practice	U.S.	Canada	North America
Bt Corn	$1,248	$56	$1,304
Insecticide Seed Treatment	$1,130	$301	$1,431
Soil Insecticide	$175	---[a]	$175
Foliar Insecticide	$249	$57	$306

[a] Too few survey respondents in Canada reported using soil insecticides to estimate a value.

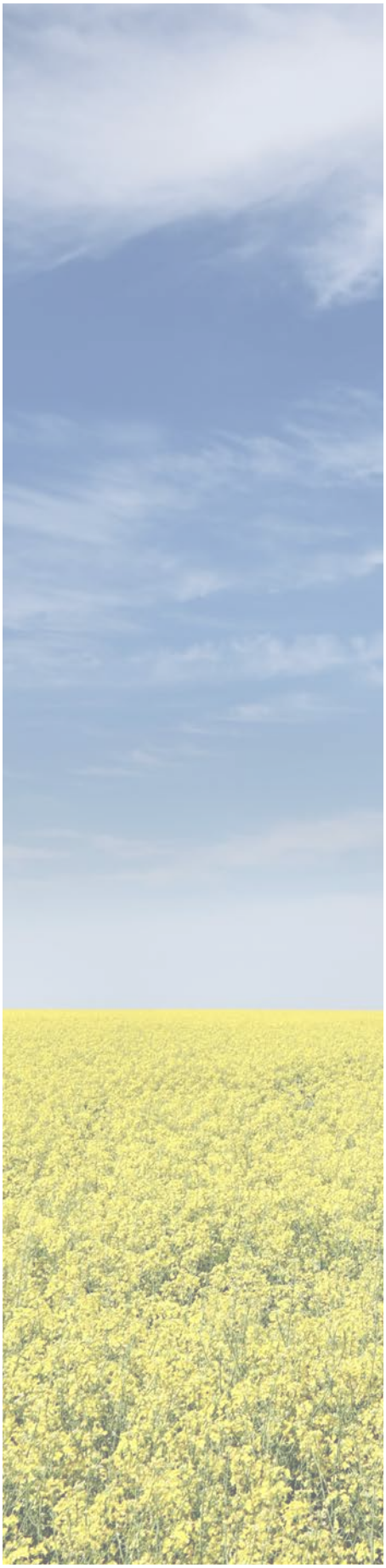
1.0 Introduction

Insect pest management in North American corn, soybean and canola production has been transformed over the past two decades. For corn, the major impetus for change has been the commercialization of genetically engineered (GE), plant-incorporated protectants (PIPs), including European corn borer (ECB) active Bt corn in 1996 and corn rootworm (CRW) active Bt corn in 2004. The increase in use of CRW Bt corn that followed commercialization was accompanied by an increase in the use of reduced risk neonicotinoid (e.g., clothianidin and thiamethoxam) insecticide seed treatments for supplemental insect control. For soybean, the impetus for change was the emergence of the invasive soybean aphid in 2000. Prior to this invasion, most of the North Central U.S. saw little insecticide use in soybean. More recently, the use of neonicotinoid (e.g., imidacloprid and thiamethoxam) insecticide seed treatments has become more common. Similarly, neonicotinoid seed treatments have become widely used in canola production, especially to manage early-season flea beetle populations historically managed using organophosphate, organochlorine, synthetic pyrethroid and carbamate insecticides.

The rapid and widespread adoption of PIPs was eclipsed by the even more rapid and widespread adoption of GE herbicide tolerant (HT) crops such as Roundup Ready® soybean, which was hard to explain based on early profitability estimates. However, further exploration revealed that these crops and their associated pest management practices provided value to farmers beyond any potential increase in profitability. Sources of these "nonpecuniary" values include the reduced risk of pest losses; increased flexibility, convenience and simplicity of pest management; and reduced human and environmental risks.

The objectives of this research were to assess 1) the value of alternative insect management practices to farmers and 2) how these values relate to nonpecuniary factors. Of particular interest is the value of neonicotinoid insecticide seed treatments. These objectives are accomplished using data collected in 2014 from a telephone survey of U.S. corn and soybean farmers and Canadian corn, soybean and canola farmers regarding their 2013 production practices.

Subsequent sections of this report lay out a framework for conceptualizing the pecuniary and nonpecuniary value to farmers of alternative insect pest management practices; discuss the design and administration of the farmer survey that produced the data used to accomplish our research objectives; and describe the analysis and results emerging from this survey data in terms of the most concerning insect pests and how farmers are managing them, the most important factors guiding farmers' insect pest management decisions, and the perceived value of these management decisions. The report concludes with a summary of our findings.



2.0 Conceptual Framework

Piggott and Marra (2008) proposed a derived demand approach for conceptualizing how nonpecuniary factors influence the adoption of GE crops. This derived demand approach is ideally suited for framing how nonpecuniary factors influence farmer pest management decisions and the value of these decisions more generally.

The concepts of Piggott and Marra's derived demand approach can be illustrated using a stylized model where a corn farmer chooses between alternative pest management practices. Let $A > 0$ be the total number of corn acres managed by a farmer. For simplicity, assume the farmer can choose between two pest management practices and let $A_1 \geq 0$ and $A_2 \geq 0$ be the number of corn acres managed under each alternative practice such that $A_1 + A_2 = A$. On average, the amount of corn produced, $Y \geq 0$, depends on the number of acres managed using each practice: $Y = f(A1, A2)$. This average is typically assumed to be nondecreasing at a nonincreasing rate regardless of the chosen practice: $\frac{\partial f(A_1,A_2)}{\partial A_i} \geq 0$ and $\frac{\partial^2 f(A_1,A_2)}{\partial {A_i}^2} \leq 0$ for $i = 1, 2$. These assumptions imply that planting more acres of corn increases the amount of corn produced and that farmers choose to plant their most productive corn acres first. Average production costs also depend of the number of acres managed under each practice: $c(A_1, A_2)$. These average costs are typically assumed to be nondecreasing at a nondecreasing rate regardless of the chosen practice: $\frac{\partial c(A_1,A_2)}{\partial A_i} \geq 0$ and $\frac{\partial^2 c(A_1,A_2)}{\partial {A_i}^2} \geq 0$ for $i = 1, 2$. These assumptions imply that planting more acres of corn increases costs and that these increases in costs tend to get larger the more corn acres planted. Given the average price of corn, $P > 0$, the farmer's average profitability is:

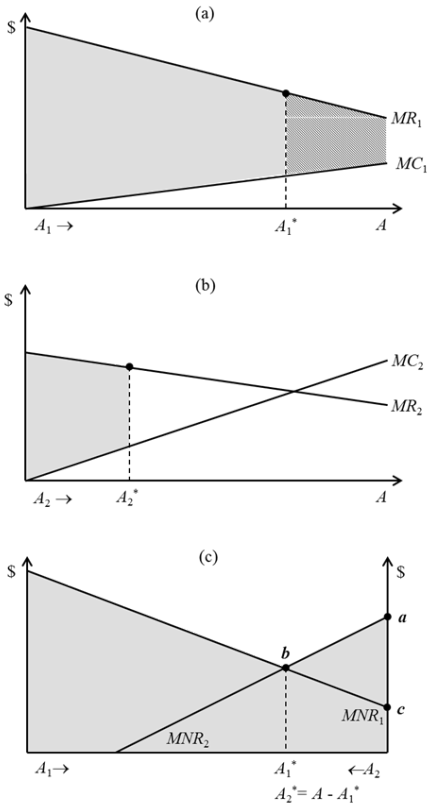
(1) $\pi(A_1, A_2) = Pf(A_1, A_2) - c(A_1, A_2).$

If average profitability is all a farmer cares about, it can be maximized by choosing $A_1 = A_1^*$ and $A_2 = A_2^*$ such that $A_1^* + A_2^* = A$ and

(2) $P\frac{\partial f(A_1^*,A_2^*)}{\partial A_1} - \frac{\partial c(A_1^*,A_2^*)}{\partial A_1} = P\frac{\partial f(A_1^*,A_2^*)}{\partial A_2} - \frac{\partial c(A_1^*,A_2^*)}{\partial A_2}.$

Figure 1 illustrates. Panel (a) shows the marginal revenue curve, $MR_1 = P\frac{\partial f(A_1^*,A_2^*)}{\partial A_1}$, and marginal cost curve, $MC_1 = \frac{\partial c(A_1^*,A_2^*)}{\partial A_1}$, as the acres managed using practice 1 increases to the right, decreasing the number of acres managed using practice 2. Similarly, panel (b) illustrates the marginal revenue curve, $MR_2 = P\frac{\partial f(A_1^*,A_2^*)}{\partial A_2}$, and marginal cost curve, $MC_2 = MC_2 = \frac{\partial c(A_1^*,A_2^*)}{\partial A_2}$, as the acres managed using practice 2 increases to the right, decreasing the number of acres managed using practice 1. To find the optimal allocation of A between A_1 and A_2, panel (c) shows the marginal net revenue curves for practice 1 and 2 ($MNR_1 = MR_1 - MC_1$ and $MNR_2 = MR_2 - MC_2$) with the axis for practice 2 reversed so A_2 increases to the left, while A_1 increases to the right making $A_1 + A_2 = A$ more explicit. The intersection of the two marginal net revenue curves – the satisfaction of equation (2) – identifies the allocation of corn acres to alternative pest management practices that maximize the average profit in equation (1). Graphically, the maximal profit equals the gray shaded area under the marginal net revenue curves in panel (c). This maximal average profit can be split into the profit attributable to corn

Figure 1. Illustration of the benefits of optimal pest management without nonpecuniary benefits.



managed using practice 1 (the gray shaded area in panel (a) between the marginal revenue and marginal cost curves) and the profit attributable to corn managed using practice 2 (the gray shaded area in panel (b) between the marginal revenue and marginal cost curves).

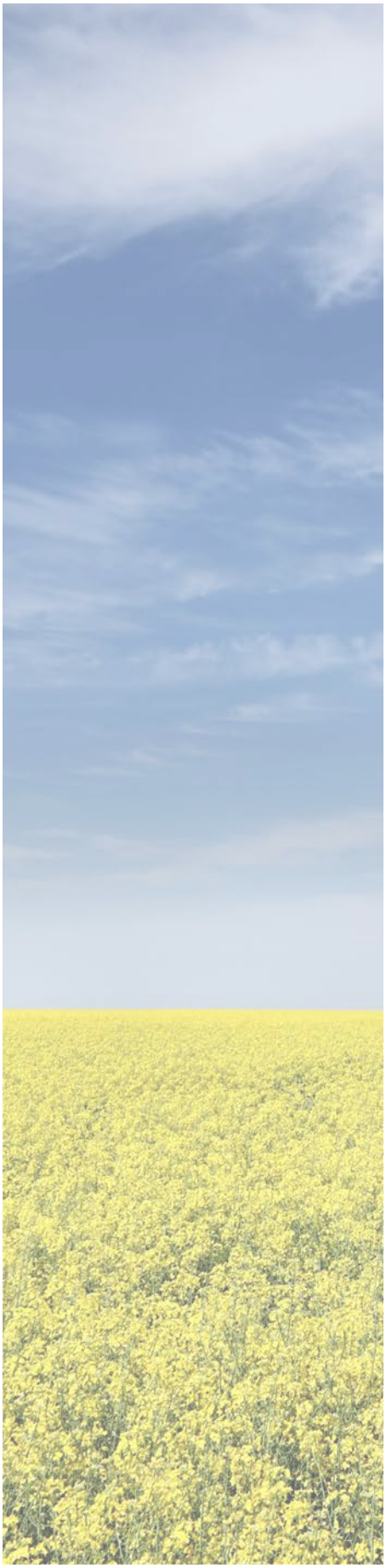
While the gray shaded area in panel (b) reflects profit attributable to using practice 2, it does not reflect the additional value practice 2 provides to the farmer because in the absence of practice 2, the farmer would presumably plant all corn acreage using practice 1. Thus, if practice 2 were not available to the farmer, he would give up the shaded gray area in panel (b), but would gain the hashed area in panel (a) by increasing corn managed using practice 1. This would result in a net loss to the farmer of profits equal to the area in panel (c) denoted by the triangle with vertices at points ***a***, ***b*** and ***c***. Therefore, the added value of practice 2 to the farmer is the area of the triangle denoted by ***abc***. Note that this area will equal the product of corn acres planted, the proportion of these acres managed using practice 2, and the additional value per acre practice 2 provides the farmer.

The framework outlined in equations (1) and (2) and illustrated in figure 1 can be augmented to incorporate nonpecuniary factors. Suppose, for example, that practice 2 provides more consistent and longer-lasting control in addition to higher average profits when compared to practice 1. If a farmer only cares about average profit, these additional factors do not matter and the analysis is unchanged. But, if a farmer cares about more consistent and longer-lasting control in addition to higher average profits, then these additional factors will matter and the analysis changes.

To show that a farmer cares about more than just average profit, economists use a utility function. This utility function captures the extent to which a farmer is willing to tradeoff profit for other factors he cares about. Let $U(\pi, \tau)$ represent this utility function, where π is average profit and τ is some other factor a farmer cares about, like more consistent and longer-lasting control. Typical assumptions for a utility function are that it is nondecreasing at a nonincreasing rate in profit and other factors the farmer cares about: $\frac{\partial U(\pi,\tau)}{\partial \pi} \geq 0, \frac{\partial U(\pi,\tau)}{\partial \tau} \geq 0, \frac{\partial^2 U(\pi,\tau)}{\partial \pi^2} \leq 0$ and $\frac{\partial^2 U(\pi,\tau)}{\partial \tau^2} \leq 0$. These assumptions imply that more of something the farmer cares about is better, but how much better declines the more the farmer already has (e.g., an extra $1,000 in profit is valued more by a farmer making $50,000 in profit than a farmer making $500,000 in profit). To show that strategy 2 provides more consistent and longer-lasting control and that this is valued by a farmer, we can write τ as an increasing function of the number of acres planted using practice 2: $\tau = h(A_2)$ where . Again, these benefits are typically believed to decline the more strategy 2 is used, also implying $\frac{\partial^2 h(A_2)}{\partial {A_2}^2} \leq 0$. Getting the most utility possible from corn production can then be accomplished by choosing $A_1 = A_1^{**}$ and $A_2 = A_2^{**}$ to maximize $U\left(\pi(A_1, A_2), h(A_2)\right)$. This will occur where $A_1^{**} + A_2^{**} = A$ and

$$(3) \quad P\frac{\partial f(A_1^{**},A_2^{**})}{\partial A_1} - \frac{\partial c(A_1^{**},A_2^{**})}{\partial A_1} = P\frac{\partial f(A_1^{**},A_2^{**})}{\partial A_2} - \frac{\partial c(A_1^{**},A_2^{**})}{\partial A_2} + \frac{\frac{\partial h(A_2^{**})}{\partial A_2}}{\frac{\partial U(\pi,\tau)}{\partial \pi}} \frac{\partial U(\pi(A_1^{**},A_2^{**}),h(A_2^{**}))}{\partial \tau}.$$

Equation (2) and (3) look almost identical with the exception of the last term on the right-hand side of equation (3). This term reflects the value of nonpecuniary benefits attributable to replacing acres planted using practice



1 with acres planted using practice 2, which provides more consistent and longer-lasting control in addition to higher average profit.

Figure 2 shows how the addition of nonpecuniary benefits changes the analysis in figure 1. The difference is that we must account for these nonpecuniary benefits when evaluating the benefits of practice 2 to the farmer. In panel (b) of figure 2, we have added a marginal nonpecuniary benefit curve:

$$MNPB = \frac{\frac{\partial h(A_2^{**})}{\partial A_2}}{\frac{\partial U(\pi,\tau)}{\partial \pi}} \frac{\partial U\left(\pi(A_1^{**},A_2^{**}),h(A_2^{**})\right)}{\partial \tau}$$

Adding these marginal nonpecuniary benefits to marginal revenues then yields the total marginal benefits of using practice 2: $MB_2 = MR_2 + MNPB$. Subtracting marginal costs and reversing the axis gives us the marginal net benefit curve ($MNB_2 = MB_2 - MC_2$) illustrated in panel (c). The intersection of the marginal net revenue curve for practice 1 and the marginal net benefit curve for practice 2 – the satisfaction of equation (3) – identifies the allocation of corn acres to alternative pest management practices that maximize a farmer's utility.

Graphically, the value of this maximal utility in terms of money equals the gray shaded area in panel (c). This maximal value can be split into the profit attributable to corn managed using practice 1 (the gray shaded area in panel (a) between the marginal revenue and marginal cost curves), the profit attributable to corn managed using practice 2 (the lighter gray shaded area in panel (b) between the marginal revenue and marginal cost curves), and the nonpecuniary benefits of using practice 2 with its more consistent and longer-lasting control (the darker gray shaded area in panel (b) between the marginal revenue and marginal benefits curves). The additional value to the farmer of using practice 2 is the area of the triangle in figure 2, panel (c) denoted by ***abc***. This area is equal to the difference between the dark and light gray areas in panel (b) and the hashed area in panel (a), which reflects the fact that if practice 2 were not available, the farmer would resort to using practice 1.

The objectives of this research were to explore the size of the area ***abc***, the additional value a pest management practice provides to a farmer as compared to what else they could do, and how this value varies in relation to the nonpecuniary factors that are most important to a farmer's choice over alternative pest management practices. We accomplish this objective by estimating how various nonpecuniary factors affect the likelihood that a farmer uses alternative pest management practices, the proportion of acres managed with alternative pest management practices, and the additional value per acre managed with alternative practices.

3.0 Data Sources

The primary data used to accomplish the objectives of this research come from a telephone survey of U.S. corn and soybean farmers and Canadian corn, soybean and canola farmers conducted by Market Probe (http://www.marketprobe.com/), a professional market research firm with offices in the U.S. and Canada. A total of 622 corn farmers from 12 U.S. states and three Canadian provinces, 622 soybean farmers from 14 U.S. states and three

Figure 2. Illustration of the benefits of optimal pest management with nonpecuniary benefits.

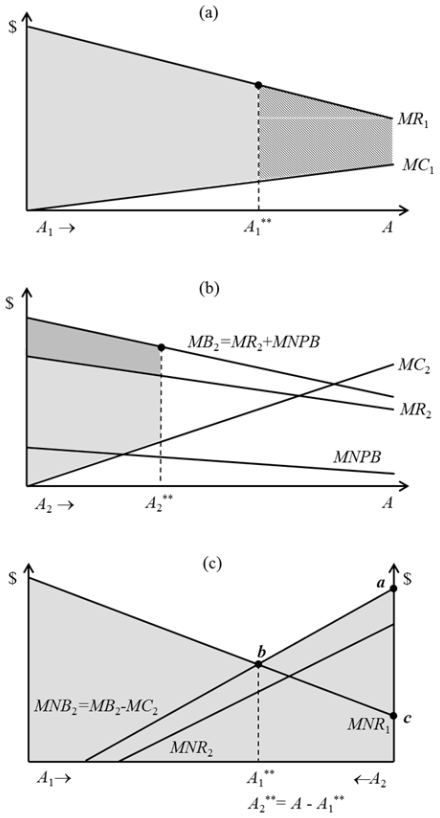
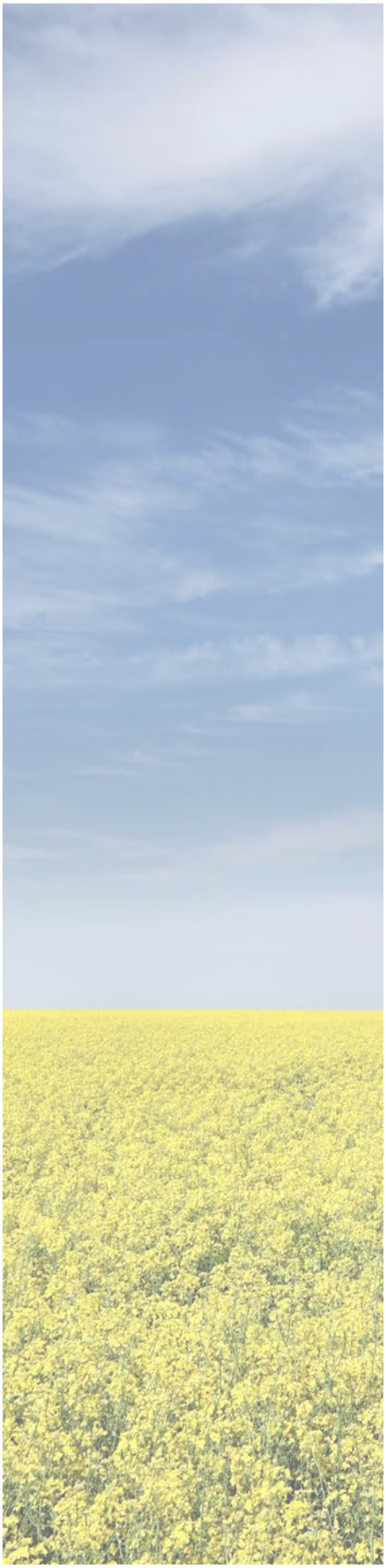


Table 1. Distribution of survey responses across U.S. States and Canadian provinces (% of surveyed farmers).

	Crop Survey		
Location	**Corn**	**Soybean**	**Canola**
U.S.	80.6	80.4	
Arkansas		4.0	
Iowa	11.7	9.3	
Illinois	10.5	9.2	
Indiana	6.1	6.3	
Kansas	4.8	4.7	
Michigan	4.0	3.9	
Minnesota	8.5	8.1	
Missouri	4.7	6.8	
Mississippi		2.4	
North Dakota	4.8	5.2	
Nebraska	10.3	5.6	
Ohio	4.8	5.3	
South Dakota	5.9	5.6	
Wisconsin	4.2	4.0	
Not Reported	0.2		
Canada	19.4	19.6	100.0
Alberta			31.6
Manitoba	4.8	5.1	16.4
Ontario	9.6	9.7	
Quebec	5.0	4.8	
Saskatchewan			52.0
Total Observations	**622**	**621**	**500**

Canadian provinces, and 500 canola farmers from three Canadian provinces were surveyed.[1] The proportion of farmers surveyed from each U.S. state and Canadian province is shown in Table 1. The telephone surveys were conducted in February and March of 2014 for U.S. farmers and April and May of 2014 for Canadian farmers. All farmers were paid a small participation fee to compensate for the time they took to complete the survey.

The survey instruments (see Appendix 8.0) were designed by the authors in consultation with Market Probe and technical experts from three registrants of neonicotinoid insecticides commonly used in seed protection products (Bayer CropScience, Syngenta and Valent). First, the survey screened participants to ensure they had planted at least a minimal amount of the targeted crop (corn, soybean or canola) in 2013 and were not a chemical or seed company employee.[2] For the 2013 growing season, the survey then asked for information on the farmer's



1. Operation (e.g., the number of target crop acres, total crop acres, other crops planted, use of conservation tillage practices, number of corn following corn acres for corn farmers, amount of leased land, and presence of a livestock enterprise),
2. Actively managed insect pests, including the most important of these pests,
3. Use of alternative pest management practices (e.g., Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides), including specific products and number of acres,
4. Average production costs, yields and price received for any marketed crop,
5. Source of insect pest management advice,
6. Most important considerations when making insect pest management decisions,
7. Perceived value of alternative insect pest management practices,
8. Biggest insect pest management concerns in the targeted crop, and
9. Education and farming experience.

The most substantial difference between the corn, soybean and canola surveys is that the corn survey asked about a farmer's use of Bt corn PIPs and soil insecticides, while the soybean and canola surveys did not since there are currently no PIPs or soil insecticides registered for use in soybean and canola. Appendix 8.0 includes a comprehensive summary of the survey results.

4.0 Econometric Methods

Dependent variables explored econometrically included the probability of adoption of a particular pest management practice, the proportion of the target crop acres managed with the practice given it was adopted, and the additional value per acre the practice provided. For corn, the practices that were considered included Bt corn adoption, insecticide seed treatments, soil insecticide treatments and foliar insecticide treatments. For soybean and canola, the considered practices included insecticide seed treatments and foliar insecticide treatments.

Of particular interest in our analysis was how these dependent variables varied geographically and in relation to various nonpecuniary factors. To explore this variation, for each of our dependent variables, we estimated four nested multivariate regression equations:

(4a) $y_i = \sum_{f \in \mathbf{F}} \alpha_f x_i^f + \sum_{r \in \mathbf{R}} \beta_r d_i^r + \sum_{p \in \mathbf{P}} \beta_{can} d_i^p + \varepsilon_i,$

(4b) $y_i = \sum_{f \in \mathbf{F}} \alpha_f x_i^f + \beta_{us} d_i^{us} + \sum_{p \in \mathbf{P}} \beta_{can} d_i^p + \varepsilon_i,$

(4c) $y_i = \sum_{f \in \mathbf{F}} \alpha_f x_i^f + \sum_{r \in \mathbf{R}} \beta_r d_i^r + \beta_{can} d_i^{can} + \varepsilon_i,$

(4d) $y_i = \sum_{f \in \mathbf{F}} \alpha_f x_i^f + \beta + \varepsilon_i,$

In these equations, yi is the dependent variable for farmer i; x_i^f is a measure of importance of nonpecuniary factor f to farmer i with F being the set of nonpecuniary factors; d_i^{us} is an indicator variable equal to 1 if farmer ***i***

operated in the U.S. and 0 otherwise; d_i^{can} is an indicator variable equal to 1 if farmer *i* operated in Canada and 0 otherwise; d_i^r is an indicator variable equal to 1 if farmer *i* operated in the United States Department of Agriculture Economic Research Service's (USDA-ERS) farm resource region *r* with R being the set of all observed farm resource regions in the data (Heartland, Northern Crescent, Northern Great Plains and Prairie Gateway for corn; and Heartland, Northern Crescent, Northern Great Plains, Prairie Gateway and Mississippi Portal for soybean); is an indicator variable equal to 1 if farmer i operated in the Canadian province p with P being the set of all observed provinces in the data (Manitoba, Ontario and Quebec for corn and soybean; and Alberta, Manitoba and Saskatchewan for canola); εi is a random error with mean 0 and estimable variance $\sigma us2$ and $\sigma can2$ for the U.S. and Canada in equations (4a) – (4c) and σ2 for equation (4d); and α_f for $f \in F$, β_r for $r \in R$, β_p for $p \in P$, $\beta_{us}, \beta_{can},$ and β, are estimable parameters.[3]

With this specification, we can test three hypotheses regarding variation in responses across geographic locations:

H1: $\beta_r = \beta_{us}$ for $r \in R$

H2: $\beta_p = \beta_{can}$ for $p \in P$

H3: $\beta_r = \beta_p = \beta$ for $r \in R$ and $p \in P$, and $\sigma us2 = \sigma can2 = \sigma 2$.

Rejection of H1 is an indication that there were regional differences in responses for U.S. farmers. Rejection of H2 is an indication that there were provincial differences in responses for Canadian farmers. Rejection of H3 is an indication of differences in responses between U.S. and Canadian farmers. This specification also allows us to assess if responses differed based on alternative nonpecuniary factors by testing:

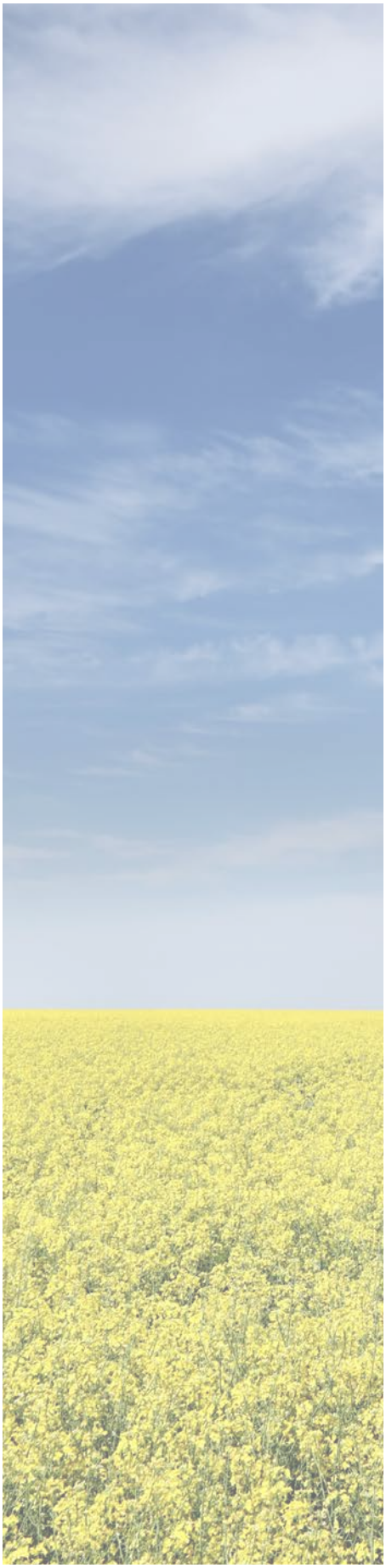
H4: $\alpha_f = 0$ for each $f \in F$ individually.

Different techniques were required to estimate equations (4a) to (4d) for each of our response variables. The responses for whether or not a farmer adopted a particular pest management practice came from a binary yes-no question on the survey, so a probit model was appropriate.

The proportion of acreage managed with a particular practice, given the farmer adopted that practice, was calculated from a farmer's response to two questions: ***1) How many acres of the target crop did you plant in 2013?*** and ***2) How many of these acres were managed with the particular practice?*** The responses to these questions were used to construct the proportion of the targeted crop acres managed with a particular practice for farmers reporting that they used the practice. This proportion was bounded between 0and 1 with frequent observations at the upper boundary, so a censored regression model was appropriate for the analysis.

The responses for the additional value per acre managed with a particular practice were categorical. An example of the questions used to elicit these responses is:

Please think carefully about all the reasons why you chose to plant corn with an insecticide seed treatment in 2013 and what else you could have



done to manage insects instead of using an insecticide seed treatment. ***Compared to these alternatives, what additional value would you say using an insecticide seed treatment provided to you per acre of treated corn?***

Not more than $5 per acre (__)

More than $5, but not more than $10 per acre (__)

More than $10, but not more than $15 per acre (__)

More than $15, but not more than $25 per acre (__)

More than $25 per acre (__)

Because farmer responses reflected increasing ranges in which their individual value may lay, interval regression was appropriate. Currency denominations for this question were based on the country in which the farmer operated, so to combine responses for the U.S. and Canada, an exchange rate of 0.92 U.S. dollars per Canadian dollar was used to adjust the Canadian ranges into U.S. dollars before the analysis was conducted. With the exception of Bt corn, the ranges of values presented to farmers were identical to the example above. For Bt corn, the ranges presented to farmers were: not more than $5 per acre; more than $5, but not more than $10 per acre; more than $10, but not more than $25 per acre; more than $25, but not more than $40 per acre; and more than $40 per acre. These higher ranges were selected for Bt corn because we anticipated the value of Bt corn would be higher. It is also important to note that the value questions were only presented to farmers who indicated they used the practice in 2013.

STATA's probit command was used to estimate the probit models, while STATA's intreg command was used to estimate the censored and interval regression models. Likelihood ratio statistics were used to test H1to H3, while regression t-statistics were used to test H4 for all target crops. Rejection of these hypotheses was judged based on a 10 percent level of significance.

Also of interest for our analysis was the additional value per acre managed with a particular practice as compared to what else the farmer could have done to manage insect pests (e.g., the area of triangle ***abc*** in Figure 2 (c)). This value can be calculated from the interval regression results. When using these results, it is important to recognize that farmers are unlikely to adopt practices that are not perceived as valuable, which must be taken into account when using regression estimates to calculate this value. To take this into account, we assumed farmers' values followed a normal distribution truncated to be greater than 0. With such a distribution, the mean value to farmers in region *r* based on equation (4a) can be calculated as:

$$(5)\quad V_r = \sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f + \hat{\beta}_r + \hat{\sigma}\frac{\phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)}{1-\Phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)}$$

where $\bar{x}_r^f$ is the average of x_i^f for farmers in region *r*; and $\hat{\alpha}_f^{us}$ for $f \in F$, $\hat{\beta}_r, \hat{\sigma}_{us}$ and are estimated parameters (Greene, 2000). The standard deviation of U.S. farmers' values in region *r* based on equation (4a) can be calculated as:

$$S_r = \hat{\sigma}_{us}\sqrt{1 - \frac{\phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)}{1-\Phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)}\left(\frac{\phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)}{1-\Phi\left(-\frac{\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)} - \frac{-\sum_{f\in F}\hat{\alpha}_f\bar{x}_r^f+\hat{\beta}_r}{\hat{\sigma}_{us}}\right)} \quad (6)$$

(Greene, 2000). Similar calculations for Canadian provinces can be done by substituting $\hat{\sigma}_{can}$ for $\hat{\sigma}_{us}$ and p for r in equations (5) and (6). Confidence intervals for equation (5) and (6) can be obtained using the regression results with the delta method (Greene, 2000). STATA's nlcom command was used for this calculation.

The state and county information collected with U.S. survey responses were used to assign farmers to one of the USDA-ERS's nine farm resource regions.[4] All but one corn farmer was from one of four farm resource regions: Heartland, Northern Crescent, Northern Great Plains and Prairie Gateway. The farmer who was not from one of these four regions was in the Eastern Uplands region and operated in a county close to the Prairie Gateway re-

Table 2. Importance rankings for factors affecting corn farmers' insect pest management decisions.

Factors	Not Important	Somewhat Important	Important	Very Important
	Percent of Surveyed Farmers			
Reducing Equipment Wear & Tear	8.2	28.5	38.0	25.3
Saving Time & Labor	3.1	20.9	41.0	35.0
Replant or Other Product Guarantees	9.3	26.4	37.1	27.2
Reducing Scouting	13.4	31.1	38.7	16.7
Convenience	2.6	26.3	43.9	27.2
Flexibility	2.8	26.8	45.2	25.3
Simplicity	4.2	21.7	45.8	28.2
Cost	1.1	15.3	33.1	50.4
Being Able to Plant Early	8.1	24.3	33.4	34.2
Family & Worker Safety	1.6	5.2	23.3	69.9
Public Safety	2.6	11.2	34.7	51.5
Protecting Water Quality	1.9	9.4	30.8	57.9
Protecting Wildlife	5.7	19.5	37.9	36.8
Protecting Beneficial Insects	3.9	16.7	40.5	38.9
Crop Marketability	5.6	12.7	32.0	49.8
Improving Plant Health	0.5	10.4	40.2	48.9
Improving Crop Stand	0.5	8.8	38.9	51.9
Protecting Yield	0.3	5.8	29.0	64.8
Having Consistent Insect Control	2.4	8.1	37.2	52.3
Having Long-Lasting Insect Control	3.1	14.1	35.3	47.6

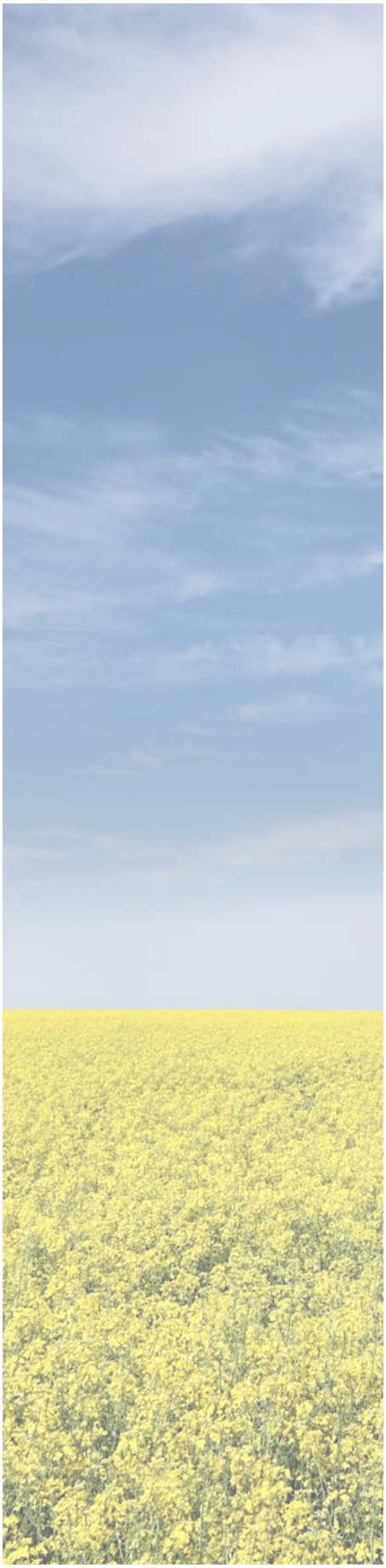


Table 3. Importance rankings for factors affecting soybean farmers' insect pest management decisions.

Factors	Not Important	Somewhat Important	Important	Very Important
	Percent of Surveyed Farmers			
Reducing Equipment Wear & Tear	5.9	26.8	36.7	30.6
Saving Time & Labor	3.4	20.0	40.0	36.6
Replant or Other Product Guarantees	9.8	28.2	36.3	25.7
Reducing Scouting	16.2	31.1	31.9	20.7
Convenience	3.8	26.8	40.4	29.1
Flexibility	2.3	27.0	41.6	29.1
Simplicity	4.3	25.5	40.6	29.6
Cost	1.6	12.2	29.6	56.5
Being Able to Plant Early	9.5	24.2	31.8	34.5
Family & Worker Safety	0.6	4.1	24.5	70.8
Public Safety	2.1	12.2	31.2	54.5
Protecting Water Quality	1.3	9.3	31.9	57.5
Protecting Wildlife	4.4	21.0	36.6	37.9
Protecting Beneficial Insects	3.6	19.3	33.3	43.8
Crop Marketability	2.8	13.8	29.4	54.0
Improving Plant Health	0.5	11.2	39.8	48.5
Improving Crop Stand	2.1	12.6	36.7	48.6
Protecting Yield	0.5	5.7	28.6	65.2
Having Consistent Insect Control	1.1	8.2	32.1	58.6
Having Long-Lasting Insect Control	2.0	13.1	35.4	49.6

gion, so he was included with this region. All but five soybean farmers were in five of the farm resource regions: Heartland, Northern Crescent, Northern Great Plains, Prairie Gateway and Mississippi Portal. Four of these five farmers were in the Eastern Uplands region and operated in counties close to the Prairie Gateway region, so their responses were included with this region. The final farmer was in the Southern Seaboard region in a county close to the Mississippi Portal region, so he was included with this region.

To measure the importance of alternative nonpecuniary factors on farmers' pest management decisions, farmers were asked to rate the importance of 20 different items on a four-point scale with 1 equal to not important, 2 equal to somewhat important, 3 equal to important and 4 equal to very important. The 20 items and proportion of corn, soybean and canola farmer responses on the four-point scale are reported in Tables 2 to 4. These items were primarily selected based on the types of nonpecuniary benefits identified in previous research (Carpenter and Gianessi, 1999; Marra, Piggott and Carlson, 2004; Fernandez-Cornejo, Hendricks and Mishra, 2005; Bonny, 2007; Sydorovych and Marra, 2008; Gardner, Nehring and Nelson, 2009; Hur-

Table 4. Importance rankings for factors affecting canola farmers' insect pest management decisions.

Factors	Not Important	Somewhat Important	Important	Very Important
	Percent of Surveyed Farmers			
Reducing Equipment Wear & Tear	7.0	29.7	35.5	27.9
Saving Time & Labor	2.4	22.1	39.2	36.2
Replant or Other Product Guarantees	8.8	28.0	37.4	25.8
Reducing Scouting	12.1	34.2	32.0	21.7
Convenience	0.8	28.4	42.5	28.2
Flexibility	1.0	25.2	41.7	32.1
Simplicity	1.8	24.3	44.5	29.4
Cost	0.2	14.6	33.5	51.7
Being Able to Plant Early	4.8	25.7	35.6	33.9
Family & Worker Safety	0.0	2.6	16.0	81.4
Public Safety	0.8	9.4	28.2	61.6
Protecting Water Quality	1.8	10.6	28.9	58.7
Protecting Wildlife	4.0	17.6	38.4	40.0
Protecting Beneficial Insects	2.6	12.3	32.4	52.7
Crop Marketability	0.6	6.5	21.6	71.4
Improving Plant Health	0.4	9.6	35.9	54.1
Improving Crop Stand	1.4	13.5	37.6	47.6
Protecting Yield	0.2	4.2	25.3	70.3
Having Consistent Insect Control	0.6	5.0	31.1	63.3
Having Long-Lasting Insect Control	1.4	13.1	33.3	52.2

ley, Mitchell and Frisvold, 2009). Items that were not identified in previous research, but we thought could also be important included improving crop stand, improving plant health, replant or other product guarantees, crop marketability and protecting beneficial insects.

Preliminary analysis of farmer responses to these items showed many were highly correlated. Therefore, we conducted a factor analysis separately for each crop.[5] Factor analysis is commonly used to reduce the number of highly correlated variables. The premise of factor analysis is that there are some underlying unobserved factors driving individual responses to various items resulting in correlation across responses. Factor analysis provides a tool for identifying what these underlying factors are and measuring them for subsequent analysis.

Table 5 reports the eigenvalues and proportion of the variance explained by the factor estimates obtained using STATA's factor command for each crop. A large eigenvalue indicates that an important underlying factor has been identified. To test the likelihood that an important factor has in fact been identified, we followed the parallel analysis paradigm reported in

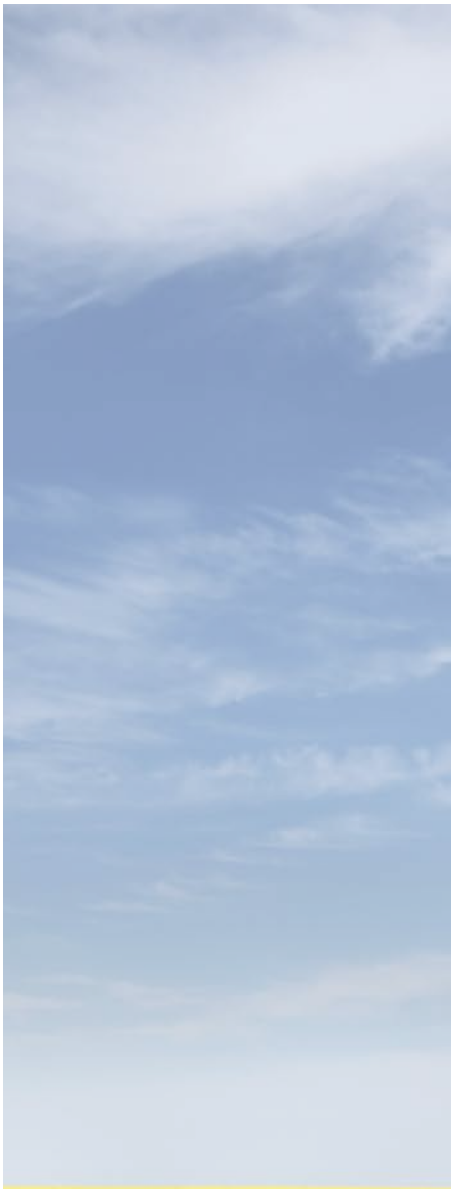


Table 5. Eigenvalues and proportion of variance accounted for by factors.

	-----Corn Farmers -----		----Soybean Farmers ----		-----Canola Farmers -----	
	Eigenvalue	Proportion of Variance	Eigenvalue	Proportion of Variance	Eigenvalue	Proportion of Variance
Factor 1	5.59***	0.81	5.36***	0.85	4.68***	0.77
Factor 2	0.98***	0.14	0.94***	0.15	1.29***	0.21
Factor 3	0.79***	0.11	0.64***	0.10	0.71***	0.12
Factor 4	0.35***	0.05	0.31***	0.05	0.24	0.04
Factor 5	0.29***	0.04	0.16	0.03	0.21	0.03
Factor 6	0.12	0.02	0.14	0.02	0.17	0.03
Factor 7	0.11	0.02	0.11	0.02	0.14	0.02
Factor 8	0.07	0.01	0.05	0.01	0.08	0.01
Factor 9	0.02	0.00	0.02	0.00	0.00	0.00
Factor 10	-0.01	0.00	-0.01	0.00	-0.02	0.00
Factor 11	-0.06	-0.01	-0.03	-0.01	-0.04	-0.01
Factor 12	-0.07	-0.01	-0.05	-0.01	-0.05	-0.01
Factor 13	-0.08	-0.01	-0.09	-0.01	-0.09	-0.02
Factor 14	-0.11	-0.02	-0.09	-0.01	-0.11	-0.02
Factor 15	-0.13	-0.02	-0.14	-0.02	-0.12	-0.02
Factor 16	-0.16	-0.02	-0.15	-0.02	-0.14	-0.02
Factor 17	-0.18	-0.03	-0.19	-0.03	-0.17	-0.03
Factor 18	-0.20	-0.03	-0.20	-0.03	-0.21	-0.03
Factor 19	-0.22	-0.03	-0.21	-0.03	-0.24	-0.04
Factor 20	-0.25	-0.04	-0.25	-0.04	-0.28	-0.05
Observations	**577**		**556**	**457**		

*** Significant at 1 percent, based on the Parallel Analysis Paradigm (Ledesma and Valero-Mora, 2007).

Ledesma and Valero-Mora (2007) and compared the observed eigenvalues to the eigenvalues that would be expected if the observed responses were actually just random.[6] Specifically, to determine how many factors were statistically significant, we simulated farmer responses using the observed proportions reported in Tables 2 to 4 assuming independent responses and performed a factor analysis on this simulated data. This was repeated 5,000 times for each crop to develop a distribution of expected eigenvalues assuming independent responses. These distributions were then compared to the observed eigenvalues to compute the probability that the first kth observed factors had eigenvalues that exceeded the simulated eigenvalues where k was varied from 1 to 20. This boot-strapping method identified five statistically significant factors for the corn responses, four for the soybean responses and three for the canola responses. The factor analysis was then repeated retaining only significant factors, and factor scores for each farmer were generated using STATA's predict command, which uses the regression method as its default. These factor scores were then included in our econometric analysis as measures of nonpecuniary factors that could influence farmers' pest management decisions and the value of these decisions.

5.0 Results

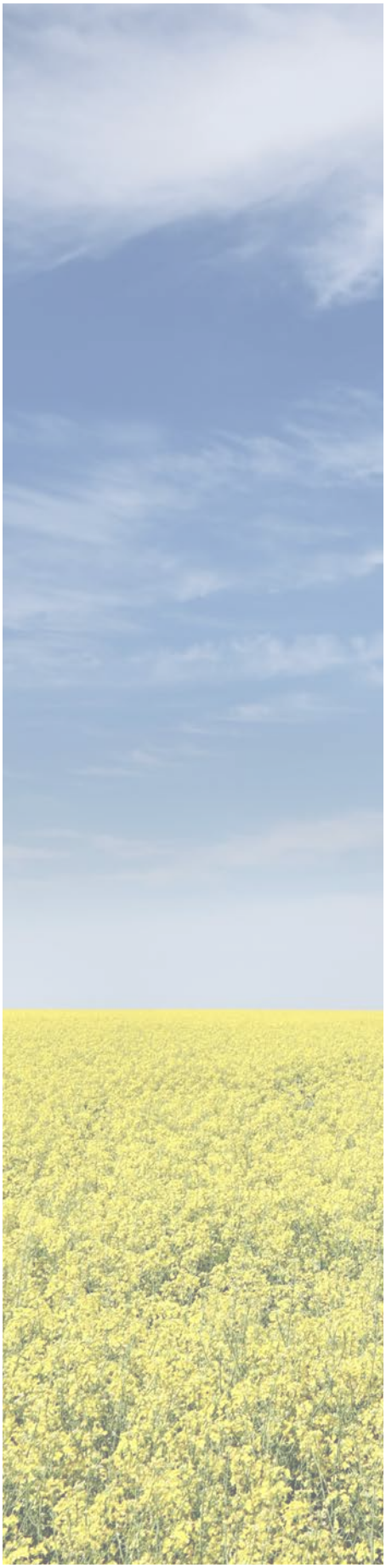
This section provides an overview of operation and farmer characteristics reported by survey respondents. It summarizes the actively managed and most important insect pests reported by farmers and the practices used to manage these pests. After discussing where farmers get their insect pest management advice and what types of nonpecuniary factors were identified as potential influences on the adoption and value of the alternative pest management practices, we turn to a discussion of our econometric results. The section concludes with estimates of the additional value per acre managed with a particular practice ($ per treated acre) and per all acres planted with the crop ($ per planted acre).

Operation and farmer characteristics

Surveyed corn farmers planted 1,352 total crop acres on average, with responding Canadian farmers planting about 150 acres more than U.S. farmers on average (Table 6). Corn acres planted averaged 45 percent of total crop acres planted for all respondents, with U.S. farmers planting more corn than their Canadian counterparts (Table 6). U.S. corn farmers also leased more acres and used no-till practices more than their Canadian counterparts. Alternatively, compared to U.S. corn farmers, Canadian corn farmers planted more corn-following-corn in 2013, were more likely to have livestock enterprises, and tended to plant a wider variety of crops. Both U.S. and Canadian corn farmers averaged close to the equivalent of a two year college or technical degree, though U.S. corn farmers had about 6.5 additional years of experience farming on average.

Surveyed soybean farmers average almost 100 more total crop acres when compared to corn farmers, with U.S. soybean farmers planting about 400 more crop acres than Canadian soybean farmers (Table 7). U.S. soybean farmers planted almost twice as many acres of soybean and leased more than twice as many acres as Canadian soybean farmers. Having livestock enterprises was somewhat more likely for U.S. soybean farmers, while the percentage of no-till soybean was similar for both U.S. and Canadian soybean farmers. While Canadian corn farmers were likely to also plant soybeans, there were many Canadian soybean farmers who did not plant corn. As with Canadian corn farmers, Canadian soybean farmers tended to plant a wider variety of crops than their U.S. counterparts. U.S. and Canadian soybean farmers averaged the equivalent of a two year college or technical degree, and there was less of a disparity in years of experience farming when compared to the U.S. and Canadian corn farmers.

Canadian canola farmers operated almost twice as many crop acres as Canadian corn farmers and more than twice as many acres as Canadian soybean farmers. More than a third of these acres were planted with canola (Table 8). These canola farmers reported leasing more land than Canadian corn and soybean farmers, though the percentage reporting livestock enterprises was similar to Canadian soybean farmers and lower than Canadian corn farmers. No-till practices were much more common for the Canadian canola farmers when compared to both U.S. and Canadian corn and soybean farmers. The vast majority of Canadian canola farmers also planted wheat, with about half planting barley and about a third planting pulses. Educational



attainment was slightly lower for Canadian canola farmers when compared to Canadian corn and soybean farmers, though they had slightly more farming experience.

Insect pests of concern to farmers

For U.S. and Canadian corn farmers, the CRW and ECB topped the list of most actively managed and most important insect pests, though U.S. corn farmers tended to see the CRW as a bigger threat, while Canadian corn farmers tended to see the ECB as being more significant (Table 9). Aphids topped the list of most actively managed and most important insect pest

Table 6. Mean (standard deviation) of operation and farmer characteristics in 2013 for corn farmer respondents.

	U.S.	Canada	All
Total Crop Acres	1,324	1,467	1,352
	(1,443)	(1,684)	(1,493)
Corn Acres	637	495	609
	(659)	(392)	(619)
Leased Acres	510	407	490
	(824)	(606)	(787)
Livestock Operations			
% of Farmers	45.3	49.6	46.1
No-Till Acres			
% of Farmers	44.6	24.8	40.7
% of Corn Acres	35.5	18.1	32.1
	(44.1)	(35.1)	(43.1)
Corn Following Corn Acres			
% of Farmers	52.1	60.3	53.7
% of Corn Acres	27.6	33.3	28.7
	(35.5)	(37.3)	(35.9)
Other Crops			
% Planting Hay/Alfalfa	18.9	11.6	17.5
% Planting Cotton	0.2		
% Planting Canola		24.0	
% Planting Soybean	77.8	82.6	78.8
% Planting Wheat	29.5	54.5	34.4
% Planting Other	9.4	30.6	13.5
Education (Years)[a]	13.7	13.6	13.7
	(1.9)	(2.2)	(2.0)
Years Farming	34.4	27.9	33.1
	(12.7)	(11.7)	(12.8)

[a] Did not complete high school = 10 years, high school = 12 years, some college = 14 years, vocational/technical training = 14 years, college graduate = 16 years, and advanced degree = 18 years.

for soybean farmers in both the U.S. and Canada (Table 10). Beetles came in second in the U.S. followed closely by mites and stink bugs. Interestingly, while mites and beetles were cited as the second and third most actively managed pests in Canadian soybean production, grasshoppers were rated as the second most important insect pest, with no farmers rating beetles as most important. The most actively managed and most important insect pest cited in Canadian canola production was the flea beetle, with the Bertha armyworm coming in a distant second (Table 11).

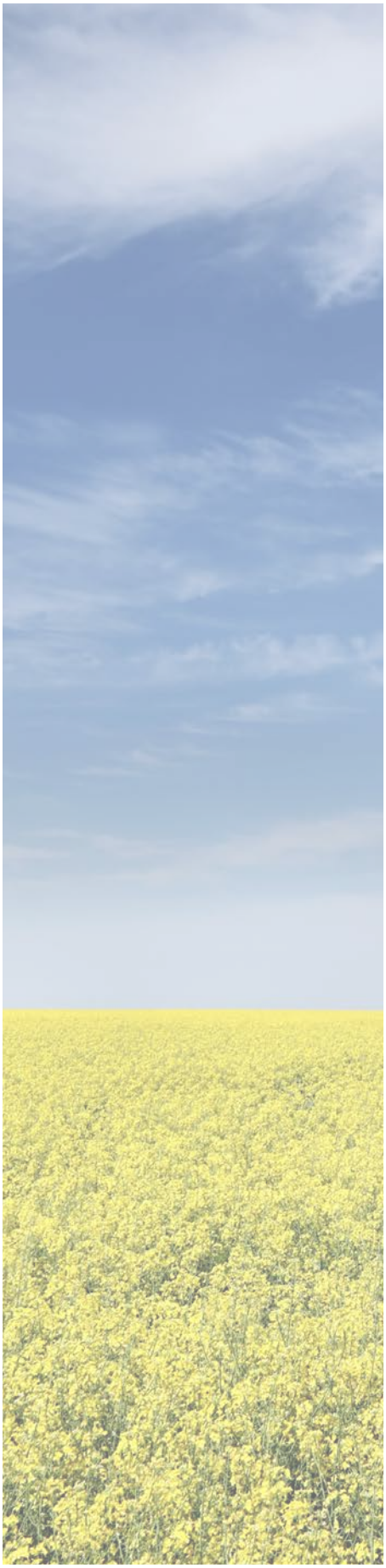
Insect pest management practices

Bt corn was the primary tactic to manage corn insect pests reported by survey respondents (Table 12). Over four out of five corn farmers reported using Bt corn, with higher levels of adoption reported in Canada. On average, U.S. respondents planted 435 acres of Bt corn, representing about

Table 7. Mean (standard deviation) of operation and farmer characteristics in 2013 for soybean farmer respondents.

	U.S.	Canada	All
Total Crop Acres	1,509	1,107	1,430
	(1,576)	(1,002)	(1,489)
Soybean Acres	676	347	611
	(808)	(265)	(745)
Leased Acres	667	312	597
	(1,109)	(445)	(1,022)
Livestock Operations			
% of Farmers	37.4	34.4	36.8
No-Till Acres			
% of Farmers	54.7	52.9	54.4
% of Soybean Acres	45.5	45.0	45.4
	(45.7)	(46.2)	(45.8)
Other Crops			
% Planting Hay/Alfalfa	11.4	11.5	11.4
% Planting Cotton	2.6		
% Planting Canola		46.7	
% Planting Corn	87.8	41.0	78.6
% Planting Wheat	30.6	66.4	37.6
% Planting Other	10.8	29.5	14.5
Education (Years)[a]	14.0	13.9	14.0
	(2.1)	(2.2)	(2.1)
Years Farming	33.2	30.7	32.7
	(14.2)	(11.8)	(13.8)

[a] Did not complete high school = 10 years, high school = 12 years, some college = 14 years, vocational/technical training = 14 years, college graduate = 16 years, and advanced degree = 18 years.



two-thirds of their total corn acreage. USDA-NASS (2014a) reports that 76 percent of corn acres in the U.S. were planted with Bt corn in 2013. Just under two-thirds of U.S. farmers reported planting stacked varieties of Bt corn that provide control of both above-ground insects like the ECB and below-ground insects like the CRW, while one in three reported planting Bt corn varieties that only control above-ground insects and just over one in 10 reported planting Bt corn varieties that only control below-ground insects. Canadian corn farmers planted an average of 375 acres of Bt corn representing about three-quarters of their total corn acreage. They were more likely than U.S. farmers to use stacked varieties with both above- and below-ground insect control and Bt corn that only controls above-ground insects, while they were less likely to plant Bt corn that only controls below-ground insects – results consistent with the relative rankings of insect pest threats reported in Table 9.

Table 8. Mean (standard deviation) of operation and farmer characteristics in 2013 for canola farmer respondents.

	Canada
Total Crop Acres	2,797
	(3,107)
Canola Acres	974
	(1,069)
Leased Acres	792
	(1,131)
Livestock Operations	
% of Farmers	35.6
No-Till Acres	
% of Farmers	70.6
% of Canola Acres	69.9
	(45.3)
Other Crops	
% Planting Hay/Alfalfa	2.8
% Planting Corn	4.8
% Planting Soybean	8.6
% Planting Wheat	87.0
% Planting Barley	47.6
% Planting Pulses	29.0
% Planting Other	44.6
Education (Years)[a]	13.4
	(2.2)
Years Farming	31.7
	(12.2)

[a] Did not complete high school = 10 years, high school = 12 years, some college = 14 years, vocational/technical training = 14 years, college graduate = 16 years, and advanced degree = 18 years.

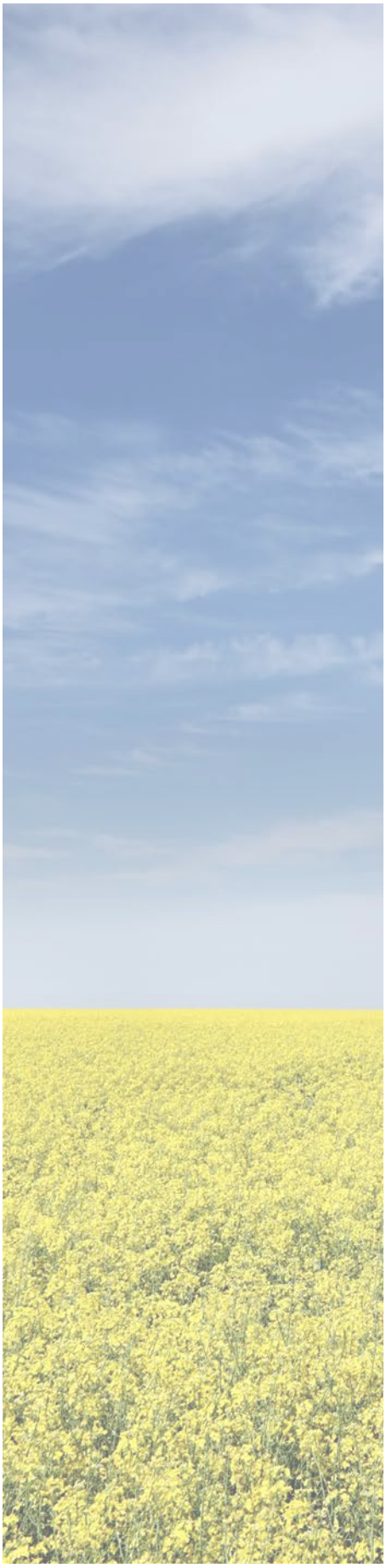
The use of insecticide seed treatments was reported by about two-thirds of U.S. and just over three-quarters of Canadian corn farmers (Table 12). Canadian corn farmers reported more corn acres, and a higher percentage of these acres were planted with insecticide-treated seed when compared to U.S. corn farmers. Based on GfK Kynetec7 data, U.S. corn acres treated with a neonicotinoid insecticide seed treatment averaged 89 percent of planted acres between 2010 and 2012.

One in five U.S corn farmers reported using a soil insecticide, while 8.2 percent reported using a foliar insecticide (Table 12). On average, U.S. corn farmers reported 97 acres were treated with a soil insecticide and 42 acres were treated with a foliar insecticide representing 14.2 and 6.0 percent of all corn acres. Based on GfK Kynetec data, U.S. corn acres treated with soil and foliar insecticides averaged 11.0 and 4.3 percent between 2010 and 2012. Canadian corn farmers were less likely to use soil insecticides (3.4 percent) and more likely to use foliar insecticides (11.7 percent), which is again consistent with the relative rankings of insect pest threats reported in Table 9.

Table 9. Percent of corn farmers who actively manage insect pest and reported insect pest is most important to manage.

U.S.			Canada		
	Actively Manage	Most Important		Actively Manage	Most Important
Corn Rootworm[a]	49.1	38.5	Corn Borer	59.5	54.4
Corn Borer[b]	41.1	25.0	Corn Rootworm	30.6	22.3
Black Cutworm	5.6	1.4	Black Cutworm	6.6	2.9
Wireworm	5.2	1.2	Wireworm	5.8	1.0
Corn Earworm[c]	5.0	1.2	Armyworm	1.7	0.0
Japanese Beetle	4.0	0.6	Grub	1.7	0.0
Maggot/Seed Maggot	3.2	0.4	Maggot	1.7	0.0
Flea Beetle	2.8	0.6	Cutworm	1.7	0.0
Grub[d]	2.4	0.2	Aphid	0.8	0.0
Nematode	2.0	0.6	Flea Beetle	0.8	0.0
Armyworm[e]	1.6	0.6	Nematode	0.8	0.0
Mite[f]	1.6	0.4			
Western Bean Cutworm	1.6	0.0			
Aphid[g]	1.2	0.0			
Chinch Bug	0.6	0.0			
Cutworm	0.6	0.6			

[a] Including Northern Corn Rootworm, Mexican Corn Rootworm, Southern Corn Rootworm and Western Corn Rootworm.
[b] Including European Corn Borer, Common Stalk Borer, Cornstalk Borer and Southwestern Corn Borer.
[c] Including Cotton Bollworm, Earworm and Tomato Fruitworm.
[d] Including White Grub and Japanese Beetle Grub.
[e] Including Fall Armyworm and True Armyworm.
[f] Including Banks Grass Mite, Spider Mite and Two-Spotted Mite.
[g] Including Corn Leaf Aphid, Bean Aphid, Bird Cherry-Oat Aphid, Green Peach Aphid and Yellow Sugarcane Aphid.



Just over half of U.S. soybean farmers used an insecticide seed treatment and almost one-quarter used foliar insecticides (see Table 13). This equates to farmers planting 322 acres of insecticide-treated seed on average, representing 44.6 percent of total soybean acreage. Alternatively, 123 acres on average were treated with a foliar insecticide, representing 16.2 percent of total soybean acres. Based on GfK Kynetec data, U.S. soybean acres planted with insecticide-treated seed and treated with foliar insecticides averaged 38.0 and 26.5 percent. Almost three-quarters of Canadian soybean farmers used an insecticide seed treatment, with only about one in seven using foliar insecticides. On average, these Canadian farmers had 216 acres or almost two-thirds of their soybean acres planted with insecticide-treated seed and 20 acres or 7.4 percent of their soybean acres treated with a foliar insecticide.

Table 10. Percent of soybean farmers who actively manage insect pest and reported insect pest is most important to manage.

U.S.			Canada		
	Actively Manage	Most Important		Actively Manage	Most Important
Aphid	38.2	31.0	Aphid	43.4	49.5
Beetle[a]	11.6	6.2	Mite	6.6	1.1
Mite[b]	8.0	3.6	Beetle	4.9	0.0
Stink Bug[c]	6.2	3.6	Grasshopper	4.1	5.3
Japanese Beetle	4.2	2.2	Wireworm	2.5	0.0
Nematode	3.8	2.4	Nematode	3.3	1.1
Armyworm[d]	3.4	2.0	Slug	1.6	0.0
Grasshopper/Cricket	2.4	1.0	Grub	0.8	0.0
Wireworm	2.0	0.8	Japanese Beetle	0.8	0.0
Threecornered Alfalfa Hopper	1.4	0.4	Maggot	0.8	1.1
Soybean Podworm	1.2	0.6	Cutworm	0.8	1.1
Grub[e]	0.8	0.0	Leafhopper	0.8	0.0
Maggot/Seed Maggot	0.8	0.4			
Bug (all)	0.6	0.6			
Looper	0.6	0.0			
Cutworm	0.6	0.4			
Budworm	0.2	0.0			
Rootworm	0.2	0.2			
Stem Weevil	0.2	0.2			
Caterpillar	0.2	0.0			
Worm	0.2	0.0			

[a] Including Bean Leaf Beetle, Blister Beetle, Mexican Bean Beetle, Colorado Potato Beetle and Flea Beetle.
[b] Including Red Spider Mite, Spider Mite and Two-Spotted Mite.
[c] Including Green Stink Bug, Brown Stink Bug, Red-shouldered Stink Bug, Southern Green Stink Bug, Red-banded Stink Bug and Rice Stink Bug.
[d] Including Beet Armyworm, Fall Armyworm and Yellowstriped Armyworm.
[e] Including White Grub and Japanese Beetle Grub.

Almost nine out of every 10 Canadian canola farmers reported planting insecticide-treated seed (Table 14). This represented 836 acres of the canola planted or 87.2 percent of all canola acreage on average. Just over one in four used foliar insecticide applications representing 182 canola acres or 18.4 percent of all canola acres on average.

Sources of insect pest management information

Agricultural retailers and seed or chemical company representatives (Table 15) were key sources of insect pest management advice for both U.S. and Canadian farmers. U.S. farmers were also heavily reliant on crop consultants. Canadian farmers were not as reliant on crop consultants; instead, about one in five relied on provincial agronomists. Fewer than one out of 10 corn and soybean farmers said they relied directly on university Extension for pest management advice, with fewer than one out of 20 relying on their neighbors for information.

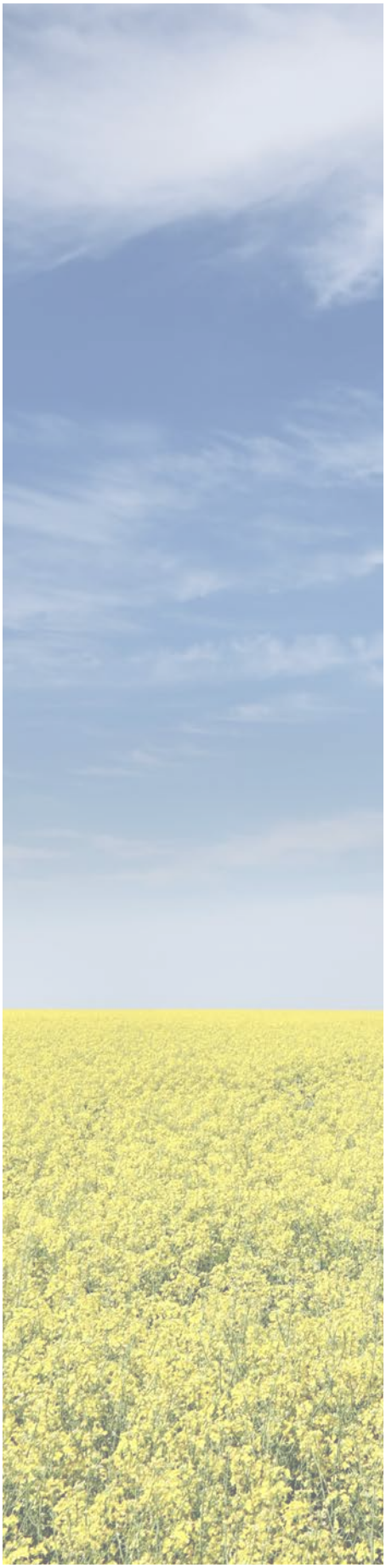
Nonpecuniary factors guiding insect pest management choices

Tables 16 to 18 report the factor loadings and item uniqueness based on how farmers rated the importance of the 20 items in Tables 2 to 4. In each table, the loading for an item with the highest absolute value across factors is highlighted in bold to help show which of the 20 items had the greatest influence on which factor. Recall that five factors were identified as signifi-

Table 11. Percent of Canadian canola farmers who actively manage insect pest and reported insect pest is most important to manage.

	Actively Manage	Most Important
Flea Beetle[a]	50.0	40.0
Bertha Armyworm	24.0	15.2
Fall Armyworm	13.4	8.1
Diamondback Moth	12.8	5.2
Lygus/Tarnished Plant Bug	12.2	8.6
Cutworm	5.0	2.9
Grasshopper	4.0	1.9
Cabbage Seedpod Weevil	3.6	1.4
Wireworm	0.6	0.0
Aphid	0.6	0.0
Swede Midge	0.6	0.0
Worm	0.4	0.0
Zebra Worm	0.2	0.5
Root Maggot	0.2	0.0
Wheat Midge	0.2	0.0
Weevil	0.2	0.5
Green Worm	0.2	0.0

[a] Including Flea Beetle, Striped Flea Beetle and Crucifer Flea Beetle.



cant for corn farmers, while four and three factors were identified as significant for soybean and canola farmers (Table 5).

For corn farmers, Reducing Equipment Wear & Tear, Convenience, Saving Time & Labor, Simplicity, Reducing Scouting, Flexibility, Cost, Being Able to Plant Early, and Replant or Other Product Guarantees all have relatively high absolute loadings for the nonpecuniary factor we refer to as Cost, Planting, Time & Ease (Table 16). These high factor loadings are all positive, indicating that corn farmer responses to these items are relatively highly and positively correlated likely due to some more general underlying preference for pest management practices that share the attributes described by these

Table12. Mean (standard deviation) of insect pest management practices employed by surveyed corn farmers.

	U.S.	Canada	All
Bt Corn			
% of Farmers	82.2	90.1	83.7
Acres	435	375	423
	(502)	(372)	(479)
% of Corn Acres	66.2	75.7	68.1
	(39.4)	(33.2)	(38.4)
ECB & CRW Bt Corn (% of Farmers)[a]	64.6	76.3	66.9
ECB-Only Bt Corn (% of Farmers)[a]	33.6	37.3	34.3
CRW-Only Bt Corn (% of Farmers)[a]	13.4	11.9	13.1
Insecticidal Seed Treatment			
% of Farmers	64.1	79.1	66.9
Acres	358	413	368
	(525)	(432)	(509)
% of Corn Acres	56.5	75.1	60.0
	(46.8)	(41.0)	(46.3)
Soil Insecticidal Treatment			
% of Farmers	19.7	3.4	16.5
Acres	97	11	81
	(290)	(68)	(264)
% of Corn Acres	14.2	2.7	12.0
	(32.9)	(15.9)	(30.7)
Foliar Insecticidal Treatment			
% of Farmers	8.2	11.7	8.9
Acres	42	23	38
	(189)	(91)	(174)
% of Corn Acres	6.0	5.0	5.8
	(22.2)	(18.8)	(21.5)

[a] ECB = European corn borer and CRW = corn rootworm.

items. The nonpecuniary factor we label Health, Environment & Marketability has relatively high absolute loadings for Public Safety, Protecting Water Quality, Protecting Beneficial Insects, Protecting Wildlife, Family & Worker Health and Crop Marketability. The nonpecuniary factor we label Plant Performance has relatively high absolute loadings for Improving Plant Health, Improving Crop Stand and Protecting Yield. The nonpecuniary factor we label Yield Risk has relatively high absolute loadings for Having Consistent Insect Control and Having Long-Lasting Insect Control. Compared to the first four factors, the final nonpecuniary factor we label as Marketability versus Ease does not have the highest absolute loadings for any of the 20 items. However, the items with relatively high absolute loadings for this factor are Crop Marketability, Simplicity and Convenience. The positive loading for Crop Marketability and negative loadings for Simplicity and Convenience are indicative of a negative correlation between corn farmer responses to Crop Marketability and Simplicity, and Crop Marketability and Convenience. Thus, this factor suggests a weak, though still significant, underlying preference where some farmers are willing to give up simplicity and convenience for greater crop marketability.

Two of the four nonpecuniary factors identified from the soybean farmer responses are similar to nonpecuniary factors identified from the corn farmer responses (Table 17). For the soybean farmers' factor we label Cost, Planting, Time & Ease, eight of the items with relatively high absolute loadings are the same as the factor labeled the same for corn farmers. The difference is that for soybean farmers, Replant or Other Product Guarantees separated out with a high loading in an alternative nonpecuniary factor we label Replant Guarantees. The six items with relatively high absolute loadings for the soybean farmers' Health, Environment & Marketability factor are the same six items with relatively high absolute loadings for factor with the same label for corn farmers. The third nonpecuniary factor identified

Table 13. Mean (standard deviation) of insect pest management practices employed by surveyed soybean farmers.

	U.S.	Canada	All
Insecticidal Seed Treatment			
% of Farmers	51.4	73.9	55.8
Acres	322	216	301
	(738)	(230)	(671)
% of Soybean Acres	44.6	66.2	48.8
	(46.8)	(43.5)	(46.9)
Foliar Insecticidal Treatment			
% of Farmers	23.0	14.4	21.3
Acres	123	20	103
	(336)	(65)	(306)
% of Soybean Acres	16.2	7.4	14.5
	(34.1)	(23.9)	(32.6)

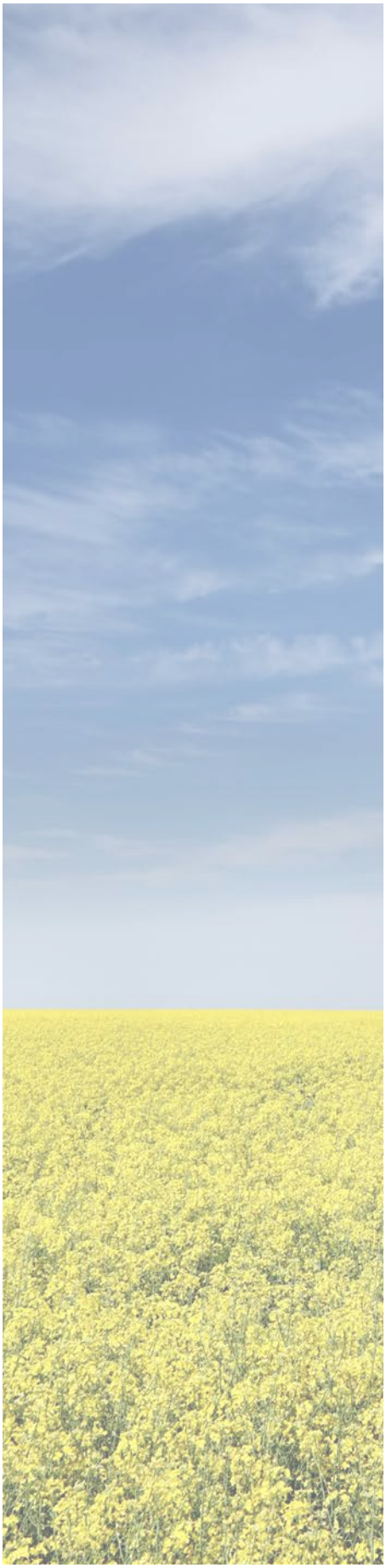


Table 14. Mean (standard deviation) of insect pest management practices employed by surveyed Canadian canola farmers.

	Canada
Insecticidal Seed Treatment	
% of Farmers	88.0
Acres	836
	(972)
% of Canola Acres	87.2
	(33.2)
Foliar Insecticidal Treatment	
% of Farmers	27.0
Acres	182
	(473)
% of Canola Acres	18.4
	(34.5)

for soybean farmers, labeled Plant Performance & Yield Risk, had relatively high absolute loadings on the same items as the Plant Performance and Yield Risk factors identified for corn farmers, which suggests that corn farmers view plant performance and yield risk concerns as more separable when making insect pest management decisions, while soybean farmers view these items as more of a package. Alternatively, soybean farmers view planting guarantees as more separable from cost, planting, time and ease, while corn farmers tend to view these items as more of a package.

The first nonpecuniary factor for canola farmers labeled Cost, Planting, Time & Ease has relatively high absolute loadings for the same items as the factor identified for corn farmers with the same label (Table 18). Alternatively, the third nonpecuniary factor for canola farmers labeled Plant Performance & Yield Risk has relatively high absolute loadings for the same items as the factor identified for soybean farmers with the same label. The items with relatively high loadings for the Health, Environment & Marketability factor identified for canola farmers are the same items with relatively high loadings for the factors identified for corn and soybean farmers with the same label.

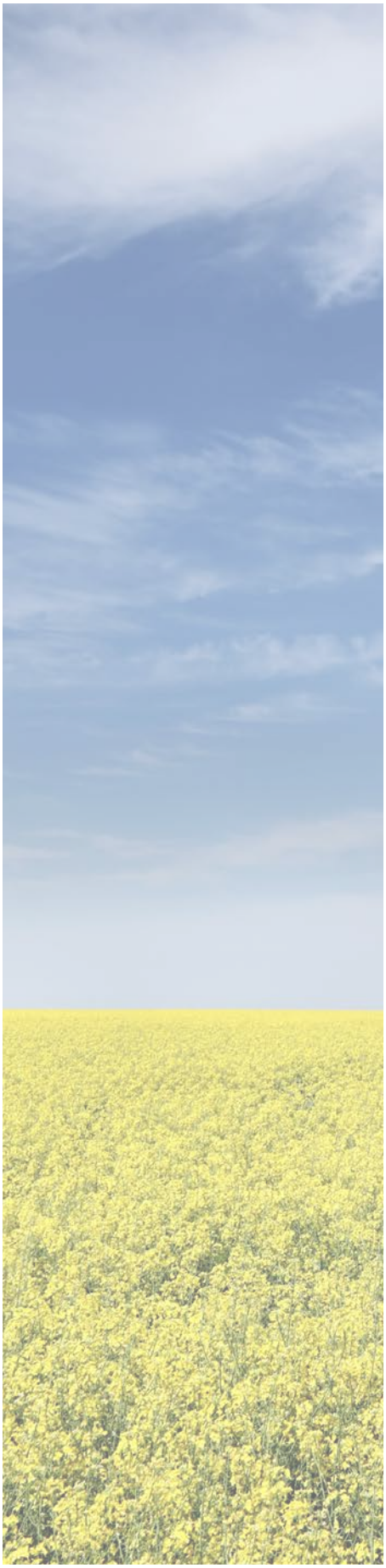
Taken together, these factor loadings reveal that there are commonalities between what nonpecuniary factors corn, soybean and canola farmers' report are important for making insect pest management decisions – a general concern for family, worker, public and environmental health. However, the results also identify important idiosyncrasies – concerns for plant performance, yield risk and replant guarantees – in what corn, soybean and canola farmers report are important for making insect pest management decisions, which makes sense given the differences in available control options and types of insect pests these options target.

Nonpecuniary and regional difference in pest management practices and value

Table 19 reports the parameter estimates and t-statistics based on equation (4a) for the probability Bt corn was used, proportion of corn acres planted with Bt corn given it was used, and the additional value of Bt corn per acre managed with it. It also reports the maximized log-likelihood, number of observations, and our likelihood-ratio statistic hypothesis tests (H1to H3). First, H1 is rejected, indicating that there were significant regional differences in the U.S. in terms of the probability Bt corn was used, the proportion of corn acres planted with Bt corn and the value of Bt corn to farmers in 2013. For Canadian provinces, H2 is rejected for the proportion of Bt corn acreage planted and value of Bt corn. We cannot reject H2 for the probability of Bt corn use for Canadian corn farmers. H3 is rejected for the probability of Bt corn use, proportion of Bt corn planted and value of Bt corn. Together, these results imply there were significant differences between U.S. and Canadian farmers in terms of their use and value of Bt corn in 2013. There were also significant regional or provincial differences within the U.S. and Canada, with the exception of the probability of Bt corn use in Canada. In terms of nonpecuniary factors, the Yield Risk factor is significant and positively associated with Bt corn use. For farmers who used Bt corn, the Cost, Planting, Time & Ease and Plant Performance factors are significant and positively associated with the proportion of corn acres planted with Bt corn. Alternatively, the Marketability versus Ease factor is significant and negatively associated with the proportion of corn acres planted with Bt corn. The Plant Performance factor is positively and significantly related, while the Cost, Planting, Time & Ease factor is negatively and significantly related to the value of Bt corn reported by farmers. The first of these results is not surprising given the effectiveness of Bt corn on targeted insects. The second is perhaps more surprising, though the cost of Bt corn seed has been on the rise and the regulatory requirements for planting Bt corn have become increasingly complicated in recent years with the commercialization of Bt corn varieties that include multiple PIP and herbicide-tolerant traits.

Table 20 reports results analogous to Table 19 for corn insecticide seed treatments. These results indicate that there were significant U.S. regional and Canadian provincial differences in the probability a farmer used an insecticide seed treatment in 2013, but not in the proportion of corn acreage planted with treated seed or the value of the seed treatment. The results also show differences between the U.S. and Canada in the probability of seed treatment use and proportion of corn acreage planted with a seed treatment in 2013, but not in terms of the value of the seed treatment. The Yield Risk and Marketability versus Ease factors are significant and positively related to use of insecticide seed treatments. Furthermore, the Yield Risk factor is significant and positively related to the value of an insecticide seed treatment. These results suggest that insecticide seed treatments are an important tool for farmers who view having consistent and long-lasting insect control as important.

Our analysis of soil insecticide use on corn is limited to U.S. farmers due to the small number of Canadian farmers (four) that reported using soil insecticides. For these U.S. corn farmers, there were significant regional differences in the adoption of soil insecticides, but not in the proportion of corn



acres treated or value of these treatments to farmers using them in 2013 (Table 21). The Yield Risk factor is significantly and positively related to the use of soil insecticides, but also significantly and negatively related to the proportion of corn acres with a soil insecticide treatment. For farmers who used soil insecticides, the Cost, Planting, Time & Ease factor is significant and positively related to the portion of treated corn acres, while the Plant Performance factor is significant and negatively associated with the value of soil insecticides.

Our analysis of foliar insecticide use in corn does not explore U.S. regional and Canadian provincial difference due to the limited number of farmers who reported using these insecticides (12 in the U.S. and 38 in Canada). The analysis that was conducted does not find significant differences between U.S. and Canadian farmers for the use or value of foliar insecticides, but does find significant differences for the proportion of acres treated by farmers who used them (Table 22). The Marketability versus Ease factor is significant and positively related to foliar insecticide use, while the Yield Risk factor is significantly and positively related to the proportion of corn acres treated with a foliar insecticide.

There were significant regional differences in terms of how U.S. soybean farmers valued insecticide-treated seed, but no significant regional differences in terms of the probability of use of treated seed and proportion of soybean acreage planted with treated seed in 2013 (Table 23). Alternatively, there were no provincial differences in terms of how Canadian farmers valued treated seed, but significant provincial differences in terms of the use of treated seed and proportion of soybean acreage planted with treated seed in 2013. The Cost, Planting, Time & Ease and Plant Performance & Yield Risk factors are significantly and positively associated with the proportion of soybean acreage planted with treated seed, while the Cost, Planting, Time & Ease factor is also significantly, though negatively, associated with the value of treated seed.

Use of foliar insecticides and the proportion of soybean acreage treated with foliar insecticides did not differ significantly regionally in the U.S. or provincially in Canada, but there were significant differences between the U.S. and Canada in 2013 (Table 24). The value of a foliar insecticide did not differ significantly in the U.S. regionally, Canada provincially, or between the U.S. and Canada in 2013. The Cost, Planting, Time & Ease factor is significantly and negatively associated with the probability of use of foliar insecticides, while the Plant Performance & Yield Risk factor is significantly and positively related to the probability of foliar insecticide use. None of the factors are significantly related to the proportion of acres treated with a foliar insecticide or the value of a foliar insecticide.

There were significant provincial differences in the probability of use of insecticide seed treatments among Canadian canola farmers, but no significant provincial differences in the proportion of canola acres planted with treated seed or the value of treated seed in 2013 (Table 25). The Cost, Planting, Time & Ease factor is significant and negatively associated with the probability of use of treated seed, while the Plant Performance & Yield Risk factor is significant and positively associated with probability of use of

treated seed. No factors are significantly related to the proportion of canola acres planted with treated seed or the value of treated seed.

There were significant provincial differences in the probability of use of foliar insecticides on canola and the proportion of canola acres treated with foliar insecticides in 2013 (Table 26). No factors are significantly related to adoption of foliar insecticides, proportion of canola acres treated with a foliar insecticide or the value of a foliar insecticide.

Overall, few consistent regional, provincial, country and nonpecuniary patterns emerge in the analysis, which likely reflects the complexities of controlling insect pests in a variety of different crops across a broad geographic landscape along with different options available for management.

Table 15. Sources of insect pest management information used by farmers.

	U.S.	Canada	All
	---------- Percent of Corn Farmers ----------		
Agricultural Retailer	34.5	41.3	35.9
Crop Consultant	28.5	12.4	25.4
Neighbor	4.4	4.1	4.3
Seed or Chemical Company Representative	35.9	33.9	35.5
University Extension Representative	9.0	4.1	8.0
Provincial Agronomist		23.1	
	---------- Percent of Soybean Farmers ----------		
Agricultural Retailer	28.0	45.1	31.4
Crop Consultant	32.0	22.1	30.1
Neighbor	2.0	4.1	2.4
Seed or Chemical Company Representative	32.0	27.9	31.2
University Extension Representative	8.2	4.1	7.4
Provincial Agronomist		20.5	
	---------- Percent of Canola Farmers ----------		
Agricultural Retailer		47.2	
Crop Consultant		8.8	
Neighbor		3.2	
Seed or Chemical Company Representative		20.6	
Provincial Agronomist		23.0	

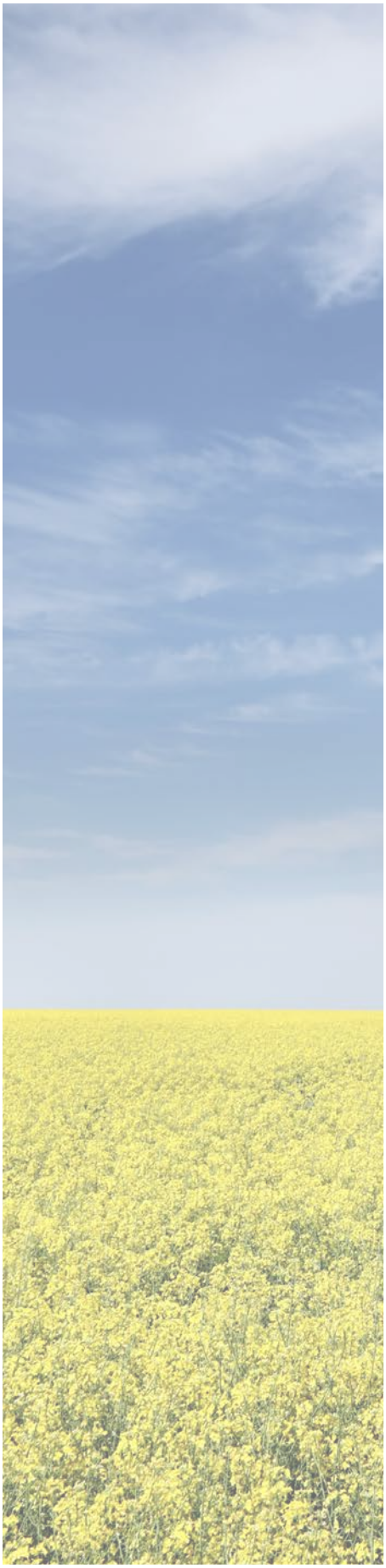


Table 16. Factor loadings and uniqueness for corn farmers with five factors retained and Varimax rotation.

	Cost, Planting, Time & Ease[a]	Health, Environment & Marketability[b]	Plant Performance[c]	Yield Risk[d]	Marketability versus Ease[e]	Uniqueness
Reducing Equipment Wear & Tear	**0.63**	0.28	0.07	0.09	0.04	0.50
Saving Time & Labor	**0.56**	0.21	0.11	0.15	-0.09	0.60
Replant or Other Product Guarantees	**0.53**	0.09	0.20	0.17	0.15	0.61
Reducing Scouting	**0.52**	0.21	0.05	0.12	0.13	0.66
Convenience	**0.51**	0.14	0.28	0.18	-0.25	0.54
Flexibility	**0.48**	0.26	0.28	0.08	-0.02	0.62
Simplicity	**0.42**	0.22	0.24	0.14	-0.26	0.63
Cost	**0.38**	0.07	0.13	0.09	0.15	0.81
Being Able to Plant Early	**0.37**	0.19	0.16	0.32	0.12	0.68
Family & Worker Safety	0.11	**0.69**	0.06	0.16	-0.02	0.49
Public Safety	0.20	**0.68**	0.13	0.10	-0.02	0.47
Protecting Water Quality	0.16	**0.62**	0.15	0.15	0.04	0.55
Protecting Wildlife	0.23	**0.56**	0.18	-0.04	0.03	0.60
Protecting Beneficial Insects	0.14	**0.43**	0.27	0.06	-0.14	0.70
Crop Marketability	0.26	**0.38**	0.20	0.08	0.28	0.67
Improving Plant Health	0.20	0.22	**0.58**	0.13	-0.04	0.56
Improving Crop Stand	0.15	0.15	**0.56**	0.26	0.00	0.58
Protecting Yield	0.12	0.16	**0.50**	0.28	0.09	0.63
Having Consistent Insect Control	0.13	0.22	0.28	**0.54**	-0.01	0.57
Having Long-Lasting Insect Control	0.28	0.16	0.27	**0.53**	-0.03	0.54

Note: The highest loading for an item across factors is highlighted in bold.

[a] Corresponds to factor 1 for corn in Table 5.

[b] Corresponds to factor 2 for corn in Table 5.

[c] Corresponds to factor 3 for corn in Table 5.

[d] Corresponds to factor 4 for corn in Table 5.

[e] Corresponds to factor 5 for corn in Table 5.

Table 17. Factor loadings and uniqueness for soybean farmers with four factors retained and Varimax rotation.

	Cost, Planting, Time & Ease[a]	Health, Environment & Marketability[b]	Plant Performance & Yield Risk[c]	Replant Guarantees[d]	Unique-ness
Reducing Equipment Wear & Tear	**0.59**	0.25	0.26	0.11	0.51
Saving Time & Labor	**0.56**	0.19	0.26	0.03	0.59
Replant or Other Product Guarantees	0.29	0.23	0.14	**0.41**	0.67
Reducing Scouting	**0.39**	0.21	0.04	0.28	0.73
Convenience	**0.60**	0.14	0.11	0.06	0.60
Flexibility	**0.49**	0.19	0.09	0.25	0.66
Simplicity	**0.59**	0.17	0.07	0.09	0.61
Cost	**0.30**	0.12	0.21	0.12	0.84
Being Able to Plant Early	**0.33**	0.11	0.25	0.32	0.72
Family & Worker Safety	0.17	**0.56**	0.21	0.04	0.61
Public Safety	0.18	**0.67**	0.17	0.04	0.49
Protecting Water Quality	0.17	**0.59**	0.17	0.09	0.59
Protecting Wildlife	0.21	**0.53**	0.09	0.15	0.64
Protecting Beneficial Insects	0.14	**0.48**	0.07	0.32	0.65
Crop Marketability	0.21	**0.44**	0.24	0.02	0.70
Improving Plant Health	0.19	0.32	**0.46**	0.15	0.63
Improving Crop Stand	0.24	0.20	**0.44**	0.29	0.63
Protecting Yield	0.00	0.34	**0.47**	0.06	0.66
Having Consistent Insect Control	0.18	0.14	**0.56**	0.02	0.63
Having Long-Lasting Insect Control	0.33	0.20	**0.52**	0.02	0.59

Note: The highest loading for an item across factors is highlighted in bold.
[a] Corresponds to factor 1 for soybean in Table 5.
[b] Corresponds to factor 2 for soybean in Table 5.
[c] Corresponds to factor 3 for soybean in Table 5.
[d] Corresponds to factor 4 for soybean in Table 5.

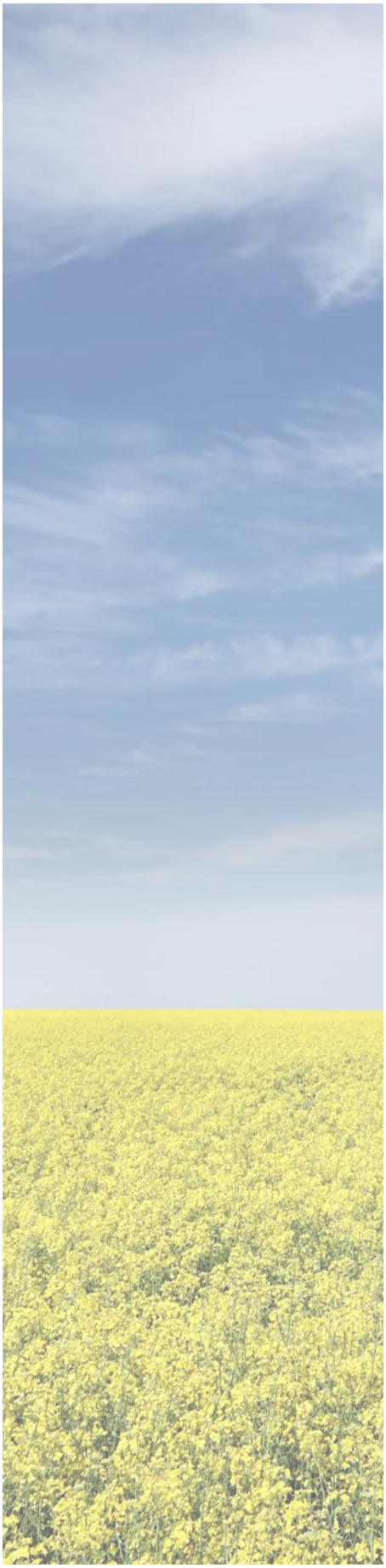


Table 18. Factor loadings and uniqueness for canola farmers with three factors retained and Varimax rotation.

	Cost, Planting, Time & Ease[a]	Health, Environment & Marketability[b]	Plant Performance & Yield Risk[c]	Unique-ness
Reducing Equipment Wear & Tear	**0.64**	0.15	0.18	0.53
Saving Time & Labor	**0.58**	0.16	0.13	0.62
Replant or Other Product Guarantees	**0.40**	0.24	0.14	0.76
Reducing Scouting	**0.52**	0.11	0.20	0.68
Convenience	**0.62**	0.13	0.08	0.60
Flexibility	**0.51**	0.20	0.26	0.63
Simplicity	**0.56**	0.13	0.14	0.65
Cost	**0.43**	0.12	0.02	0.80
Being Able to Plant Early	0.43	0.10	0.17	0.78
Family & Worker Safety	0.01	**0.50**	0.32	0.65
Public Safety	0.09	**0.63**	0.19	0.56
Protecting Water Quality	0.22	**0.60**	-0.01	0.59
Protecting Wildlife	0.19	**0.59**	0.01	0.61
Protecting Beneficial Insects	0.14	**0.60**	0.01	0.62
Crop Marketability	0.10	**0.37**	0.22	0.80
Improving Plant Health	0.31	0.16	**0.40**	0.72
Improving Crop Stand	0.32	0.12	**0.44**	0.69
Protecting Yield	0.14	0.20	**0.48**	0.71
Having Consistent Insect Control	0.18	0.12	**0.49**	0.71
Having Long-Lasting Insect Control	0.36	-0.01	**0.50**	0.61

Note: The highest loading for an item across factors is highlighted in bold.
[a] Corresponds to factor 1 for canola in Table 5.
[b] Corresponds to factor 2 for canola in Table 5.
[c] Corresponds to factor 3 for canola in Table 5.

Table 19. Parameter estimates (t-statistics) for probability of use, proportion of corn acres and value per acre managed for bt corn.

	Probability of Use[a]	Proportion of Corn Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.082	0.056**	-1.951**
	(1.00)	(2.10)	(2.48)
Health, Environment & Marketability	0.071	0.018	0.342
	(0.92)	(0.68)	(0.45)
Plant Performance	-0.067	0.056*	1.555*
	(0.71)	(1.83)	(1.69)
Yield Risk	0.326***	0.056	0.245
	(3.29)	(1.53)	(0.23)
Marketability versus Ease	-0.090	-0.075**	1.383
	(0.75)	(2.03)	(1.28)
U.S. Farm Resource Regions			
Heartland (1 = Yes, 0 = No)	1.058***	0.977***	18.990***
	(11.32)	(29.89)	(22.17)
Northern Crescent (1 = Yes, 0 = No)	0.599***	0.967***	18.349***
	(3.51)	(14.17)	(9.22)
Northern Great Plains (1 = Yes, 0 = No)	1.123***	1.165***	15.160***
	(5.42)	(14.86)	(8.00)
Prairie Gateway (1 = Yes, 0 = No)	0.721***	0.899***	13.615***
	(3.80)	(12.59)	(6.75)
Canadian Provinces			
Manitoba (1 = Yes, 0 = No)	0.950***	0.705***	16.891***
	(3.45)	(9.02)	(5.93)
Ontario (1 = Yes, 0 = No)	1.366***	1.098***	14.676***
	(5.86)	(17.65)	(7.74)
Quebec (1 = Yes, 0 = No)	1.711***	1.019***	24.252***
	(3.76)	(11.51)	(8.08)
Standard Deviation U.S.		0.396***	12.402***
		(16.16)	(24.04)
Standard Deviation Canada		0.342***	12.895***
		(8.61)	(11.72)
Log-Likelihood	-237.41	-234.98	-761.63
Observations	566	419	449
Hypothesis Tests			
H1. No U.S. Regional Differences (χ2(3))	7.59*	7.41*	8.16**
H2. No Canadian Provincial Differences (χ2(2))	2.54	15.86***	7.18**
H3. No U.S. and Canada Differences (χ2(6a or 7b))	13.97**	23.47***	15.94**

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

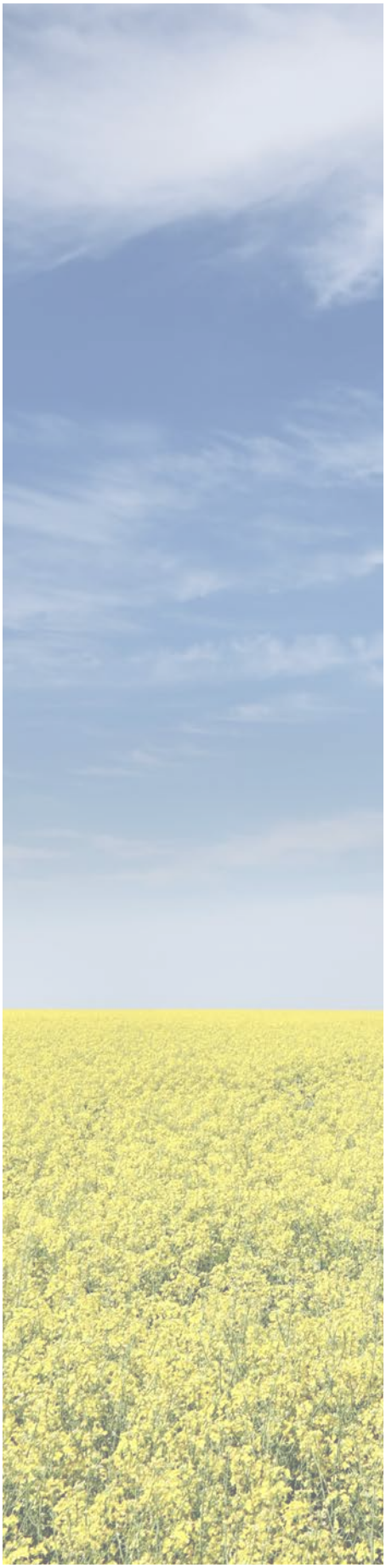


Table 20. Parameter estimates (t-statistics) for probability of use, proportion of corn acres and value per acre managed for corn insecticide seed treatments.

	Probability of Use[a]	Proportion of Corn Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.045	0.052	-0.271
	(0.61)	(0.82)	(0.51)
Health, Environment & Marketability	0.106	-0.004	0.045
	(1.56)	(0.06)	(0.08)
Plant Performance	0.102	0.123	-0.042
	(1.24)	(1.57)	(0.06)
Yield Risk	0.208**	-0.034	1.630**
	(2.30)	(0.35)	(2.05)
Marketability versus Ease	0.190*	0.068	0.236
	(1.83)	(0.76)	(0.31)
U.S. Farm Resource Regions			
Heartland (1 = Yes, 0 = No)	0.473***	1.512***	12.550***
	(5.98)	(14.60)	(21.45)
Northern Crescent (1 = Yes, 0 = No)	0.097	1.343***	12.558***
	(0.61)	(7.87)	(9.07)
Northern Great Plains (1 = Yes, 0 = No)	0.109	1.873***	12.838***
	(0.66)	(7.82)	(8.83)
Prairie Gateway (1 = Yes, 0 = No)	0.501***	1.566***	11.997***
	(2.74)	(8.37)	(9.06)
Canadian Provinces			
Manitoba (1 = Yes, 0 = No)	0.720***	1.690***	9.069***
	(2.61)	(5.17)	(4.90)
Ontario (1 = Yes, 0 = No)	1.486***	2.004***	11.722***
	(5.75)	(5.79)	(9.94)
Quebec (1 = Yes, 0 = No)	0.076	1.338***	7.643***
	(0.28)	(4.35)	(2.86)
Standard Deviation U.S.		0.723***	7.707***
		(9.15)	(20.77)
Standard Deviation Canada		0.695***	7.884***
		(3.57)	(10.59)
Log-Likelihood	-326.20	-183.14	-615.57
Observations	554	360	361
Hypothesis Tests			
H1. No U.S. Regional Differences (χ2(3))	7.62*	4.38	0.21
H2. No Canadian Provincial Differences (χ2(2))	15.40***	4.41	2.78
H3. No U.S. and Canada Differences (χ2(6a or 7b))	33.31***	13.59*	6.76

[a] Probit Estimates.

[b] Interval Regression Estimates.

* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table 21. Parameter estimates (t-statistics) for probability of use, proportion of corn acres and value per acre managed for corn soil insecticides.

	Probability of Use[a]	Proportion of Corn Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.128	0.371***	-1.123
	(1.53)	(3.84)	(1.05)
Health, Environment & Marketability	0.030	-0.021	-0.150
	(0.38)	(0.23)	(0.14)
Plant Performance	-0.115	0.061	-2.243*
	(1.17)	(0.57)	(1.76)
Yield Risk	0.230**	-0.232*	2.286
	(2.05)	(1.69)	(1.51)
Marketability versus Ease	0.036	0.046	1.353
	(0.29)	(0.33)	(0.78)
U.S. Farm Resource Regions			
Heartland (1 = Yes, 0 = No)	-0.675***	1.056***	11.889***
	(8.19)	(10.69)	(12.38)
Northern Crescent (1 = Yes, 0 = No)	-1.053***	1.263***	10.817***
	(5.53)	(4.71)	(4.29)
Northern Great Plains (1 = Yes, 0 = No)	-1.820***	0.375	18.805**
	(5.76)	(0.91)	(2.18)
Prairie Gateway (1 = Yes, 0 = No)	-1.124***	1.376***	12.272***
	(5.16)	(4.55)	(4.04)
Standard Deviation U.S.		0.581***	7.772***
		(7.39)	(11.64)
Log-Likelihood	-212.18	-59.16	-150.24
Observations	455	86	88
Hypothesis Test			
H1. No U.S. Regional Differences (χ2(3))	20.81***	4.49	0.83

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

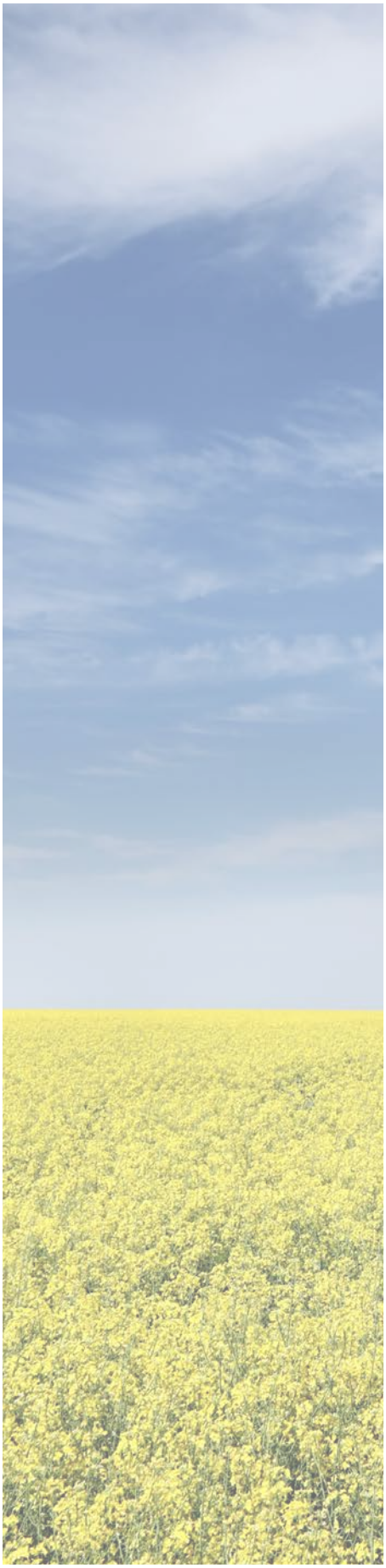


Table 22. Parameter estimates (t-statistics) for probability of use, proportion of corn acres and value per acre managed for corn foliar insecticides.

	Probability of Use[a]	Proportion of Corn Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.016	-0.076	1.294
	(0.18)	(0.44)	(0.77)
Health, Environment & Marketability	0.051	0.086	1.029
	(0.54)	(0.74)	(0.66)
Plant Performance	0.115	-0.129	2.603
	(0.99)	(0.67)	(1.24)
Yield Risk	0.117	0.334**	-0.805
	(0.91)	(2.01)	(0.34)
Marketability versus Ease	0.294**	-0.011	2.839
	(2.14)	(0.07)	(1.31)
U.S. (1 = Yes, 0 = No)	-1.399***	0.991***	13.582***
	(16.08)	(8.31)	(10.58)
Canada (1 = Yes, 0 = No)	-1.203***	0.447***	13.034***
	(7.59)	(3.49)	(4.28)
Standard Deviation U.S.		0.547***	7.466***
		(4.37)	(7.39)
Standard Deviation Canada		0.431***	9.679***
		(3.08)	(3.80)
Log-Likelihood	-168.97	-35.76	-79.61
Observations	563	50	48
Hypothesis Test			
H3. No U.S. and Canada Differences (χ2(1a or 2b))	1.17	8.66***	0.88

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Table 23. Parameter estimates (t-statistics) for probability of use, proportion of soybean acres and value per acre managed for soybean insecticide seed treatments.

	Probability of Use[a]	Proportion of Soybean Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.030	0.121**	-1.113**
	(0.43)	(2.05)	(2.06)
Health, Environment & Marketability	0.031	-0.042	-0.765
	(0.44)	(0.68)	(1.39)
Plant Performance & Yield Risk	-0.003	0.167***	0.896
	(0.04)	(2.59)	(1.48)
Replant Guarantees	0.137	0.012	-0.937
	(1.44)	(0.15)	(1.19)
U.S. Farm Resource Regions			
Heartland (1 = Yes, 0 = No)	0.140*	1.405***	12.323***
	(1.83)	(15.36)	(21.77)
Northern Crescent (1 = Yes, 0 = No)	-0.022	1.099***	7.638***
	(0.13)	(7.61)	(5.71)
Northern Great Plains (1 = Yes, 0 = No)	-0.226	1.416***	8.690***
	(1.27)	(7.31)	(6.09)
Prairie Gateway (1 = Yes, 0 = No)	-0.089	1.538***	11.964***
	(0.46)	(7.38)	(7.62)
Mississippi Portal (1 = Yes, 0 = No)	0.041	1.285***	10.613***
	(0.18)	(6.32)	(6.01)
Canadian Provinces			
Manitoba (1 = Yes, 0 = No)	0.129	1.244***	15.418***
	(0.56)	(6.64)	(6.60)
Ontario (1 = Yes, 0 = No)	1.055***	1.622***	13.076***
	(4.73)	(8.52)	(8.91)
Quebec (1 = Yes, 0 = No)	0.472*	1.031***	11.417***
	(1.70)	(6.24)	(4.66)
Standard Deviation U.S.		0.638***	6.372***
		(9.49)	(18.21)
Standard Deviation Canada		0.534***	8.922***
		(5.11)	(9.55)
Log-Likelihood	-361.72	-172.30	-464.20
Observations	549	306	284
Hypothesis Tests			
H1. No U.S. Regional Differences (χ2(4))	4.51	4.94	14.01***
H2. No Canadian Provincial Differences (χ2(2))	8.74**	8.81**	1.43
H3. No U.S. and Canada Differences (χ2(7a or 8b))	27.88***	14.65*	25.60***

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

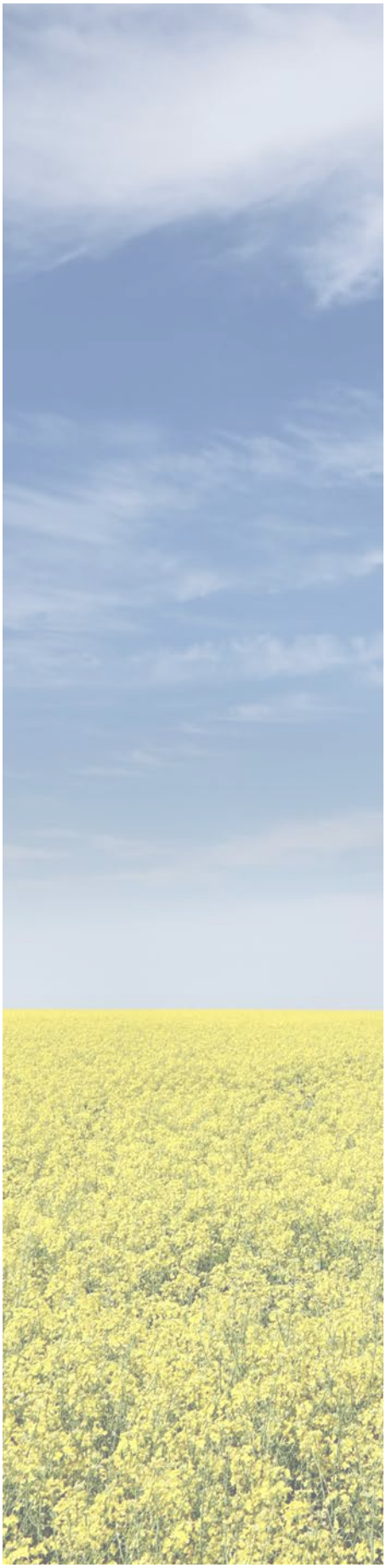


Table 24. Parameter estimates (t-statistics) for probability of use, proportion of soybean acres and value per acre managed for soybean foliar insecticides.

	Probability of Use[a]	Proportion of Soybean Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.170**	-0.032	-0.485
	(2.15)	(0.38)	(0.47)
Health, Environment & Marketability	0.115	-0.035	-0.065
	(1.43)	(0.36)	(0.05)
Plant Performance & Yield Risk	0.163*	0.063	1.259
	(1.85)	(0.63)	(1.01)
Replant Guarantees	0.052	0.050	1.337
	(0.48)	(0.41)	(0.88)
U.S. Farm Resource Regions			
Heartland (1 = Yes, 0 = No)	-0.683***	1.073***	11.864***
	(8.09)	(10.46)	(11.49)
Northern Crescent (1 = Yes, 0 = No)	-0.955***	0.673***	8.510**
	(4.90)	(3.26)	(2.50)
Northern Great Plains (1 = Yes, 0 = No)	-0.942***	0.750***	13.101***
	(4.53)	(3.37)	(4.72)
Prairie Gateway (1 = Yes, 0 = No)	-1.137***	0.787***	13.915***
	(4.60)	(2.89)	(4.08)
Mississippi Portal (1 = Yes, 0 = No)	-0.034	1.234***	15.399***
	(0.14)	(5.58)	(6.55)
Canadian Provinces			
Manitoba (1 = Yes, 0 = No)	-0.829***	0.526***	9.516***
	(3.12)	(2.70)	(3.59)
Ontario (1 = Yes, 0 = No)	-1.075***	0.947***	7.724***
	(4.91)	(4.11)	(2.63)
Quebec (1 = Yes, 0 = No)	-1.369***	0.169	11.500**
	(3.57)	(0.57)	(2.54)
Standard Deviation U.S.		0.633***	8.064***
		(8.40)	(12.01)
Standard Deviation Canada		0.422***	6.262***
		(3.59)	(4.35)
Log-Likelihood	-274.73	-89.61	-192.32
Observations	548	115	112
Hypothesis Tests			
H1. No U.S. Regional Differences (χ2(4))	5.01	6.22	3.45
H2. No Canadian Provincial Differences (χ2(2))	1.44	4.28	0.52
H3. No U.S. and Canada Differences (χ2(7a or 8b))	19.70***	13.42*	6.59

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Value estimates

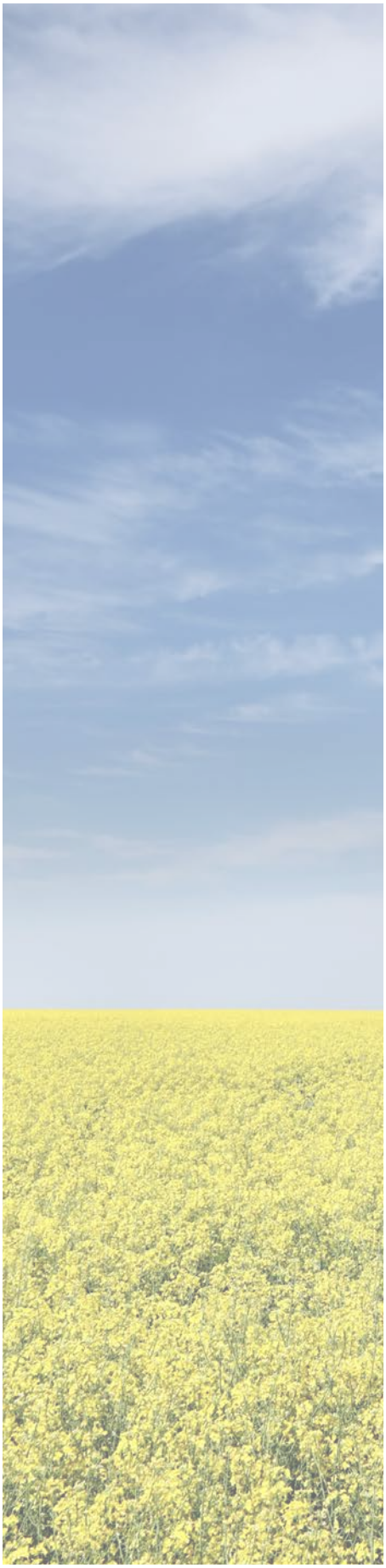
Tables 27 to 29 report the estimated mean and standard deviation along with the 95 percent confidence intervals for the $ per treated acre value to corn farmers from using Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides. They also report the estimated mean and standard deviation along with the 95 percent confidence intervals for the $ per treated acre value to soybean and canola farmers from using insecticide seed treatments and foliar insecticides. These estimates are reported for the various U.S. regions and Canadian provinces in addition to the U.S. and Canada. The estimates are based on equations (5) and (6) using interval regression results from equation (4a). The estimated value represents the additional value per acre managed with the practice as compared to what else the farmer could have done to manage insects (i.e., the area of triangle ***abc*** in Figure 2 (c)).

The estimated mean values of Bt corn for U.S. and Canadian corn farmer respondents are similar – $19.78 per acre with a confidence interval of $18.61 to $20.95 per acre and $20.05 per acre with a confidence interval of $17.54 to $22.55 per acre (Table 27). This result masks regional and provincial differences with estimated means ranging from $16.75 per acre in the Prairie Gateway region to $25.16 per acre in Quebec. The estimated standard deviation is also similar for U.S. and Canadian respondents – $10.85 per acre with a confidence interval of $10.15 to $11.55 per acre versus $11.46 per acre with a confidence interval of $9.94 to $12.99 per acre. Regional and provincial variation in these standard deviations, which range from $10.06 in the Prairie Gateway region to $11.98 in Quebec, is not as large as the regional variation in the mean values.

The difference between U.S. and Canadian corn farmer respondents in the estimated mean value of planting insecticide-treated seed is also modest – $13.38 per acre with a confidence interval of $12.55 to $14.21 per acre and $12.02 per acre with a confidence interval of $10.41 to $13.64 per acre (Table 28). Regional and provincial variation ranged from $10.00 per acre in Quebec to $13.64 per acre in the Northern Great Plains. As with Bt corn, there is less variation in the estimated standard deviations: $6.91 per acre in the U.S. with a confidence interval of $6.40 to $7.43 per acre, $6.79 per acre in Canada with a confidence interval of $5.79 to $7.80 per acre, and regional variation ranging from $6.96 per acre in the Northern Great Plains to $6.21 per acre in Quebec.

The estimated mean value of using soil insecticides on corn for U.S. respondents is $12.92 per acre with a confidence interval of $11.43 to $14.42 per acre (Table 27). Regionally, this value varied from a high of $18.97 per acre in the Northern Great Plains to a low of $12.10 per acre in the Northern Crescent. The estimated standard deviation for the U.S. is $6.89 with a confidence interval of $5.98 to $7.81 and regional variation from $6.70 per acre in the Northern Crescent to $7.57 per acre in the Northern Great Plains.

The estimated mean value of using a foliar insecticide on corn is $14.17 per acre in the U.S. with a confidence interval of $11.87 to $16.48 per acre (Table 29). In Canada, the estimated mean was $14.75 per acre with a confidence interval of $9.39 to $20.11 per acre. The U.S. standard deviation is $6.88 per acre with the confidence interval $5.43 to $8.34 per acre, while the Canadi-



an standard deviation is somewhat larger at $8.27 per acre with the confidence interval $4.87 to $11.68 per acre.

Compared to corn, there are more substantial differences between the U.S. and Canada soybean farmer respondents for the estimated mean value of planting insecticide-treated seed – $11.93 per acre with a confidence interval of $11.11 to $12.75 per acre and $14.53 per acre with a confidence interval of $12.54 to $16.53 per acre (Table 28). Regional and provincial variation ranged from $9.04 per acre in the Northern Crescent to $16.25 per acre in Manitoba. These more substantial differences are mirrored in the standard deviation estimates: $5.99 per acre in the U.S. with a confidence interval of $5.48 to $6.49 per acre, $7.82 per acre in Canada with a confidence interval of $6.55 to $9.10 per acre, and regional and provincial variation ranging from $5.29 in the Northern Crescent to $8.13 in Manitoba.

The estimated mean value to U.S. soybean respondents from using a foliar insecticide is $13.48 per acre with a confidence interval of $11.98 to $14.98 per acre (Table 29). In Canada, the estimate is lower at $10.06 per acre with

Table 25. Parameter estimates (t-statistics) for probability of use, proportion of canola acres and value per acre managed for canola insecticide seed treatments.

	Probability of Use[a]	Proportion of Canola Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.212**	0.332	-0.373
	(2.10)	(0.62)	(0.78)
Health, Environment & Marketability	-0.019	0.453	-0.037
	(0.19)	(0.99)	(0.07)
Plant Performance & Yield Risk	0.208*	0.548	-0.024
	(1.92)	(1.02)	(0.04)
Canadian Provinces			
Alberta (1 = Yes, 0 = No)	0.828***	5.890**	11.232***
	(6.78)	(2.38)	(14.10)
Manitoba (1 = Yes, 0 = No)	1.667***	13.284	12.939***
	(7.05)	(0.02)	(14.06)
Saskatchewan (1 = Yes, 0 = No)	1.404***	5.431**	11.691***
	(11.58)	(2.48)	(20.81)
Standard Deviation		1.912**	7.732***
		(2.14)	(23.54)
Log-Likelihood	-151.74	-22.52	-661.48
Observations	452	399	377
Hypothesis Test			
H2. No Canadian Provincial Differences ($\chi 2(2)$)	16.52***	2.23	2.08

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

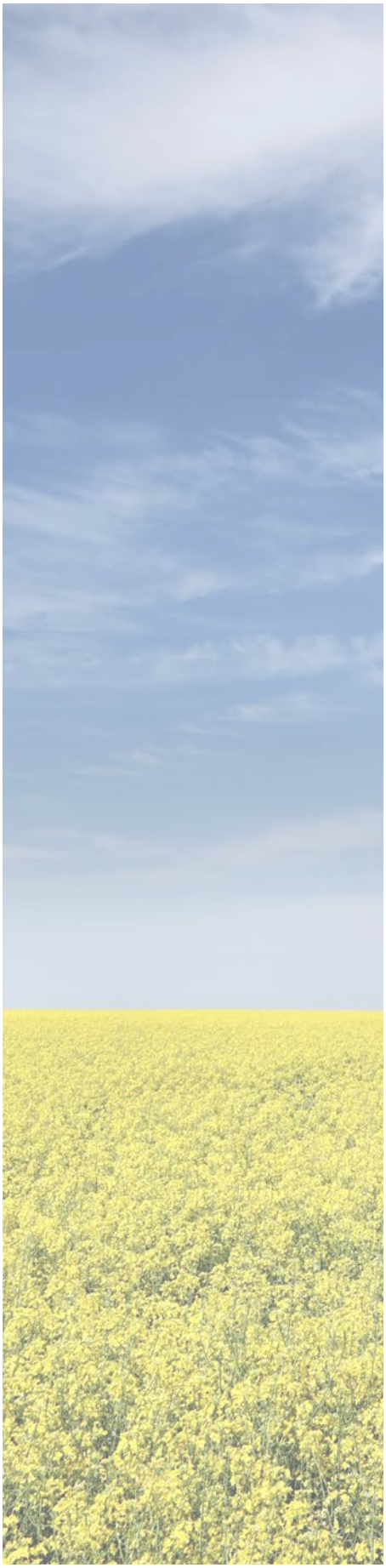
a confidence interval of $7.00 to $13.13 per acre. Ontario respondents had the lowest estimated mean value ($9.03 per acre), while Mississippi Portal respondents had the highest ($15.93 per acre). The estimated standard deviation in the U.S. is $7.21 per acre with a confidence interval of $6.28 to $8.14 per acre. The estimated standard deviation in Canada is $5.50 per acre with a confidence interval of $3.59 to $7.41 per acre. Mississippi Portal respondents had the highest estimated standard deviation ($7.52 per acre), while Ontario respondents had the lowest ($5.23 per acre).

The estimated mean value of using insecticide-treated canola seed for Canadian respondents is $12.85 per acre with a confidence interval of $12.13 to $13.58 per acre (Table 28). Provincial variation ranged from $12.39 per acre in Alberta to $13.74 per acre in Manitoba. The standard deviation is $6.84 per acre with a confidence interval of $6.39 to $7.29 per acre, and provincial variation ranging from $6.74 per acre in Alberta to $6.99 per acre in Manitoba.

Canadian canola respondents' estimated mean value from using a foliar insecticide is $13.88 per acre with a confidence interval of $12.27 to $15.50 per acre (Table 29). Respondents from Manitoba have the highest estimated mean value ($15.66 per acre), while those from Alberta have the lowest ($11.93 per acre). The estimated standard deviation is $7.83 per acre with a confidence interval of $6.82 to $8.85 per acre. This standard deviation ranged from $7.25 per acre in Alberta to $8.09 per acre in Manitoba.

The value estimates reported in Tables 27 to 29 are only for acres where a particular management practice was used. Therefore, they do not take into account the proportion of acres that did not use a particular management practice. To take this into account, we use the information on the proportion of acres managed with each practice in Tables 12 to 14 to measure the value of a practice as $ per planted acre for each crop acre rather than the value per treated acre managed with the practice. For example, a practice with a value of $20 per treated acre that is used on 60 percent of a farmer's planted acres has a value of $20 x 60% = $12 per planted acre. These values per planted acre are reported in Table 30 for the U.S. and Canada.

As expected, these estimated values decrease when expressed on a per planted acre basis, with the largest decreases for those practices used on the fewest acres (foliar insecticides in corn and soybean) and the smallest decreases for those practices used on the most planted acres (insecticide seed treatments on canola in Canada). For corn farmer respondents, the value of Bt corn in the U.S. and Canada is $13.09 and $15.18 per acre of corn. The value of using insecticide seed treatments in the U.S. and Canada is $7.56 and $9.03 per acre of corn. The value of soil insecticides in the U.S. is $1.83 per acre of corn. The value of foliar insecticides in the U.S. and Canada is $0.85 and $0.74 per acre of corn. For soybean farmer respondents, the value of an insecticide seed treatment in the U.S. and Canada is $5.32 and $9.62 per acre of soybean, while the value of foliar insecticides in the U.S. and Canada is $2.18 and $0.74 per acre of soybean. For canola farmer respondents, the value of an insecticide seed treatment in Canada is $11.20 per acre of canola, while the value of foliar insecticides in Canada is $2.55 per acre of canola.



Multiplying these values expressed as $ per planted acre by the total planted acres of each crop gives a national level estimate of the total farmer value of that practice. Planted acres in the U.S. for 2013, the production year about which farmers were surveyed, were 95.4 million for corn, 76.8 million for soybean and 1.3 million for canola (USDA-NASS 2014b). Planted acres in Canada for 2013 were 3.7 million for corn, 4.6 million for soybean and 19.9 million for canola (Statistics Canada 2014a). This planted acres information shows the small amount of corn and soybean acres planted in Canada relative to the U.S. and how much more important canola is in Canada relative to the U.S.

Table 31 reports the total farmer value in the U.S. and Canada for each practice based on these total crop planted acres and the $ per planted acre values in Table 30. As a reminder, these values are the additional value for that insect management practice relative to available alternatives, and all values are U.S. dollars, with Canadian values converted to U.S. dollars using an exchange rate of 0.92 U.S. dollars per Canadian dollar.

Table 26. Parameter estimates (t-statistics) for probability of use, proportion of canola acres and value per acre managed for canola foliar insecticides.

	Probability of Use[a]	Proportion of Canola Acres[b]	Value Per Acre Managed[b]
Factor Scores			
Cost, Planting, Time & Ease	-0.033	0.042	-0.945
	(0.43)	(0.68)	(0.83)
Health, Environment & Marketability	0.049	0.052	-0.902
	(0.63)	(0.84)	(0.79)
Plant Performance & Yield Risk	0.131	0.127	1.902
	(1.45)	(1.61)	(1.30)
Canadian Provinces			
Alberta (1 = Yes, 0 = No)	-0.722***	0.963***	9.518***
	(6.14)	(9.67)	(5.64)
Manitoba (1 = Yes, 0 = No)	-0.305**	0.671***	14.644***
	(2.12)	(7.23)	(8.35)
Saskatchewan (1 = Yes, 0 = No)	-0.737***	0.822***	12.392***
	(8.04)	(10.94)	(9.36)
Standard Deviation		0.488***	9.020***
		(10.22)	(12.21)
Log-Likelihood	-251.16	-85.08	-198.79
Observations	447	115	109
Hypothesis Test			
H2. No Canadian Provincial Differences ($\chi 2(2)$)	6.93**	4.85*	4.43

[a] Probit Estimates.
[b] Interval Regression Estimates.
* Significant at 10 percent. ** Significant at 5 percent. *** Significant at 1 percent.

Bt corn generated almost $1.25 billion in value for U.S. farmers and $56 million in Canada, where far fewer corn acres were planted. The total farmer value for insecticide seed treatments was an estimated $1.13 billion in the U.S. for corn and soybean farmers, with almost two-thirds of this value ($721 million) for corn farmers. In Canada, total farmer values were smaller due to fewer total planted acres. Nevertheless, the total farmer value was $33 million for Canadian corn farmers, $44 million for Canadian soybean farmers and $223 million for Canadian canola farmers, so that all combined, the estimated total farmer value for insecticide seed treatments was more than $301 million in Canada. In the U.S., the total farmer value for soil insecticides was $175 million for corn, while for foliar insecticides, the total farmer value for corn was $81 million and $168 million for soybean. In Canada, the total farmer value of foliar insecticides was $3 million each for corn and soybeans, and $56 million for canola.

These results indicate that for North American corn farmers, Bt corn is the most valuable insect management practice, followed by insecticide seed treatments, soil insecticides (U.S. farmers only) and finally foliar insecticides. For North American soybean and canola farmers, insecticide seed treatments are substantially more valuable than foliar insecticides. Comparing across crops, insecticide seed treatments in the U.S. are more valuable to corn farmers than to soybean farmers. In Canada, insecticide seed treatments are much more valuable to canola farmers than to soybean and corn farmers. Foliar insecticides are more valuable to soybean farmers than to corn farmers in the U.S., while they are much more valuable to canola farmers than to soybean and corn farmers in Canada.

Combining across the U.S. and Canada, the total farmer value for neonicotinoid seed treatments was $1.431 billion in 2013, making them the most valued insect management practice in North America. Bt corn was second, with a total farmer value of $1.304 billion. The total farmer value of foliar insecticides and soil insecticides were a distance third and fourth at $306 million and $175 million respectively. Taken as a whole, these results demonstrate that neonicotinoid seed treatments provide substantial value to North American corn, soybean and canola farmers.

6.0 Summary

The objectives of this research were to assess 1) the value of alternative insect pest management practices to farmers and 2) how these values relate to nonpecuniary factors. To accomplish these objectives, we conducted telephone surveys in 2014 of corn and soybean farmers in the U.S. and corn, soybean and canola farmers in Canada. Corn farmers were queried about their use in 2013 of Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides. Soybean and canola farmers were queried about their use in 2013 of insecticide seed treatments and foliar insecticides. All farmers were queried about their educational background, farming experience, insect pests of concern, source of insect pest management information, nonpecuniary factors influencing their pest management decisions and the value they receive from alternative pest management practices. Factor analysis was used to better understand the nonpecuniary factors influencing farmer pest management decisions. Econometric methods were

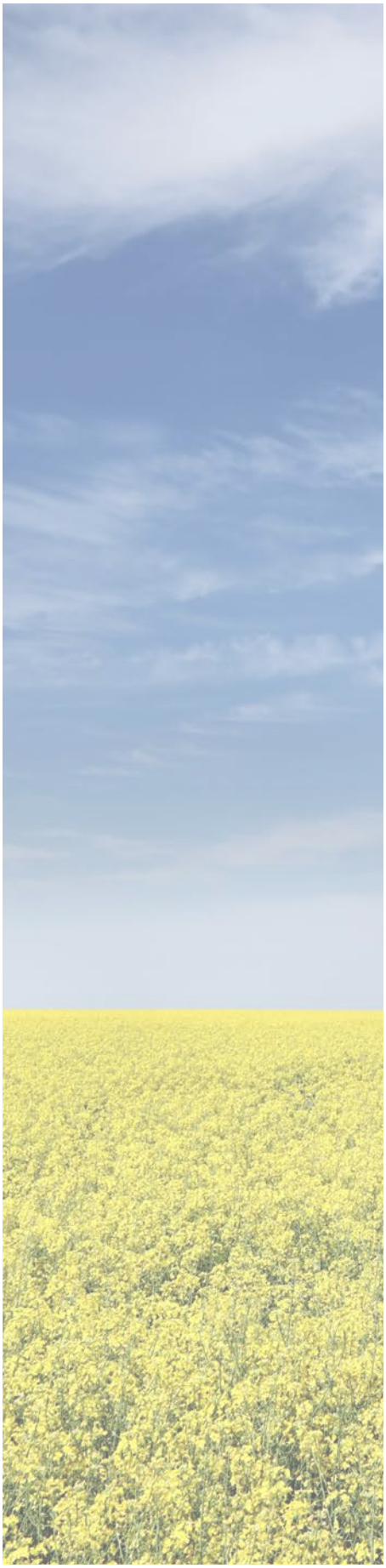


Table 27. Estimated mean and standard deviation of value ($) per treated acre for Bt corn and soil insecticides on corn.

	Bt Corn	Soil Insecticide
	----------Mean ----------	
U.S.	**19.78 [18.61, 20.95]**	**12.92 [11.43, 14.42]**
Heartland	20.62 [19.21, 22.04]	12.92 [11.29, 14.54]
Northern Crescent	20.13 [17.08, 23.17]	12.10 [8.35, 15.85]
Northern Great Plains	17.80 [15.13, 20.46]	18.97 [2.96, 34.98]
Prairie Gateway	16.75 [14.06, 19.44]	13.22 [8.45, 17.98]
Canada	**20.05 [17.54, 22.55]**	
Manitoba	19.30 [15.07, 23.53]	
Ontario	17.76 [14.88, 20.64]	
Quebec	25.16 [19.97, 30.34]	
	----------Standard Deviation----------	
U.S.	**10.85 [10.15, 11.55]**	**6.89 [5.98, 7.81]**
Heartland	10.96 [10.24, 11.68]	6.87 [5.95, 7.79]
Northern Crescent	10.86 [9.96, 11.76]	6.70 [5.54, 7.86]
Northern Great Plains	10.34 [9.43, 11.25]	7.57 [6.12, 9.01]
Prairie Gateway	10.06 [9.11, 11.02]	6.92 [5.69, 8.15]
Canada	**11.46 [9.94, 12.99]**	
Manitoba	10.94 [9.27, 12.61]	
Ontario	10.56 [9.05, 12.07]	
Quebec	11.98 [10.24, 13.72]	

Note: 95th percent confidence intervals are reported in brackets.

Table 28. Estimated mean and standard deviation of value ($) per treated acre managed with insecticidal seed treatments for corn, soybean and canola.

	Corn	Soybean	Canola
	----------Mean ----------		
U.S.	**13.38 [12.55, 14.21]**	**11.93 [11.11, 12.75]**	
Heartland	13.41 [12.42, 14.40]	12.73 [11.72, 13.73]	
Northern Crescent	13.42 [11.20, 15.64]	9.04 [7.19, 10.89]	
Northern Great Plains	13.64 [11.30, 15.99]	9.79 [7.70, 11.88]	
Prairie Gateway	12.97 [10.89, 15.05]	12.41 [9.74, 15.08]	
Mississippi Portal		11.28 [8.44, 14.12]	
Canada	**12.02 [10.41, 13.64]**	**14.53 [12.54, 16.53]**	**12.85 [12.13, 13.58]**
Alberta			12.39 [11.15, 13.63]
Manitoba	10.92 [8.30, 13.55]	16.25 [12.34, 20.17]	13.74 [12.23, 15.25]
Ontario	12.84 [10.88, 14.80]	14.39 [11.93, 16.84]	
Quebec	10.00 [6.61, 13.39]	13.16 [9.55, 16.77]	
Saskatchewan			12.74 [11.82, 13.67]
	----------Standard Deviation ----------		
U.S.	**6.91 [6.40, 7.43]**	**5.99 [5.48, 6.49]**	
Heartland	6.92 [6.39, 7.44]	5.96 [5.44, 6.48]	
Northern Crescent	6.92 [6.29, 7.54]	5.29 [4.66, 5.91]	
Northern Great Plains	6.96 [6.32, 7.59]	5.46 [4.83, 6.10]	
Prairie Gateway	6.84 [6.22, 7.46]	5.92 [5.31, 6.53]	
Mississippi Portal		5.75 [5.09, 6.42]	
Canada	**6.79 [5.79, 7.80]**	**7.82 [6.55, 9.10]**	**6.84 [6.39, 7.29]**
Alberta			6.74 [6.25, 7.23]
Manitoba	6.47 [5.35, 7.59]	8.13 [6.69, 9.56]	6.99 [6.48, 7.50]
Ontario	6.91 [5.88, 7.95]	7.80 [6.49, 9.10]	
Quebec	6.21 [4.89, 7.53]	7.53 [6.09, 8.96]	
Saskatchewan			6.81 [6.35, 7.27]

Note: 95th percent confidence intervals are reported in brackets.

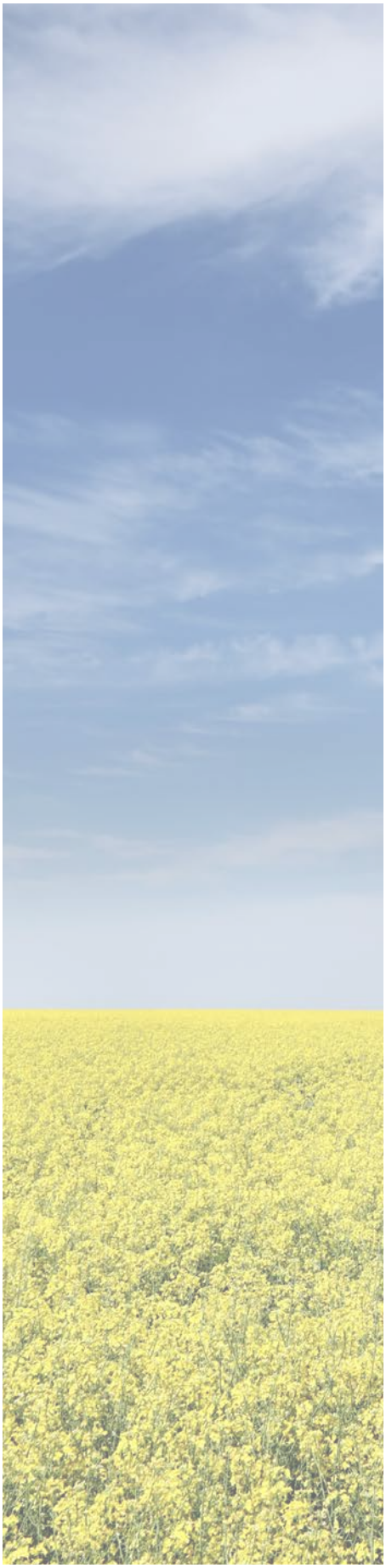


Table 29. Estimated mean and standard deviation of the value ($) per treated acre managed with foliar insecticides for corn, soybean and canola.

	Corn	Soybean	Canola
	----------Mean ----------		
U.S.	**14.17 [11.87, 16.48]**	**13.48 [11.98, 14.98]**	
Heartland		13.04 [11.32, 14.75]	
Northern Crescent		10.67 [6.27, 15.06]	
Northern Great Plains		14.01 [9.58, 18.44]	
Prairie Gateway		14.67 [9.10, 20.24]	
Mississippi Portal		15.93 [11.88, 19.99]	
Canada	**14.75 [9.39, 20.11]**	**10.06 [7.00, 13.13]**	**13.88 [12.27, 15.50]**
Alberta			11.93 [9.57, 14.30]
Manitoba		10.36 [6.02, 14.69]	15.66 [12.78, 18.54]
Ontario		9.03 [4.76, 13.31]	
Quebec		11.98 [4.34, 19.62]	
Saskatchewan			13.92 [11.80, 16.05]
	----------Standard Deviation ----------		
U.S.	**6.88 [5.43, 8.34]**	**7.21 [6.28, 8.14]**	
Heartland		7.05 [6.13, 7.98]	
Northern Crescent		6.48 [5.01, 7.95]	
Northern Great Plains		7.23 [6.06, 8.41]	
Prairie Gateway		7.34 [6.08, 8.60]	
Mississippi Portal		7.52 [6.41, 8.62]	
Canada	**8.27 [4.87, 11.68]**	**5.50 [3.59, 7.41]**	**7.83 [6.82, 8.85]**
Alberta			7.25 [6.16, 8.34]
Manitoba		5.52 [3.48, 7.57]	8.09 [6.97, 9.21]
Ontario		5.23 [3.25, 7.22]	
Quebec		5.79 [3.53, 8.04]	
Saskatchewan			7.75 [6.70, 8.80]

Note: 95th percent confidence intervals are reported in brackets.

used to better understand regional difference in pest management practices and the value of these practices as well as how differences in these pest management practices and the value of these practices related to various nonpecuniary factors. The results of the econometric analysis were also used to estimate the value of the alternative pest management practices.

The major pests of concern noted by corn farmers were the CRW and ECB. Interestingly, while U.S. farmers tended to see the CRW as the most important threat, Canadian farmers saw the ECB as the most important threat. U.S. and Canadian farmers agreed that the aphid was the biggest threat in soybean. For Canadian canola farmers, the biggest threat was the flea beetle. Agricultural retailers and seed or chemical company representatives were the most widely used sources of insect pest management advice for both U.S. and Canadian farmers.

Bt corn was the primary management tactic U.S. and Canadian corn farmers reported using to control insect pests. This was followed by insecticide seed treatments. Both soil and foliar insecticide applications were relatively uncommon in corn, though Canadian corn farmers were more likely to use foliar insecticides, while U.S. corn farmers were more likely to use soil insecticides. About 50 percent more soybean farmers in Canada reported using insecticide seed treatments when compared to U.S. soybean farmers. Alternatively, U.S. soybean farmers were more likely to use foliar insecticides than Canadian soybean farmers. About nine out of 10 Canadian canola farmers used insecticide seed treatments with only one in four using foliar insecticides.

There were similarities in the factors of importance to corn, soybean and canola farmers when making insect pest management decisions. For example, all farmers viewed human and environmental health risks, such as family, worker and public safety; water quality; and wildlife and beneficial insect protection, similarly in terms of their importance for making pest management decisions. However, there were also interesting idiosyncrasies. For example, corn farmers viewed the importance of plant performance (e.g., plant health, crop stand and yield protection) and yield risk (e.g., consistent and long-lasting control) differently, while soybean and canola farmers tended to view these factors similarly.

A variety of significant country differences between the U.S. and Canada, regional differences in the U.S., and provincial differences in Canada were evident. Differences evident between the U.S. and Canada included differences in the proportion of farmers reporting the use of Bt corn and insecticide seed treatments in corn and soybean. They included significant differences in the proportion of corn acreage planted with Bt corn, planted with an insecticide seed treatment and treated with a foliar insecticide; and the proportion of soybean acreage planted with an insecticide seed treatment and treated with a foliar insecticide. They also included differences in per acre value of Bt corn to corn farmers, and value of insecticide-treated seed and foliar insecticides to soybean farmers. Differences evident between regions of the U.S. included differences in the proportion of corn farmers reporting the use of Bt corn, insecticide seed treatments and soil insecticides; in the proportion of corn acreage planted with Bt corn; and the per acre value of Bt corn to corn farmers and insecticide seed treatments to soybean farmers. Differences evident between Canadian provinces includ-

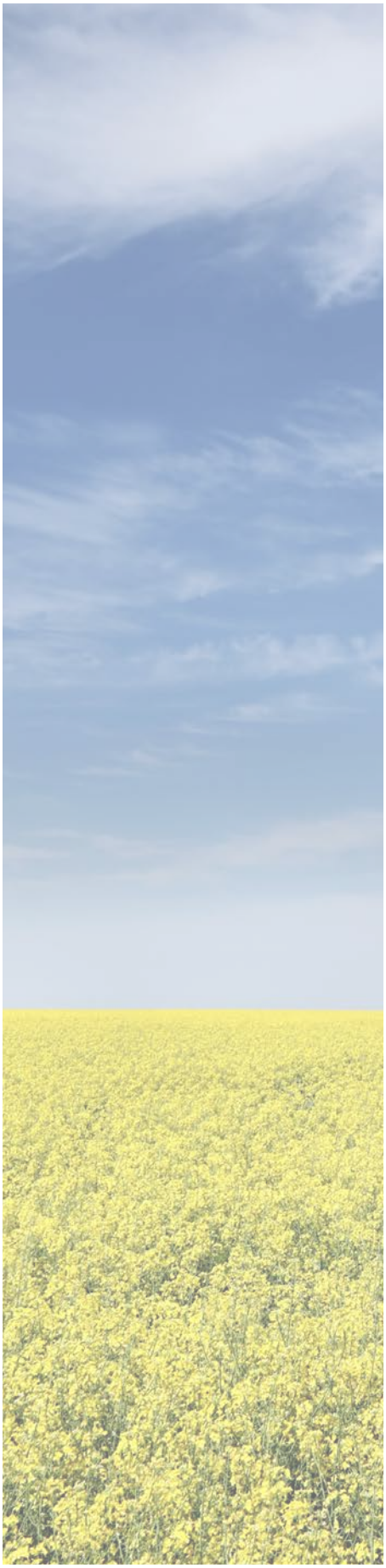


Table 30. Implied value per crop acre for Bt corn, insecticide seed treatments, soil insecticides and foliar insecticides for U.S. and Canadian corn, soybean and canola survey respondents.

	U.S.		Canada		
	Corn	Soybean	Corn	Soybean	Canola
	$/Corn Acre	$/Soybean Acre	$/Corn Acre	$/Soybean Acre	$/Canola Acre
Bt Corn	13.09		15.18		
Insecticide Seed Treatments	7.56	5.32	9.03	9.62	11.20
Soil Insecticides	1.83				
Foliar Insecticides	0.85	2.18	0.74	0.74	2.55

Table 31. Estimated total farmer value for Bt corn, insecticide seed treatments, soil insecticides, and foliar insecticides for U.S. and Canadian corn, soybean and canola in 2013 (U.S. $ million).

Insect Management Practice	U.S.	Canada	North America
Bt Corn (Corn only)	$1,248	$56	$1,304
Insecticide Seed Treatment			
Corn	$721	$33	$754
Soybean	$409	$44	$453
Canola	---[a]	$223	$223
Soil Insecticide (Corn only)	$175	---[b]	$175
Foliar Insecticide			
Corn	$81	$3	$84
Soybean	$168	$3	$171
Canola	---[a]	$56	$56

Totals By Practice	U.S.	Canada	North America
Bt Corn	$1,248	$56	$1,304
Insecticide Seed Treatment	$1,130	$301	$1,431
Soil Insecticide	$175	---[b]	$175
Foliar Insecticide	$249	$57	$306

[a] Canola farmers only surveyed in Canada.
[b] Too few survey respondents in Canada reported using soil insecticides to estimate a value.

ed differences in the proportion of corn and soybean farmers reporting the use of an insecticide seed treatment, and the proportion of canola farmers reporting the use of soil and foliar insecticides. They included the proportion of corn acreage planted with Bt corn, soybean acreage planted with insecticide-treated seed, and the proportion of canola acreage treated with a foliar insecticide. Finally, they included the value of Bt corn to corn farmers and foliar insecticides to canola farmers.

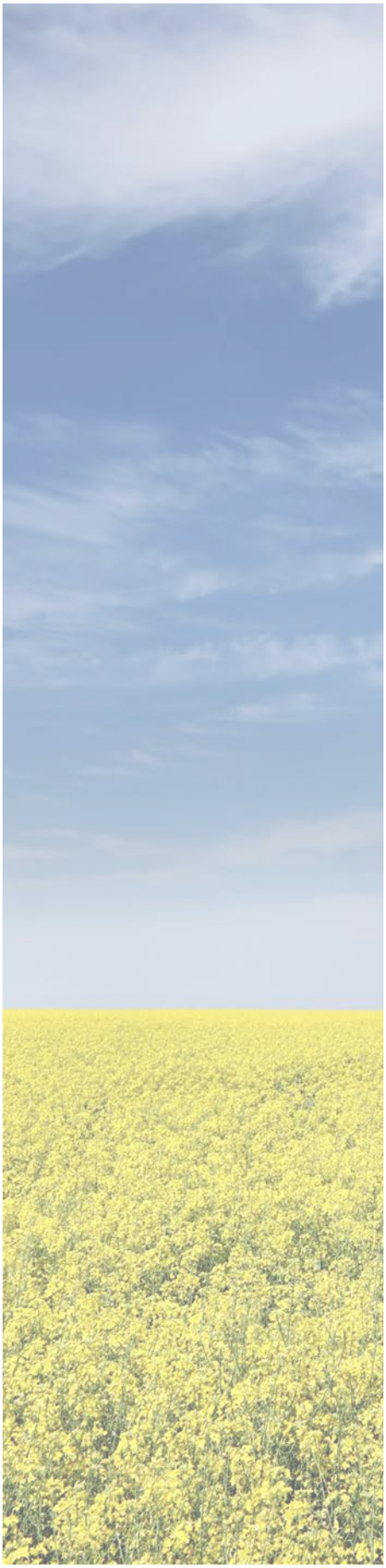
Various nonpecuniary factors were found to be significantly related to the pest management practices farmers reported using, the proportion of the crop farmers reported managing with the practices, and the value of the practices reported by farmers. How these nonpecuniary factors were associated with the use and value of alternative practices varied by crop and practice.

The estimated value of Bt corn is about $20 per treated acre in both the U.S. and Canada. The estimated farmer value for insecticide seed treatments is $13.38 per treated acre for U.S. corn farmers and about $12 per treated acre for Canadian corn farmers. The estimated value of insecticide seed treatments for soybean differs substantially in the U.S. and Canada: more than $14.50 per treated acre in Canada, but not quite $12 per treated acre in the U.S. The estimated value of insecticide seed treatments is $12.85 per treated acre for Canadian canola farmers, while the estimated value of soil insecticides is almost $13 per treated acre for U.S. corn farmers. The estimated value of foliar insecticides is more than $14 per treated acre for both U.S. and Canadian corn farmers, while the value for Canadian canola farmers is just under $14 per treated acre. Just as for insecticide seed treatments, the estimated value of foliar insecticides for soybean differs substantially for the U.S and Canada: almost $13.50 per treated acre in the U.S. but about $10 per treated acre in Canada.

These estimated values all decrease when expressed on a per planted acre basis, with the largest decreases for those practices used on the fewest acres (foliar insecticides in corn and soybean) and the smallest decreases for those practices used on the most planted acres (insecticide seed treatments on canola in Canada). However, multiplying the estimated value per planted acre by total planted acres for each crop in 2013 (the survey crop year) gives the total farmer value for each insect management practice.

The estimated total value of Bt corn in 2013 was $1.25 billion in the U.S. and $56 million in Canada. The estimated total value of insecticide seed treatments in 2013 was $1.13 billion in the U.S. and $301 million in Canada. The estimated total value of soil insecticide treatments in 2013 was $175 million in the U.S. The estimated total value of foliar insecticide treatments in 2013 was $249 million in the U.S. and $57 million in Canada.

Based on these results, neonicotinoid seed treatments were the most valued insect management practice for North American corn, soybean and canola farmers, with a total farmer value of $1.43 billion in 2013. Bt corn was second, with a total farmer value of $1.3 billion in 2013. The total farmer value of foliar and soil insecticides were $306 million and $175 million respectively. Taken as a whole, these results demonstrate that neonicotinoid seed treatments provide substantial value to North American corn, soybean and canola farmers.



7.0 Footnotes

1. The 12 U.S. states sampled for corn accounted for 82 percent of the corn acres planted in the U.S. in 2013, while the 14 U.S. states sampled for soybean accounted for 90 percent of the soybean acres planted in the U.S. in 2013 (USDA-NASS 2014a). The three Canadian provinces sampled for corn, canola and soybean represented over 97 percent of corn, canola and soybean acres planted in Canada in 2011 (Statistics Canada, 2014b).

2. For U.S. corn and soybean farmers, the minimal amount of target crop acres was 250. For Canadian corn, soybean and canola farmers, the minimal amount of target crop acres was 100, 60 and 250.

3. See http://www.ers.usda.gov/publications/aib-agricultural-information-bulletin/aib760.aspx for map of USDA-ERS farm resource regions.

4. An excel file with link from county and state FIPS codes to the USDA-ERS's farm resource regions is available at http://webarchives.cdlib.org/wayback.public/UERS_ag_1/20111128195215/http:/www.ers.usda.gov/Briefing/ARMS/resourceregions/resourceregions.htm.

5. We conducted the factor analysis for each crop separately after determining that there were significant differences in response across crops for most of the 20 items.

6. There are a variety of methods for selecting the appropriate number of factors to retain for further analysis. Two of the most popular are Kaiser rule, which retains factors with eigenvalues greater than 1, and Cattell's Scree test, which plots eigenvalues from largest to smallest and looks for the point where the change in the eigenvalues becomes negligible. The Kaiser rule is often criticized for being ad hoc, while Cattell's Scree test is often criticized for being subjective. Alternatively, the parallel analysis paradigm has the advantage of having statistical foundations and being more objective. Furthermore, it has been found to perform well in simulation studies (Courtney, 2013).

7. GfK Kynetec data are widely recognized as among the best survey-based data on agricultural chemical use and have been collected annually for almost 50 years. For a description of the GfK Kynetec data, see pages i and 1 of *Methods and Assumptions for Estimating the Impact of Neonicotinoid Insecticides on Pest Management Practices and Costs for U.S. Corn, Soybean, Wheat, Cotton and Sorghum Farmers*.

8.0 Appendix A: Survey Scripts

The next several pages include copies of the survey scripts used to conduct the telephone interview. These scripts include the specific questions used during the interview, as well as notes for the interviewer. The survey scripts are in the following order:

1. U.S. Corn Survey Script
2. U.S. Soybean Survey Script
3. Canadian Canola Survey Script
4. Canadian Corn Survey Script
5. Canadian Soybean Survey Script

SCRIPT FOR SURVEY OF U.S. CORN FARMERS

Coding #: _____ (1-6)

Respondent First Name: _____ (7-21)
Respondent Last Name: _____ (22-36)
Phone: _____ (37-46)
Respondent ID: _____ (47-52)
Batch: _____ (53-55)
Validated by: _____
Interview #: _____ (56-59)

Quotas:

	State	Quotas
(_)-1	Iowa	n=73
(_)-2	Illinois	n=64
(_)-3	Nebraska	n=64
(_)-4	Minnesota	n=54
(_)-5	Indiana	n=38
(_)-6	South Dakota	n=37
(_)-7	Kansas	n=30
(_)-8	Wisconsin	n=26
(_)-9	Ohio	n=30
(_)-10	North Dakota	n=30
(_)-11	Missouri	n=30
(_)-12	Michigan	n=24

Date: _____
Edited by: _____
Open End checked by: _____
Edited by: _____
Project #: XXXXXXXXX)

INSECT MANAGEMENT PRACTICES

Hello, my name is _____ with _____, an agricultural research firm conducting a survey with growers in your area. If you qualify and complete the **15**-minute survey today, we will mail you **$10** as a token of our appreciation. Please be assured that we are not selling anything and that any answers you provide will be kept strictly confidential. Our interest is in understanding national farming trends and not any one individual's particular answers. First, I need to ask you a couple of questions to see if you qualify.

A. Are you actively involved in farming?

Yes.....(__)
No.....(__) -- **Thank and terminate**

B. Are you the individual primarily responsible for decisions concerning crop inputs such as the seeds and insecticides used in your farming operation?

Yes.....(__)
No.....(__) -- **Ask for referral**

C. Do you or any member of your household:

	Yes	**No**
a. Work for a farm chemical manufacturer, distributor, or retailer	(__)	(__)
b. Work for a seed company	(__)	(__)

[If "yes" >> explain, thank, and apologize.]

D. How many acres of corn did you plant in 2013?

_____ **acres**

[Must have 250 acres of Corn. If less than 250 of Corn >> explain, thank, and terminate.]
Note for data collection: We need number of phone contacts made for non-response rate.

E. How many of these **[Q.D]** corn acres were planted with conventional tillage? And how many were planted with no tillage?

a. Conventional Tillage....._____ **acres**

b. No-Tillage....._____ **acres**

F. How many of these **[Q.D]** corn acres were planted following 2012 corn?

_____ **acres**

G. In addition to corn, what other crops did you plant in 2013?

Alfalfa or hay.....(__)
Cotton.....(__)
Soybean.....(__)
Wheat.....(__)
Other.....(__)

H. How many total crop acres did you plant in 2013?

_____ **acres [Must be >= to QD]**

1. What corn pests do you actively manage? **[Unaided, Multiple Answer]**

Insect Pest	**Other Names**	
Aphid	Corn Leaf Aphid / Bean Aphid / Bird Cherry-Oat Aphid / Green Peach Aphid / Yellow Sugarcane Aphid	( )-1
Armyworm	Fall Armyworm / True Armyworm	( )-2
Black Cutworm		( )-3
Cinch Bug		( )-4
Corn Borer	European Corn Borer/ Common Stalk Borer/ Cornstalk Borer/ Southwestern Corn Borer	( )-5
Corn Ear Worm	Cotton Bollworm/ Earworm/ Tomato Fruitworm	( )-6
Corn Rootworm	Northern Corn Rootworm/ Mexican Corn Rootworm/ Southern Corn Rootworm/ Western Corn Rootworm	( )-7
Flea Beetle	Corn Flea Beetle	( )-8
Grub	Japanese Beetle Grub/ White Grub	( )-9
Japanese Beetle		( )-10
Maggot	Corn Seed Maggot / Seedcorn Maggot	( )-11

Mite	Banks Grass Mite / Spider Mite / Two-Spotted Mite	( )-12
Nematode		( )-13
Western Bean Cutworm		( )-14
Wireworm		( )-15
Other **[specify]:**	_____	( )-16
Other **[specify]:**	_____	( )-17
Other **[specify]:**	_____	( )-18
Other **[specify]:**	_____	( )-19
Other **[specify]:**	_____	( )-20

2. **[If/Only from Q1]** Which one of these corn pests would you say is the most important for you to manage?

_____

3. Did you plant any of your **[Q.D]** corn acres with Bt corn in 2013?

Yes.....(__)-1
No.....(__)-2 – [**skip to Q.6a]**

4. Did you plant any Bt corn in 2013 that:

(_) a. protects against **BOTH** above ground insects like the corn borer and below ground insects like the corn rootworm?

Yes .....(__)-1
No.....(__)-2

(_) a2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

(_) b. **ONLY** protects against above ground insects like the corn borer?

Yes .....(__)-1
No.....(__)-2

(_) b2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

(_) c. **ONLY** protects against below ground insects like the corn rootworm?

Yes .....(__)-1
No.....(__)-2

(_) c2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

[NOTE: 4a2, 4b2 and 4c2 acres are unique of each other, should = all Bt corn on farm]

5a. What specific Bt corn seed did you plant in 2013? Did you plant any _____ ?

5b. And, how many acres of **[Bt corn]** did you plant? **[SUM of 5b acres = 4a2 + 4b2 + 4c2]**

Product	**Q.5a Used**	**Q.5b Acres**
Agrisure CB/LL, Agrisure GT/CB/LL,	(_)-1	_____
Agrisure RW, Agrisure GT/RW	(_)-2	_____
Agrisure CB/LL/RW, Agrisure 3000GT, Agrisure Artesian 4011A	(_)-3	_____
Agrisure Viptera 3110	(_)-4	_____
Agrisure Viptera 3111	(_)-5	_____
Agrisure 3122 E-Z Refuge	(_)-6	_____
Agrisure Viptera 3220 E-Z Refuge	(_)-7	_____
Herculex I (HX1)	(_)-8	_____
Herculex RW (HXRW)	(_)-9	_____
Herculex XTRA (HXX)	(_)-10	_____
Optimum AcreMax (AM-R)	(_)-11	_____
Optimum AcreMax1 (AM1)	(_)-12	_____
Optimum AcreMax Rootworm (AMRW-R)	(_)-13	_____
Optimum AcreMax Xtra (AMX-R)	(_)-14	_____
Optimum AcreMax XTreme (AMXT-R)	(_)-15	_____
Optimum Intrasect	(_)-16	_____
Optimum Intrasect Xtra	(_)-17	_____
Optimum Intrasect XTreme	(_)-18	_____
Optimum TRIsect	(_)-19	_____
YieldGard VT Triple	(_)-20	_____
Genuity VT Double PRO RIB Complete (GENVT2P)	(_)-21	_____
Genuity VT Triple PRO RIB Complete (GENVT3P)	(_)-22	_____
Genuity SmartStax RIB Complete	(_)-23	_____
Refuge Advanced Powered by SmartStax	(_)-24	_____
Other **[specify]:** _____	(_)-25	_____
Other **[specify]:** _____	(_)-26	_____
Other **[specify]:** _____	(_)-27	_____
Other **[specify]:** _____	(_)-28	_____

NOTE: AID BRAND FAMILY, THEN SPECIFY TYPES.

6a. Were any of your **[Q.D]** corn acres in 2013 planted with seed that had an insecticide seed treatment?

Yes.....(__)-1
No.....(__)-2 – [**skip to Q.8.]**

6b. How many of your **[Q.D]** corn acres were planted with seed that had an insecticide seed treatment?

_____ **acres**

6c. What seed treatments did you use on corn in 2013?

6d. And how many corn acres were planted with these treated seeds? **[SUM of Q6d = Q6b]**

Product	**Q.6c Used**	**Q.6d Acres**
Acceleron IC-609	(_)-1	_____
Avicta	(_)-2	_____
Avicta Complete 500/ Avicta Complete 250	(_)-3	_____
Avicta Duo	(_)-4	_____
Cruiser	(_)-5	_____
Cruiser Maxx	(_)-6	_____
Poncho 600	(_)-7	_____
Poncho Votivo / Poncho 1250 Votivo	(_)-8	_____
Other **[specify]:** _____	(_)-9	_____
Other **[specify]:** _____	(_)-10	_____
Other **[specify]:** _____	(_)-21	_____
Other **[specify]:** _____	(_)-22	_____

7. If you were able to buy the same hybrids without an insecticidal seed treatment, would you have still planted corn with an insecticidal seed treatment?

Yes .....(__)-1
No.....(__)-2
Some, but not all .....(__)-3

8a. Were any of your **[Q.D]** corn acres in 2013 treated with a soil-applied insecticide?

Yes .....(__)-1
No.....(__)-2– [**skip to Q.9.]**

8b. How many of your **[Q.D]** corn acres were treated with a soil insecticide?

_____ **acres**

8c. What soil insecticides were applied to your corn in 2013?
8d. And on how many corn acres were these soil insecticides applied? **[SUM of Q8d >= Q8b; if > 8b, verify]**

Product	**Q.8c Used**	**Q.8d Acres**
Aztec/ Aztec 4.67(4.67%) G/ Aztec 2.1(2.1%) G	(_)-1	_____
Brigade 2 EC	(_)-2	_____
Capture/ Capture LFR	(_)-3	_____
Cobalt	(_)-4	_____
Counter / Counter 15(15%) G/ Counter 20(20%) G	(_)-5	_____
Force/ Force 3(3%) G/ Force CS	(_)-6	_____
Fortress 5G	(_)-7	_____
Lorsban/ Lorsban 15G/ Lorsban 75 WG	(_)-8	_____
Smart Choice 5(5%) G	(_)-9	_____
Other **[specify]:** _____	(_)-10	_____
Other **[specify]:** _____	(_)-11	_____
Other **[specify]:** _____	(_)-12	_____
Other **[specify]:** _____	(_)-13	_____

9a. Were any of your **[Q.D]** corn acres in 2013 treated with a foliar insecticide?

Yes .....(__)-1
No.....(__)-2– [**skip to Q.10.]**

9b. How many of your **[Q.D]** corn acres were treated with a foliar insecticide?

_____ **acres**

9c. What foliar insecticides were used to treat your corn in 2013?
9d And on how many corn acres were they used at least once? **[SUM of Q9d >= Q9b; if > 9b, verify]**

Product	**Q.9c Used**	**Q.9d Acres**
Asana XL	(_)-1	_____
Baythroid XL	(_)-2	_____
Belt SC	(_)-3	_____
Brigade 2 EC	(_)-4	_____
Coragen 1.67 SC	(_)-5	_____
Intrepid 2F	(_)-6	_____
Lannate 90 SP	(_)-7	_____
Lorsban/ Lorsban 4 E/ Lorsban 75 WG	(_)-8	_____
Mustang Max	(_)-9	_____
Penncap-M 2 FM	(_)-10	_____
Permethrin 3.2 EC	(_)-11	_____
Proaxis/ Proaxis 0.5 CS / Proaxis 0.5 EC	(_)-12	_____
Radiant SC	(_)-13	_____
Sevin 80 S	(_)-14	_____
Tracer 4 SC	(_)-15	_____
Warrior	(_)-16	_____
Other **[specify]:** _____	(_)-17	_____
Other **[specify]:** _____	(_)-18	_____
Other **[specify]:** _____	(_)-19	_____
Other **[specify]:** _____	(_)-20	_____

9e. Were your foliar-applied insecticide treatments on your corn pre-planned or based on scouting conducted by you, a crop consultant, or other agricultural professional?

Pre-planned .....(__)-1
Based on scouting .....(__)-2
Both.....(__)-3

10. Please think about the seed, fertilizer, pesticides, equipment, and hired labor you devoted to growing corn in 2013. On average, how much per acre would you say it cost you? I know this may vary from field to field, but what is your best estimate across your entire operation?

$_____._____ cost per acre

11. On average, how much per acre would you say your 2013 corn yielded? That is, how many bushels per acre, on average, across your entire operation?

_____ **bushels per acre**

12a. Have you sold any of your 2013 corn?

Yes .....(__)-1
No.....(__)-2 -- **[Skip to Q.13.]**

12b. In terms of dollars per bushel, what would you say is the average price you received for the 2013 corn you sold?

$____.____ **per bushels**

13. When deciding how to best manage insect pests, where do you go for advice?

Agricultural retailer.....(__)-1
Crop consultant.....(__)-2
Neighbor .....(__)-3
Seed or chemical company representative.....(__)-4
University Extension representative .....(__)-5
Other **[specify]**

_____

14. When choosing how to control insects with a particular insecticide or seed choice, what are the most important factors for you to consider?

_____

_____

_____

15. When choosing how to control insects with a particular insecticide or seed choice, how important are each of the following _____?

Would you say: Not important
Somewhat important
Important
Very important?

		Not important	**Somewhat important**	**Important**	**Very important**
Cost	( )-1	1	2	3	4
Protecting yield	( )-2	1	2	3	4
Having consistent insect control	( )-3	1	2	3	4
Crop marketability	( )-4	1	2	3	4
Replant or other product guarantees	( )-5	1	2	3	4
Improving plant health	( )-6	1	2	3	4
Improving crop stand	( )-7	1	2	3	4
Being able to plant early	( )-8	1	2	3	4
Convenience	( )-9	1	2	3	4

Simplicity	( )-10	1	2	3	4
Flexibility	( )-11	1	2	3	4
Saving time and labor	( )-12	1	2	3	4
Reducing scouting	( )-13	1	2	3	4
Having long lasting insect control	( )-14	1	2	3	4
Protecting beneficial insects	( )-15	1	2	3	4
Protecting wildlife	( )-16	1	2	3	4
Protecting water quality	( )-17	1	2	3	4
Family and worker safety	( )-18	1	2	3	4
Public safety	( )-19	1	2	3	4
Reducing equipment wear and tear	( )-20	1	2	3	4

[Q.16a – Q.16d rotated across surveys to control for order effects.]

[If no Bt corn >> skip.]

(_) 16a.Please think carefully about **all** the reasons why you chose to plant Bt corn in 2013 and what else you could have done to manage insects instead of planting Bt corn. Compared to these alternatives, what **additional value** would you say using Bt corn provided to you **per acre of Bt corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**25** per acre.....(__)-3
More than $**25**, but not more than $**40** per acre.....(__)-4
More than $**40** per acre .....(__)-5

[If No seed treatment >> skip.]

(_) 16b.Please think carefully about **all** the reasons why you chose to plant corn with an insecticidal seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticidal seed treatment. Compared to these alternatives, what **additional value** would you say using an insecticidal seed treatment provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no soil insecticide >> skip.]

(_) 16c.Please think carefully about **all** the reasons why you chose to treat your corn acreage with a soil insecticide in 2013 and what else you could have done to manage insects instead of applying a soil insecticide. Compared to these alternatives, what **additional value** would you say using soil insecticides provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no foliar insecticide >> skip.]

(_) 16d.Please think carefully about **all** the reasons why you chose to treat your corn with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what **additional value** would you say using a foliar insecticide provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)
More than $**5**, but not more than $**10** per acre.....(__)
More than $**10**, but not more than $**15** per acre.....(__)
More than $**15**, but not more than $**25** per acre.....(__)
More than $**25** per acre .....(__)\

17. In general, what are your biggest concerns with regard to insect management in **Corn**?

_____

_____

READ:

I have just a few questions left to help group your responses with responses from others.

18. How many of your **[Q.G]** crop acres in 2013 did you rent or lease?
_____ **acres**
19. How many years have you been managing a farming operation?
_____ **years**
20. What is the last year of formal education that you completed? Would you say:
Did not complete high school .....(__)-1
High school .....(__)-2
Some college.....(__)-3
Vocational/technical training.....(__)-4
College graduate .....(__)-5
Advanced degree.....(__)-6
21. Did you raise any commercial livestock in 2013?
Yes .....(__)-1
No.....(__)-2

READ

Thank you. So that we can mail you your **$10**, could I please have your address?

Name: _____

Address: _____

City: _____

State: _____

ZIP Code: _____

Phone: (_____) _____

SCRIPT FOR SURVEY OF U.S. SOYBEAN FARMERS

Coding #: _____ (1-6)

Respondent First Name: _____ (7-21)
Respondent Last Name: _____ (22-36)
Phone: _____ (37-46)
Respondent ID: _____ (47-52)
Batch: _____ (53-55)
Validated by: _____
Interview #: _____ (56-59)

Quotas:

	State	Quotas
(_)-1	Iowa	n=73
(_)-2	Illinois	n=64
(_)-3	Nebraska	n=64
(_)-4	Minnesota	n=54
(_)-5	Indiana	n=38
(_)-6	South Dakota	n=37
(_)-7	Kansas	n=30
(_)-8	Wisconsin	n=26
(_)-9	Ohio	n=30
(_)-10	North Dakota	n=30
(_)-11	Missouri	n=30
(_)-12	Michigan	n=24

Date: _____
Edited by: _____
Open End checked by: _____
Edited by: _____
Project #: XXXXXXXXX

INSECT MANAGEMENT PRACTICES

Hello, my name is _____ with _____, an agricultural research firm conducting a survey with growers in your area. If you qualify and complete the **15**-minute survey today, we will mail you **$10** as a token of our appreciation. Please be assured that we are not selling anything and that any answers you provide will be kept strictly confidential. Our interest is in understanding national farming trends and not any one individual's particular answers. First, I need to ask you a couple of questions to see if you qualify.

A. Are you actively involved in farming?

Yes.....(__)
No.....(__) -- **Thank and terminate**

B. Are you the individual primarily responsible for decisions concerning crop inputs such as the seeds and insecticides used in your farming operation?

Yes.....(__)
No.....(__) -- **Ask for referral**

C. Do you or any member of your household:

		Yes	No
a.	Work for a farm chemical manufacturer, distributor, or retailer	(__)	(__)
b.	Work for a seed company	(__)	(__)

[If "yes" >> explain, thank, and apologize.]

D. How many acres of soybean did you plant in 2013?

_____ **acres**

[Must have 250 acres of Soybean. If less than 250 of Soybean >> explain, thank, and terminate.]
Note for data collection: We need number of phone contacts made for non-response rate.

E. How many of these **[Q.D]** soybean acres were planted with conventional tillage? And how many were planted with no tillage?

a. Conventional Tillage....._____ **acres**

b. No-Tillage....._____ **acres**

F. In addition to soybean, what other crops did you plant in 2013?

Alfalfa or hay .....(__)
Corn.....(__)
Cotton.....(__)
Wheat .....(__)
Other .....(__)

G. How many total crop acres did you plant in 2013?

_____ **acres [Must be >= to Q.D]**

1. What soybean pests do you actively manage? **[Unaided, Multiple Answer]**

Insect Pest	**Other Names**	
Aphid	Soybean Aphid	( )-1
Armyworm	Beet Armyworm/ Fall Armyworm/ Yellow Stripe Armyworm	( )-2
Beetle	Bean Leaf Beetle/ Blister Beetle/ Mexican Bean Beetle/ Colorado Potato Beetle/ Flea Beetle	( )-3
Grasshopper	Cricket	( )-4
Grub	White Grub/ Japanese Beetle Grub	( )-5
Japanese Beetle		( )-6
Maggot	Bean Seed Maggot/ Seed Maggot	( )-7
Mite	Red Spider Mite/ Spider Mite/ Two-Spotted Mite	( )-8
Soybean Podworm	Corn Earworm/ Bollworm	( )-9
Stink Bug	Green Stink Bug/ Brown Stink Bug/ Redshoulder Stink Bug/ Southern Green Stink Bug/ Red Banded Stink Bug/ Rice Stink Bug	( )-10
Three Cornered Alfalfa Hopper		( )-11
Wireworm		( )-12
Other **[specify]:**	_____	( )-13
Other **[specify]:**	_____	( )-14
Other **[specify]:**	_____	( )-15
Other **[specify]:**	_____	( )-16
Other **[specify]:**	_____	( )-17

2. **[If/Only from Q1]** Which one of these soybean pests would you say is the most important for you to manage?

_____

3. Were any of your **[Q.D]** soybean acres in 2013 planted with seed that had an insecticidal seed treatment?

Yes.....(__)
No.....(__) – [**skip to Q.7.]**

4. How many of your **[Q.D]** soybean acres were planted with seed that had an insecticidal seed treatment?

_____ **acres**

5. What seed treatments did you use on your 2013 soybean?
And how many acres were planted with these treated seeds?

Product	**Used**	**Acres**
Acceleron Brands (Monsanto Seed Treatments)	(_)-1	_____
Cruiser Maxx	(_)-2	_____
Cruiser Maxx Advanced	(_)-3	_____
Gaucho 600	(_)-4	_____
Inovate	(_)-5	_____
Poncho Votivo	(_)-6	_____
PPST 2030 (Pioneer Premium Seed Treatment)	(_)-7	_____
Warden CX	(_)-8	_____
Warden RTA	(_)-9	_____
Other **[specify]:** _____	(_)-10	_____
Other **[specify]:** _____	(_)-11	_____
Other **[specify]:** _____	(_)-12	_____
Other **[specify]:** _____	(_)-13	_____

6. If you were able to buy the same soybean varieties without an insecticidal seed treatment, would you have still planted soybean with an insecticidal seed treatment?

Yes .....(__)-1
No.....(__)-2
Some, but not all .....(__)-3

7. Were any of your **[Q.D]** soybean acres in 2013 treated with a foliar insecticide?

Yes.....(__)
No.....(__)– [**skip to Q.11.]**

8. How many of your **[Q.D]** soybean acres were treated with a foliar insecticide?

_____ **acres**

9. What foliar insecticides were used to treat your soybean in 2013? And on how many acres were they used at least once?

Product	**Used**	**Acres**
Acephate	(_)-1	_____
Asana	(_)-2	_____
Baythroid	(_)-3	_____
Belt	(_)-4	_____
Bifen	(_)-5	_____
Bracket	(_)-6	_____
Brigade	(_)-7	_____
Chlorpyrifos	(_)-8	_____
Cobalt	(_)-9	_____
Declare*	(_)-10	_____
Delta Gold	(_)-11	_____
Dimilin	(_)-12	_____
Endigo	(_)-13	_____
Hero	(_)-14	_____
Intrepid	(_)-15	_____
Karate	(_)-16	_____
Kendo	(_)-17	
Lambda-Cy	(_)-18	
Lambdastar	(_)-19	
Leverage	(_)-20	
Lorsban	(_)-21	
Mustang	(_)-22	
Nufos	(_)-23	
Orthene	(_)-24	
Silencer	(_)-25	
Sniper*	(_)-26	
Steward	(_)-27	
Swagger	(_)-28	
Tombstone	(_)-29	
Tundra	(_)-30	
Up-Cyde	(_)-31	
Warrior	(_)-32	
Other **[specify]:** _____	(_)-33	_____
Other **[specify]:** _____	(_)-34	_____
Other **[specify]:** _____	(_)-35	_____
Other **[specify]:** _____	(_)-36	_____

10. Were your soybean foliar insecticide treatments pre-planned or based on scouting conducted by you, a crop consultant, or other agricultural professional?

Pre-planned .....(__)-1
Based on scouting .....(__)-2
Both.....(__)-3

11. Please think about the seed, fertilizer, pesticides, equipment, and hired labor you devoted to growing soybean in 2013. On average, how much per acre would you say it cost you? I know this may vary from field to field, but what is your best estimate across your entire operation?

$_____._____ cost per acre

12. On average, how much per acre would you say your 2013 soybean yielded? That is, how many bushels per acre, on average, across your entire operation?

_____ **bushels per acre**

13. Have you sold any of your 2013 soybean?

Yes .....(__)-1
No.....(__)-2 -- **[Skip to Q.15]**

14. In terms of dollars per bushel, what would you say is the average price you received for the 2013 soybean you sold?

$____.____ **per bushels**

15. When deciding how to best manage insect pests, where do you go for advice?

Agricultural retailer.....(__)-1
Crop consultant.....(__)-2
Neighbor .....(__)-3
Seed or chemical company representative.....(__)-4
University Extension representative .....(__)-5
Other **[specify]**

_____

16. When choosing how to control insects with a particular insecticide, what are the most important factors for you to consider?

_____

_____

_____

17. When choosing how to control insects with a particular insecticide, how important are each of the following _____?

Would you say: Not important
Somewhat important
Important
Very important?

		Not important	**Somewhat important**	**Important**	**Very important**
Cost	( )-1	1	2	3	4
Protecting Yield	( )-2	1	2	3	4
Having Consistent Insect Control	( )-3	1	2	3	4
Crop Marketability	( )-4	1	2	3	4

Replant or Other Product Guarantees	( )-5	1	2	3	4
Improving Plant Health	( )-6	1	2	3	4
Improving Crop Stand	( )-7	1	2	3	4
Being Able to Plant Early	( )-8	1	2	3	4
Convenience	( )-9	1	2	3	4
Simplicity	( )-10	1	2	3	4
Flexibility	( )-11	1	2	3	4
Saving Time and Labor	( )-12	1	2	3	4
Reducing Scouting	( )-13	1	2	3	4
Having Long Lasting Insect Control	( )-14	1	2	3	4
Protecting Beneficial Insects	( )-15	1	2	3	4
Protecting Wildlife	( )-16	1	2	3	4
Protecting Water Quality	( )-17	1	2	3	4
Family and Worker Safety	( )-18	1	2	3	4
Public Safety	( )-19	1	2	3	4
Reducing Equipment Wear and Tear	( )-20	1	2	3	4

[Questions 18 – 19 rotated across surveys to control for order effects.]
[If No Seed Treatment >> skip.]

(_) 18. Please think carefully about **all** the reasons why you chose to plant soybean with an insecticidal seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticidal seed treatment. Compared to these alternatives, what **additional value** would you say using an insecticidal seed treatment provided to you **per acre of treated soybean**?

Not more than $**5** per acre	(__)
More than $**5**, but not more than $**10** per acre	(__)
More than $**10**, but not more than $**15** per acre	(__)
More than $**15**, but not more than $**25** per acre	(__)
More than $**25** per acre	(__)

[If No foliar insecticde >> skip.]

(_) 19. Please think carefully about **all** the reasons why you chose to treat your soybean with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what **additional value** would you say using a foliar insecticide provided to you **per acre of treated soybean**?

Not more than $**5** per acre	(__)
More than $**5**, but not more than $**10** per acre	(__)
More than $**10**, but not more than $**15** per acre	(__)
More than $**15**, but not more than $**25** per acre	(__)
More than $**25** per acre	(__)

20. In general, what are your biggest concerns with regard to insect management in **Soybean**?

_____

_____

_____

READ:

I have just a few questions left to help group your responses with responses from others.

21. How many of your **[Q.G]** crop acres in 2013 did you rent or lease?

_____ **acres**

22. How many years have you been managing a farming operation?

_____ **years**

23. What is the last year of formal education that you completed? Would you say:

Did not complete high school .....(__)-1
High school .....(__)-2
Some college.....(__)-3
Vocational/technical training.....(__)-4
College graduate .....(__)-5
Advanced degree.....(__)-6

24. Did you raise any commercial livestock in 2013?

Yes .....(__)-1
No.....(__)-2

READ

Thank you. So that we can mail you your **$10**, could I please have your address?

Name: _____

Address: _____

City: _____

State: _____

ZIP Code: _____

Phone: (_____) _____

SCRIPT FOR SURVEY OF CANADIAN CANOLA FARMERS

Coding #: _____ (1-6)

Respondent First Name: _____ (7-21)
Respondent Last Name: _____ (22-36)
Phone: _____ (37-46)
Respondent ID: _____ (47-52)
Batch: _____ (53-55)
Validated by: _____
Interview #: _____ (56-59)

Quotas: (n=500)

	State	Quotas
(_)-1	AB	n=158
(_)-2	SK	n=260
(_)-3	MB	n=82

Date: _____
Edited by: _____
Open End checked by: _____
Edited by: _____
Project #: XXXXXXXXX

INSECT MANAGEMENT PRACTICES

Hello, my name is _____ with _____, an agricultural research firm conducting a survey with growers in your area. If you qualify and complete the **15**-minute survey today, we will mail you **$10** as a token of our appreciation. Please be assured that we are not selling anything and that any answers you provide will be kept strictly confidential. Our interest is in understanding national farming trends and not any one individual's particular answers. First, I need to ask you a couple of questions to see if you qualify.

A. Are you actively involved in farming?

Yes.....(__)
No.....(__) -- **Thank and terminate**

B. Are you the individual primarily responsible for decisions concerning crop inputs such as the seeds and insecticides used in your farming operation?

Yes.....(__)
No.....(__) -- **Ask for referral**

C. Do you or any member of your household: **Yes** **No**

a. Work for a farm chemical manufacturer, distributor, or retailer ..... (__) (__)
b. Work for a seed company ..... (__) (__)

[If "yes" >> explain, thank, and apologize.]

D. How many acres of canola did you plant in 2013?

_____ **acres**

[Must have 300 acres of canola. If less than 300 of canola >> explain, thank, and terminate.]
Note for data collection: We need number of phone contacts made for non-response rat

E. How many of these **[Q.D]** canola acres were planted with conventional tillage? And how many were planted with no tillage?

a. Conventional Tillage....._____ **acres**

b. No-Tillage ....._____ **acres**

F. In addition to canola, what other crops did you plant in 2013?

Alfalfa or hay or forage.....(__)
Corn.....(__)
Soybeans .....(__)
Wheat .....(__)
Barley.....(__)
Pulses (peas/lentils/chickpeas).....(__)
Other .....(__)

G. How many total crop acres did you plant in 2013?

_____ **acres -- Must be ≥ Q.D.**

H. And, how many summer fallow acres, if any, did you have last year in 2013?

_____ **Fallow acres**

1. What canola pests do you actively manage? **[Unaided, multiple answer.]**

Insect Pest	**Other Names**	
Armyworm	Fall Armyworm	(_)-1
Bertha Armyworm		(_)-2
Cabbage Seedpod weevil		(_)-3
Cutworm		(_)-4
Diamondback Moth		(_)-5
Flea Beetle	Striped Flea Beetle / Crucifer Flea Beetle	(_)-6
Lygus Bug	Tarnished Plant Bug	(_)-7
Wireworm		(_)-8
Other **[specify]:**	_____	
Other **[specify]:**	_____	
Other **[specify]:**	_____	
Other **[specify]:**	_____	
Other **[specify]:**	_____	

2. **[If/Only from Q.1:]** Which one of these canola pests would you say is the most important for you to manage?

_____

3a. Were any of your **[Q.D]** canola acres in 2013 planted with seed that had an insecticide seed treatment?

Yes.....(__)-1
No.....(__)-2 – **skip to Q.4a**

3b. How many of your **[Q.D]** canola acres were planted with seed that had an insecticide seed treatment?

_____ **acres**

3c. What seed treatments did you use on your 2013 canola?
3d. And how many acres were planted with these treated seeds?

Product	**Used**	**Acres**
Acceleron (DEKALB)	(_)-1	_____
Helix Extra/Helix Vibrance (Syngenta)	(_)-2	_____
Prosper EverGol (Bayer)	(_)-3	_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____

3e. If you were able to buy the same canola varieties without an insecticidal seed treatment, would you have still planted canola with an insecticidal seed treatment?

Yes .....(__)-1
No.....(__)-2
Some, but not all .....(__)-3

4a. Were any of your **[Q.D]** canola acres in 2013 treated with a foliar insecticide?

Yes.....(__)-1
No .....(__)-2 – **skip to Q.5**

4b. How many of your **[Q.D]** canola acres were treated with a foliar insecticide?

_____ **acres**

4c. What foliar insecticides were used to treat your canola in 2013?
4d. And on how many acres were they used at least once?

Product	**Used**	**Acres**
Ambush	(_)-1	_____
Citadel	(_)-2	_____
Cygon	(_)-3	_____
Decis	(_)-4	_____
Lagon	(_)-5	_____
Lannate	(_)-6	_____
Lorsban	(_)-7	_____
Malathion	(_)-8	_____
Matador	(_)-9	_____
Monitor	(_)-10	_____
Nufos	(_)-11	_____
Perm-up	(_)-12	_____
Pounce	(_)-13	_____
Pyrifos	(_)-14	_____
Pyrinex	(_)-15	_____

Ripcord	(_)-16	_____
Sevin XLR	(_)-17	_____
Silencer	(_)-18	_____
UP-Cyde	(_)-19	_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____
Other **[specify]:** _____		_____

4e. Were your canola foliar insecticide treatments pre-planned or based on scouting conducted by you, a crop consultant, or other agricultural professional?

Pre-planned .....(__)-1
Based on scouting .....(__)-2
Both.....(__)-3

5. Please think about the seed, fertilizer, pesticides, equipment, and hired labor you devoted to growing canola in 2013. On average, how much per acre would you say it cost you? I know this may vary from field to field, but what is your best estimate across your entire operation?

$_____._____ cost per acre

6. On average, how much per acre would you say your 2013 canola yielded? That is, how many bushels per acre, on average, across your entire operation?

_____ **bushels per acre**

7a. Have you sold any of your 2013 canola?

Yes .....(__)-1
No.....(__)-2 -- **Skip to Q.8**

7b. In terms of dollars per bushel, what would you say is the average price you received for the 2013 canola you sold?

$____.____ **per bushel**

8. When deciding how to best manage insect pests, where do you go for advice?

Agricultural retailer.....(__)-1
Crop consultant.....(__)-2
Neighbor .....(__)-3
Seed or chemical company representative.....(__)-4
Provincial agronomist .....(__)-5
Other **[specify]**
_____

9. When choosing how to control insects with a particular insecticide, what are the most important factors for you to consider?

_____

_____

10. When choosing how to control insects with a particular insecticide, how important are each of the following _____?

Would you say:
Not important
Somewhat important
Important
Very important?

		Not important	Somewhat important	Important	Very important
Cost	( )-1	1	2	3	4
Protecting yield	( )-2	1	2	3	4
Having consistent insect control	( )-3	1	2	3	4
Crop marketability	( )-4	1	2	3	4
Replant or other product guarantees	( )-5	1	2	3	4
Improving plant health	( )-6	1	2	3	4
Improving crop stand	( )-7	1	2	3	4
Being able to plant early	( )-8	1	2	3	4
Convenience	( )-9	1	2	3	4
Simplicity	( )-10	1	2	3	4
Flexibility	( )-11	1	2	3	4
Saving time and labor	( )-12	1	2	3	4
Reducing scouting	( )-13	1	2	3	4
Having long lasting insect control	( )-14	1	2	3	4
Protecting beneficial insects	( )-15	1	2	3	4
Protecting wildlife	( )-16	1	2	3	4
Protecting water quality	( )-17	1	2	3	4
Family and worker safety	( )-18	1	2	3	4
Public safety	( )-19	1	2	3	4
Reducing equipment wear and tear	( )-20	1	2	3	4

[Questions 11 – 12 rotated across surveys to control for order effects.]

[If no <u>Seed Treatment</u> >> skip.]

(_) 11. Please think carefully about **<u>all</u>** the reasons why you chose to plant canola with an insecticide seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticide seed treatment. Compared to these alternatives, what **<u>additional value</u>** would you say using an insecticide seed treatment provided to you **<u>per acre of treated canola</u>**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no Foliar Insecticide >> skip.]

(_) 12. Please think carefully about **all** the reasons why you chose to treat your canola with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what **additional value** would you say using a foliar insecticide provided to you **per acre of treated canola**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

13. In general, what are your biggest concerns with regard to insect management in **canola**?

_____

_____

READ:

I have just a few questions left to help group your responses with responses from others.

14. How many of your **[Q.G]** crop acres in 2013 did you rent or lease?
_____ **acres**
15. How many years have you been managing a farming operation?
_____ **years**
16. What is the last year of formal education that you completed? Would you say:

Did not complete high school .....(__)-1
High school .....(__)-2
Some college or university.....(__)-3
Vocational/technical training.....(__)-4
College or University graduate .....(__)-5
Advanced degree.....(__)-6

17. Did you raise any commercial livestock in 2013?
Yes .....(__)-1
No.....(__)-2

READ
Thank you. So that we can mail you your **$10**, could I please have your address?

Name: _____

Address: _____

City: _____

State: _____

Postal Code: _____

Phone: (_____) _____

SCRIPT FOR SURVEY OF CANADIAN CORN FARMERS

Coding #: _____ (1-6)

Respondent First Name: _____ (7-21)
Respondent Last Name: _____ (22-36)
Phone: _____ (37-46)
Respondent ID: _____ (47-52)
Batch: _____ (53-55)
Validated by: _____
Interview #: _____ (56-59)

Quotas: (n = 100 – 125)

	Province	Quotas
(_)-1	Manitoba	n=30
(_)-2	Quebec	n=30
(_)-3	Ontario	n=60

Date: _____
Edited by: _____
Open End checked by: _____
Edited by: _____
Project #: XXXXXXXXX

INSECT MANAGEMENT PRACTICES

Hello, my name is _____ with _____, an agricultural research firm conducting a survey with growers in your area. If you qualify and complete the **15**-minute survey today, we will mail you **$15** as a token of our appreciation. Please be assured that we are not selling anything and that any answers you provide will be kept strictly confidential. Our interest is in understanding national farming trends and not any one individual's particular answers. First, I need to ask you a couple of questions to see if you qualify.

A. Are you actively involved in farming?

Yes.....(__)
No.....(__) -- **Thank and terminate**

B. Are you the individual primarily responsible for decisions concerning crop inputs such as the seeds and insecticides used in your farming operation?

Yes.....(__)
No.....(__) -- **Ask for referral**

C. Do you or any member of your household:

	Yes	**No**
a. Work for a farm chemical manufacturer, distributor, or retailer	(__)	(__)
b. Work for a seed company	(__)	(__)

[If "yes" >> explain, thank, and apologize.]

D. How many acres of corn did you plant in 2013?

_____ **acres**

[Must have 250 acres of Corn. If less than 250 of Corn >> explain, thank, and terminate.]
Note for data collection: We need number of phone contacts made for non-response rate.

E. How many of these **[Q.D]** corn acres were planted with conventional tillage? And how many were planted with no tillage?

a. Conventional Tillage....._____ **acres**

b. No-Tillage....._____ **acres**

F. How many of these **[Q.D]** corn acres were planted following 2012 corn?

_____ **acres**

G. In addition to corn, what other crops did you plant in 2013?

Alfalfa or hay or forage.....(__)
Canola .....(__)
Soybean.....(__)
Wheat .....(__)
Other .....(__)

H. How many total crop acres did you plant in 2013?

_____ **acres [Must be >= to Q.D.]**

1. What corn pests do you actively manage? **[Unaided, multiple answer.]**

Insect Pest	**Other Names**	
Aphid	Corn Leaf Aphid / Bean Aphid / Bird Cherry-Oat Aphid / Green Peach Aphid / Yellow Sugarcane Aphid	( )-1
Armyworm	Fall Armyworm / True Armyworm	( )-2
Cutworm	Black Cutworm / Striped Cutworm / Western Bean Cutworm	( )-3
Cinch Bug		( )-4
Corn Borer	European Corn Borer/ Common Stalk Borer/ Cornstalk Borer/ Southwestern Corn Borer	( )-5
Corn Ear Worm	Cotton Bollworm/ Earworm/ Tomato Fruitworm	( )-6
Corn Rootworm	Northern Corn Rootworm/ Mexican Corn Rootworm/ Southern Corn Rootworm/ Western Corn Rootworm	( )-7
Flea Beetle	Corn Flea Beetle	( )-8
Grub	Japanese Beetle Grub/ White Grub	( )-9
Japanese Beetle		( )-10
Maggot	Corn Seed Maggot / Seedcorn Maggot	( )-11
Mite	Banks Grass Mite / Spider Mite / Two-Spotted Mite	( )-12
Nematode		( )-13
Wireworm		( )-14
Craneflies	European March Craneflies / Leatherjacket	( )-15
Millipedes		( )-16
Slugs		( )-17
Other **[specify]:**	_____	( )-18
Other **[specify]:**	_____	( )-19
Other **[specify]:**	_____	( )-20
Other **[specify]:**	_____	( )-21
Other **[specify]:**	_____	( )-22

2. **[If/Only from Q.1:]** Which one of these corn pests would you say is the most important for you to manage?

_____

3. Did you plant any of your **[Q.D]** corn acres with Bt corn in 2013?

Yes.....(__)-1
No.....(__)-2 – **skip to Q.6a**

4. Did you plant any Bt corn in 2013 that:

(_) a. protects against **BOTH** above ground insects like the corn borer and below ground insects like the corn rootworm?

Yes .....(__)-1
No.....(__)-2

(_) a2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

(_) b. **ONLY** protects against above ground insects like the corn borer?

Yes .....(__)-1
No.....(__)-2

(_) b2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

(_) c. **ONLY** protects against below ground insects like the corn rootworm?

Yes .....(__)-1
No.....(__)-2

(_) c2. **[If "yes" >> ask:]** How many acres?

_____ **acres**

[NOTE: 4a2, 4b2 and 4c2 acres are unique of each other, should = all Bt corn on farm.]

5a. What specific Bt corn seed did you plant in 2013? Did you plant any _____ ?
5b. And, how many acres of **[Bt corn]** did you plant? **[SUM of 5b acres = 4a2 + 4b2 + 4c2.]**

Product	**Q.5a Used**	**Q.5b Acres**
Agrisure CB/LL, Agrisure GT/CB/LL,	(_)-1	_____
Agrisure RW, Agrisure GT/RW	(_)-2	_____
Agrisure CB/LL/RW, Agrisure 3000GT, Agrisure Artesian 4011A	(_)-3	_____
Agrisure Viptera 3110	(_)-4	_____
Agrisure Viptera 3111	(_)-5	_____
Agrisure 3122 E-Z Refuge	(_)-6	_____
Agrisure Viptera 3220 E-Z Refuge	(_)-7	_____

Herculex I (HX1)	(_)-8	_____
Herculex RW (HXRW)	(_)-9	_____
Herculex XTRA (HXX)	(_)-10	_____
Optimum AcreMax (AM-R)	(_)-11	_____
Optimum AcreMax1 (AM1)	(_)-12	_____
Optimum AcreMax Rootworm (AMRW-R)	(_)-13	_____
Optimum AcreMax Xtra (AMX-R)	(_)-14	_____
Optimum AcreMax XTreme (AMXT-R)	(_)-15	_____
Optimum Intrasect	(_)-16	_____
Optimum Intrasect Xtra	(_)-17	_____
Optimum Intrasect XTreme	(_)-18	_____
Optimum TRIsect	(_)-19	_____
YieldGard VT Triple	(_)-20	_____
Genuity VT Double PRO RIB Complete (GENVT2P)	(_)-21	_____
Genuity VT Triple PRO RIB Complete (GENVT3P)	(_)-22	_____
Genuity SmartStax RIB Complete	(_)-23	_____
Refuge Advanced Powered by SmartStax	(_)-24	_____
Other **[specify]:** _____	(_)-25	_____
Other **[specify]:** _____	(_)-26	_____
Other **[specify]:** _____	(_)-27	_____
Other **[specify]:** _____	(_)-28	_____

NOTE: AID BRAND FAMILY, THEN SPECIFY TYPES.

6a. Were any of your **[Q.D]** corn acres in 2013 planted with seed that had an insecticide seed treatment?

Yes.....(__)-1
No.....(__)-2 – **skip to Q.8.**

6b. How many of your **[Q.D]** corn acres were planted with seed that had an insecticide seed treatment?

_____ **acres**

6c. What seed treatments did you use on corn in 2013?
6d. And how many corn acres were planted with these treated seeds? **[SUM of Q.6d = Q.6b.]**

Product	**Q.6c Used**	**Q.6d Acres**
Acceleron IC-609	(_)-1	_____
Avicta	(_)-2	_____
Avicta Complete 500/ Avicta Complete 250	(_)-3	_____
Avicta Duo	(_)-4	_____
Cruiser	(_)-5	_____
Cruiser Maxx	(_)-6	_____
Poncho 600	(_)-7	_____
Poncho Votivo / Poncho 1250 Votivo	(_)-8	_____
Cruiser 250 / Cruiser 1250	(_)-9	_____
Other **[specify]:** _____	(_)-10	_____
Other **[specify]:** _____	(_)-11	_____
Other **[specify]:** _____	(_)-12	_____
Other **[specify]:** _____	(_)-13	_____

7. If you were able to buy the same hybrids without an insecticidal seed treatment, would you have still planted corn with an insecticidal seed treatment?

Yes .....(__)-1
No.....(__)-2
Some, but not all .....(__)-3

8a. Were any of your **[Q.D]** corn acres in 2013 treated with a soil-applied insecticide?

Yes .....(__)-1
No.....(__)-2– **skip to Q.9.**

8b. How many of your **[Q.D]** corn acres were treated with a soil insecticide?

_____ **acres**

8c. What soil insecticides were applied to your corn in 2013?
8d. And on how many corn acres were these soil insecticides applied? **[SUM of Q8d >= Q8b; if > 8b, verify]**

Product	**Q.8c Used**	**Q.8d Acres**
Aztec/ Aztec 4.67(4.67%) G/ Aztec 2.1(2.1%) G	(_)-1	_____
Brigade 2 EC	(_)-2	_____
Capture/ Capture LFR	(_)-3	_____
Cobalt	(_)-4	_____
Counter / Counter 15(15%) G/ Counter 20(20%) G	(_)-5	_____
Force/ Force 3(3%) G/ Force CS	(_)-6	_____
Fortress 5G	(_)-7	_____
Lorsban/ Lorsban 15G/ Lorsban 75 WG	(_)-8	_____
Smart Choice 5(5%) G	(_)-9	_____
Other **[specify]:** _____	(_)-10	_____
Other **[specify]:** _____	(_)-11	_____
Other **[specify]:** _____	(_)-12	_____
Other **[specify]:** _____	(_)-13	_____

9a. Were any of your **[Q.D]** corn acres in 2013 treated with a foliar insecticide?

Yes .....(__)-1
No.....(__)-2– **skip to Q.10**

9b. How many of your **[Q.D]** corn acres were treated with a foliar insecticide?

_____ **acres**

9c. What foliar insecticides were used to treat your corn in 2013?

9d And on how many corn acres were they used at least once? **[SUM of Q.9d >= Q.9b; if > 9b >> verify.]**

Product	**Q.9c Used**	**Q.9d Acres**
Asana XL	(_)-1	_____
Baythroid XL	(_)-2	_____
Belt SC	(_)-3	_____
Brigade 2 EC	(_)-4	_____
Coragen 1.67 SC	(_)-5	_____
Intrepid 2F	(_)-6	_____
Lannate 90 SP	(_)-7	_____
Lorsban/ Lorsban 4 E/ Lorsban 75 WG	(_)-8	_____
Mustang Max	(_)-9	_____
Penncap-M 2 FM	(_)-10	_____
Permethrin 3.2 EC	(_)-11	_____
Proaxis/ Proaxis 0.5 CS / Proaxis 0.5 EC	(_)-12	_____
Radiant SC	(_)-13	_____
Sevin 80 S	(_)-14	_____
Tracer 4 SC	(_)-15	_____
Warrior	(_)-16	_____
Cygon	(_)-17	_____
Decis 5EC	(_)-18	_____
Lagon	(_)-19	_____
Matador	(_)-20	_____
Other **[specify]:** _____	(_)-21	_____
Other **[specify]:** _____	(_)-22	_____
Other **[specify]:** _____	(_)-23	_____
Other **[specify]:** _____	(_)-24	_____

9e. Were your foliar-applied insecticide treatments on your corn pre-planned or based on scouting conducted by you, a crop consultant, or other agricultural professional?

Pre-planned .....(__)-1
Based on scouting .....(__)-2
Both.....(__)-3

10. Please think about the seed, fertilizer, pesticides, equipment, and hired labor you devoted to growing corn in 2013. On average, how much per acre would you say it cost you? I know this may vary from field to field, but what is your best estimate across your entire operation?

$_____._____ cost per acre

11. On average, how much per acre would you say your 2013 corn yielded? That is, how many bushels per acre, on average, across your entire operation?

_____ bushels per acre

12a. Have you sold any of your 2013 corn?

Yes .....(__)-1
No.....(__)-2 -- **Skip to Q.13**

12b. In terms of dollars per bushel, what would you say is the average price you received for the 2013 corn you sold?

$____.____ **per bushels**

13. When deciding how to best manage insect pests, where do you go for advice?

Agricultural retailer.....(__)-1
Crop consultant.....(__)-2
Neighbor .....(__)-3
Seed or chemical company representative.....(__)-4
University Extension representative .....(__)-5
Provincial agronomist.....(__)-6
Other **[specify]**

_____

14. When choosing how to control insects with a particular insecticide or seed choice, what are the most important factors for you to consider?

_____

_____

_____

15. When choosing how to control insects with a particular insecticide or seed choice, how important are each of the following _____?
Would you say: Not important
Somewhat important
Important
Very important?

		Not important	**Somewhat important**	**Important**	**Very important**
Cost	( )-1	1	2	3	4
Protecting yield	( )-2	1	2	3	4
Having consistent insect control	( )-3	1	2	3	4
Crop marketability	( )-4	1	2	3	4
Replant or other product guarantees	( )-5	1	2	3	4
Improving plant health	( )-6	1	2	3	4
Improving crop stand	( )-7	1	2	3	4
Being able to plant early	( )-8	1	2	3	4
Convenience	( )-9	1	2	3	4
Simplicity	( )-10	1	2	3	4
Flexibility	( )-11	1	2	3	4
Saving time and labor	( )-12	1	2	3	4
Reducing scouting	( )-13	1	2	3	4

Having long lasting insect control	( )-14	1	2	3	4
Protecting beneficial insects	( )-15	1	2	3	4
Protecting wildlife	( )-16	1	2	3	4
Protecting water quality	( )-17	1	2	3	4
Family and worker safety	( )-18	1	2	3	4
Public safety	( )-19	1	2	3	4
Reducing equipment wear and tear	( )-20	1	2	3	4

[Q.16a – Q.16d rotated across surveys to control for order effects.]

[If no Bt Corn >> skip.]

(_) 16a.Please think carefully about **all** the reasons why you chose to plant Bt corn in 2013 and what else you could have done to manage insects instead of planting Bt corn. Compared to these alternatives, what **additional value** would you say using Bt corn provided to you **per acre of Bt corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**25** per acre.....(__)-3
More than $**25**, but not more than $**40** per acre.....(__)-4
More than $**40** per acre .....(__)-5

[If no Seed Treatment >> skip.]

(_) 16b.Please think carefully about **all** the reasons why you chose to plant corn with an insecticidal seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticidal seed treatment. Compared to these alternatives, what **additional value** would you say using an insecticidal seed treatment provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no Soil Insecticide >> skip.]

(_) 16c.Please think carefully about **all** the reasons why you chose to treat your corn acreage with a soil insecticide in 2013 and what else you could have done to manage insects instead of applying a soil insecticide. Compared to these alternatives, what **additional value** would you say using soil insecticides provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no Foliar Insecticide >> skip.]

(_) 16d.Please think carefully about **all** the reasons why you chose to treat your corn with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what **additional value** would you say using a foliar insecticide provided to you **per acre of treated corn**?

Not more than $**5** per acre.....(__)
More than $**5**, but not more than $**10** per acre.....(__)
More than $**10**, but not more than $**15** per acre.....(__)
More than $**15**, but not more than $**25** per acre.....(__)
More than $**25** per acre .....(__)

17. In general, what are your biggest concerns with regard to insect management in **Corn**?

_____

_____

READ:

I have just a few questions left to help group your responses with responses from others.

18. How many of your **[Q.G]** crop acres in 2013 did you rent or lease?
_____ **acres**

19. How many years have you been managing a farming operation?
_____ **years**

20. What is the last year of formal education that you completed? Would you say:
Did not complete high school .....(__)-1
High school .....(__)-2
Some college or university.....(__)-3
Vocational/technical training.....(__)-4
College or university graduate.....(__)-5
Advanced degree.....(__)-6

21. Did you raise any commercial livestock in 2013?

Yes .....(__)-1
No.....(__)-2

READ

Thank you. So that we can mail you your **$15**, could I please have your address?

Name: _____

Address: _____

City: _____

State: _____

Postal Code: _____

Phone: (_____) _____

SCRIPT FOR SURVEY OF CANADIAN SOYBEAN FARMERS

Coding #: _____ (1-6)

Respondent First Name: _____ (7-21)
Respondent Last Name: _____ (22-36)
Phone: _____ (37-46)
Respondent ID: _____ (47-52)
Batch: _____ (53-55)
Validated by: _____
Interview #: _____ (56-59)

Quotas: (n = 100 – 125)

	Province	Quotas
(_)-1	Manitoba	n=30
(_)-2	Quebec	n=30
(_)-3	Ontario	n=60

Date: _____
Edited by: _____
Open End checked by: _____
Edited by: _____
Project #: XXXXXXXXX

INSECT MANAGEMENT PRACTICES

Hello, my name is _____ with _____, an agricultural research firm conducting a survey with growers in your area. If you qualify and complete the **15**-minute survey today, we will mail you **$15** as a token of our appreciation. Please be assured that we are not selling anything and that any answers you provide will be kept strictly confidential. Our interest is in understanding national farming trends and not any one individual's particular answers. First, I need to ask you a couple of questions to see if you qualify.

A. Are you actively involved in farming?

Yes.....(__)
No.....(__) -- **Thank and terminate**

B. Are you the individual primarily responsible for decisions concerning crop inputs such as the seeds and insecticides used in your farming operation?

Yes.....(__)
No.....(__) -- **Ask for referral**

C. Do you or any member of your household:

	Yes	**No**
a. Work for a farm chemical manufacturer, distributor, or retailer	(__)	(__)
b. Work for a seed company	(__)	(__)

[If "yes" >> explain, thank, and apologize.]

D. How many acres of soybeans did you plant in 2013?
_____ **acres**

[Must have 150 acres of soybeans. If less than 150 of soybeans >> explain, thank, and terminate.]
Note for data collection: We need number of phone contacts made for non-response rate.

E. How many of these **[Q.D]** soybean acres were planted with conventional tillage? And how many were planted with no tillage?

a. Conventional Tillage....._____ **acres**

b. No-Tillage....._____ **acres**

F. In addition to soybeans, what other crops did you plant in 2013?

Alfalfa or hay or forage.....(__)
Corn.....(__)
Canola.....(__)
Wheat.....(__)
Other.....(__)

G. How many total crop acres did you plant in 2013?

_____ **acres [Must be ≥ Q.D.]**

1. What soybean pests do you actively manage? **[Unaided, multiple answer.]**

Insect Pest	**Other Names**	
Aphid	Soybean Aphid	( )-1
Armyworm	Beet Armyworm/ Fall Armyworm/ Yellow Stripe Armyworm	( )-2
Beetle	Bean Leaf Beetle/ Blister Beetle/ Mexican Bean Beetle/ Colorado Potato Beetle/ Flea Beetle	( )-3
Grasshopper	Cricket	( )-4
Grub	White Grub/ Japanese Beetle Grub/Black Turfgrass Ataenius/ European Chafer / Soil Grub	( )-5
Japanese Beetle		( )-6
Maggot	Bean Seed Maggot/ Seed Maggot	( )-7
Mite	Red Spider Mite/ Spider Mite/ Two-Spotted Mite	( )-8
Soybean Podworm	Corn Earworm/ Bollworm	( )-9
Stink Bug	Green Stink Bug/ Brown Stink Bug/ Redshoulder Stink Bug/ Southern Green Stink Bug/ Red Banded Stink Bug/ Rice Stink Bug	( )-10
Threecornered Alfalfa Hopper		( )-11
Wireworm		( )-12
Nematodes		( )-13
Slugs		( )-14
Leafhoppers		( )-15
Millipedes		( )-16
Tarnished Plant bug	Lygus bug	( )-17
Other **[specify]:**	_____	( )-18
Other **[specify]:**	_____	( )-19
Other **[specify]:**	_____	( )-20
Other **[specify]:**	_____	( )-21
Other **[specify]:**	_____	( )-22

2. **[If/Only from Q.1:]** Which one of these soybean pests would you say is the most important for you to manage?

_____

3a. Were any of your **[Q.D]** soybean acres in 2013 planted with seed that had an insecticide seed treatment?

Yes.....(__)-1
No.....(__)-2 – **skip to Q.4a**

3b. How many of your **[Q.D]** soybean acres were planted with seed that had an insecticide seed treatment?

_____ **acres**

3c. What seed treatments did you use on your 2013 soybean?
3d. And how many acres were planted with these treated seeds?

Product	**Used**	**Acres**
Acceleron Brands (Monsanto Seed Treatments)	(_)-1	_____
Cruiser Maxx	(_)-2	_____
Cruiser Maxx Advanced	(_)-3	_____
Gaucho 600	(_)-4	_____
Inovate	(_)-5	_____
Poncho Votivo	(_)-6	_____
PPST 2030 (Pioneer Premium Seed Treatment)	(_)-7	_____
Warden CX	(_)-8	_____
Warden RTA	(_)-9	_____
Apron Maxx	(_)-10	_____
Apron Maxx Vibrance	(_)-11	_____
Stress Shield 600	(_)-12	_____
Other **[specify]:** _____	(_)-13	_____
Other **[specify]:** _____	(_)-14	_____
Other **[specify]:** _____	(_)-15	_____
Other **[specify]:** _____	(_)-16	_____

3e. If you were able to buy the same soybean varieties without an insecticidal seed treatment, would you have still planted soybean with an insecticidal seed treatment?

Yes .....(__)-1
No.....(__)-2
Some, but not all .....(__)-3

4a. Were any of your **[Q.D]** soybean acres in 2013 treated with a foliar insecticide?

Yes.....(__)-1
No.....(__)-2 – **skip to Q.5**

4b. How many of your **[Q.D]** soybean acres were treated with a foliar insecticide?

_____ **acres**

4c. What foliar insecticides were used to treat your soybean in 2013?

4d. And on how many acres were they used at least once?

Product	**Used**	**Acres**
Acephate	(_)-1	_____
Asana	(_)-2	_____
Baythroid	(_)-3	_____
Belt	(_)-4	_____
Bifen	(_)-5	_____
Bracket	(_)-6	_____
Brigade	(_)-7	_____
Chlorpyrifos	(_)-8	_____
Cobalt	(_)-9	_____
Declare	(_)-10	_____
Delta Gold	(_)-11	_____
Dimilin	(_)-12	_____
Endigo	(_)-13	_____
Hero	(_)-14	_____
Intrepid	(_)-15	_____
Karate	(_)-16	_____
Kendo	(_)-17	_____
Lambda-Cy	(_)-18	_____
Lambdastar	(_)-19	_____
Leverage	(_)-20	_____
Lorsban	(_)-21	_____
Mustang	(_)-22	_____
Nufos	(_)-23	_____
Orthene	(_)-24	_____
Silencer	(_)-25	_____
Sniper	(_)-26	_____
Steward	(_)-27	_____
Swagger	(_)-28	_____
Tombstone	(_)-29	_____
Tundra	(_)-30	_____
Up-Cyde	(_)-31	_____
Warrior	(_)-32	_____
Concept	(_)-33	_____
Coragen	(_)-34	_____
Cygon	(_)-35	_____
Decis 5EC	(_)-36	_____
Lagon	(_)-37	_____
Matador	(_)-38	_____
Movento	(_)-39	_____
Other **[specify]:** _____	(_)-40	_____
Other **[specify]:** _____	(_)-41	_____

4e. Were your soybean foliar insecticide treatments pre-planned or based on scouting conducted by you, a crop consultant, or other agricultural professional?

Pre-planned .....(__)-1
Based on scouting .....(__)-2
Both.....(__)-3

5. Please think about the seed, fertilizer, pesticides, equipment, and hired labor you devoted to growing soybeans in 2013. On average, how much per acre would you say it cost you? I know this may vary from field to field, but what is your best estimate across your entire operation?

$_____._____ cost per acre

6. On average, how much per acre would you say your 2013 soybeans yielded? That is, how many bushels per acre, on average, across your entire operation?

_____ bushels per acre

7a. Have you sold any of your 2013 soybeans?

Yes .....(__)-1
No.....(__)-2 -- **Skip to Q.8**

7b. In terms of dollars per bushel, what would you say is the average price you received for the 2013 soybeans you sold?

$____.____ **per bushel**

8. When deciding how to best manage insect pests, where do you go for advice?

Agricultural retailer.....(__)-1
Crop consultant.....(__)-2
Neighbor .....(__)-3
Seed or chemical company representative.....(__)-4
University Extension representative .....(__)-5
Provincial agronomist.....(__)-6
Other **[specify]**
_____

9. When choosing how to control insects with a particular insecticide, what are the most important factors for you to consider?

_____

_____

10. When choosing how to control insects with a particular insecticide, how important are each of the following _____?
Would you say:
Not important
Somewhat important
Important
Very important?

		Not important	Somewhat important	Important	Very important
Cost	( )-1	1	2	3	4
Protecting yield	( )-2	1	2	3	4
Having consistent insect control	( )-3	1	2	3	4
Crop marketability	( )-4	1	2	3	4

Replant or other product guarantees	( )-5	1	2	3	4
Improving plant health	( )-6	1	2	3	4
Improving crop stand	( )-7	1	2	3	4
Being able to plant early	( )-8	1	2	3	4
Convenience	( )-9	1	2	3	4
Simplicity	( )-10	1	2	3	4
Flexibility	( )-11	1	2	3	4
Saving time and labor	( )-12	1	2	3	4
Reducing scouting	( )-13	1	2	3	4
Having long lasting insect control	( )-14	1	2	3	4
Protecting beneficial insects	( )-15	1	2	3	4
Protecting wildlife	( )-16	1	2	3	4
Protecting water quality	( )-17	1	2	3	4
Family and worker safety	( )-18	1	2	3	4
Public safety	( )-19	1	2	3	4
Reducing equipment wear and tear	( )-20	1	2	3	4

[Questions 11 – 12 rotated across surveys to control for order effects.]
[If no <u>Seed Treatment</u> >> skip.]

(_) 11. Please think carefully about **<u>all</u>** the reasons why you chose to plant soybean with an insecticide seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticide seed treatment. Compared to these alternatives, what **<u>additional value</u>** would you say using an insecticide seed treatment provided to you **<u>per acre of treated soybean</u>**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

[If no <u>Foliar Insecticide</u> >> skip.]

(_) 12. Please think carefully about **<u>all</u>** the reasons why you chose to treat your soybeans with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what **<u>additional value</u>** would you say using a foliar insecticide provided to you **<u>per acre of treated soybeans</u>**?

Not more than $**5** per acre.....(__)-1
More than $**5**, but not more than $**10** per acre.....(__)-2
More than $**10**, but not more than $**15** per acre.....(__)-3
More than $**15**, but not more than $**25** per acre.....(__)-4
More than $**25** per acre .....(__)-5

13. In general, what are your biggest concerns with regard to insect management in **soybeans**?

_____

_____

READ:
I have just a few questions left to help group your responses with responses from others.

14. How many of your **[Q.G]** crop acres in 2013 did you rent or lease?
_____ **acres**

15. How many years have you been managing a farming operation?
_____ **years**

16. What is the last year of formal education that you completed? Would you say:

Did not complete high school .....(__)-1
High school .....(__)-2
Some college or university.....(__)-3
Vocational/technical training.....(__)-4
College or university graduate.....(__)-5
Advanced degree.....(__)-6

17. Did you raise any commercial livestock in 2013?

Yes .....(__)-1
No.....(__)-2

READ
Thank you. So that we can mail you your **$15**, could I please have your address?

Name: _____

Address: _____

City: _____

State: _____

Postal Code: _____

Phone: (_____) _____

9.0 Appendix B: Survey Data Descriptive Summary Tables

The purpose of this appendix is to provide a comprehensive tabular overview of survey responses broken down by country and crop. Note that for responses that include dollars, no conversion has been made – responses from the U.S. are in U.S. dollars and from Canada are in Canadian dollars.

How many acres of corn/soybean/canola did you plant in 2013? (Proportion of Respondents)

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	501	637	659	250	7,200
	Canada	121	495	392	100	2,600
Soybean	U.S.	500	676	808	250	13,623
	Canada	122	347	265	60	1,500
Canola	Canada	500	975	1,069	250	10,000

How many of these corn/soybean/canola acres were planted with conventional tillage? (Proportion of Respondents)

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	500	360	467	0	4,000
	Canada	120	388	343	0	1,800
Soybean	U.S.	499	349	500	0	4,300
	Canada	119	188	249	0	1,400
Canola	Canada	494	222	677	0	10,000

How many of these corn/soybean/canola acres were planted with no tillage? (Proportion of Respondents)

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	500	243	509	0	6,000
	Canada	121	85	244	0	1,500
Soybean	U.S.	499	316	722	0	13,623
	Canada	121	129	178	0	1,100
Canola	Canada	494	722	1,007	0	8,000

How many of these corn acres were planted following 2012 corn? (Proportion of Respondents)

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	496	193	411	0	4,000
	Canada	118	182	325	0	2,600

In addition to corn/soybean/canola, what other crops did you plant in 2013? (Proportion of All Respondents)

Crop	Country	Hay	Corn	Cotton	Canola	Soybean	Wheat	Barley	Pulses	Other
Corn	U.S.	0.190		0.002		0.778	0.295			0.094
	Canada	0.116			0.240	0.826	0.545			0.306
Soybean	U.S.	0.114	0.878	0.026			0.306			0.108
	Canada	0.115	0.410		0.467		0.664			0.295
Canola	Canada	0.028	0.048			0.086	0.870	0.476	0.290	0.446

How many total crop acres did you plant in 2013?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	455	1,304	1,386	120	15,000
	Canada	112	1,467	1,685	82	10,000
Soybean	U.S.	480	1,481	1,476	150	16,000
	Canada	117	1,107	1,002	107	5,000
Canola	Canada	497	2,797	3,107	300	34,000

What corn pests do you actively manage? Which one of these corn pests would you say is the most important for you to manage? (Proportion of Respondents)

	Corn			
	U.S		Canada	
Pest	Actively Manage	Most Important	Actively Manage	Most Important
Corn Rootworm	0.491	0.541	0.306	0.250
Corn Borer	0.411	0.350	0.595	0.636
Black Cutworm	0.056	0.020	0.066	0.034
Wireworm	0.052		0.058	0.011
Corn Earworm	0.050	0.014		
Japanese Beetle	0.040	0.008		
Maggot	0.032	0.006	0.017	
Flea Beetle	0.028	0.008	0.008	
Grub	0.024	0.003	0.017	
Nematode	0.020	0.008	0.008	
Armyworm	0.016	0.008	0.017	
Mite	0.016	0.006		
Western Bean Cutworm	0.016	0.017		
Aphid	0.012		0.008	
Cinch Bug	0.006			
Cutworm	0.006	0.008	0.017	
Bullworm		0.003		
Bt Corn			0.017	0.011
Agronomist			0.008	0.011
Weeds			0.008	0.023
Blackbirds			0.008	
Worms				0.011
Root Insects (all)				0.011
Observations	**501**	**357**	**121**	**88**

What soybean pests do you actively manage? Which one of these soybean pests would you say is the most important for you to manage? (Proportion of Respondents)

	Soybean			
	U.S		Canada	
Pest	**Actively Manage**	**Most Important**	**Actively Manage**	**Most Important**
Aphid [Soybean Aphid]	0.382	0.531	0.434	0.746
Beetle [Bean Leaf Beetle/ Blister Beetle/ Mexican Bean Beetle/ Colorado Potato Beetle/ Flea Beetle]	0.116	0.106	0.049	
Mite [Red Spider Mite/ Spider Mite/ Two-Spotted Mite]	0.080	0.062	0.066	0.016
Stink Bug [Green Stink Bug/ Brown Stink Bug/ Red-Shouldered Stink Bug/ Southern Green Stink Bug/ Red-Banded Stink Bug/ Rice Stink Bug]	0.062	0.062		
Japanese Beetle	0.042	0.038	0.008	
Nematode	0.038	0.041	0.025	0.016
Armyworm [Beet Armyworm/ Fall Armyworm/ Yellowstriped Armyworm]	0.034	0.034		
Weeds/Grasses	0.028	0.041	0.066	0.095
Grasshopper [Cricket]	0.024	0.017	0.041	0.079
Wireworm	0.020	0.014	0.025	
Threecornered Alfalfa Hopper	0.014	0.007		
Soybean Podworm [Corn Earworm/ Bollworm]	0.012	0.010		
Grub [White Grub/ Japanese Beetle Grub]	0.008		0.008	
Maggot [Bean Seed Maggot/ Seed Maggot]	0.008	0.007	0.008	0.016
Cutworms	0.006	0.007	0.008	0.016
Bugs (All)	0.006	0.010		
Loopers	0.006			
Slugs	0.002	0.003	0.016	
Budworms	0.002			
White Mold	0.002			
Rootworms	0.002	0.003		
Stem Weevil	0.002	0.003		
Frogeye	0.002	0.003		
Caterpillars	0.002			
Worms	0.002			
Leafhoppers			0.008	
Soybean Cyst Nematode			0.008	
Ragweed			0.008	0.016
Observations	**500**	**292**	**122**	**63**

What canola pests do you actively manage? Which one of these canola pests would you say is the most important for you to manage? (Proportion of Respondents)

	Canada Canola	
Pest	**Actively Manage**	**Most Important**
Flea Beetle/ Striped Flea Beetle/ Crucifer Flea Beetle	0.5	0.457
Bertha Armyworm	0.24	0.174
Armyworm/ Fall Armyworm	0.134	0.092
Diamondback Moth	0.128	0.060
Lygus Bug/ Tarnished Plant Bug	0.122	0.098
Cutworm	0.05	0.033
Grasshopper	0.04	0.022
Cabbage Seedpod Weevil	0.036	0.016
Weeds	0.028	0.016
Sclerotinia	0.014	0.011
Wireworm	0.006	
Wild Oats	0.006	
Yellow Aster	0.006	
Aphid	0.006	
Swede Midge	0.006	
Wild Buckwheat	0.004	
Volunteer Grains	0.004	0.005
Worms	0.004	
Zebra Worm	0.002	0.005
Clovers	0.002	
Root Diseases	0.002	
Root Maggot	0.002	
Wheat Midge	0.002	
Gopher	0.002	
Weevil	0.002	0.005
Grass	0.002	
Fungal Diseases	0.002	
Green Worms	0.002	
Canada Thistle	0.002	0.005
Stinkweed	0.002	
Observations	**500**	**184**

Did you plant any of your corn acres with Bt corn in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	501	0.800	0.174	0.026
	Canada	121	0.901	0.099	

Did you plant any Bt corn in 2013 that: protects against BOTH above-ground insects like the corn borer and below-ground pest like the corn rootworm? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.751	0.195	0.055
	Canada	109	0.798	0.138	0.064

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	294	457	474	15	4,000
	Canada	83	358	359	20	2,400

Did you plant any Bt corn in 2013 that: ONLY protects against above-ground insects like the corn borer? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.392	0.556	0.052
	Canada	109	0.376	0.523	0.101

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	152	333	385	15	3,000
	Canada	40	297	282	25	1,200

Did you plant any Bt corn in 2013 that: ONLY protects against below-ground pests like the corn rootworm? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.155	0.781	0.065
	Canada	109	0.119	0.771	0.110

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	59	445	581	20	4,000
	Canada	13	130	71	20	280

Did you plant any Agrisure? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.117	0.833	0.050
	Canada	109	0.110	0.789	0.101

Did you plant any Agrisure CB/LL OR Agrisure GT/CB/LL? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.213	0.511	0.277
	Canada	13	0.231	0.308	0.462

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	9	400	616	50	2,000
	Canada	1	150		150	150

Did you plant any Agrisure RW OR Agrisure GT/RW? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.255	0.489	0.255
	Canada	13	0.231	0.308	0.462

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	11	206	212	40	650
	Canada	2	33	11	25	40

Did you plant any Agrisure CB/LL/RW OR Agrisure 3000GT OR Agrisure Artesian 4011A? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.277	0.511	0.213
	Canada	13	0.385	0.231	0.385

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	11	172	195	25	600
	Canada	1	80		80	80

Did you plant any Agrisure Viptera 3110? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.043	0.702	0.255
	Canada	13	0.231	0.385	0.385

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	2	238	53	200	275
	Canada	1	250		250	250

Did you plant any Agrisure Viptera 3111? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.191	0.574	0.234
	Canada	13	0.308	0.308	0.385

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	8	99	63	50	200
	Canada	3	117	115	50	250

Did you plant any Agrisure 3122 E-Z Refuge? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.128	0.638	0.234
	Canada	13	0.154	0.385	0.462

How many acres?

Crop	Country	Observations	Mean	StandardDeviation	Minimum	Maximum
Corn	U.S.	6	61	32	25	100
	Canada	1	50		50	50

Did you plant any Agrisure Viptera 3220 E-Z Refuge? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	47	0.064	0.723	0.213
	Canada	13	0.231	0.385	0.385

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	2	425	177	300	550
	Canada	1	250		250	250

Did you plant any other Agrisure Bt corn in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No
Corn	U.S.	47	0.043	0.957
	Canada	9	0.222	0.778

What other types of Agrisure Bt corn did you plant? (Number of Respondents)

	Corn	
Type of Other Agrisure Bt Corn	U.S	Canada
Crows	1	
Agrisure E-Z Refuge		1
Agrisure		1
Agrisure Viptera		1
Don't Know	1	4
Observations	**2**	**6**

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	1	500		500	500
	Canada	3	120	121	50	260

Did you plant any Herculex? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.421	0.541	0.037
	Canada	109	0.532	0.385	0.083

Did you plant any Herculex I (HX1)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	169	0.408	0.414	0.178
	Canada	58	0.466	0.207	0.328

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	63	393	674	25	5,000
	Canada	23	279	267	25	1,000

Did you plant any Herculex RW (HXRW)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	169	0.195	0.657	0.148
	Canada	58	0.103	0.586	0.310

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	25	168	152	10	500
	Canada	2	350	71	300	400

Did you plant any Herculex XTRA (HXX)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	169	0.462	0.408	0.130
	Canada	58	0.259	0.500	0.241

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	67	209	222	20	1,000
	Canada	10	121	59	50	200

Did you plant any other Herculex Bt corn in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No
Corn	U.S.	169	0.024	0.976
	Canada	58	0.083	0.917

What other types of Herculex Bt corn did you plant? (Number of Respondents)

	Corn	
Type of Other Herculex Bt Corn	**U.S**	**Canada**
Herculex I (HX1)	1	
Rootworm	1	
Herculex		1
Don't Know	1	3
Observations	**3**	**4**

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	2	175	35	150	200
	Canada	1	50		50	50

Did you plant any Optimum AcreMax or Optimum Intrasect? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.180	0.763	0.057
	Canada	109	0.165	0.734	0.101

Did you plant any Optimum AcreMax (AM-R)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.347	0.514	0.139
	Canada	18	0.611	0.111	0.278

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	19	206	219	40	900
	Canada	9	140	156	20	500

Did you plant any Optimum AcreMax1 (AM1)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.319	0.486	0.194
	Canada	18	0.111	0.556	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	18	114	91	24	400
	Canada	1	50		50	50

Did you plant any Optimum AcreMax Rootworm (AMRW-R)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.222	0.639	0.139
	Canada	18	0.111	0.556	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	15	160	220	20	900
	Canada	1	50		50	50

Did you plant any Optimum AcreMax Xtra (AMX-R)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.208	0.667	0.125
	Canada	18	0.056	0.611	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	11	172	126	50	500
	Canada	1	500		500	500

Did you plant any Optimum AcreMax XTreme (AMXT-R)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.056	0.819	0.125
	Canada	18	0.167	0.500	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	2	75	35	50	100
	Canada	1	100		100	100

Did you plant any Optimum Intrasect? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.042	0.833	0.125
	Canada	18	0.056	0.611	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	3	75	43	25	100
	Canada					

Did you plant any Optimum Intrasect Xtra? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.069	0.833	0.097
	Canada	18		0.667	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	3	108	88	25	200
	Canada					

Did you plant any Optimum Intrasect XTreme? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.042	0.861	0.097
	Canada	18	0.056	0.611	0.333

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	2	50	0	50	50
	Canada					

Did you plant any Optimum TRIsect? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	72	0.014	0.903	0.083
	Canada	18		0.722	0.278

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	1	50		50	50
	Canada					

Did you plant any other Optimum AcreMax or Optimum Intrasect Bt corn in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No
Corn	U.S.	72	0.014	0.986
	Canada	15	0.067	0.933

Did you plant any Genuity? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.322	0.633	0.045
	Canada	109	0.523	0.431	0.046

Did you plant any YieldGard VT Triple? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.439	0.516	0.045
	Canada	109	0.523	0.394	0.083

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	146	267	362	1	2,800
	Canada	37	190	216	12	1,200

Did you plant any Genuity VT Double PRO RIB Complete (GENVT2P)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	129	0.318	0.636	0.047
	Canada	57	0.175	0.649	0.175

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	33	227	202	25	1,000
	Canada	8	130	78	40	275

Did you plant any Genuity VT Triple PRO RIB Complete (GENVT3P)? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	129	0.426	0.527	0.047
	Canada	57	0.246	0.579	0.175

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	47	283	611	1	4,000
	Canada	12	106	86	5	300

Did you plant any Genuity SmartStax RIB Complete? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	129	0.597	0.372	0.031
	Canada	57	0.754	0.158	0.088

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	67	218	214	1	1,000
	Canada	35	216	238	2	1,300

Did you plant any other Genuity Bt corn in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No
Corn	U.S.	129	0.047	0.953
	Canada	47	0.085	0.915

What other types of Genuity Bt corn did you plant? (Number of Respondents)

	Corn	
Type of Other Genuity Bt Corn	U.S	Canada
Genuity VT Double PRO RIB Complete (GENVT2P)	1	
Genuity SmartStax RIB Complete	2	
DEKALB	1	
Roundup Ready		1
SmartStax		1
Don't Know	2	2
Observations	**6**	**4**

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	4	128	66	50	200
	Canada	2	450	71	400	500

Did you plant any Refuge Advanced Powered by SmartStax? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.242	0.701	0.057
	Canada	109	0.339	0.550	0.110

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	66	207	347	1	2,500
	Canada	27	126	137	5	700

Did you plant any other Bt corn seed in 2013? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Don't Know
Corn	U.S.	401	0.200	0.766	0.035
	Canada	84	0.190	0.762	0.048

What other types of Bt corn seed did you plant in 2013? (Number of Respondents)

	---------- Corn ----------	
Type of Bt Corn	U.S	Canada
Pioneer	25	6
DEKALB	21	3
Channel	5	
Croplan	4	
Don't know	3	4
Legend	3	
Garst	3	
Mycogen	3	
Golden Harvest	3	
Burrus	2	
Roundup Ready	2	
Wyffels	2	

Agrisure Viptera 3220 E-Z Refuge	1	
Optimum AcreMax (AM-R)	1	
Genuity VT Double PRO RIB Complete (GENVT2P)	1	
Genuity SmartStax RIB Complete	1	
NK	1	
LG	1	
Agrigold	1	
Dynagrow	1	
Wellman	1	
Young Seed	1	
Master's Choice	1	
REA	1	
Beck	1	
Hoegemeyer	1	
DuPont	1	
Asgrow	1	
Fontanelle	1	
BT3	1	
MFA	1	
Morcorn	1	
YieldGard		2
SmartStax		1
Genuity		1
Roundup		1
General Seed		1
7,443.000		1
2,628.000		1
Pioneer 7213		1
B95		1
D97		1
Observations	**96**	**24**

How many acres?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	88	460	631	15	5,003
	Canada	26	307	320	24	1,500

Were any of your corn/soybean/canola acres in 2013 planted with seed that had an insecticide seed treatment? (Proportion of Respondents)

Crop	Country	Yes	No	Don't Know
Corn	U.S.	0.621	0.347	0.032
	Canada	0.719	0.190	0.091
Soybean	U.S.	0.508	0.480	0.012
	Canada	0.721	0.254	0.025
Canola	Canada	0.862	0.118	0.020

How many of your corn/soybean/canola acres were planted with seed that had an insecticide seed treatment?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	298	566	564	30	5,000
	Canada	87	522	424	50	2,600
Soybean	U.S.	254	626	932	20	13,623
	Canada	87	293	222	40	1,100
Canola	Canada	431	950	982	50	8,000

What seed treatments did you use on corn in 2013? (Proportion of Respondents)

	Corn	
Seed Treatment	U.S	Canada
Poncho Votivo/Poncho 1250 Votivo	0.235	0.023
Poncho 600	0.212	0.149
CruiserMaxx	0.167	0.276
Cruiser	0.084	0.034
Poncho 250	0.071	
Acceleron IC-609	0.051	0.057
Avicta Duo	0.013	
Don't know	0.013	
Avicta	0.010	
Capture	0.010	
Seedman's Choice	0.006	
Force	0.006	
Aztec	0.006	
Avicta Complete 500/ Avicta Complete 250	0.003	
Poncho 1200	0.003	
Poncho 2500	0.003	
Becks	0.003	
Pasro	0.003	

Escalade	0.003	
Gaucho	0.003	
Triple Stax	0.003	
Poncho GT	0.003	
Herculex	0.003	
Genuity	0.003	
Poncho 500	0.003	
Furtan	0.003	
Cruiser 250/Cruiser 1250		0.023
Observations	**311**	**87**

What seed treatments did you use on soybean in 2013? (Proportion of Respondents)

	Soybean	
Seed Treatment	**U.S**	**Canada**
CruiserMaxx	0.362	0.625
Poncho Votivo	0.146	0.045
Acceleron Brands (Monsanto Seed Treatments)	0.102	0.011
Don't know	0.059	0.011
Gaucho 600	0.059	
PPST 2030 (Pioneer Premium Seed Treatment)	0.047	
CruiserMaxx Advanced	0.024	0.011
Inovate	0.024	0.011
Pioneer product	0.012	
Warden CX	0.004	
Warden RTA	0.004	
NK product	0.004	
Poncho 1250	0.004	
Becks product	0.004	
Turbo Treat	0.004	
Escalade	0.004	
ApronMaxx		0.057
Optimum/Optimize		0.011
Roundup		0.011
DEKALB		0.011
Diazinon		0.011
TagTeam		0.011
Vibrance		0.011
Observations	**254**	**88**

What seed treatments did you use on canola in 2013? (Proportion of Respondents)

	--Canola --
Seed Treatment	**Canada**
Helix Extra/Helix Vibrance (Syngenta)	0.318
Prosper EverGol (Bayer)	0.241
Helix	0.021
Don't know	0.021
Prosper	0.019
Acceleron (DEKALB)	0.016
JumpStart	0.007
CruiserMaxx	0.005
Rovral	0.005
Prosper 400	0.002
Proline	0.002
Ronilan	0.002
Gaucho	0.002
Furadan	0.002
Vitaflo	0.002
Raxil	0.002
Bayer	0.002
Observations	**431**

How many corn acres were planted with [Product] treated seeds?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Acceleron	U.S.	15	382	163	24	600
Acceleron	Canada	3	400	200	200	600
Avicta	U.S.	2	380	170	260	500
Avicta Complete	U.S.	1	300		300	300
Avicta Duo	U.S.	4	338	229	100	600
Cruiser	U.S.	21	551	619	150	2,500
Cruiser	Canada	3	193	144	30	300
CruiserMaxx	U.S.	49	499	658	50	3,500
CruiserMaxx	Canada	21	462	361	40	1,500
Poncho 600	U.S.	60	468	288	75	1,600
Poncho 600	Canada	13	392	325	30	1,200
Poncho Votivo	U.S.	59	555	424	40	2,000
Poncho Votivo	Canada	1	400		400	400
Other	U.S.	62	586	470	80	2,000
Other	Canada	21	422	403	1	1,800

How many soybean acres were planted with [Product] treated seeds?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Acceleron	U.S.	23	582	358	100	1,500
Acceleron	Canada	1	105		105	105
CruiserMaxx	U.S.	89	658	585	100	3,500
CruiserMaxx	Canada	55	320	257	40	1,100
CruiserMaxx Advanced	U.S.	6	780	562	225	1,600
CruiserMaxx Advanced	Canada	1	230		230	230
Gaucho 600	U.S.	14	356	291	60	1,120
Inovate	U.S.	6	332	350	50	1,000
Inovate	Canada	1	20		20	20
Poncho Votivo	U.S.	32	372	267	65	1,000
Poncho Votivo	Canada	4	73	64	17	150
PPST 2030	U.S.	12	565	274	200	1,000
Warden CX	U.S.	1	560		560	560
Roundup Ready	Canada	6	279	131	90	435
Poncho 1250	Canada	1	435		435	435
Sure-Gro	Canada	1	435		435	435
Other	Canada	5	256	293	49	750
Other	U.S.	21	521	333	70	1,500

How many canola acres were planted with [Product] treated seeds?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Helix Extra/Helix Vibrance	Canada	132	786	742	70	6,200
Acceleron	Canada	7	807	1,065	300	3,200
Prosper EverGol	Canada	101	958	1,083	0	7,000
CruiserMaxx	Canada	42	1,017	978	250	5,000
Vitaflo	Canada	1	300		300	300

If you were able to buy the same corn/soybean/canola without an insecticidal seed treatment, would you have still planted corn with an insecticidal seed treatment? (Proportion of Respondents)

Crop	Country	Observations	Yes	No	Some, But Not All	Don't Know
Corn	U.S.	311	0.756	0.158	0.048	0.039
	Canada	87	0.655	0.218	0.080	0.046
Soybean	U.S.	254	0.799	0.126	0.028	0.047
	Canada	88	0.659	0.216	0.057	0.068
Canola	Canada	431	0.798	0.172	0.016	0.014

Were any of your corn acres in 2013 planted with a soil-applied insecticide? (Proportion of Respondents)

Crop	Country	Yes	No	Don't Know
Corn	U.S.	0.192	0.780	0.028
	Canada	0.033	0.942	0.025

How many of your corn acres were planted with a soil-applied insecticide? (Proportion of Respondents)

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	91	516	482	20	3,000
	Canada	4	334	190	105	500

What soil insecticides were applied to your corn in 2013? (Proportion of Respondents)

Soil Insecticide	Canada
Force/ Force 3(3%) G/ Force CS	0.329
Aztec/ Aztec 4.67(4.67%) G/ Aztec 2.1(2.1%) G	0.224
Capture/ Capture LFR	0.165
Lorsban/ Lorsban 15G/ Lorsban 75 WG	0.071
Cobalt	0.047
Smart Choice 5(5%) G	0.035
Counter/ Counter 15(15%) G/ Counter 20(20%) G	0.024
Don't know	0.024
Warrior	0.024
Fortress 5G	0.012
Pounce	0.012
Mustang	0.012
Poncho 250	0.012
Forest Liquid	0.012
Poncho 500	0.012
Observations	**86**

How many corn acres did you apply [Product] soil insecticide to?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Aztec	U.S.	18	502	689	25	3,000
Capture	U.S.	12	715	686	200	2,500
Cobalt	U.S.	3	660	505	200	1,200
Counter	U.S.	2	408	131	315	500
Force	U.S.	27	466	391	30	2,000
Fortress	U.S.	1	360		360	360
Lorsban	U.S.	6	312	261	20	800
Smart Choice	U.S.	3	467	466	140	1,000
Other	U.S.	10	612	220	300	1,000

Were any of your corn/soybean/canola acres in 2013 treated with a foliar insecticide? (Proportion of Respondents)

Crop	Country	Yes	No	Don't Know
Corn	U.S.	0.080	0.890	0.030
	Canada	0.116	0.876	0.008
Soybean	U.S.	0.226	0.758	0.016
	Canada	0.139	0.828	0.033
Canola	Canada	0.264	0.712	0.024

How many of your corn/soybean/canola acres in 2013 were treated with a foliar insecticide?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	39	518	448	100	2,500
	Canada	13	210	195	10	650
Soybean	U.S.	110	546	521	40	3,500
	Canada	14	168	104	32	400
Canola	Canada	131	678	705	70	3,500

What foliar insecticides were used to treat your corn in 2013? (Proportion of Respondents)

	Corn	
Foliar Insecticide	U.S	Canada
Warrior	0.200	
Lorsban/Lorsban 4 E/ Lorsban 75 WG	0.175	
Baythroid XL	0.075	
Brigade 2 EC	0.075	
Don't know	0.075	
Headline/Headline Quilt	0.050	0.143
Sevin 80 S	0.050	0.071
Mustang Max	0.050	
Coragen 1.67 SC	0.025	0.143
Intrepid 2F	0.025	
Hero	0.025	
Gold	0.025	
Karate	0.025	
Dursban	0.025	
Matador		0.214
Tracer 4 SC		0.071
Pounce		0.071
Observations	**40**	**14**

What foliar insecticides were used to treat your soybean in 2013? (Proportion of Respondents)

	Soybean	
Foliar Insecticide	**U.S**	**Canada**
Warrior	0.177	
Asana	0.142	
Lorsban	0.097	
Hero	0.071	
Don't know	0.062	0.118
Acephate	0.053	
Baythroid	0.053	
Karate	0.035	
Mustang	0.027	
Belt	0.018	
Cobalt	0.018	
Endigo	0.018	
Orthene	0.018	
Tundra	0.018	
Quilt	0.018	
Proaxis	0.018	
Silencer	0.009	0.059
Bracket	0.009	
Brigade	0.009	
Declare	0.009	
Intrepid	0.009	
Leverage	0.009	
Sniper	0.009	
Besiege	0.009	
Pilot	0.009	
Ammo	0.009	
Eraser	0.009	
DuPont product	0.009	
Syngenta product	0.009	
Matador		0.235
Decis 5EC		0.059
Folicur		0.059
Sevin		0.059
Observations	**113**	**17**

What foliar insecticides were used to treat your soybean in 2013? (Proportion of Respondents)

	--- Canola ---
Foliar Insecticide	**Canada**
Decis	0.235
Matador	0.159
Lorsban	0.061
Silencer	0.045
Proline	0.045
Sevin XLR	0.038
Headline	0.038
Astound	0.030
Helix	0.015
Citadel	0.008
Cygon	0.008
Malathion	0.008
Nufos	0.008
Pyrinex	0.008
Ripcord	0.008
Mustang	0.008
Mavrik	0.008
Prosaro	0.008
Caramba	0.008
Acceleron	0.008
Protector	0.008
Coragen	0.008
Rovral	0.008
Don't know	0.008
Observations	**132**

How many corn acres did you apply [Product] foliar insecticide at least once?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Baythroid	U.S.	3	800	529	400	1,400
Brigade	U.S.	2	425	247	250	600
Coragen	U.S.	1	1,000		1,000	1,000
Coragen	Canada	2	140	127	50	230
Intrepid	U.S.	1	200		200	200
Lorsban	U.S.	7	303	188	100	500
Mustang Max	U.S.	2	240	113	160	320
Sevin	U.S.	2	275	177	150	400
Sevin	Canada	1	150		150	150
Tracer	Canada	1	650		650	650
Warrior	U.S.	8	763	809	100	2,500
Headline/Headline Quilt.	Canada	4	63	45	10	100
Matador	Canada	2	65	21	50	80
Other	U.S.	8	544	241	300	1,000

How many soybean acres did you apply [Product] foliar insecticide at least once?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Acephate	U.S.	4	281	140	125	400
Asana	U.S.	15	457	310	40	1,000
Baythroid	U.S.	6	453	314	100	1,000
Belt	U.S.	2	950	778	400	1,500
Brigade	U.S.	1	1,400		1,400	1,400
Cobalt	U.S.	2	685	940	20	1,350
Endigo	U.S.	2	160	198	20	300
Hero	U.S.	8	551	365	200	1,200
Intrepid	U.S.	1	1,250		1,250	1,250
Karate	U.S.	4	1,113	517	500	1,750
Leverage	U.S.	1	400		400	400
Lorsban	U.S.	11	309	213	40	700
Mustang	U.S.	3	1,450	1,776	400	3,500
Orthene	U.S.	2	841	578	432	1,250
Sniper	U.S.	1	350		350	350
Tundra	U.S.	2	300	0	300	300
Warrior	U.S.	19	361	300	40	1,000
Proaxis	Canada	1	40		40	40
Pilot	Canada	4	150	81	80	260
DuPont product	Canada	3	267	122	160	400
Other	U.S.	16	468	480	80	2,000

How many canola acres did you apply [Product] foliar insecticide at least once?

[Product]	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Citadel	Canada	1	1,000		1,000	1,000
Cygon	Canada	1	140		140	140
Decis	Canada	31	489	540	70	3,100
Lorsban	Canada	8	941	1,086	160	3,300
Malathion	Canada	1	160	.	160	160
Matador	Canada	21	497	452	100	2,000
Nufos	Canada	1	1,500		1,500	1,500
Pyrinex	Canada	1	500		500	500
Ripcord	Canada	1	200		200	200
Sevin XLR	Canada	5	288	93	140	400
Silencer	Canada	6	462	373	150	1,200
Proline	Canada	23	705	745	150	3,400
Astound	Canada	2	1,845	2,199	290	3,400

Were your foliar-applied insecticide treatments on your corn/soybean/canola preplanned or based on scouting conducted by you, a crop consultant or other agricultural professional? (Proportion of Respondents)

Crop	Country	Observations	Preplanned	Scouting	Both	Don't Know
Corn	U.S.	40	0.250	0.625	0.050	0.075
	Canada	14	0.357	0.500	0.143	
Soybean	U.S.	113	0.248	0.673	0.062	0.018
	Canada	17	0.235	0.529	0.118	0.118
Canola	Canada	132	0.144	0.742	0.098	0.015

Please think about the seed, fertilizer, pesticides, equipment and hired labor you devoted to growing corn/soybean/canola in 2013. On average, how much per acre would you say it cost you ($ per Acre)? I know this may vary from field to field, but what is your best estimate across your entire operation?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	435	351.71	184.23	0.00	900.00
	Canada	107	391.05	236.57	6.00	1,500.00
Soybean	U.S.	422	216.43	147.21	0.00	875.00
	Canada	102	196.75	99.10	0.00	500.00
Canola	Canada	481	205.09	77.43	0.00	500.00

On average, how much per acre would you say your 2013 corn/soybean/canola yielded? That is, how many bushels per acre, on average, across your entire operation?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	489	158.0	46.3	0.0	300.0
	Canada	115	148.8	76.5	2.0	500.0
Soybean	U.S.	495	50.5	47.2	1.0	750.0
	Canada	113	48.6	59.2	1.0	500.0
Canola	Canada	493	43.9	28.0	10.0	565.0

Have you sold any of your 2013 corn/soybean/canola? (Proportion of All Respondents)

Crop	Country	Yes	No	Don't Know
Corn	U.S.	0.741	0.253	0.006
	Canada	0.868	0.124	0.008
Soybean	U.S.	0.890	0.102	0.008
	Canada	0.984	0.016	
Canola	Canada	0.916	0.084	

In terms of dollars per bushel, what would you say is the average price you received for the 2013 corn/soybean/canola you sold?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	5.04	4.30	0.00	50.00	5.04
	Canada	43.31	91.00	3.00	590.00	43.31
Soybean	U.S.	13.06	2.16	2.50	48.00	13.06
	Canada	65.78	149.83	10.00	580.00	65.78
Canola	Canada	10.66	2.35	0.00	45.00	10.66

When deciding how to best manage insect pests, where do you go for advice? (Proportion of Respondents)

	Corn	
Source of Advice	U.S	Canada
Seed or chemical company representative	0.359	0.339
Agricultural retailer	0.345	0.413
Crop consultant	0.285	0.124
University Extension representative	0.090	0.041
Neighbor	0.044	0.041
Fertilizer dealer	0.024	0.017
Agronomist	0.022	0.231
Coop	0.010	0.008
Internet	0.008	0.017
Don't know	0.008	
Magazines	0.006	0.017
Meetings	0.002	

News articles	0.002	
Veterinarian	0.002	
Coffee shop	0.002	
Seed dealer/supplier		0.017
Club counsel		0.008
Government Extension		0.008
Provincial pesticide book		0.008
Scout		0.008
Myself		0.008
Cargill		0.008
Lang Farms		0.008
Dealer		0.008
Observations	**501**	**121**

When deciding how to best manage insect pests, where do you go for advice? (Proportion of Respondents)

	Soybean	
Source of Advice	**U.S**	**Canada**
Seed or chemical company representative	0.320	0.279
Crop consultant	0.320	0.221
Agricultural retailer	0.280	0.451
University Extension representative	0.082	0.041
The markets	0.030	0.008
Neighbor	0.020	0.041
Internet	0.018	0.033
Myself	0.018	
Agronomist	0.014	0.016
Local supplier	0.014	0.008
Local coop	0.012	0.033
Field scout	0.008	0.008
Literature	0.004	0.008
Local elevator	0.004	
County agent	0.004	
Pesticide dealer	0.002	0.008
Agronomy meetings	0.002	
Coffee shop	0.002	
Provincial agronomist		0.205
Applicator		0.016
Advertising		0.008
Magazines		0.008
Agricultural company		0.008
Club board		0.008
Seed company		0.008
Observations	**500**	**122**

When deciding how to best manage insect pests, where do you go for advice? (Proportion of Respondents)

	-- Canola --
Source of Advice	**Canada**
Agricultural retailer	0.472
Provincial agronomist	0.230
Seed or chemical company representative	0.206
Crop consultant	0.088
Internet	0.038
Neighbor	0.032
Myself	0.032
Local ag retailer	0.028
Agronomist	0.020
Local elevator	0.014
Farm newspapers	0.012
Local coop	0.010
Canola Council of Canada	0.008
Agrologist	0.008
Magazines	0.006
Books/literature	0.006
Call chemical company	0.004
Crop Production Services	0.004
Pioneer dealer	0.004
Company training meetings	0.004
Brochures	0.004
Government agricultural information center	0.004
Government agency	0.002
Cargill	0.002
Blue Book	0.002
Producer meetings	0.002
My son	0.002
University pest book	0.002
Custom applicator	0.002
Vitera	0.002
Grain companies	0.002
Alberta Canola Grower's website	0.002
AgriTrends	0.002
UFC	0.002
Research center	0.002
Local agent	0.002
Fertilizer dealer	0.002
Saskatchewan Agriculture	0.002
Bayer CropScience	0.002
Don't know	0.002
Observations	**500**

When choosing how to control insects with a particular insecticide or seed choice, what are the most important factors for you to consider? UNAIDED (Proportion of Respondents)

	Corn	
Factor	**U.S**	**Canada**
Standability	0.451	0.306
Mode of action	0.269	0.165
Ease of application	0.160	0.091
Results/effectiveness	0.112	0.281
Moisture	0.086	0.132
Type of insects	0.074	0.083
Chemical dealer	0.068	0.091
Seed quality	0.064	0.083
Crop rotation	0.062	0.140
Consultant's recommendation	0.060	0.066
Timing/timing of application	0.058	0.174
Yield	0.058	0.132
Seed genetics	0.048	0.074
Cost effectiveness	0.046	0.091
Residual effect	0.034	0.066
Code 15	0.026	0.107
Agronomist recommendation	0.026	0.091
Plant health	0.026	0.074
Supplier	0.022	0.041
Fertilizer used	0.018	0.066
Environmental impact/safety	0.002	0.041
Don't know	0.002	0.017
Ear retention	0.002	
Degree of infestation		0.033
Cost/price		0.025
Corn borer control		0.017
Profit/return on investment		0.017
Hybrid		0.008
Thermal unit		0.008
Type of insect		0.008
Testing with sample insecticides		0.008
Seed dealer recommendation		0.008
The field's history		0.008
Insect mutation		0.008
Seed		0.008
Product brand		0.008
My experience		0.008

Representative's recommendation		0.008
Broad-spectrum control		0.008
Risk if I don't use an insecticide		0.008
Human safety		0.008
Ease of harvesting		0.008
Plant emergence		0.008
Plant disease		0.008
Insecticide residue		0.008
Drought resistance		0.008
Fungicide resistance		0.008
Safety		0.008
Track record of the product		0.008
Seed treatment		0.008
Product support		0.008
Bee safety		0.008
Crop safety		0.008
Product availability		0.008
Choosing product with best control		0.008
If it's GMO or not		0.008
Ease of applying seed treatment		0.008
Glyphosate resistance		0.008
Plantability		0.008
Observations	**501**	**121**

When choosing how to control insects with a particular insecticide, what are the most important factors for you to consider? UNAIDED (Proportion of Respondents)

	Soybean	
Factor	**U.S**	**Canada**
Cost	0.460	0.287
Having consistent insect control	0.188	0.270
Protecting yield	0.180	0.041
Having long-lasting insect control	0.122	0.066
Family and worker safety	0.056	0.107
Improving plant health	0.048	0.016
Simplicity	0.044	0.033
Public safety	0.042	0.033
Convenience	0.038	0.016
Saving time and labor	0.028	0.016
Improving crop stand	0.026	
Flexibility	0.026	
Degree of infestation/damage	0.022	0.090
Replant or other product guarantees	0.016	

Crop marketability	0.014	
Return on investment/profit	0.012	0.025
Being able to plant early	0.012	0.000
Application timing	0.010	0.049
Protecting beneficial insects	0.010	0.041
Protecting wildlife	0.010	0.016
Protecting water quality	0.010	0.016
Chemical company's recommendation	0.010	
Reducing scouting	0.008	
Results of scouting	0.004	
Relying on my experience	0.004	
Grasshoppers	0.004	
Amount of water needed	0.002	0.016
Agronomist's recommendation	0.002	0.016
Insect resistance	0.002	0.008
Nematodes	0.002	
Local coop's recommendation	0.002	
Amount of leaf disease	0.002	
Product is broad-spectrum	0.002	
Japanese beetles	0.002	
Other farmer's experience	0.002	
Product has multiple modes of action	0.002	
Crop consultant's recommendation	0.002	
Recommendations	0.002	
Aphids	0.002	
Environmental safety		0.033
Crop safety		0.016
Quality of the product		0.016
Using the least effective rate		0.016
Next year's crop		0.008
Seed treatment		0.008
Seed safety		0.008
Odor		0.008
No residue on the plant		0.008
Equipment needed		0.008
Infestation of below-ground pests		0.008
Weather conditions		0.008
Field re-entry time		0.008
Must be biodegradable		0.008
Safety		0.008
Chemical rotation		0.008
Choosing the right product		0.008
Control of worms		0.008
Observations	**500**	**122**

When choosing how to control insects with a particular insecticide, what are the most important factors for you to consider? UNAIDED (Proportion of Respondents)

	-- Canola --
Factor	**Canada**
Cost	0.326
Having consistent insect control/effectiveness	0.308
Family and worker safety	0.132
Degree of infestation/damage	0.090
Having long-lasting insect control/residual control	0.088
Timing of application	0.080
Public safety	0.068
Protecting beneficial insects	0.066
Protecting yield	0.052
Economic threshold	0.040
Improving plant health/plant health	0.034
Choosing a product that controls targeted insects	0.026
Convenience/ease of use	0.024
Protecting the environment	0.024
Product availability	0.024
Protecting wildlife	0.022
Weather conditions	0.022
Simplicity	0.018
Safety	0.018
Quick acting	0.014
Saving time and labor	0.012
Protecting water quality	0.012
Local retailer's recommendation	0.010
Crop stage	0.010
Control of flea beetle	0.006
Field re-entry time	0.006
Return on investment	0.006
Using post experience/knowledge	0.006
Crop marketability	0.004
Replant or other product guarantees	0.004
Improving crop stand	0.004
Reducing equipment wear and tear	0.004
Agronomist's recommendation	0.004
Residue left in the soil	0.004
Mode of action	0.004
Product rebates	0.004
Residue on plant	0.004
Method of application	0.004
Applicator's recommendation	0.004

Being able to plant early	0.002
Flexibility	0.002
Reducing scouting	0.002
Coop's recommendation	0.002
Aerial application	0.002
Chemical rotation	0.002
Biological factors	0.002
Who to hire to apply chemicals	0.002
Getting the seed treated	0.002
Kind of pests	0.002
Product is not an organic phosphate	0.002
Protecting bees/pollinators	0.002
Control of moths	0.002
Scouting the fields	0.002
Early application	0.002
Next year's crop	0.002
Quality of the product	0.002
Seed variety	0.002
Profit	0.002
Observations	**500**

CORN: When choosing how to control insects with a particular insecticide or seed choice, how important is each of the following _____?

SOYBEAN AND CANOLA: When choosing how to control insects with a particular insecticide, how important is each of the following _____? (Proportion of Respondents)

Cost

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.012	0.144	0.317	0.521	0.006
	Canada	0.008	0.190	0.380	0.421	
Soybean	U.S.	0.018	0.122	0.294	0.554	0.012
	Canada	0.008	0.115	0.287	0.574	0.016
Canola	Canada	0.002	0.146	0.334	0.516	0.002

Protecting Yield

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.004	0.060	0.301	0.627	0.008
	Canada		0.050	0.231	0.711	0.008
Soybean	U.S.	0.004	0.066	0.304	0.616	0.010
	Canada	0.008	0.016	0.197	0.762	0.016
Canola	Canada	0.002	0.042	0.252	0.702	0.002

Having Consistent Insect Control

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.028	0.082	0.355	0.527	0.008
	Canada	0.008	0.074	0.421	0.479	0.017
Soybean	U.S.	0.008	0.074	0.336	0.570	0.012
	Canada	0.025	0.107	0.238	0.607	0.025
Canola	Canada	0.006	0.050	0.310	0.630	0.004

Crop Marketability

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.056	0.130	0.311	0.481	0.022
	Canada	0.050	0.099	0.314	0.504	0.033
Soybean	U.S.	0.026	0.144	0.300	0.516	0.014
	Canada	0.033	0.098	0.238	0.582	0.049
Canola	Canada	0.006	0.064	0.214	0.708	0.008

Replant or Other Product Guarantees

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.096	0.271	0.367	0.251	0.014
	Canada	0.074	0.215	0.364	0.339	0.008
Soybean	U.S.	0.098	0.282	0.362	0.242	0.016
	Canada	0.090	0.254	0.336	0.295	0.025
Canola	Canada	0.086	0.274	0.366	0.252	0.022

Improving Plant Health

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.004	0.116	0.411	0.459	0.010
	Canada	0.008	0.050	0.339	0.587	0.017
Soybean	U.S.	0.002	0.112	0.400	0.476	0.010
	Canada	0.016	0.107	0.369	0.492	0.016
Canola	Canada	0.004	0.096	0.358	0.540	0.002

Improving Crop Stand

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.004	0.094	0.401	0.493	0.008
	Canada	0.008	0.058	0.322	0.603	0.008
Soybean	U.S.	0.020	0.126	0.358	0.482	0.014
	Canada	0.025	0.115	0.377	0.467	0.016
Canola	Canada	0.014	0.134	0.374	0.474	0.004

Being Able to Plant Early

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.092	0.253	0.329	0.311	0.014
	Canada	0.033	0.182	0.331	0.446	0.008
Soybean	U.S.	0.100	0.262	0.312	0.308	0.018
	Canada	0.066	0.139	0.311	0.467	0.016
Canola	Canada	0.048	0.254	0.352	0.336	0.010

Convenience

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.030	0.250	0.449	0.261	0.010
	Canada	0.008	0.306	0.372	0.298	0.017
Soybean	U.S.	0.042	0.264	0.394	0.280	0.020
	Canada	0.016	0.254	0.402	0.303	0.025
Canola	Canada	0.008	0.282	0.422	0.280	0.008

Simplicity

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.050	0.208	0.441	0.285	0.016
	Canada	0.008	0.240	0.496	0.248	0.008
Soybean	U.S.	0.042	0.236	0.402	0.296	0.024
	Canada	0.041	0.303	0.377	0.262	0.016
Canola	Canada	0.018	0.242	0.442	0.292	0.006

Flexibility

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.034	0.269	0.443	0.240	0.014
	Canada		0.240	0.455	0.289	0.017
Soybean	U.S.	0.026	0.272	0.392	0.286	0.024
	Canada	0.008	0.230	0.467	0.279	0.016
Canola	Canada	0.010	0.248	0.410	0.316	0.016

Saving Time and Labor

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.034	0.220	0.405	0.333	0.008
	Canada	0.017	0.157	0.413	0.405	0.008
Soybean	U.S.	0.032	0.198	0.392	0.368	0.010
	Canada	0.041	0.197	0.410	0.336	0.016
Canola	Canada	0.024	0.220	0.390	0.360	0.006

Reducing Scouting

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.138	0.289	0.387	0.174	0.012
	Canada	0.107	0.372	0.347	0.124	0.050
Soybean	U.S.	0.152	0.308	0.314	0.204	0.022
	Canada	0.172	0.262	0.279	0.180	0.107
Canola	Canada	0.118	0.334	0.312	0.212	0.024

Having Long-Lasting Insect Control

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.034	0.134	0.341	0.483	0.008
	Canada	0.017	0.165	0.388	0.430	
Soybean	U.S.	0.020	0.120	0.368	0.476	0.016
	Canada	0.016	0.164	0.262	0.533	0.025
Canola	Canada	0.014	0.130	0.332	0.520	0.004

Protecting Beneficial Insects

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.046	0.186	0.405	0.349	0.014
	Canada	0.008	0.083	0.380	0.529	
Soybean	U.S.	0.042	0.202	0.342	0.398	0.016
	Canada	0.008	0.139	0.270	0.566	0.016
Canola	Canada	0.026	0.122	0.322	0.524	0.006

Protecting Wildlife

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.064	0.206	0.373	0.343	0.014
	Canada	0.025	0.140	0.380	0.446	0.008
Soybean	U.S.	0.048	0.226	0.372	0.342	0.012
	Canada	0.025	0.131	0.320	0.508	0.016
Canola	Canada	0.040	0.176	0.384	0.400	

Protecting Water Quality

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.022	0.108	0.319	0.541	0.010
	Canada	0.008	0.033	0.248	0.711	
Soybean	U.S.	0.014	0.094	0.332	0.546	0.014
	Canada	0.008	0.082	0.238	0.648	0.025
Canola	Canada	0.018	0.106	0.288	0.586	0.002

Family and Worker Safety

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.020	0.060	0.261	0.653	0.006
	Canada		0.017	0.107	0.868	0.008
Soybean	U.S.	0.008	0.050	0.266	0.666	0.010
	Canada			0.148	0.844	0.008
Canola	Canada			0.026	0.160	0.814

Public Safety

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.030	0.128	0.351	0.479	0.012
	Canada	0.008	0.041	0.314	0.636	
Soybean	U.S.	0.026	0.132	0.322	0.510	0.010
	Canada		0.074	0.254	0.664	0.008
Canola	Canada	0.008	0.094	0.282	0.616	

Reducing Equipment Wear and Tear

Crop	Country	Not Important	Somewhat Important	Important	Very Important	Don't Know
Corn	U.S.	0.088	0.275	0.367	0.257	0.012
	Canada	0.050	0.306	0.405	0.215	0.025
Soybean	U.S.	0.056	0.262	0.338	0.328	0.016
	Canada	0.066	0.270	0.451	0.189	0.025
Canola	Canada	0.070	0.296	0.354	0.278	0.002

Please think carefully about all the reasons why you chose to plant Bt corn in 2013 and what else you could have done to manage insects instead of planting Bt corn. Compared to these alternatives, what additional value would you say using Bt corn provided to you per acre of Bt corn? (Proportion of Respondents)

Crop	Country	Observations	Not more than $5 per acre	More than $5, but not more than $10 per acre	More than $10, but not more than $25 per acre	More than $25, but not more than $40 per acre	More than $40 per acre	Don't Know
Corn	U.S.	401	0.137	0.229	0.312	0.187	0.067	0.067
	Canada	109	0.174	0.165	0.257	0.174	0.147	0.083

Please think carefully about all the reasons why you chose to plant corn/soybean/canola with an insecticidal seed treatment in 2013 and what else you could have done to manage insects instead of using an insecticidal seed treatment. Compared to these alternatives, what additional value would you say using an insecticidal seed treatment provided to you per acre of treated corn/soybean/canola? (Proportion of Respondents)

Crop	Country	Observations	Not more than $5 per acre	More than $5, but not more than $10 per acre	More than $10, but not more than $15 per acre	More than $15, but not more than $25 per acre	More than $25 per acre	Don't Know
Corn	U.S.	311	0.151	0.286	0.251	0.170	0.103	0.039
	Canada	87	0.253	0.218	0.218	0.103	0.126	0.080
Soybean	U.S.	254	0.130	0.303	0.280	0.102	0.083	0.102
	Canada	88	0.159	0.227	0.227	0.136	0.193	0.057
Canola	Canada	431	0.162	0.258	0.260	0.125	0.135	0.060

Please think carefully about all the reasons why you chose to treat your corn acreage with a soil insecticide in 2013 and what else you could have done to manage insects instead of applying a soil insecticide. Compared to these alternatives, what additional value would you say using soil insecticides provided to you per acre of treated corn *(Question not asked of soybean/canola growers because no soil insecticides registered for use on these crops)* ***?*** (Proportion of Respondents)

Crop	Country	Observations	Not more than $5 per acre	More than $5, but not more than $10 per acre	More than $10, but not more than $15 per acre	More than $15, but not more than $25 per acre	More than $25 per acre	Don't Know
Corn	U.S.	96	0.219	0.229	0.250	0.156	0.104	0.042
	Canada	4	0.250	0.250	0.500			

Please think carefully about all the reasons why you chose to treat your corn/soybean/canola with a foliar insecticide in 2013 and what else you could have done to manage insects instead of using a foliar insecticide. Compared to these alternatives, what additional value would you say using a foliar insecticide provided to you per acre of treated corn/soybean/canola? (Proportion of Respondents)

Crop	Country	Observations	Not more than $5 per acre	More than $5, but not more than $10 per acre	More than $10, but not more than $15 per acre	More than $15, but not more than $25 per acre	More than $25 per acre	Don't Know
Corn	U.S.	40	0.125	0.225	0.250	0.200	0.125	0.075
	Canada	14	0.143	0.214	0.143	0.143	0.214	0.143
Soybean	U.S.	113	0.150	0.327	0.212	0.124	0.124	0.062
	Canada	17	0.235	0.294	0.176	0.059	0.059	0.176
Canola	Canada	132	0.250	0.189	0.212	0.106	0.174	0.068

In general, what are your biggest concerns with regard to insect management in corn? UNAIDED (Proportion of Respondents)

	Corn	
Concern	**U.S**	**Canada**
Control/effectiveness	0.200	0.140
Insect resistance	0.172	0.165
Corn borer control	0.092	0.099
Effect on yield	0.086	0.132
Rootworm control	0.082	0.050
Cost of products	0.064	0.008
Worker/public safety	0.062	0.025
Plant stand	0.046	0.083
Plant health	0.044	0.091
Effect on environment	0.030	0.041
Cutworm control	0.028	0.017
Don't know	0.022	0.033
Reliable/consistent	0.014	0.008
Timing	0.012	0.017
Weather effect	0.012	0.008
Plant trait resistance	0.010	0.017
Product availability	0.010	0.008
That it won't kill beneficial insects	0.008	0.025
Ease of use	0.008	0.017
Cost of scouting	0.008	
Profit	0.006	0.008
Earworm control	0.006	
Long residual effectiveness	0.006	
All insects	0.004	0.033
Wireworms	0.004	0.025
Seed treatment effectiveness	0.004	0.025
Government regulations	0.004	0.008
Seed companies continue research	0.004	0.008
Logging	0.004	
Ear retention	0.004	
Beetle control	0.004	
Corn on corn	0.002	0.008
Feed quality	0.002	0.008
Corn maggot control	0.002	
That I need a refuge	0.002	
Ensuring crop rotation	0.002	
Grasshopper control	0.002	

Spider mite control	0.002	
Grub worm control	0.002	
Bee safety		0.033
Resistance management		0.025
Ease of harvesting		0.017
Safety issues		0.017
Public perception of insecticide use		0.008
Drift		0.008
Crop safety		0.008
Corn after hay		0.008
Ease of treating seed		0.008
Bird safety		0.008
Wildlife safety		0.008
Dust from seed treatment		0.008
Observations	**501**	**121**

In general, what are your biggest concerns with regard to insect management in soybean? UNAIDED (Proportion of Respondents)

	---------- Soybean ----------	
Concern	**U.S**	**Canada**
Insect control/effectiveness	0.316	0.295
Protecting the yield	0.146	0.082
Resistance	0.100	0.041
Plant health	0.086	0.066
Timely application	0.070	0.057
Human safety	0.070	0.057
Cost	0.062	0.016
Aphids	0.042	0.123
Don't know	0.034	0.049
Residual control	0.034	
Protecting beneficial insects	0.030	0.098
Return on investment	0.022	
Environmentally safe	0.020	0.082
Finding the insects	0.014	0.066
Profit	0.014	0.041
Convenience/ease of application	0.010	0.008
Bean leaf beetles	0.010	0.000
Product availability	0.006	0.008
Weather conditions	0.006	0.008
Spider mites	0.006	0.008

Leafhoppers	0.006	
Minimizing applications	0.006	
New insects	0.004	0.008
Nematodes	0.004	0.008
Scouting time	0.004	
Drift	0.004	
Seed damage	0.004	0.000
Grasshoppers	0.002	0.025
Stink bugs	0.002	0.008
Rootworm	0.002	0.008
Seed quality	0.002	
Government regulations	0.002	
Product is broad spectrum	0.002	
Diseases that insects carry	0.002	
EPA	0.002	
Soybean rust	0.002	
Germs	0.002	
Marketing product with residual insecticide	0.002	
Leaf-eating insects	0.002	
Clover worms	0.002	
Pod worms	0.002	
Grubs	0.002	
Wireworms	0.002	
Finding the right product	0.002	
Stem borer	0.002	
Protecting the bees		0.041
Safety		0.033
Can we get control with a seed treatment?		0.016
Saving time and labor		0.016
Armyworms		0.008
Slugs		0.008
Wildlife safety		0.008
Degree of infestation		0.008
Decision to spray or not		0.008
Early-season insects		0.008
Water safety		0.008
Control of small insects		0.008
Observations	**500**	**122**

In general, what are your biggest concerns with regard to insect management in Canola? UNAIDED (Proportion of Respondents)

	-- Canola --
Concern	**Canada**
Effective insect control	0.204
Protecting the yield	0.190
Control of flea beetle	0.106
Timing of application	0.082
Plant health/ safety	0.082
Human safety	0.062
Protecting beneficial insects	0.056
Resistance to chemicals	0.046
Protecting the environment	0.046
Cost	0.044
Seed treatment effectiveness	0.038
Controlling insects early	0.036
Finding the insects early/effective scouting	0.032
Control of armyworm/Bertha armyworm	0.030
Don't know	0.030
Safety	0.026
Maintaining a good stand	0.026
Protecting bees	0.018
Good plant emergence	0.018
Residual control	0.016
Profit	0.016
Economic threshold	0.014
Weather conditions	0.012
Return on investment	0.012
Degree of infestation	0.012
Control of diamondback moth	0.010
Product availability	0.010
Control of lygus bug	0.010
Insect management	0.010
Protecting wildlife	0.010
Product reliability	0.008
Choosing a product that controls targeted insects	0.008
Need to rotate crops	0.008
Having to reseed	0.006
Control of cutworm	0.006
Number of applications needed	0.006
Control of worms	0.004
Food safety	0.004

Control of yellow aster	0.004
Residue in the crop	0.004
Crop damage from the sprayer	0.004
Convenience/ease of use	0.004
Control of cabbage seedpod weevil	0.002
Control of wireworm	0.002
U.S. trade winds	0.002
Control of swede midge	0.002
Control of alfalfa loopers	0.002
Residue in the soil	0.002
Cost of scouting	0.002
Control of gophers	0.002
Drift	0.002
New insect species	0.002
Control in one application	0.002
Observations	**500**

How many of your crop acres in 2013 did you rent or lease?

Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	495	512	825	0	11,500
	Canada	121	407	606	0	4,000
Soybean	U.S.	492	667	1,109	0	16,000
	Canada	122	313	445	0	2,000
Canola	Canada	497	793	1,131	0	9,000

How many years have you been managing a farming operation?

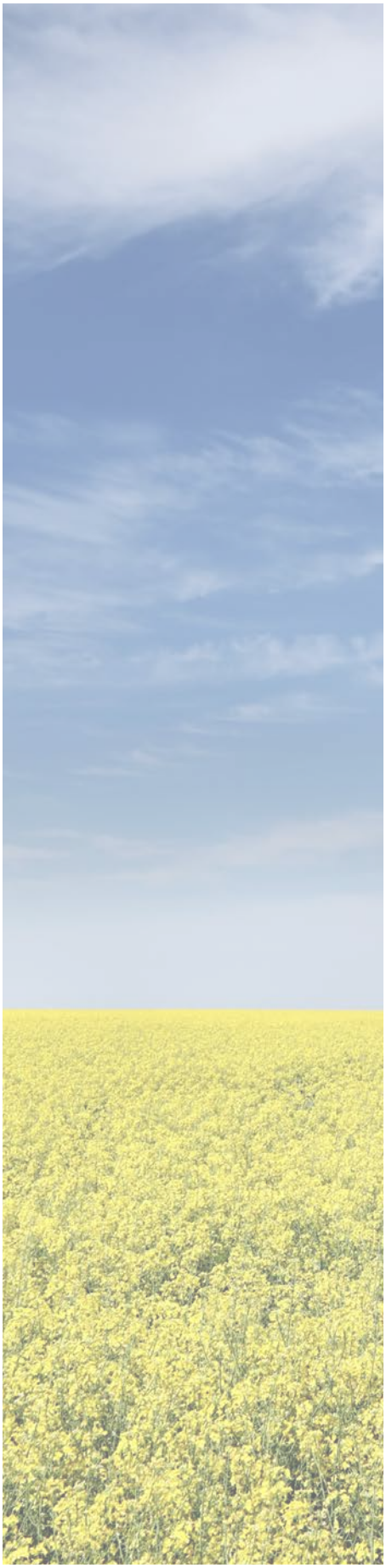
Crop	Country	Observations	Mean	Standard Deviation	Minimum	Maximum
Corn	U.S.	499	34.4	12.7	1	76
	Canada	121	27.9	11.7	2	60
Soybean	U.S.	496	33.2	14.2	2	77
	Canada	122	30.7	11.8	3	65
Canola	Canada	499	31.7	12.2	2	70

Did you raise any commercial livestock in 2013? (Proportion of Responents)

Crop	Country	Yes	No	Don't Know
Corn	U.S.	0.453	0.545	0.002
	Canada	0.496	0.471	0.033
Soybean	U.S.	0.374	0.626	
	Canada	0.344	0.631	0.025
Canola	Canada	0.356	0.642	0.002

What is the last year of formal education that you completed? Would you say: (Proportion of Respondents)

Crop	Country	Observations	Did Not Complete High School	High School	Some College	Vocational/Technical Training	College Graduate	Advanced Degree
Corn	U.S.	493	0.026	0.404	0.209	0.071	0.247	0.043
	Canada	121	0.140	0.314	0.132	0.041	0.364	0.008
Soybean	U.S.	493	0.026	0.375	0.185	0.069	0.256	0.089
	Canada	121	0.099	0.289	0.182	0.033	0.355	0.041
Canola	Canada	499	0.156	0.309	0.142	0.108	0.259	0.026



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