

FLAX TOP MANAGER GROWER SURVEY 2006-07

EXECUTIVE SUMMARY

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Executive Summary

Flax Canada 2015 has been established to document the opportunity for a \$1.5 billion farm gate value of flax in the bio economy. FC 2015 is structured as an economic development strategy based on creating sustainable value from enhanced flax acreage and from the development and commercialization of novel flax products into existing and new markets. Many of the commercial opportunities that have been identified by FC 2015 will be based in rural communities and/or will have strong linkages with producers. However, an important component of the strategy is to ensure strong flax production capabilities in Canada. If this is not met, then meeting any overall economic goals set by this strategy will not be met.

The FC 2015 Steering Committee (FCSC) under the guidance of the Plant Breeding and Production Working Group (BPWG) coordinated this project. This is the second phase of the project, with the initial phase being conducted in 2005/2006. The results of this project are meant to provide information on the production practices that will contribute to the FC 2015 Plant Breeding and Production Strategic Plan. It will highlight best case and worst case production practices. The specific goals were as follows:

Type of Flax and Pest Management System

The vast majority of respondents (87.4%) grew a flax conventional system. Another 6.4% grew flax organic and 2.6% (13 respondents) grew yellow flax conventional. Only 11 respondents grew flax pesticide free and 7 grew solin conventional. These results are similar to the previous study where 86.9% of respondents grew a flax conventional system.

Yield and Grade

More than one quarter of respondents (27.8%) had an overall yield of 16 to 20 bushels per acre the most recent year that they grew flax. Another 24.1% had a yield of 21 to 25 bushels per acre, while 21.3% had a yield of 15 bushels per acre or less and 26.8% had a yield of more than 25. The overall average was 21.5 bushels per acre, which is similar to the average of 22.4 bushels per acre in the previous study. In terms of consistency of yield, 44.3% of respondents have a long-term average yield of 21 to 25 bushels per acre for their flax crops. The overall average is similar to that of the most recent growing year, at 21.6 bushels per acre. This is also similar to the long term average in the previous study (21.9 bushels per acre).

The average yield for Flax Conventional System is 22.1 bushels per acre. Flax Organic Productions yield an average of 12.4 bushels per acre, which is significantly less than for Flax Conventional System.

With regard to the grade of respondents' most recent flax crop, the vast majority (92.8%) indicated that the grade of their flax crops was 100% #1 CW. Another 3.4% had 100% #2 CW, while 2.1% had 100% #3 CW. Another 3.6% had 100% #2 CW, while 2.4% had 100% #3 CW. These results are similar to those of the previous study, where 94.1% had 100% #1 CW, 3.4% had 100% #2 CW, and 2.1% had 100% #3 CW.

In terms of long-term grade, on average, respondents indicated that 97.8% of their flax crops are #1 CW. Another 1.8% are #2 CW and 0.4% are #3 CW. This is similar to the results of the previous study, where 96.1% of respondents' flax crops were #1 CW, 2.4% were #2 CW, and 1.5% were #3 CW.

Classifying Top, Middle and Bottom Producers

Using both current and long-term yield and grade, a cluster analysis was used to place each respondent who uses a flax conventional system into a group of top, middle, or bottom producers. Since other flax systems have unique requirements and considerations, they have not been included in this analysis, as it would not be appropriate to compare them directly with flax conventional growers. The following table shows a summary of each group. Top growers had a most recent yield of 31.8 bushels/acre and a long term average yield of 27.3 bushels/acre. They also had an average of 99.2% #1 CW in their most recent year, and 100% long-term. These results are similar to those of the previous study.

Grower Groups	Top Growers (N=73)	Middle Growers (N=164)	Bottom Growers (N=167)
Most recent yield (bushels/acre)	31.8	23.9	16.1
Long-term average yield (bushels/acre)	27.3	23.3	18.6
Most recent grade of flax crops (% #1 CW)	99.2	99.2	97.3
Most recent grade of flax crops (% #2 CW)	0.7	0.5	2.1
Most recent grade of flax crops (% #3 CW)	0.1	0.3	0.6
Long-term grade of flax crops (% #1 CW)	100.0	97.0	94.2
Long-term grade of flax crops (% #2 CW)	0.0	2.4	3.0
Long-term grade of flax crops (% #3 CW)	0.0	0.6	2.8

In the long term, 53% of respondents have a 3-5% overall dockage of their flax crops. 17.1% have a dockage of less than 3%, and 29% have more than 5% dockage. The overall average dockage is 5.4% and the median is 4%. These results are similar to the previous study, where the average dockage was 5.2% and the median was 4%. Top growers have an average dockage of 3.8%.

Dockage levels for the most recent flax crops are similar to overall dockage rates. The average dockage is 6.2% and the median is 4%. Again, these results are similar to those of the previous study, where the average dockage was 5.6% and the median was 4%.

The average dockage for flax conventional system was 5.5%. As would be expected, organic productions have higher dockage, with an average of 15.1% for flax organic production. These results are consistent with those of the previous study.

Preliminary Information

All respondents have most recently planted flax since 2003, with the majority planting it in 2006.

Overall, 39.5% of respondents cropped less than 1000 total acres in the most recent year that they grew flax. Another 40.6% cropped 1000 to 2499 acres and 19.9% cropped 2500 or more. The average is 1600 total acres and the median is 1200. This is

significantly less than the average of approximately 1900 total acres in the previous study.

In all, 39.4 respondents seeded less than 150 acres of flax in the most recent year that they grew it. Another 38.4% seeded 150 to 300 acres, and 22.1% seeded more than 300. The average is 238 acres and the median is 160. These results are similar to those of the previous study, where the average was 258 acres and the median was 190.

More than one third of respondents have grown flax in their crop rotation for less than 10 years (35.5%). Another 46.2% have grown flax for 10 to 20 years and 18.3% have included it for more than twenty years. On average, respondents have grown flax for about 14 years.

Crop Rotation

Nearly half of all respondents use a four year crop rotation with flax (43.8%). Another 27.4% use a three year rotation and 12.2% use five years or more, while 6.4% use a two year rotation and 10.2% have only grown flax for one season or do not have a specific rotation. While the differences between top, middle and bottom groups are not major, bottom growers are slightly more likely than top growers to use a rotation of four years or less.

Taking all crop rotations into account, 12.7% of respondents grow canola in the year prior to growing flax. This is a slight decrease from the previous study, where 15.7% of respondents who indicated their crop rotation grew canola in the year prior to growing flax. Interestingly, this does not vary between grower groups.

Overall, 50.8% of respondents indicated they chose their crop rotation simply because it works best. Also, 16.7% use their particular rotation for disease and/or pest control, while 15.4% use it for weed control and 13.1% for soil management. Reasons for rotations do not differ significantly between top, middle and bottom growers.

When asked what the primary reason was that they planted flax, most respondents said it was because it fit into their crop rotation (55%). Another 26.2% planted flax because it is a cash crop, which is significantly lower than the 41.3% of respondents who indicated this was their primary reason in the previous study. Also, 5.8% grew flax for diversification and 3.8% for seed production.

Flax Varieties

The most common variety of flax seed used is CDC Bethune (46.7% of those using flax conventional system), followed by Vimy at 17.8%, and AC Watson at 6.4%. No other is used by more than 5% of respondents. Nearly one-half of top growers used CDC Bethune (47.9%), compared to 38.9% of bottom growers.

Of those who use the flax conventional system, 60.2% use farm saved seed, 30.2% use certified seed and 7.8% use foundation seed. This is significantly different from the previous study, where 43.3% used farm saved seed, and 44.5% used certified seed. Although we cannot conclude that it is statistically significant, the most notable difference between top and bottom growers is that bottom growers are more likely than others to

use farm saved seed, which is different from the previous study where they were less likely than other growers to use farm saved seed.

The average percent germination for the flax conventional system is about 94%. This does not differ significantly between top, middle and bottom growers.

Fertility Regime

Overall, 20.2% of respondents conducted soil testing, which is slightly, but not significantly, less than in the previous study (23.7%). Bottom growers are less likely than top and middle growers to have conducted soil testing (13.8% and 28.8% respectively).

Overall, 15.8% of respondents did not apply fertilizers at all. Of the 421 respondents who did apply fertilizers, 92.4% did so once, while 7.6% applied them twice. These results are significantly different from the previous study, where 84.3% of respondents applied fertilizers once, and 15.7% twice. Bottom growers are less likely than other respondents to apply fertilizers. Also, conventional growers with minimum or conventional tillage regimes are more likely than other growers to apply fertilizers twice per year.

The majority of respondents indicated their first (or only) fertilizer application occurs in May. Of those who apply fertilizers twice, nearly half apply both times in May (45.2%). Another 22.6% apply fertilizer for the first time in October and the second time in May.

Of those who applied fertilizer at least once, 40.9% used a deep or side banded application, which is significantly less than in the previous study (48.2%). Another 32.1% used seed placed application, which is similar to the previous study (31.1%). Conventional system growers with a zero tillage regime are most likely to use a deep or side banded application method (52.5%), compared to 39.6% of those with a minimum tillage regime, and 25.3% of those with a conventional tillage regime.

Of those who applied fertilizer, 29.2% used a fertilizer rate of less than 60 pounds per acre. Another 31.5% used a rate of 60 to 99 pounds per acre, and 39.3% used a rate of 100 or more. The average for those who applied fertilizer only once is approximately 90 pounds per acre, which is similar to the previous study (86 pounds per acre). For respondents who applied fertilizer twice, the average rate for the first application was 74 pounds per acre, and for the second application was 46 pounds per acre. These rates are slightly higher than in the previous study (69 pounds per acre for the first application and 38 pounds per acre for the second application).

Only three total respondents used micro-nutrients (two in their only application, and one in both of their applications). This is slightly less than in the previous study, where seven respondents indicated they used micro-nutrients.

As in the previous study, each of the factors related to fertility regime (number of applications, application method, fertilizer rate, and use of micronutrients) were analyzed to determine which are most related to productivity (yield for flax conventional system). A number of correlation and regression methods were used and it was found that the

most important factor is simply that fertilizer is used. Those who did not apply fertilizer at all had an average yield of 18.2 bushels per acre, compared to 22.6 for those who applied fertilizer once and 21.6 for those who applied twice.

Tillage Regime

Overall, 45% of respondents used a zero till regime, while 28.8% used minimum till and 26% used conventional till. These results are consistent with those of the previous study. There is a significant difference in tillage regimes of top growers as compared to bottom growers, with 31.5% of top growers using minimum till, compared to 19.8% of those in the bottom group. Also, 31.7% of those in the bottom group used conventional till, compared to only 16.4% of those in the top group.

Method of Seeding

Of the total respondents, 37.8% used an air-drill for seeding, which is significantly less than the 46.7% of respondents in the previous study. Another 35.4% used an air-seeder, and 11.8% used a double disc press drill. Top growers are most likely to use an air-drill, while bottom and middle growers are more likely to use an air-seeder. Also, conventional system growers with a zero tillage regime are more likely than other respondents to use an air-drill, while those with a minimum tillage regime are most likely to use an air-seeder.

The average fan speed for both air-seeders and air-drills is approximately 3017 RPM, which is similar to the average of approximately 3000 in the previous study. The majority of respondents (55%) said that the speed of the implement used for seeding was 5 MPH. Another 36.8% were slower than 5 MPH and 10.9% were faster. The average speed is approximately 4.7 MPH, which is similar to the average of 4.9 MPH in the previous study.

More than two-thirds of respondents used a packing method after seeding (67.8%), which is similar to the previous study (65.6%). Nearly one-half of respondents do not use any other post-seeding process (44.8%), while 30% use a row packer, and 26.2% harrow.

Each of the factors related to seeding method (seeding equipment, row spacing, type of opener, packing method, and post-seeding process, and tillage regime) were analyzed to determine which are most related to productivity (yield for flax conventional system). As in the previous study, a number of correlation and regression methods were used and it was found that using an air-drill has the most positive impact on yield, while using conventional till has a the most negative impact.

Seeding

Overall, 71.6% of respondents begin seeding flax in the second (35.2%) or third (36.4%) week of May. The earliest is the third week of March and the latest is the second week of June. This is similar to the results of the previous study and does not vary significantly between grower groups.

The overall average seeding rate for Flax Conventional System is about 42 lbs/acre, which is the same as in the previous study. It does not differ significantly between top, middle and bottom growers.

Of those who use the Flax Conventional System, 33.1% seed at a depth of one inch. 40.2% seed at a depth of less than one inch, and 26.7% seed at a depth of more than one inch. The overall average seeding depth for Flax Conventional System is about one inch, which is the same as in the previous study. It does not differ significantly between top, middle and bottom growers.

Of those who use the Flax Conventional system, 69.2% rated the evenness of their crop as 8 or better out of 10. The average rating is 7.9 out of 10. As would be expected, top growers rated the evenness of their crops significantly better than bottom growers (8.6 and 7.5 out of 10 respectively).

The following table shows that crop evenness is similar for the different systems.

	N	Minimum	Maximum	Mean
Flax Conventional	435	1	10	7.9
Flax Pesticide Free Production	11	7	10	8.8
Flax Organic Production	31	3	10	8.2
Solin Conventional System	7	4	10	7.4
Yellow Flax Conventional System	13	3	10	7.1

Each of the factors related to seeding (start date, rate, depth, and temperature) were analyzed to determine which are most related to productivity (yield for flax conventional system). Seeding depth has a negative correlation to yield (Pearson Correlation = -0.14). Growers who seeded at a depth of less than one inch had higher yields than those who seeded at a depth of more than one inch (23.3 bushels per acre and 20.4 bushels per acre respectively).

Weeds

Respondents were asked to identify their top 3 most problematic weeds for their flax crops. Overall, 56.4% of respondents indicated that Wild Oats was one of the most problematic weeds for their flax crop. Other common problematic weeds were Kochia (29.6%), Thistle (28.6%), and Buck Wheat (28.4%). In the previous study, Wild Oats, Kochia, and Thistle were the most common problematic weeds.

More than three-quarters of respondents used in-crop (post-emergence) control methods (76.6%). Also, 29.2% used pre-seed methods, 10.8% used pre-emergence methods, 10% used pre-harvest methods, and 8.6% used cultural methods. Overall, 6.8% of respondents did not use any control methods. These results are similar to the previous study.

Of the total respondents, 86.2% applied herbicides. Top growers appear to be more likely than bottom growers to have applied herbicide in their most recent flax year (98.6% and 89.2% respectively). Conventional system growers with either zero tillage or minimum tillage regimes are most likely to have applied herbicides.

Nearly three-quarters of those who applied herbicides did so once in their most recent flax year (73.8%). Another 22.3% applied herbicides twice, 3.7% applied them three times, and 0.2% (one respondent) applied them four times. Conventional system growers with a zero till regime were most likely to apply them more than once.

The most common herbicide used is Buctril, at 56.7%, followed by FlaxMax at 23.3%, Poast Ultra at 20.5%, and Roundup at 19.3%.

Only 7.9% of all respondents who used herbicides had resistance problems, which is similar to the previous study (5.7%). Overall, 48.6% of respondents indicated their weed emergence was after their crop emergence. Another 43.4% said it was at the same time as their crop emergence, and 5.2% said it was before their crop emergence. These results are consistent with those of the previous study.

Overall, 90.2% of respondents estimated their yield loss due to weeds. Of these respondents, 31.4% lost more than 5% of their yield, for an average loss of approximately 6.4%. Respondents who did not use herbicides lost an average of 13% of their yield, compared to 5.3% for those who used herbicides. On average, growers in the bottom group lost 8.4% of their yield due to weeds, significantly more than top growers (2.8%) and those in the middle group (4.2%). Also, on average, organic growers lost 17.9% of their yield due to weeds, significantly more than other growers.

When asked to indicate the herbicide used in the year prior to growing flax, 22.8% of respondents indicated they used Roundup. The next most common herbicide was Puma (16.4%), followed by Buctril (15.8%) and Horizon (13.8%). The likelihood respondents used Roundup does not vary between grower groups.

Each of the factors related to weed control (control methods, number of herbicide applications, rate of applications and crop stage of applications) were analyzed to determine which are most related to productivity (overall yield). A number of correlation and regression methods were used and it was found that the most important thing is simply that herbicides are used. Those who did not apply herbicides at all had an average yield of 16.6 bushels per acre, compared to 22.6 for those who applied fertilizer once or more. There is not a significant difference between those who applied one, two or three times. In terms of other weed control factors, in-crop (post-emergence) methods are most positively correlated with yield.

Insects

Overall, 61.4% of respondents inspected their fields for insects in their most recent flax year, which is consistent with the 64.8% of respondents who inspected their flax fields for insects in the previous study. Overall, 71.2% of top growers inspected their fields for insects, compared to 54.5% of growers in the bottom group.

Insects were not a major problem for most respondents. Of the respondents who inspected their fields, 249 (81.1%) indicated that they did not have insect problems. The remaining 58 respondents (18.9%) indicated specific insects that affected their crops, the most common of which were aphids and grasshoppers. In the previous study, grasshoppers were most common, followed by aphids.

More than three quarters of respondents who indicated specific insects they did not use any insect control methods (78%). Insecticides were used by eight respondents (13.6%). These results are consistent with the previous study, where 76.9% of respondents did not use any insect control methods and sixteen respondents (17.6%) used insecticides.

Overall, 90.8% of respondents did not lose yield due to insects. Top and bottom growers are equally likely to have no loss due to insects. Three growers in the bottom group had more than 10% yield loss due to weeds.

Disease

The majority of respondents inspected their flax fields for disease (56%), which is similar to the 53.3% of respondents in the previous study who inspected their flax crops for diseases. Overall, 63% of top growers inspected their flax fields for disease, compared to 56.7% of middle growers and 49.7% of bottom growers.

Most respondents who inspected for disease did not have any problems. Only fourteen respondents mentioned diseases that caused problems (4.8%).

Of the respondents who inspected their crops for disease, 77.5% did not use any disease control methods. Another 20% used cultural methods, while one respondent used a fungicide, and four respondents used seed that was pre-treated with fungicide.

Overall, 95.2 of respondents did not have any yield loss due to disease. Only five respondents lost more than 5%. There are no major differences in disease loss for the different groups of farmers.

Harvest

Of the total respondents, 21% used a desiccant, which is significantly less than in the previous study (27.8%). While we cannot conclude the difference is significant, top growers appear more likely to have used a desiccant than bottom growers.

Of the respondents who used a desiccant, 69.5% used Roundup, 7.6% (8 respondents) used Reglone, and 20% used other desiccants. These results are similar to the previous study, where 75.6% of respondents used Roundup and 5.3% (7 respondents) used Reglone. Although we cannot say that the difference is significant, it appears that bottom growers are more likely than those in the top group to use Roundup.

Nearly three-quarters of those who applied a desiccant did so in September (74.2%), with most of those doing so in the first or second week. Of those who applied desiccants, 57.9% of the top growers applied it in the first week of September, compared to 32% of the bottom growers.

Of those who provided an application rate for their desiccant, 67.4% said one litre/acre. Another 15.8% apply at less than one litre/acre, and 16.8% apply at more than one litre/acre.

Most of the respondents who applied desiccants said that they did so at a maturity stage of 8 or higher out of 10 (69.9%). The average is 8.0, which is similar to the average of 7.9 in the previous study, and does not differ between top, middle and bottom growers.

Overall, 56.4% of respondents swathed, while 43.6% straight combined, which is consistent with the results of the previous study. While we cannot conclude that the difference is statistically significant, it appears that top growers were more likely than others to straight combine. Conventional system growers with a conventional tillage regime and organic growers are more likely than other respondents to swath.

More than one-half of all respondents who straight combined did so in September (51%). Another 39.5% combined in October, and 6.7% combined in August. It appears that growers in the top group are more likely than those in the bottom group to straight combine in the third or fourth weeks of September.

The majority of respondents who swathed did so in September (64%). Another 18.2% swathed in October, and 17.1% swathed in August. Of the respondents who indicated they swathed, 56.6% indicated their harvest date is in September, while 33.6% indicated it is in October.

Each of the factors related to harvest (use of desiccants, rate of application, crop stage of application, and swath/straight combine and their dates) were analyzed to determine which are most related to productivity (overall yield). A number of correlation and regression methods were used and it was that the most important thing was that desiccants were used. Those who did not use a desiccant had an average yield of 21.7 bushels per acre, compared to 23.7 bushels per acre for those who used a desiccant.

Overall, 20.4% of respondents experienced weathering or frost damage problems, which is similar to the results from the previous study (23.6%). While we cannot conclude the difference is significant, it appears bottom growers are more likely than top growers to have experienced weathering or frost damage.

Of the respondents who experienced weathering or frost damage, 28.4% lost a grade because of it. This equates to 5.8% of all respondents, which is similar to the 5.5% of all respondents in the previous study. Overall, 29.4% of those in the bottom group who experienced weathering problems lost a grade because of it, this equates to 6% of all growers in the bottom group.

Straw Management

Nearly one-half of all respondents burn their straw (46.4%). More than one-third remove their straw for sale (37.4%), 26.4% use chopping, 17.4% use spreading, and 6.8% use incorporation. Overall, 2.6% do not use any straw management practices. These results are similar to those of the previous study. Top growers are slightly more likely to use burning or removal for sale, while bottom growers are slightly more likely to use chopping. Conventional growers with a conventional tilling regime are more likely than other respondents to use burning, while pesticide free and organic growers are more likely to use removal for sale.

With an average rating of 9.3 out of 10, the majority of respondents rated the standability of their crop pre-harvest as 8 or better out of 10 (93%). The average rating in the previous study was slightly lower, at 9.0 out of 10, with 88.4% of respondents giving a rating of 8 or better. Standability was rated very high for top, middle and bottom growers.

When asked if they would be willing to change their agronomic practices to increase the value of their straw, nearly three-quarters of respondents would be willing to change their agronomic practices to increase the value of their straw (73.4%), which is similar to the previous study (78.2%). When asked to specify what they would be willing to do, 32.4% of respondents would be willing to bale/sell the straw, and 31.9% would be willing to do anything to increase the value. Also, 13.6% indicated any potential changes would depend on what is involved or the price, and 12.8% would stop burning the straw.

Overall, 80.8% of the top growers are willing to change their agronomic practices to increase the value of their straw, compared to 65.3% of the bottom growers. Conventional growers with either a zero or a minimum tillage regime are most willing to change their agronomic practices.

Flax Acreage

Overall, 64.4% of respondents indicated that their flax acreage has remained stable over the last five years. Another 13.4% have increased their flax acreage, and 17.6% have decreased their acreage. While we cannot conclude the differences are significant, 72.6% of top growers indicated their flax acreage has remained stable, compared to 62.9% of bottom growers, and 16.8% of bottom growers indicated their flax acreage has decreased, compared to 6.8% of top growers.

Of those who indicated that their flax acreage has increased, 37.3% said it is because they see it as a cash crop. The next most common reason was crop rotation (25.4%) followed by land expansion (14.9%).

Of those who indicated that their flax acreage has remained stable, 54.3% said it is because of their crop rotation. The next most common reason was it is a cash crop (14%), followed by their number of total acres being limited/staying the same (8.7%).

Of those who indicated that their flax acreage has decreased, 47.7% said it is because of the price. The next most common reason was the market for flax (10.2%) followed by the weather (9.1%).

Comparisons to Canola

More than three-quarters of respondents have grown canola in the past three years, which is significantly less than in the previous study (68.4%). Top growers are more likely than bottom growers to have grown canola in the past three years. Also, conventional system growers with either a zero till or a minimum till regime are most likely to have grown canola in the past three years. Of those who grow canola, 80.6% seed it on more acres than flax, while 11.9% seed the same amount of flax and canola, and 7.5% seed more flax than canola. These results are consistent with the previous study.

In terms of cost, the majority of respondents believe that canola is more costly than flax (81.3%), while 11.4% said that the cost is the same and 6.4% think that canola is less costly.

With regard to difficulty, 51.2% of respondents think that canola is less difficult than flax. Another 31.3% think that they have the same level of difficulty and 17.5% think that canola is more difficult.

In terms of profitability, 69% of respondents think canola is more profitable than flax, which is a significant increase from the previous study (41.7%). Another 19.9% said they have the same level of profitability and 7.6% think canola is less profitable, compared to about 28% each in the previous study.

More than one-quarter of respondents think the removal of the flax contract from the Winnipeg Commodity Exchange has made flax marketing more difficult (26.8%), which is slightly less than in the previous study (32.8%). Another 61.2% think it has not, and 12% are unsure.

Overall, 54.8% of respondents obtain their flax marketing/agronomic information from an industry/independent agronomist. Other common sources include the Flax Council of Canada (21.2%), and elevator companies (21%). In total, 20% of respondents mentioned other sources of information. The most common areas respondents indicated that need to be researched for flax production are yield (28.2%), market (23.2%) and variety (21%).

Demographics

Overall, 33% of respondents are 46 to 55 years old. Another 27.2% are 36 to 45 years old, while 14.2% are over 55 years old and 25.6% are 45 years old and under. The average age of respondents is 53 years old. The average ages are approximately 50.6 years old for top growers, 52.6 for middle growers and 54.1 for bottom growers. These differences are not significant.

When asked to classify their farm, 60.2% of respondents indicated they have a grain and oilseed farm and 37.6% have a mixed operation (i.e. livestock and crops). These results are similar to the previous study, where 60.2% of respondents classified their farm as grain and oilseed and 37.7% classified their farm as a mixed operation. While we cannot say the difference is significant, it appears bottom growers are more likely than top growers to have a mixed operation farm.

Only 6% of respondents have participated in formalized training in flax production, which is the same as in the previous study. Interestingly, top growers are no more likely than others to indicate that they have participated in formalized training in flax production.

Of the total respondents, 35.6% would characterize their soil type as brown, 33% as dark brown, 25.8% as black, 4.4% as grey, and 4% as dark grey. Ten respondents are unsure how they would classify their soil type. In the previous study, 29.7% characterized their soil as brown, 32.2% as dark brown, 34.3% as black, 3.4% as dark grey, and 4.2% as grey.

Overall, 37% of top growers have a black soil type, compared to only 19.2% of bottom growers, while 43.7% of bottom growers have a brown soil, compared to 28.8% of top growers.

Predictors of Overall Yield

Each of the following variables which were found to have relationships to productivity were entered into a regression model to determine which areas are most important in determining yield: tillage regime, type of equipment used for seeding, herbicide application, % loss due to weeds, inspected for insects, % loss due to insects, inspected for disease, % loss due to disease, experienced weathering damage, swath/straight combine, and fertilizer applications. The following variables, in order of strength, were found to have the greatest relationships with overall yield:

- Herbicide use
- Experienced weathering or frost damage
- Inspected for insects
- Seed depth
- % yield lost due to weeds
- % yield lost due to disease

Four of these variables were also included in the regression model in the previous study: herbicide use, experience weathering or frost damage, inspected for insects, and % yield lost due to weeds. Variables included in the previous study's model that are not in this model are: number of fertilizer applications, use of Vimy seed variety, and use of air seeder.

The results of this analysis indicate that herbicide use and weathering have the greatest impact on yield. Those who inspected their fields for insects also tended to have better yields, this is likely a reflection of the idea that whether or not a farmer inspects his crops for insects is a good indication of the overall type of farmer that he is. The depth at which seeds were planted also affect yield – the deeper the seed is planted, the lower the yield.

Summary of Top Growers

Following is a summary of the factors that separate top flax growers from the rest:

- Nearly one-half of top growers used CDC Bethune (47.9%), compared to 38.9% of bottom growers.
- Top growers rated the evenness of their crops significantly better than bottom growers (8.6 and 7.5 out of 10 respectively).
- Top growers are more likely than bottom growers to have conducted soil testing (28.8% and 13.8% respectively).
- Overall, 94.5% of top growers applied fertilizers, compared to 84.4% of bottom growers.
- The majority of top growers use a zero till regime
- Most top growers use an air-drill for seeding
- In all, 98.6% of top growers applied herbicide in their most recent flax year, compared to 89.2% of bottom growers

- Overall, 71.2% of top growers inspected their fields for insects, compared to 54.5% of growers in the bottom group.
- Overall, 63% of top growers inspected their flax fields for disease, compared to 56.7% of middle growers and 49.7% of bottom growers.
- In total, 26% of top growers used a desiccant, compared to 16.8% of those in the bottom group
- Overall, 52.1% of top growers straight combine, compared to 42.5% of bottom growers.