### Fiber Flax Variety and Seeding Rate X Seeding Method Trials near Saskatoon in 2001

### Biolin Research Inc.

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**Project Title:** 

Fiber Flax Variety and Seeding Rate X Seeding Method Trials near

Saskatoon in 2001

Biolin Research Inc. would like to gratefully acknowledge the financial support given by the Saskatchewan Flax Development Commission and would like to thank Lori Johnston of ICMS, Tim Fluter, Prem Sharma and especially Kara Templeton and Randy Cowan, for their efforts in helping to successfully complete this project.

### **EXECUTIVE SUMMARY**

In May of 2001, Biolin Research Inc. ("Biolin") received funding from the Saskatchewan Flax Development Commission ("SaskFlax") to:

- 1. Compare the seed and content of fourteen fiber flax varieties and two oilseed varieties at a location near Saskatoon in the year 2001; and
- 2. Compare the seed yields, bast fiber content, and fiber yielding ability of two fiber flax varieties seeded both in rows and broadcast at 40 kg, 80 kg and 120 kg per hectare.

To generate these results, two plot experiments, each with four replicates, were set up about 20 miles from Saskatoon near the village of Aberdeen in May 2001 to produce seed and fiber. The variety trial consisted of fourteen fiber varieties and two oilseed varieties planted on May 24<sup>th</sup> using a seeding rate of 40 kg/ha in plots with dimensions of 7 meters by 1.22 meters. The seeding rate trial used two fiber varieties planted on May 24<sup>th</sup> at seeding rates of 40 kg/ha, 80 kg/ha and 120 kg/ha in plots with dimensions of 7 meters by 1.22 meters. Plots were sprayed for weed control at the appropriate time but a lack of moisture and the shallow seeding depth in the seeding method trial led to low or non-existent plant emergence for fiber collection.

Before combining, four or two ½ m<sup>2</sup> areas of plants were pulled out of the ground, wrapped, labeled and stored. Sub-samples of each of the stems of these pulled plants were prepared and retted by staff of Biolin. A reciprocating blade-type breaker/decorticator was used to roughly separate clean bast fibers from the retted dry straw and final cleaning of the bast fibers was done by hand to calculate fiber yields per hectare.

In September 2001, a plot harvester was used to cut the ripened seed bolls off the stems. The resultant seed was cleaned by ICMS and used to calculate the seed yield of each plot. It is now being stored at Biolin Research Inc. for use in further agronomic trials.

Variety Trial

The results of the variety trials showed that the average plot seed yield of fiber varieties ranged from 133 to 250 kg/ha and average plot seed yield from the oilseed varieties Flanders and Valour yielding 156 kg/ha and 184 kg/ha respectively.

The bast fiber content, expressed as a percent of unretted straw weight, varied from 14.1 to 22.0 percent in the fiber varieties. Only the two oilseed varieties, Flanders and Valour, had fiber contents that were significantly lower than the other tested varieties, at 12.0% and 11.2%, respectively.

The length of straw was assumed to be from the tips of the roots to the top of the seed bolls. The height of plants in plots ranged from 28 to 42 cm in the fiber varieties and 23 to 27 cm in the oilseed varieties, with Electra being significantly taller than Arriane, the "check" variety and Alba, Valour, Flanders and Viking were significantly shorter than Arriane.

The bast fiber yield per hectare was estimated by multiplying the percent of bast fiber in unretted stems by the weight of unretted salvaged straw. This calculation gave bast fiber yields that varied from 170 to 283 kg/ha in fiber varieties and Valour and Flanders, the two oilseed varieties, having significantly lower bast fiber yields of 53 and 59 kg/ha respectively.

### Seeding Rate and Method Trial

In the case of the two varieties, Flanders and Hermes, planted by two seeding methods and at three different seeding rates. There was no real significance between seed yields at 40, 80 or 120 kg/ha due in part to a high c.v., but there was a significance between row and broadcast seeding with row seeding providing a higher seed yield. Fiber results were only on the row method as the broadcast method did not produce enough stems that could be tested due to low to non-existent moisture. The average bast fiber percent on unretted straw in row seeding was not significantly different between the three seeding rates but the variety, Hermes, had significantly higher fiber content than the variety, Flanders. Straw length was significantly different between the two varieties with Hermes being significantly taller than Flanders.

The seed yield results showed average plot results ranged from 46 to 259 kg/ha, with row seeding being significantly better than Broadcast seeding.

The bast fiber content in a single plot, expressed as a percent of unretted straw weight, varied from 10.6 to 18.9 percent, although all the averages had higher than 50% c.v. There was a significant difference between Flanders and Hermes with Hermes having a higher fiber content. There was no significant difference in bast fiber content among the seeding rates.

The length of straw was assumed to be from the tips of the roots to the top of the seed bolls. The average height of plants in plots ranged from 29 to 48 cm. There was a significant difference between varieties with Hermes being significantly taller than Flanders. Seeding rates had no significant effect on straw length.

The yield of bast fiber yield per hectare was estimated by multiplying the percent of bast fiber in unretted stems by the weight of unretted salvaged straw. This calculation gave bast fiber yields that varied from 176 to 323 kg/ha. Seed and straw yields, straw length and bast fiber yield were dramatically negatively impacted by the lack of moisture during the growing season.

### Conclusions

There are large differences in the bast fiber and seed yielding ability of different fiber flax varieties that can be grown in Saskatchewan. Seeding rates and methods also appear to have significant impacts on such yields. Unfortunately, in this trial the drought impacted very negatively on being able to clearly separate out the expected differences. Resources were not available to determine how quality traits (e.g., fiber fineness) are affected by choice of variety and agronomic practice. More trials over more years and at more locations are needed to increase our knowledge base of what responses can be expected when we choose certain fiber flax varieties and agronomic practices.

### TECHNICAL REPORT

### **Abstract**

The seed, straw and bast fiber yields of 16 flax varieties were compared. Several varieties exhibited results that were statistically significantly different. Two varieties were seeded at different rates and with different methods. No seeding rate had a statistically significant effect on seed, straw and bast fiber yield. Seeding in narrow rows may have reduced the possible impact of seeding rates. A lack of moisture during the growing season reduced seed and straw yields and reduced the ability of statistical tests to detect significant differences in results.

### **Background and Objectives**

### Background

Farmers in Western Canada seed roughly two million acres of flax every year and consequently produce 800 to 1,200 kg of "salvageable" straw per hectare. Only 10-15% of this straw is collected and used in the manufacture of specialty papers and plastic components or for local farm use. The flax straw that is not removed from the field, for these uses, is normally burnt or chopped and spread. Unfortunately both these options cost farmers time and money and create negative environmental impacts.

Previous agronomic work carried out by Biolin Research has shown that the fiber and seed yielding ability of European fiber flax varieties can vary by more than 100% for a given location in a given year. With such a wide range of possible results, choosing superior varieties and agronomic practices will have a tremendous impact on the profit that farmers and processors can generate from growing such varieties.

This type of work is vitally important to maximize fiber production per hectare and to develop the technical coefficients (e.g., fiber content, fiber yield per hectare etc.) that can be used with confidence in developing business plans and raising investment capital for higher-end flax processing plants and farm operations.

### **Objectives**

In May of 2001, Biolin Research Inc. ("Biolin") received funding from the Saskatchewan Flax Development Commission ("SaskFlax") to:

- 1. Compare the seed, bast fiber content and fiber yielding ability of fourteen fiber flax varieties and two oilseed varieties at a location near Saskatoon in the year 2001; and
- 2. Compare the seed yields, bast fiber content, and fiber yielding ability of two fiber flax varieties seeded both in rows and broadcast at 40 kg, 80 kg and 120 kg per hectare.

### Experimental Methods

- A plot site was selected on a farm about 4 kilometers south of Aberdeen. This site was chosen because the company contracted to seed and harvest these flax plots had leased land for canola and pulse crops near their central base at Aberdeen and had both a plot seeder and plot harvester. The soil at the site appeared to be a thin black or dark brown loam soil. The previous year the site had been planted to a cereal. A considerable amount of cereal straw remained on the surface and the land has some stones. Before crop planting, the field had been cultivated twice and harrowed three times to better spread and incorporate the straw. No fertilizer was put on before seeding. Since little or no rain fell on the site prior to seeding, the top inch of soil was dry and the flax had to be seeded below one inch for it to be in a moist seedbed.
- The variety trial plots were much the same area as conventional research plots (1.22 X 7 meters or roughly 4 X 23 feet). The plots were set out in four replicated rows of sixteen varieties with the order of the varieties being randomized within each of the four rows. Each plot was planted with a double disk press wheel plot seeder, in narrow seed rows (20 cm apart), using the equivalent of 40 kg/ha of seed. These plots were seeded on May 24<sup>th</sup>, 2001.
- The rate and method of seeding trial used Flanders, an oilseed flax with relatively high fiber content, and Hermes, a European variety that has been one of the better performing ones in previous trials in Saskatchewan. Each plot was a conventional size (1.22 X 7 meters or roughly 4 X 23 feet). The plots were set out in four replicated rows of twelve different variety/method/seeding rate combinations with the order of the variety, seeding rate and method combinations being randomized within each of the four rows. These plots were seeded on May 24<sup>th</sup>, 2000. First the broadcast plots were seeded by lifting the disks out of the ground and dropping the seed on top of the ground. The Packer wheels on the seeder were repositioned to cover as much ground as possible. The seed was then raked by hand in three directions before rolling twice with a lawn roller filled with water. The packer wheels were repositioned to pack only the seed in the rows and row seeded plots were then planted. By the time the randomized seeding patterns was complete, all plots in rate and method of seeding trial were driven over or packed twice.
- Due to the dry cool conditions the flax took more than ten days to emerge.
- Total rainfall from May 24<sup>th</sup> to harvest was about 60 cm and much of this came in little showers that had little effect. After a small amount of rain fell, the equivalent of 40 kg/ha of nitrogen and 20 kg/ha of phosphorous was applied to the plots.
- Four 0.25m² areas of straw with heads on were pulled out of the ground in the variety plots when plants were mature. The straw was pulled from areas randomly selected from portions of the plot that appeared to be of average height and density. In the case of the rate of seeding plots, only two 0.25 m² areas of whole plants were only taken from the row planted plots because many of the seeds in the broadcast plots did not emerge. Although it is normal practice to randomly select four 0.25m² sampling areas from the whole plot, this was not done because, in some areas, the drought had been so severe that only a few flax

plants survived. (i.e., a sampling area in such an empty spot would give an extreme bias to the final result so we picked sample areas only from areas that appeared "normal"). After the straw was pulled it was put inside labeled cardboard rolls or paper bags and put into storage.

- To maximize the amount of sound seed that could be obtained from the plots, the flax plants were allowed to ripen naturally. The plants remaining in all the plots were harvested at the end of September.
- During the winter the samples were processed and the seed was kept and put in separate labeled bags and put into storage.
- From each straw sample collected, a sub-sample bundle of straw 4.1 cm in diameter and 19.1 cm in length was taken. After bundling, each sub-sample was bound with two elastic bands and tagged with a plastic-coated label.
- A sub-sample bundle of straw from each trial was retted separately in a warm water tank for four to six days until the results of the "Fried Shake Test" showed that the majority of bundles were optimally retted. This test involved placing fifteen pieces of retting straw, each approximately 10.0 cm in length, each from a different bundle, in fifteen test tubes half full of boiling water with one piece of straw in each test tube. The test tubes were stoppered and placed in a machine designed by Biolin Research to violently shake test tubes for forty-five seconds. After shaking, the straw in each test tube was visually scored for loose fibers on a whole number scale from "0" to "3" with "0" representing no loose fibers and "3" representing total loosening of all bast fibers on the stem. When the average score was above 2.8 and there were no "0" scores and at least twelve test tubes had a score of "3", the bundles in the batch were considered fully retted. The bundles were then taken out of the tank, rinsed in tap water and set in drying racks for approximately four days to dry.
- Dry bundles were weighed and the fiber was extracted using a reciprocating blade-type breaker/decorticator. The fiber was hand cleaned to the point where few or no shives were left. After cleaning, the fiber was weighed and placed in separate sample bags and labeled.
- Data from the above trials was entered into Excel spreadsheets, sorted and analyzed for statistically significant results using regression analysis with binary variables to represent different varieties and treatments.
- A report was written summarizing what was done and what results were obtained.

### Results and Discussion

Summary data from the plots are presented in Tables A-1 to A-8 that appear in the following text section of this report.

Appendix A shows individual plot data for the bast fiber content, fiber yield, seed yield, plant length and salvageable straw yields of all the varieties and agronomic trials that were processed as well as data on seed moisture, seed weight, dry unretted weights, dry retted weights, and length of straw.

Appendix B contains printouts of the regression equations that were selected as being those that best made use of the data that was generated by these trials and that show which explanatory variables, if any, have a statistically significant impact on seed, straw and bast fiber percent and bast fiber yield.

### Variety Trials

### Seed Yields

Due to the lack of rain (the least in 100 years), average seed yields were roughly 15 - 25% of the yield one might expect in a normal year. In addition to much lower than expected yields, the plot seed yields showed a high variation in seed yields even among the same variety. This made it difficult to find statistically significant differences in yields between varieties and treatments unless they were extremely different. Surprisingly both of the oilseed varieties, Valour and Flanders, had lower seed yields than many of the fiber varieties.

The seed yield of individual plots ranged from 49 to 339 kg/ha in the fourteen fiber flax varieties and from 39 to 398 kg/ha in the oilseed varieties (see Table 1 in Appendix A). When we consider the four plot averages for each variety, the yields ranged from 133 to 251 kg/ha from the fourteen fiber flax varieties and from 156 to 184 kg/ha for the oilseed varieties (see Table 1). Regression analysis showed that there was no significant difference between any of the varieties (see Equation B-1 in Appendix B).

### Straw Length

The straw length from individual variety plots varied from 19 to 46 cm (see Table A-4 in Appendix A) The four plot average straw lengths varied from 28 to 42 cm in fiber varieties and from 23 to 27 in oilseed varieties (Table 4) with Electra having significantly higher straw lengths and Alba, Viking, Valour and Flanders having significantly lower straw length than Arriane, the variety used as the intercept term in the regression equation (see Equation B-2). These results are partially expected since the oilseed varieties Valour and Flanders, are normally shorter than fiber varieties.

### Bast Fiber Content

The bast fiber content, based on unretted straw, of individual plots ranged from 12.8 to 26.0 percent in the fourteen fiber flax varieties and from 8.9 to 13.5 percent in the oilseed varieties (see A-3 in Appendix A). Average bast fiber content was lower than the content one might expect in a normal year. When we consider the four plot averages for each variety, the bast fiber content, expressed as a percent of unretted straw weight, varied from 14.1 to 22.0 percent in fiber varieties and 11.2 to 12.0 percent in oilseed varieties (see Table 2). Hermes, Electra, and Diane had fiber contents that were statistically significantly higher than Arriane, the variety used as the intercept in the regression equation and Viking, Flanders and Valour had fiber contents that were significantly lower (see Equation B-3 in Appendix B).

### · Bast Fiber Yield

The yield of bast fiber per hectare was estimated by multiplying the percent of bast fiber in unretted stems by the weight of unretted salvaged straw. This calculation gave individual plot bast fiber yields of 132 to 335 kg/ha in the fiber varieties and 37 to 69 kg/ha in the oilseed varieties (see Table A-2). Four plot average bast fiber yields varied from 165 to 283 kg/ha in the fiber varieties and 53 to 59 kg/ha in the oilseed varieties (see Table 3). Electra, Diane and Hermes had significantly higher bast fiber yield per hectare and Valour and Flanders had significantly lower bast fiber yield than Arriane, the variety used as the intercept in the regression equation. (see Equation B-4 in Appendix B). These results are partially expected since the low bast fiber yields are from varieties that have significantly low fiber content or low salvageable straw yields.

It should be pointed out that there are several ways to estimate and calculate the weight of unretted salvage straw depending on the assumptions one makes regarding the harvest method that would be normally be used to salvage the straw in a normal size field on a farm. In this set of trials, we assumed that the average salvageable yield was 27% of the total unretted plant weight including seed, chaff, seed holders, stems and roots) in oilseed flax varieties and 50% of the total plant weight in fiber flax varieties. These percentages were based on some previous unpublished research work carried by Biolin Research Inc in which the individual weights of different plant components were taken and then expressed as a percentage of the total plant weight. In actual farm practice, the salvageable weight will depend on how high the stubble is cut above the ground and how far below the seed bolls the stems are cut since these two cuts determine the maximum stem length. Although salvageable straw yields in a farm situation and/or in a normal year may vary from what we have calculated in those trials, the relative merits of a particular variety should not change.

Table 1 - Variety Trial Averages - Sorted on Seed Yield

				Fiber %	Fiber	
	Straw	Unretted	Salvagable	of	Yield	Seed
	Length	1m² wt	Straw Wt	Unretted	(kg/ha)	Yield
Variety	(cm) /a	(g)/b	(kg/ha)/c	Straw	/d	(kg/ha)
Viking	28	120	1203	14.1%	170	251
Electra	42	129	1291	22.0%	283	250
Diane	37	134	1336	21.1%	282	212
Hermes	35	119	1189	21.5%	255	202
Jitka	32	115	1155	18.3%	211	202
Arriane	35	119	1195	16.7%	200	194
Evelin	33	116	1162	19.1%	224	193
llona	32	110	1100	16.0%	175	186
Valour	27	88	475	11.2%	53	184
Escalina	32	105	1049	17.6%	186	178
Laura	34	115	1145	17.2%	199	168
Elise	34	111	1111	16.4%	183	160
Flanders	23	94	506	12.0%	59	156
Caeser	34	128	1280	18.4%	235	150
Alba	28	111	1114	14.9%	165	147
Opaline	35	112	1122	18.8%	213	133

Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m<sup>2</sup> per acre. Color and/or shading indicates performance grouped by quartiles.

- a/ Straw length is approximately average from ground level
- b/ All 1m<sup>2</sup> weights have roots and seed attached
- c/ Based on average % of straw that is usable when plants are short and grown under stressed conditions times the Unretted 1m2 total plant weight times 10,000 m2 per hectare divided by 1,000g per kg
- d/ Fiber yield is based on Fiber % of Unretted Straw times Salvageable Straw Weight

Table 2 - Variety Trial Averages - Sorted on Bast Fiber Content

	Straw	Unretted	Salvagable	Fiber % of	Fiber Yield	Seed
	Length	1m² wt	Straw Wt	Unretted	(kg/ha)	Yield
Variety	(cm) /a	(g)/b	(kg/ha)/c	Straw	/d	(kg/ha)
Electra	42	129	1291	22.0%	283	250
Hermes	35	119	1189	21.5%	255	202
Diane	37	134	1336	21.1%	282	212
Evelin	33	116	1162	19.1%	224	193
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Jitka	32	115	1155	18.3%	211	202
Escalina	32	105	1049	17.6%	186	178
Laura	34	115	1145	17.2%	199	168
Arriane	35	119	1195	16.7%	200	194
Elise	34	111	1111	16.4%	183	160
llona	32	110	1100	16.0%	175	186
Alba	28	111	1114	14.9%	165	147
Viking	28	120	1203	14.1%	170	251
Flanders	23	94	506	12.0%	59	156
Valour	27	88	475	11,2%	53	184

Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m<sup>2</sup> per acre. Color and/or shading indicates performance grouped by quartiles.

- a/ Straw length is approximately average from ground level
- b/ All 1m<sup>2</sup> weights have roots and seed attached
- c/ Based on average % of straw that is usable when plants are short and grown under stressed conditions times the Unretted 1m2 total plant weight times 10,000 m2 per hectare divided by 1,000g per kg
- d/ Fiber yield is based on Fiber % of Unretted Straw times Salvageable Straw Weight

Table 3 - Variety Trial Averages - Sorted on Fiber Yield

Variety	Straw Length (cm)/a	Unretted 1m² wt (g)/b	Salvagable Straw Wt (kg/ha)/c	Straw	Fiber Yield (kg/ha) /d	Seed Yield (kg/ha)
Electra	42	129	1291	22.0%	283	250
Diane	37	134	1336	21.1%	282	212
Hermes	35	119	1189	21.5%	255	202
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Elise	34	111	1111	16.4%	183	160
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Flanders		94	506	12.0%	59	156
Valour	27	88	475	11.2%	53	184

Plots were 4ft X 23ft = 92 ft $^2$  = 8.6 m $^2$  = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m $^2$  per acre. Color and/or shading indicates performance grouped by quartiles.

- a/ Straw length is approximately average from ground level
- b/ All 1m<sup>2</sup> weights have roots and seed attached
- c/ Based on average % of straw that is usable when plants are short and grown under stressed conditions times the Unretted 1m2 total plant weight times 10,000 m2 per hectare divided by 1,000g per kg
- d/ Fiber yield is based on Fiber % of Unretted Straw times Salvageable Straw Weight

Table 4 - Variety Trial Averages - Sorted on Straw Length

Variety	Straw Length (cm)/a	Unretted 1m² wt (g)/b	Salvagable Straw Wt (kg/ha)/c	Fiber % of Unretted Straw	Fiber Yield (kg/ha) /d	Seed Yield (kg/ha)
Electra	42	129	1291	22.0%	283	250
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a/ Straw length is approximately average from ground level

b/ All 1m<sup>2</sup> weights have roots and seed attached

c/ Based on average % of straw that is usable when plants are short and grown under stressed conditions times the Unretted 1m2 total plant weight times 10,000 m2 per hectare divided by 1,000g per kg

d/ Fiber yield is based on Fiber % of Unretted Straw times Salvageable Straw Weight

### Seeding Rate and Method Trial

The data gathered from this trial does not accurately reflect what would be expected in a normal year due to the lack of moisture and, the poor growth of the broadcast method.

### Seed Yields

The individual plot yields ranged from 3 to 511 kg/ha (see Table A-6) with the four plot average seed yields ranging from 46 to 259 kg/ha (See Table 5). The seed yield of the row seeding method was significantly higher than broadcast seeding (see Equation B-5).

### Straw Length

Straw lengths from individual plots varied from 24 to 48 cm (see Table A-16) and average straw lengths that varied from 27 to 39 cm (see Table 8). Hermes was significantly higher than Flanders (See Equation B-6).

Many of the broadcast plots came up so poorly that a good sample of straw could not be obtained and hence some of the results in the tables are blank. In the case of regressions, only row seeded results were used and hence the number of observations is 24 and not the 48 that would be expected (see Equation B-6 in Appendix B). Due to the low plant stands and seed yields, only two  $0.25m^2$  areas of plants were pulled out in each of row seeded plots.

### Bast Fiber Content

The individual plot results ranged from 8.6 to 21.8 percent and the four plot averages of bast fiber content, based on unretted straw, ranged from 10.6 to 19.2 percent (see Table 6). Hermes had significantly higher fiber content than Flanders (see Equation B-7 in Appendix B).

### Bast Fiber Yield

The individual plots ranged from 52 to 517 kg/ha, and the four plot averages ranged from 176 to 323 kg/ha (See Table 7). The yield of bast fiber yield per hectare was estimated by multiplying the percent of bast fiber of unretted straw by the calculated weight of unretted pulled ½m² samples adjusted for the percentage of plant weight that could likely be salvaged (see variety trials for a more detailed explanation). Hermes produced significantly more bast fiber yield than Flanders but there was no significant difference in bast fiber yield due to seeding rates (see Equation B-8 in Appendix B).

Table 5 - Seeding Rate Trial Averages - Sorted on Seed Yield

Variety	Seeding Method	Seeding Rate (kg/ha)	Straw Length (cm) /a	1m² wt (g) /b	Salvagable Straw Wt (kg/ha) /c	Unretted	Fiber Yield (kg/ha) /d	Seed Yield (kg/ha)
Flanders	Row	40	28.4	167.5	1674.5	10.6%	176.1	258.8
Flanders	Row	80	27.4	166.6	1665.5	12.1%	193.0	253.2
Hermes	Row	120	36.9	168.5	1684.5	18.9%	323.2	201.9
Hermes	Row	80	36.4	145.4	1454.0	19.2%	288.2	185.1
Hermes	Row	40	39.4	163.5	1634.5	16.3%	280.8	178.8
Flanders	Row	120	26.8	166.9	1669.0	11.5%	197.7	121.8
Flanders	Broadcast	80						92.2
Hermes	Broadcast	40						89.0
Flanders	Broadcast	120						68.8
Flanders	Broadcast	40						58.1
Hermes	Broadcast	80						49.2
Hermes	Broadcast	120	SWEAK TENER	Me1/3616161	(2) (5) (4) (5) (5) (6) (7)	P. 179 (1987)	the Marian Comment	46.1

Plots were 4ft X 23ft = 92 ft $^2$  = 8.6 m $^2$  = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m $^2$  per acre. Color and/or shading indicates performance grouped by quartiles.

al Straw length is approximately average from ground level

b/ All 1m<sup>2</sup> weights have roots and seed attached and are double the ½m<sup>2</sup> weights

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m2 total plant weight times 2 times 10,000 m2 per hectare divided by 1,000g per kg

Table 6 - Seeding Rate Trial Averages - Sorted on Fiber % of Unretted Straw

Variety	Seeding Method	Seeding Rate (kg/ha)	Straw Length (cm) /a	1m² wt (g) /b	Salvagable Straw Wt (kg/ha) /c	Unretted	Fiber Yield (kg/ha) /d	Seed Yield (kg/ha)
Hermes	Row	80	36.4	145.4	1454.0	19.2%	288.2	185.1
Hermes	Row	120	36.9	168.5	1684.5	18.9%	323.2	201.9
Hermes	Row	40	39.4	163.5	1634.5	16.3%	280.8	178.8
Flanders	Row	80	27.4	166.6	1665.5	12.1%	193.0	253.2
Flanders	Row	120	26.8	166.9	1669.0	11.5%	197.7	121.8
Flanders	Row	40	28.4	167.5	1674.5	10.6%	176.1	258.8
Flanders	Broadcast	80						92.2
Hermes	Broadcast	40						89.0
Flanders	Broadcast	120						68.8
Flanders	Broadcast	40						58.1
Hermes	Broadcast	80						49.2
Hermes	Broadcast	120						46.1

Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m<sup>2</sup> per acre. Color and/or shading indicates performance grouped by quartiles.

al Straw length is approximately average from ground level

b/ All 1m<sup>2</sup> weights have roots and seed attached and are double the ½m<sup>2</sup> weights

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m2 total plant weight times 2 times 10,000 m2 per hectare divided by 1,000g per kg

Table 7 - Seeding Rate Trial Averages - Sorted on Fiber Yield

Variety	Seeding Method	Seeding Rate (kg/ha)	Straw Length (cm) /a	1m² wt (g) /b	Salvagable Straw Wt (kg/ha) /c	Unretted	Fiber Yield (kg/ha) /d	Seed Yield (kg/ha)
Hermes	Row	120	36.9	168.5	1684.5	18.9%	323.2	201.9
Hermes	Row	80	36.4	145.4	1454.0	19.2%	288.2	185.1
Hermes	Row	40	39.4	163.5	1634.5	16.3%	280.8	178.8
Flanders	Row	120	26.8	166.9	1669.0	11.5%	197.7	121.8
Flanders	Row	80	27.4	166.6	1665.5	12.1%	193.0	253.2
Flanders	Row	40	28.4	167.5	1674.5	10.6%	176.1	258.8
Flanders	Broadcast	80						92.2
Hermes	Broadcast	40						89.0
Flanders	Broadcast	120						68.8
Flanders	Broadcast	40						58.1
Hermes	Broadcast	80						49.2
Hermes	Broadcast	120						46.1

Plots were 4ft X 23ft = 92 ft $^2$  = 8.6 m $^2$  = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m $^2$  per acre. Color and/or shading indicates performance grouped by quartiles.

a/ Straw length is approximately average from ground level

b/ All 1m<sup>2</sup> weights have roots and seed attached and are double the ½m<sup>2</sup> weights

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m2 total plant weight times 2 times 10,000 m2 per hectare divided by 1,000g per kg

Table 8 - Seeding Rate Trial Averages - Sorted on Straw Length

	Seeding	Seeding Rate	Straw Length	1m² wt	Salvagable Straw Wt	Unretted	Fiber Yield (kg/ha)	Seed Yield
Variety	Method	(kg/ha)	(cm) /a	(g) /b	(kg/ha) /c	The second secon	/d	(kg/ha)
Hermes	Row	40	39.4	163.5	1634.5		280.8	178.8
Hermes	Row	120	36.9	168.5	1684.5	18.9%	323.2	201.9
Hermes	Row	80	36.4	145.4	1454.0	19.2%	288.2	185.1
	Row	40	28.4	167.5	1674.5	10.6%	176.1	258.8
	Row	80	27.4	166.6	1665.5	12.1%	193.0	253.2
Flanders	Row	120	26.8	166.9	1669.0	11.5%	197.7	121.8
Flanders	Broadcast	80						92.2
Hermes	Broadcast	40						89.0
Flanders	Broadcast	120						68.8
Flanders	Broadcast	40	and the second second					58.1
Hermes	Broadcast	80						49.2
Hermes	Broadcast	120			V 4			46.1

Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m<sup>2</sup> per acre. Color and/or shading indicates performance grouped by quartiles.

a/ Straw length is approximately average from ground level

b/ All 1m<sup>2</sup> weights have roots and seed attached and are double the ½m<sup>2</sup> weights

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m2 total plant weight times 2 times 10,000 m2 per hectare divided by 1,000g per kg

### Conclusions and Impact

### **Conclusions**

Variety Trial

Seed and straw yields were roughly 15% the normal expected yield because of a severe lack of moisture (e.g., the oilseed varieties had average seed yields of 2.5 to 3.0 bushels/acre compared to a normal expected yield of flax on stubble near Saskatoon of 20 to 25 bushels per acre).

There is usually a tremendous difference between the seed yields of oilseed and fiber varieties (i.e., Valour and Flanders yield roughly three times as much seed as the average fiber flax variety), however, in this trial, there was only a 38% difference in seed yields between the highest seed yielding oilseed variety (Valour) and the lowest seed yielding fiber variety (Opaline). This shows that although all the fiber varieties tested will grow and mature in Saskatchewan, there is a tremendous range of seed yield outcomes. Only continued testing over a number of years and locations will verify which fiber varieties are truly the most suited for Saskatchewan conditions. (The reader could compare this result to the summary data presented in the Saskatchewan Seed Guide 2000 that shows average seed yield differences of 10% or less between the highest and lowest oilseed varieties that are recommended for planting in a particular soil type.)

Processors of flax straw are most interested in the percentage of fiber in a given quantity of straw. This trial showed the fiber content of the two oilseed varieties to be, on the average between 11.2 and 12.0% while the fiber varieties had fiber contents that ranged from 14.1% to 22.0%. Thus, these trials indicates that a processor could expect to get roughly 183% more fiber from a given weight of straw if that straw is from a fiber variety. Fiber varieties are generally taller than oilseed varieties and in these trials the straw from the oilseed varieties was roughly 23 to 27 cm in length while the length in the best four fiber varieties ranged from 33 to 42 cm. This means that the length of straw of the tallest four fiber varieties was roughly 145% more than of the oilseed varieties. If we consider fiber yield as a function of the weight of salvageable straw and the fiber content of the straw, calculations show that the oilseed varieties produced 53 to 59 kg/ha of fiber while the best four fiber varieties produced from 235 to 283 kg/ha of fiber. This mean that, on average, the best four fiber varieties produced about 4.6 times more fiber per hectare that the oilseed varieties. However, we should note that there was more than 71.5% difference in fiber yield per hectare between the highest and lowest fiber varieties. Such a large percentage difference once again points out that although all the fiber varieties tested will grow and mature in Saskatchewan, there is a tremendous range of outcomes. Only continued testing over a number of years and locations will verify which fiber varieties are truly the most suited for Saskatchewan conditions.

### Seeding Rate and Method Trial

The seeding rates (40, 80 and 120 kg/ha) had no significance in seed, straw length, fiber % and fiber yield. Hermes was significantly taller than Flanders and has a significantly higher fiber % and produced significantly more bast fiber per hectare than Flanders. Surprisingly there was no significant difference in seed yields between Flanders and Hermes. In terms of comparison between broadcast and row seeding methods, only seed was harvested due to the very poor plant stands of the broadcast plots. Seed and straw yields were higher in row seeded plots although only seed yields were measured.

The author of this report hypothesizes, that in years of severe drought, straw yield, fiber yield and fiber % will not differ significantly among seeding rates of 40, 80 or 120 kg/ha and that any seeds not in moisture at the time of seeding will do poorly. Resources were not available to test this or compare all the possible fiber characteristics (e.g., speed of retting, fineness of fiber, ease of cleaning) that could be significantly affected by seeding rates, seeding methods and varieties.

Flax fibers can range in value from less than \$300/tonne to more than \$4,000/tonne. Almost all the difference in price is due to differences in quality parameters. Agronomic practices can have a very big impact on the ultimate quality of fiber that can be produced. Research work needs to be done to look at how different quality traits are affected by agronomic practices.

### Impact

It is really too early in the development of flax fiber based industries in Saskatchewan for the results of these trials to have any immediate impact, however, the results are helping to build a knowledge base that can start to be used when planning various options and business plans to set up or expand flax fiber based processing industries. As with most agronomic trials, these trials should be repeated over a number of years and locations because the wide range of weather and soil conditions in Saskatchewan (among years and locations) can greatly affect agronomic results and long term conclusions. This makes it very risky to assume one trial at one location in one year will truly represent the long terms averages that might be expected.

The drought was so bad no conclusions for normal conditions can be made regarding methods and rates of seeding other than that in a dry year, if seed is not in moisture when seeded, the seed and straw yield will be even worse than that just produced by drought. The fiber yield per hectare of the best four varieties are much, much lower than in a normal year but these varieties (with the exceptions of Electra and Ceaser which was tested for the first time in this trial) have shown superior performance in previous years in terms of fiber yield and are also among the highest in terms of seed yield.

The reader is reminded that actual results in a given year at a given location may be much higher than those indicated in this example. Given results like this, we can see that the profitability of growing flax for seed multiplication and/or fiber production will greatly depend on the producer and processor's knowledge of the technical coefficients (i.e., yields, response rates) that can be expected or planned for over the long run. The differences in outcome in this trial are much greater than most of the differences experienced when simply testing for seed yield differences in new oilseed flax varieties and yet, every year, new oilseed varieties of flax are tested in at least twelve different locations in Saskatchewan. Given the very large differences in bast fiber yields per hectare that were experienced in the variety and rate of seeding trial that has just been described, many more trials are definitely needed to increase our ability to state, WITH CONFIDENCE, what technical responses (e.g., bast fiber percentage, bast fiber yield, seed yield) we will get when we vary agronomic practices and how these will likely impact the profitability of what we are doing.

# Appendix A Data on Individual Plot Results

Table A-1 - Variety Trials Sorted on Seed Yield

		Seed	Yield	(kg/ha)	338.6	324.6	313.9	312.4	301.3	298.1	292.3	287.1	285.3	262.9	262.4	259.8	253.6	246.8	241.8	240.0	230.3	220.8	220.3	217.3	215.3	208.3	203.2	198.1	192.9	190.4	187.8	187.8	187.8	187.0	182.6
	Fiber	Yield	(kg/ha)		195.8		287.3	181.7	248.7	68.4	293.1	) ) 27	69.2	335.1	192.5	214.7	205.1	291.6	205.2	269.5	206.5	311.1	316.2	239.1	148.4	242.9	199.3	275.2	234.9	215.3	244.2	212.8	168.0	171.7	229.1
	Fiber %	of	Unretted (	Straw	14.2%	20.2%	21.1%	14.1%	18.7%	10.2%	21.3%	11.3%	12.0%	21.8%	17.5%	15.5%	17.7%	20.6%	18.2%	19.2%	18.1%	26.0%	23.1%	18.2%	13.9%	17.9%	17.4%	21.3%	22.8%	17.1%	22.2%	17.5%	13.4%	15.6%	19.2%
			Fiber wt	(a)	4.2	7.6	7.7	4.1	6.4	2.9	7.7	2.5	3.2	8.4	2.0	5.1	2.0	6.8	5.4	6.9	5.1	7.4	8.9	5.7	3.4	6.3	5.0	7.3	5.9	5.7	5.9	6.4	4.7	4.3	5.2
		Retted	Bundle	wt (g)	24.9	31.7	30.2	23.4	27.6	16.7	29.2	18.5	21.5	32.4	22.7	26.4	22.7	26.6	24.3	29.0	22.6	24.4	24.6	24.6	20.1	28.2	23.0	26.3	21.5	26.4	22.1	29.1	27.5	19.9	22.5
		Dry	Bundle	wt (g)	32.50	40.20	38.90	31.40	36.90	30.70	38.30	24.60	29.20	40.80	30.80	35.40	30.40	35.40	31.90	38.10	30.30	30.90	31.70	33.80	26.80	37.40	31.20	36.50	28.40	35.90	28.80	39.20	37.20	30.00	29.60
		Salvagable	Straw Wt	(kg/ha) /c	1375.0	1502.0	1362.0	1285.0	1329.0	9.699	1374.0	503.3	575.6	1536.0	1101.0	1385.0	1157.0	1415.0	1125.0	1402.0	1141.0	1198.0	1367.0	1317.0	1069.0	1357.0	1148.0	1293.0	1031.0	1258.0	1101.0	1217.0	1251.0	1098.0	1194.0
-		Unretted	1m <sup>2</sup> wt	q/ (b)	137.5	150.2	136.2	128.5	132.9	124.0	137.4	93.2	106.6	153.6	110.1	138.5	115.7	141.5	112.5	140.2	114.1	119.8	136.7	131.7	106.9	135.7	114.8	129.3	103.1	125.8	110.1	121.7	125.1	109.8	119.4
		Straw	Length	(cm) /a	30.0	44.0	44.0	26.0	36.0	21.0	39.0	26.0	29.0	38.0	33.0	32.0	35.0	40.0	34.0	39.0	34.0	46.0	39.0	31.0	29.0	37.0	28.0	33.0	37.0	36.0	36.0	36.0	34.5	33.0	30.5
				Variety	Viking	Electra	Electra	Viking	Jitka	Flanders	Hermes	Valour	Valour	Diane	Arriane	Alba	Escalina	Diane	Evelin	Laura	Ilona	Electra	Evelin	Jitka	Viking	Arriane	Evelin	Hermes	Hermes	Laura	Diane	Caeser	Ilona	Arriane	Escalina
				Rep	3	4	3	4	4	4	က	4	-	8	4	4	4	4	4	က	4	2	2	က	2	2	က	4	2	4	-	4	-	3	3
				Plot	42	57	43	53	56	58	45	ည	16	44	59	09	61	55	20	46	51	31	59	48	32	30	37	54	27	49	15	52	14	38	47

		E(C.D)	Version		EW		III/A		2000		5,51			uvai	307E	2.7.11						15.5	9/3/	legis 1	558		1/1				52					<b>70</b>
	Sood	Yield	(kg/ha)	182.6	174.9	174.9	167.2	167.2	164.6	162.1	159.5	159.5	154.4	151.8	149.2	146.6	144.1	138.9	138.9	133.8	131.2	131.2	128.6	126.1	118.3	118.3	115.8	113.2	113.2	113.2	105.5	102.9	87.5	48.9	48.9	38.6
i A	Viola Viola	(kg/ha)	D/	141.4	243.0	188.2	256.3	140.3	199.8	132.3	277.0	186.5	63.3	255.3	257.4	209.8	146.1	230.0	153.9	139.3	230.2	53.3	177.7	216.8	194.9	149.7	50.2	179.1	168.5	133.7	176.4	195.8	154.4	158.9	37.2	50.2
Tiber %	2 y	Unretted	Straw	14.3%	17.2%	18.7%	20.4%	15.3%	19.1%	15.3%	21.9%	17.1%	10.9%	17.9%	19.9%	18.0%	14.8%	20.8%	14.2%	16.5%	19.4%	13.5%	16.5%	20.5%	15.9%	15.0%	12.4%	18.2%	17.5%	15.8%	17.5%	16.2%	17.6%	12.8%	8.9%	13.3%
		Fiber wt	(B)	3.6	6.2	4.7	6.5	3.4	5.2	4.4	7.9	8.4	2.6	7.3	6.1	6.0	3.8	9.9	3.1	හ හ	6.1	2.8	4.4	6.4	4.7	3.6	2.4	4.3	4.9	3.6	4.9	5.7	4.7	3.6	1.6	2.4
	D0400	Bundle	wt (g)	19.6	29.2	20.1	25.7	18.6	22.6	22.6	30.5	22.3	19.2	32.4	24.3	26.7	20.2	22.9	17.6	18.2	26.2	16.7	21.0	24.6	23.7	18.8	16.0	19.1	22.3	18.1	22.2	27.4	21.4	22.2	14.8	14.7
	č	Bundle	wt (a)	27.20	38.50	27.60	34.00	24.40	29.60	31.00	38.60	30.40	26.20	43.50	32.90	36.00	28.10	30.90	24.00	25.40	33.80	23.40	29.10	33.50	31.70	26.10	21.70	26.00	30.60	25.60	30.50	37.70	29.00	30.70	20.10	20.40
	0.1.0	Straw Wt	(ka/ha) /c	986.0	1415.0	1009.0	1258.0	916.0	1045.0	863.0	1266.0	1092.0	579.4	1427.0	1291.0	1168.0	984.0	1103.0	1082.0	847.0	1185.0	395.8	1074.0	1057.0	1223.0	998.0	406.1	983.0	963.0	847.0	1008.0	1209.0	877.0	1240.0	415.8	378.5
	Inretted	1m <sup>2</sup> wf	q/ (D)	98.6	141.5	100.9	125.8	91.6	104.5	86.3	126.6	109.2	107.3	142.7	129.1	116.8	98.4	110.3	108.2	84.7	118.5	73.3	107.4	105.7	122.3	8.66	75.2	98.3	96.3	84.7	100.8	120.9	87.7	124.0	77.0	70.1
	2	Straw	(cm) /a	32.0	38.0	30.5	37.0	32.0	35.0	33.0	38.0	29.0	28.0	29.0	34.0	31.5	28.0	35.0	27.0	31.0	38.0	19.0	31.0	32.0	35.0	31.0	23.0	30.0	31.0	29.0	32.0	32.0	32.0	21.0	28.0	22.0
			Variety	Elise	Elise	Jitka	Opaline	llona	Elise	Escalina	Caeser	Ilona	Flanders	Caeser	Diane	Opaline	Alba	Electra	Viking	Alba	Opaline	Flanders	Laura	Hermes	Arriane	Elise	Valour	Escalina	Jitka	Laura	Evelin	Caeser	Opaline	Alba	Valour	Flanders
			Rep	4	_	_	4	2	m	-	2	8	8	8	2	3	2	_	_	က	-	-	_	-	_	2	2	2	10	2	-	_	2	-	3	2
			Plot		13	12	62	18	34	11	28	41	36	40	24	39	21	7	e	35	4	ဖ	2	6	2	26	20	19	22	23	∞	10	25	-	33	17

			Straw	Unretted	Salvagable Straw We	Dry	Retted	,	Fiber % of	Fiber Yield	Seed
Plot Rep	Rep	Variety	(cm) /a	d/ (g)	(kg/ha) /c	wt (g)	wt (g)	(g)	Straw	p/	(kg/ha)
Notes: Plots w 39.368 Plots w	rere 4ft ) bushels rere seec	<i>Notes:</i> Plots were 4ft X 23ft = 92 ft² = 8.6 m 39.368 bushels per tonne, 1000kg p Plots were seeded May 24/01 at 40 l	t² = 8.6 m² = 1000kg per 01 at 40 kg/	Notes: Plots were 4ft X 23ft = 92 ft <sup>2</sup> = 8.6 m <sup>2</sup> = 0.00086ha = 0.000348ac 39.368 bushels per tonne, 1000kg per tonne, 4047 m <sup>2</sup> per acre. Plots were seeded May 24/01 at 40 kg/ha	Notes: Plots were 4ft X 23ft = 92 ft <sup>2</sup> = 8.6 m <sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m <sup>2</sup> per acre. Plots were seeded May 24/01 at 40 kg/ha						
a/ Strav b/ All 11 c/ Base	v length i m² weigh d on ave ½m² tot	<ul> <li>al Straw length is approximately avera</li> <li>bl All 1m² weights have roots and seec</li> <li>cl Based on average amount of straw</li> <li>½m² total plant weight times 2</li> <li>dl Fiber Yield is based on Fiber % of 1</li> </ul>	tely averages and seed a tof straw the jubt times 2 tillings her % of 1 mer	<ul> <li>a/ Straw length is approximately average from ground level</li> <li>b/ All 1m² weights have roots and seed attached and are do</li> <li>c/ Based on average amount of straw that is usable when pleased on average amount weight times 2 times 10,000 m² per</li> <li>d/ Fiber Yield is based on Fiber % of Unretted straw times 5</li> </ul>	<ul> <li>al Straw length is approximately average from ground level</li> <li>bl All 1m² weights have roots and seed attached and are double the ½m² weights</li> <li>cl Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg</li> <li>dl Fiber Yield is based on Fiber % of Unretted straw times Salvageable Straw Weight</li> </ul>	n <sup>2</sup> weights ort and grow ided by 1,01 Straw Wei	n under stres 30g per kg	ssed condition	ns times the un	retted	

Table A-2 - Variety Trials Sorted on Fiber Yield

Straw	Unretted	Salvagable	Dry	Retted		Fiber % of	Fiber Yield	Seed
	1m <sup>2</sup> wt	Straw Wt	Bundle	Bundle	Fiber wt	Unretted	(kg/ha)	Yield
	153.6	(kg/na) /c 1536.0	Wr (g)	32.4	8.4	21.8%	335.1	262.9
	136.7	1367.0	31.70	24.6	8.9	23.1%	316.2	220.3
	119.8	1198.0	30.90	24.4	7.4	26.0%	311.1	220.8
	150.2	1502.0	40.20	31.7	7.6	20.2%	303.6	324.6
	137.4	1374.0	38.30	29.2	7.7	21.3%	293.1	292.3
	141.5	1415.0	35.40	26.6	6.8	20.6%	291.6	246.8
	136.2	1362.0	38.90	30.2	7.7	21.1%	287.3	313.9
l, li	126.6	1266.0	38.60	30.5	7.9	21.9%	277.0	159.5
	129.3	1293.0	36.50	26.3	7.3	21.3%	275.2	198.1
	140.2	1402.0	38.10	29.0	6.9	19.2%	269.5	240.0
	129.1	1291.0	32.90	24.3	6.1	19.9%	257.4	149.2
	125.8	1258.0	34.00	25.7	6.5	20.4%	256.3	167.2
	142.7	1427.0	43.50	32.4	7.3	17.9%	255.3	151.8
	132.9	1329.0	36.90	27.6	6.4	18.7%	248.7	301.3
	110.1	1101.0	28.80	22.1	5.9	22.2%	244.2	187.8
	141.5	1415.0	38.50	29.2	6.2		243.0	174.9
	135.7	1357.0	37.40	28.2	6.3		242.9	208.3
	131.7	1317.0	33.80	24.6	5.7		239.1	217.3
	103.1	1031.0	28.40	21.5	5.9		234.9	192.9
	118.5	1185.0	33.80	26.2	6.1		230.2	131.2
	110.3	1103.0	30.90	22.9	5.9		230.0	138.9
	119.4	1194.0	29.60	22.5	5.2		976	182.6
	105.7	1057.0	33.50	24.6	6.4		216.8	126.1
	125.8	1258.0	35.90	26.4	5.7	17.1%		190.4
	138.5	1385.0	35.40	26.4	5.1	15.5%	100	259.8
ı	121.7	1217.0	39.20	29.1	6.4	17.5%	S)	187.8
	116.8	1168.0	36.00	26.7	6.0	18.0%	209.8	146.6
1	114.1	1141.0	30.30	22.6	5.1	18.1%	100	230.3
	112.5	1125.0	31.90	24.3	5.4	18.2%	1010 102	241.8
	115.7	1157.0	30.40	22.7	5.0		205.1	253.6
	104.5	1045.0	29.60	22.6	5.2	19.1%	199.8	164.6

								_			_		_		_	_	_	_	_	_	_		_	_	_	_	1		_	_		_	1	_	_	$\neg$
	Seed	<b>Yield</b>	(kg/ha)	203.2	102.9	338.6	118.3	262.4	174.9	159.5	312.4	113.2	128.6	105.5	187.0	113.2	187.8	48.9	87.5	138.9	118.3	215.3	144.1	182.6	167.2	133.8	113.2	162.1	285.3	298.1	154.4	287.1	131.2	115.8	38.6	48.9
i	Yield	(kg/ha)	p/	199.3	195.8	195.8	194.9	192.5	188.2	186.5	181.7	179.1	177.7	176.4	1.171	168.5	168.0	158.9	154.4	153.9	149.7	148.4	146.1	141.4	140.3	139.3	133.7	132.3	69.2	68.4	63.3	56.9	53.3	50.2	50.2	37.2
i	Fiber %	Unretted	Straw	17.4%	16.2%	14.2%	15.9%	17.5%	18.7%	17.1%	14.1%	18.2%	16.5%	17.5%	15.6%	17.5%	13.4%	12.8%	17.6%	14.2%	15.0%	13.9%	14.8%	14.3%	15.3%	16.5%	15.8%	15.3%	12.0%	10.2%	10.9%	11.3%	13.5%	12.4%	13.3%	8.9%
		Fiber wt	(g)	5.0	5.7	4.2	4.7	5.0	4.7	4.8	4.1	4.3	4.4	4.9	4.3	4.9	4.7	3.6	4.7	3.1	3.6	3.4	3.8	3.6	3.4	3.8	3.6	4.4	3.2	2.9	2.6	2.5	2.8	2.4	2.4	1.6
	Retted	Bundle	wt (g)	23.0	27.4	24.9	23.7	22.7	20.1	22.3	23.4	19.1	21.0	22.2	19.9	22.3	27.5	22.2	21.4	17.6	18.8	20.1	20.2	19.6	18.6	18.2	18.1	22.6	21.5	16.7	19.2	18.5	16.7	16.0	14.7	14.8
	Dry	Bundle	wt (g)	31.20	37.70	32.50	31.70	30.80	27.60	30.40	31.40	26.00	29.10	30.50	30.00	30.60	37.20	30.70	29.00	24.00	26.10	26.80	28.10	27.20	24.40	25.40	25.60	31.00	29.20	30.70	26.20	24.60	23.40	21.70	20.40	20.10
	Salvadable	Straw Wt	(kg/ha) /c	1148.0	1209.0	1375.0	1223.0	1101.0	1009.0	1092.0	1285.0	983.0	1074.0	1008.0	1098.0	963.0	1251.0	1240.0	877.0	1082.0	998.0	1069.0	984.0	0.986	0.916	847.0	847.0	863.0	575.6	9.699	579.4	503.3	395.8	406.1	378.5	415.8
	Unretted	1m <sup>2</sup> wt	q/ (6)	114.8	120.9	137.5	122.3	110.1	100.9	109.2	128.5	98.3	107.4	100.8	109.8	96.3	125.1	124.0	87.7	108.2	8.66	106.9	98.4	98.6	91.6	84.7	2.48	86.3	106.6	124.0	107.3	93.2	73.3	75.2	70.1	77.0
	Straw	Length	(cm) /a	28.0	32.0	30.0	35.0	33.0	30.5	29.0	26.0	30.0	31.0	32.0	33.0	31.0	34.5	21.0	32.0	27.0	31.0	29.0	28.0	32.0	32.0	31.0	29.0	33.0	29.0	21.0	28.0	26.0	19.0	23.0	22.0	28.0
			Variety	Evelin	Caeser	Viking	Arriane	Arriane	Jitka	Ilona	Viking	Escalina	Laura	Evelin	Arriane	Jitka	Ilona	Alba	Opaline	Viking	Elise	Viking	Alba	Elise	Ilona	Alba	Laura	Escalina	Valour	Flanders	Flanders	Valour	Flanders	Valour	Flanders	Valour
			Rep	က	_	3	_	4	_	3	4	2	-	_	က	7	~	_	2	~	7	2	7	4	2	က	2	-	-	4	က	4	_	2	7	က
			Plot	37	10	42	2	59	12	41	53	19	5	8	38	22	14	_	25	3	26	32	21	64	18	35	23	7	16	58	38	63	စ	20	17	33

Juretted
1m <sup>2</sup> wt
(g) /b
= 0.00086ha $= 0.000348$ acre.
39.368 bushels per tonne, 1000kg per tonne, 4047 m² per acre. Plots were seeded May 24/01 at 40 kg/ha

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted

½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg

a/ Straw length is approximately average from ground level b/ All 1m  $^2$  weights have roots and seed attached and are double the  $\%\text{m}^2$  weights

Table A-3 - Variety Trials Sorted on Fiber %

		Straw	Unretted	Salvagable	Dry	Retted		Fiber %	Fiber	Seed
		Length	1m <sup>2</sup> wt	Straw Wt	Bundle	Bundle	Fiber wt	Unretted	(kg/ha)	Yield
Plot Rep	_	(cm) /a	(g) /p	(kg/ha) /c	wt (g)	wt (g)	(g)	Straw	/d	(kg/ha)
	_	0.00	119.8	1196.0	34.70	24.4	4.7	26.0%	311.1	220.8
22 62	-	39.0	130.7	0.7051	07.10	24.6	8.9	23.1%	316.2	220.3
	_	37.0	103.1	1031.0	28.40	21.5	5.9	22.8%	234.9	192.9
		36.0	110.1	1101.0	28.80	22.1	5.9	22.2%	244.2	187.8
	Caeser	38.0	126.6	1266.0	38.60	30.5	7.9	21.9%	277.0	159.5
	Diane	38.0	153.6	1536.0	40.80	32.4	8.4	21.8%	335.1	262.9
	Hermes	39.0	137.4	1374.0	38.30	29.2	7.7	21.3%	293.1	292.3
4	Hermes	33.0	129.3	1293.0	36.50	26.3	7.3	21.3%	275.2	198.1
3	Electra	44.0	136.2	1362.0	38.90	30.2	7.7	21.1%	287.3	313.9
1	7.57	35.0	110.3	1103.0	30.90	22.9	5.9	20.8%	230.0	138.9
4		40.0	141.5	1415.0	35.40	26.6	6.8	20.6%	291.6	246.8
-	Hermes	32.0	105.7	1057.0	33.50	24.6	6.4	20.5%	216.8	126.1
4	Opaline	37.0	125.8	1258.0	34.00	25.7	6.5	20.4%	256.3	167.2
4	Electra	44.0	150.2	1502.0	40.20	31.7	7.6	20.2%	303.6	324.6
7	Diane	34.0	129.1	1291.0	32.90	24.3	6.1	19.9%	257.4	149.2
-	Opaline	38.0	118.5	1185.0	33.80	26.2	6.1	19.4%	230.2	131.2
ო	Laura	39.0	140.2	1402.0	38.10	29.0	6.9	19.2%	269.5	240.0
	Escalina	30.5	119.4	1194.0	29.60	22.5	5.2	19.2%	229.1	182.6
	Elise	35.0	104.5	1045.0	29.60	22.6	5.2	19.1%	199.8	164.6
	Jitka	36.0	132.9	1329.0	36.90	27.6	6.4	18.7%	248.7	301.3
	Jitka	30.5	100.9	1009.0	27.60	20.1	4.7	18.7%	188.2	174.9
50 4	Evelin	34.0	112.5	1125.0	31.90	24.3	5.4	18.2%	205.2	241.8
7	Escalina	30.0	98.3	983.0	26.00	19.1	4.3	18.2%	179.1	113.2
	Jitka	31.0	131.7	1317.0	33.80	24.6	5.7	18.2%	239.1	217.3
4	Ilona	34.0	114.1	1141.0	30.30	22.6	5.1	18.1%	206.5	230.3
	Opaline	31.5	116.8	1168.0	36.00	26.7	0.9	18.0%	209.8	146.6
2	Arriane	37.0	135.7	1357.0	37.40	28.2	6.3	%6'21	242.9	208.3
40 3	Caeser	29.0	142.7	1427.0	43.50	32.4	7.3	17.9%	255.3	151.8
	Escalina	35.0	115.7	1157.0	30.40	22.7	5.0	17.7%	205.1	253.6
25 2	Opaline	32.0	87.7	877.0	29.00	21.4	4.7	17.6%	154.4	87.5
	Evelin	32.0	100.8	1008.0	30.50	22.2	4.9	17.5%	176.4	105.5

Straw   Unretted   Straw   Straw   Carlo   Straw   Carlo   Straw   Carlo   C	-										
Report of the length									Fiber %	Fiber	
Rep         Variety         Im² wt         straw Wt         Bundle         Fiber wt         Unretted         (kg/ha)           2         Jilka         31.0         69.3         f(g/ha)         wt(g)         4.9         17.5%         10.8           4         Caeser         36.0         121.7         121.7         121.7         30.60         22.3         4.9         17.5%         102.5           4         Ariane         38.0         121.7         121.7         30.80         22.7         5.0         17.5%         192.5           4         Ariane         38.0         141.5         141.50         38.20         29.2         6.2         17.2%         243.0           4         Ariane         38.0         141.5         141.50         38.50         29.2         6.2         17.2%         199.3           5         Leura         38.0         141.5         141.50         38.50         29.2         6.2         17.2%         199.3           4         Leina         31.0         107.4         1074.0         29.0         29.2         6.2         17.4%         198.3           3         Alba         31.0         107.4         1074.0         29			Straw	Unretted	Salvagable	Dry	Retted		of	Yield	Seed
Variety (cm)/a         (g)/b         (kg/ha)/c         wf (g)         wf (g)         wf (g)         r/g			Length	1m <sup>2</sup> wt	Straw Wt	Bundle	Bundle	Fiber wt	Unretted	(kg/ha)	Yield
Jitke         31.0         96.3         963.0         30.60         22.3         4.9         17.5%         17.5	œ	 ariety	(cm) /a	q/ (b)	(kg/ha)/c	wt (g)	wt (g)	(g)	Straw	þ/	(kg/ha)
Caeser         36.0         121.7         1217.0         39.20         29.1         6.4         17.5%         2.2           Arriane         33.0         110.1         1101.0         30.80         22.7         5.0         17.5%         17.5%           Elise         38.0         141.5         1416.0         36.20         29.2         6.2         17.2%         2           Laura         38.0         125.8         1258.0         35.90         26.4         5.7         17.1%         2           Ilona         29.0         109.2         109.2         30.40         22.3         4.8         17.6%	N	tka	31.0		963.0	30.60	22.3	4.9	17.5%	168.5	113.2
Arriane         33.0         110.1         1101.0         30.80         22.7         5.0         17.5%         11.5%	4	aeser	36.0		1217.0	39.20	29.1	6.4	17.5%	212.8	187.8
Evelin         28.0         114.8         1148.0         31.20         23.0         5.0         17.4%         11           Elise         38.0         141.5         1415.0         38.50         26.4         5.7         17.2%         2.2           Laura         38.0         141.5         1415.0         38.50         26.4         5.7         17.1%         2.1           Ilona         29.0         1092.0         30.40         22.3         4.8         17.1%         17.1%           Alba         31.0         107.4         1074.0         29.10         21.0         4.4         16.5%         17.1%           Arriane         35.0         122.3         1223.0         31.70         23.7         4.7         16.2%         11.6%	4	rriane	33.0		1101.0	30.80	22.7	5.0	17.5%	192.5	262.4
Elise         38.0         141.5         1415.0         38.50         29.2         6.2         17.2%         2.5           Laura         36.0         125.8         1286.0         35.90         26.4         5.7         17.1%         2           Laura         31.0         1072.2         30.40         22.3         4.8         17.1%         1           Alba         31.0         1072.2         1074.0         23.0         4.4         16.5%         1           Alba         31.0         120.9         120.9         37.70         27.4         4.4         16.5%         1           Arriane         35.0         122.3         1229.0         37.70         27.4         5.7         16.2%         1           Arriane         35.0         122.3         120.0         37.70         27.4         5.7         16.2%         1           Arriane         35.0         109.8         100.0         37.70         25.4         4.7         16.5%         1           Alba         32.0         108.8         1080.0         37.00         20.4         4.4         16.5%         1           Escalina         33.0         108.8         1080.0	3	velin	28.0		1148.0	31.20	23.0	5.0	17.4%	199.3	203.2
Laura         36.0         125.8         1258.0         36.90         26.4         5.7         17.1%         2.5           Ilona         29.0         109.2         30.40         22.3         4.8         17.1%         11.1%	-	lise	38.0		1415.0	38.50	29.2	6.2	17.2%	243.0	174.9
Ilona   29.0   109.2   1092.0   30.40   22.3   4.8   17.1%   11	4	aura	36.0		1258.0	35.90	26.4	5.7	17.1%	215.3	190.4
Alba         31.0         107.4         1074.0         29.10         21.0         4.4         16.5%         1           Alba         31.0         84.7         847.0         25.40         18.2         3.8         16.5%         1           Caeser         32.0         120.9         1209.0         37.70         25.7         4.7         15.9%         1           Ariane         35.0         122.3         1229.0         34.7         34.0         25.0         4.7         15.8%         1           Alba         32.0         169.8         109.8         30.00         19.9         4.3         15.8%         1           Alba         32.0         138.5         1385.0         35.40         26.4         5.1         15.8%         1           Alba         32.0         138.5         1385.0         35.40         26.4         4.4         15.8%         1           Ilona         32.0         91.6         916.0         24.0         18.6         3.4         15.9%         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1	8	ona	29.0		1092.0	30.40	22.3	4.8	17.1%	186.5	159.5
Alba         31.0         84.7         847.0         25.40         18.2         3.8         16.5%         11.5%           Caeser         32.0         120.9         1209.0         37.70         27.4         5.7         16.2%         11.5%	_	aura	31.0		1074.0	29.10	21.0	4.4	16.5%	177.7	128.6
Caeser         32.0         120.9         1203.0         37.70         27.4         5.7         16.2%         1           Arriane         35.0         122.3         1223.0         31.70         23.7         4.7         15.9%         1           Laura         28.0         162.3         1223.0         31.70         23.7         4.7         15.9%         1           Arriane         33.0         109.8         1098.0         26.4         5.4         5.5         15.8%         1           Alba         32.0         138.5         1385.0         26.4         5.1         15.5%         1           Elise         31.0         90.8         968.0         26.40         18.6         3.4         15.3%         1           Alba         32.0         98.4         98.0         26.10         18.6         3.6         14.8%         1           Viking         28.0         98.4         98.0         27.20         19.6         3.6         14.8%         1           Viking         29.0         108.2         10.20.2         3.4         4.1         4.1         4.1         4.1         4.1         4.1         4.1         4.1         4.1	3	lba	31.0		847.0	25.40	18.2	3.8	16.5%	139.3	133.8
Arriane         35.0         122.3         31.70         23.7         4.7         15.9%         1           Laura         29.0         84.7         847.0         25.60         18.1         3.6         15.8%         1           Arriane         33.0         109.8         1098.0         30.00         19.9         4.3         15.6%         1           Abba         32.0         138.5         1385.0         35.40         26.4         5.1         15.5%         2           Elise         32.0         98.8         13.0         24.40         18.8         3.6         15.3%         1           Alba         28.0         98.4         984.0         28.10         18.8         3.6         14.8%         1           Alba         28.0         98.4         984.0         28.10         18.8         3.6         14.3%         1           Viking         30.0         137.5         1375.0         24.9         4.2         14.2%         1           Viking         29.0         106.9         26.80         20.4         4.1         14.2%         1           Viking         29.0         106.9         27.2         24.9         4.2	_	aeser	32.0	120.9	1209.0	37.70	27.4	5.7	16.2%	195.8	102.9
Laura         29.0         84.7         847.0         25.60         18.1         3.6         15.8%         1           Arriane         33.0         109.8         1098.0         30.00         19.9         4.3         15.6%         1           Abba         32.0         138.5         1385.0         35.40         26.4         5.1         15.6%         1           Escalina         33.0         86.3         863.0         31.00         22.6         4.4         15.5%         2           Ilona         32.0         91.6         916.0         24.40         18.6         3.4         15.3%         1           Alba         28.0         98.4         98.0         26.10         18.8         3.6         15.0%         1           Alba         28.0         98.6         98.0         27.20         19.6         3.6         14.2%         1           Viking         27.0         108.2         24.0         17.6         3.4         4.1         4.1         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2         4.2	_	rriane	35.0	122.3	1223.0	31.70	23.7	4.7	15.9%	194.9	118.3
Arriane         33.0         109.8         1098.0         30.00         19.9         4.3         15.6%         1           Alba         32.0         138.5         1385.0         35.40         26.4         5.1         15.5%         2           Escalina         32.0         138.5         1385.0         35.40         26.4         5.1         15.5%         2           Ilona         32.0         91.6         916.0         24.40         18.6         3.4         15.3%         1           Ilona         32.0         91.6         916.0         24.40         18.6         3.4         15.3%         1           Elise         31.0         99.8         998.0         26.10         18.8         3.6         15.0%         1           Alba         28.0         98.4         984.0         28.10         20.2         3.8         14.8%         1           Viking         29.0         137.5         1375.0         24.00         17.6         3.4         14.2%         1           Viking         29.0         108.9         20.20         20.4         4.1         14.7%         1           Viking         29.0         106.9         1069.0 <td>2</td> <td>aura</td> <td>29.0</td> <td>84.7</td> <td>847.0</td> <td>25.60</td> <td>18.1</td> <td>3.6</td> <td>15.8%</td> <td>133.7</td> <td>113.2</td>	2	aura	29.0	84.7	847.0	25.60	18.1	3.6	15.8%	133.7	113.2
Alba         32.0         138.5         1385.0         35.40         26.4         5.1         15.5%         2           Escalina         33.0         86.3         863.0         31.00         22.6         4.4         15.3%         1           Ilona         32.0         91.6         916.0         24.40         18.6         3.4         15.3%         1           Elise         31.0         99.8         998.0         26.10         18.8         3.6         15.0%         1           Alba         28.0         98.4         984.0         28.10         20.2         3.8         14.8%         1           Viking         28.0         137.5         137.50         24.9         4.2         14.2%         1           Viking         26.0         108.2         24.0         17.6         3.4         14.2%         1           Viking         26.0         108.2         24.0         17.6         3.4         14.2%         1           Viking         26.0         106.9         1085.0         24.0         17.6         3.4         14.1%         1           Ilona         32.0         106.9         24.0         16.7         24.9	3	rriane	33.0	109.8	1098.0	30.00	19.9	4.3	15.6%	171.7	187.0
Escalina         33.0         86.3         863.0         31.00         22.6         4.4         15.3%         1           Ilona         32.0         91.6         916.0         24.40         18.6         3.4         15.3%         1           Elise         31.0         99.8         998.0         26.10         18.8         3.6         15.0%         1           Alba         28.0         98.4         984.0         28.10         20.2         3.8         14.8%         1           Alba         28.0         98.6         986.0         27.20         19.6         3.6         14.3%         1           Viking         27.0         108.2         24.9         4.2         14.2%         1           Viking         27.0         108.2         24.9         4.1         14.7%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.7%         1           Viking         29.0         106.9         26.80         20.1         3.4         13.9%         1           Viking         29.0         106.9         26.80         20.40         14.7         2.4         13.4% </td <td>4</td> <td>Iba</td> <td>32.0</td> <td>138.5</td> <td>1385.0</td> <td>35.40</td> <td>26.4</td> <td>5.1</td> <td>15.5%</td> <td>214.7</td> <td>259.8</td>	4	Iba	32.0	138.5	1385.0	35.40	26.4	5.1	15.5%	214.7	259.8
Ilona   32.0   91.6   916.0   24.40   18.6   3.4   15.3%   14.8%   1	-	scalina	33.0	86.3	863.0	31.00	22.6	4.4	15.3%	132.3	162.1
Elise         31.0         99.8         998.0         26.10         18.8         3.6         15.0%         1           Alba         28.0         98.4         984.0         28.10         20.2         3.8         14.8%         1           Elise         32.0         98.6         986.0         27.20         19.6         3.6         14.3%         1           Viking         27.0         137.5         1375.0         27.20         24.9         4.2         14.2%         1           Viking         27.0         108.2         1082.0         24.00         17.6         3.1         14.2%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.1%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         4.1         14.2%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         4.1         14.1%         1           Flanders         29.0         106.9         30.70         22.2         3.6         12.8%         1         12.4%           Valour <td>CA</td> <td>ona</td> <td>32.0</td> <td>91.6</td> <td>916.0</td> <td>24.40</td> <td>18.6</td> <td>3.4</td> <td>15.3%</td> <td>140.3</td> <td>167.2</td>	CA	ona	32.0	91.6	916.0	24.40	18.6	3.4	15.3%	140.3	167.2
Alba         28.0         98.4         984.0         28.10         20.2         3.8         14.8%         1           Elise         32.0         98.6         986.0         27.20         19.6         3.6         14.3%         1           Viking         30.0         137.5         1375.0         22.50         24.9         4.2         14.2%         1           Viking         27.0         108.2         1082.0         24.00         17.6         3.1         14.2%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.2%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Flanders         29.0         106.9         1251.0         37.20         27.5         4.7         13.4%         1           Alba         21.0         124.0         1240.0         22.2         3.6         12.8%         1           Valour         23.0         106.6         575.	N	lise	31.0	8.66	0.866	26.10	18.8	3.6	15.0%	149.7	118.3
Elise         32.0         98.6         986.0         27.20         19.6         3.6         14.3%         1           Viking         30.0         137.5         1375.0         32.50         24.9         4.2         14.2%         1           Viking         27.0         108.2         1082.0         24.00         17.6         3.1         14.2%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.1%         1           Viking         26.0         106.9         106.9         26.80         20.1         3.4         14.1%         14.1%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Viking         29.0         106.9         23.40         16.7         2.8         13.5%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.4%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%           Valour         26.0         93.2         5	4	lba	28.0	98.4	984.0	28.10	20.2	3.8	14.8%	146.1	144.1
Viking         30.0         137.5         1375.0         32.50         24.9         4.2         14.2%         1           Viking         27.0         108.2         1082.0         24.00         17.6         3.1         14.2%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.1%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Flanders         19.0         73.3         395.8         23.40         16.7         2.8         13.5%         1           Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Alba         21.0         124.0         30.70         22.2         3.6         12.8%         1           Alba         21.0         124.0         30.70         22.2         3.6         12.8%         1           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20	4	lise	32.0	98.6	0.986.0	27.20	19.6	3.6	14.3%	141.4	182.6
Viking         27.0         108.2         1082.0         24.00         17.6         3.1         14.2%         1           Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.1%         1           Viking         26.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Flanders         19.0         73.3         395.8         23.40         16.7         2.8         13.5%         1           Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%         1           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.4%         1	60	Tking	30.0	137.5	1375.0	32.50	24.9	4.2	14.2%	195.8	338.6
Viking         26.0         128.5         1285.0         31.40         23.4         4.1         14.1%         1           Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Flanders         19.0         73.3         395.8         23.40         16.7         2.8         13.5%         1           Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%         1           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         28.0         77.0         415.8         20.10	_	Tking	27.0	108.2	1082.0	24.00	17.6	3.1	14.2%	153.9	138.9
Viking         29.0         106.9         1069.0         26.80         20.1         3.4         13.9%         1           Flanders         19.0         73.3         395.8         23.40         16.7         2.8         13.5%         1           Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%         1           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%           Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         77.0         415.8         20.10         16.7	4	Tking	26.0	128.5	1285.0	31.40	23.4	1.4	14.1%	181.7	312.4
Flanders         19.0         73.3         395.8         23.40         16.7         2.8         13.5%         13.5%         1           Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%         1           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%         1           Valour         26.0         93.2         575.6         29.20         21.5         3.2         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	1	Tiking	29.0	106.9	1069.0	26.80	20.1	3.4	13.9%	148.4	215.3
Ilona         34.5         125.1         1251.0         37.20         27.5         4.7         13.4%         1           Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%         1           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%         1           Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	_	landers	19.0	73.3	395.8	23.40	16.7	2.8	13.5%	53.3	131.2
Flanders         22.0         70.1         378.5         20.40         14.7         2.4         13.3%           Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%           Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	_	ona	34.5	125.1	1251.0	37.20	27.5	4.7	13.4%	168.0	187.8
Alba         21.0         124.0         1240.0         30.70         22.2         3.6         12.8%         1           Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%         12.4%           Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	14	landers	22.0	70.1	378.5	20.40	14.7	2.4	13.3%	50.2	38.6
Valour         23.0         75.2         406.1         21.70         16.0         2.4         12.4%           Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	_	Iba	21.0	124.0	1240.0	30.70	22.2	3.6	12.8%	158.9	48.9
Valour         29.0         106.6         575.6         29.20         21.5         3.2         12.0%           Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	14	alour	23.0	75.2	406.1	21.70	16.0	2.4		50.2	115.8
Valour         26.0         93.2         503.3         24.60         18.5         2.5         11.3%           Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	_	'alour	29.0	106.6	575.6		21.5	3.2		69.2	285.3
Flanders         28.0         107.3         579.4         26.20         19.2         2.6         10.9%           Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	4	'alour		93.2	503.3		18.5	2.5		56.9	287.1
Flanders         21.0         124.0         669.6         30.70         16.7         2.9         10.2%           Valour         28.0         77.0         415.8         20.10         14.8         1.6         8.9%	(1)	landers		107.3	579.4	26.20	19.2	2.6	10.9%	63.3	154.4
Valour 28.0 77.0 415.8 20.10 14.8 1.6 8.9%	4	landers		124.0	9.699		16.7	2.9	10.2%	68.4	298.1
	(1)	/alour		77.0	415.8		14.8	1.6	8.9%	37.2	48.9

100					The second secon	200					
Plot	Rec	Varietv	Straw Length	Unretted 1m² wt	Salvagable Straw Wt (kg/ha)/c	Dry Bundle wt (a)	Retted Bundle	Fiber wt	Fiber wt Unretted (a)	Fiber Yield (kg/ha)	Seed Yield (kg/ha)
			1 ()	2. (6)	1	161	161	(6)			
Notes: Plots w 39.368 Plots w	were 4ft ) bushels were see	Notes: Plots were 4ft X 23ft = 92 ft <sup>2</sup> = 8.6 m <sup>2</sup> = 0.039.368 bushels per tonne, 1000kg per tor Plots were seeded May 24/01 at 40 kg/ha	t² = 8.6 m² = 1000kg per /01 at 40 kg/	Notes: Plots were 4ft X 23ft = 92 ft <sup>2</sup> = 8.6 m <sup>2</sup> = 0.00086ha = 0.000348ac 39.368 bushels per tonne, 1000kg per tonne, 4047 m <sup>2</sup> per acre. Plots were seeded May 24/01 at 40 kg/ha	= 0.00086ha = 0.000348acre. r tonne, 4047 m² per acre. J/ha						
a/Stra	iw length i	a/ Straw length is approximately averag	ately average	a/ Straw length is approximately average from ground level	ge from ground level	n <sup>2</sup> weights					
	5		ים מוות פספת	מושפוופת מוות	177 015 016500	2					
c/ Bas	ed on ave	erage amoun	nt of straw th	at is usable w	c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted	ort and grow	in under stres	ssed condition	ns times the un	retted	
	1/2 to	tal plant weig	ght times 2 ti	imes 10,000 n	½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg	rided by 1,00	30g per kg				

Table A-4 - Results of Variety Trials Sorted on Straw Length

Unretted Salvagable
1m²wt
(g) /b (kg/ha) /c
119.8
150.2
136.2
11.5
136.7
137.4
140.2
153.6
126.6
141.5
118.5
125.8
35.7
103.1
132.9
10.1
125.8
121.7
110.3
115.7
104.5
125.1
129.1
114.1
112.5
129.3
110.1
109.8
86.3
105.7

Retted wt (g)         Fiber wt (g)         Priber %           8 bundle wt (g)         5.1         15.5%           26.4         5.1         15.5%           26.4         5.1         15.5%           26.4         5.7         16.2%           27.4         5.7         16.2%           27.4         5.7         16.2%           21.4         4.7         17.6%           21.4         4.7         17.6%           26.7         6.0         18.0%           26.7         6.0         18.0%           26.7         6.0         18.0%           26.7         6.0         18.0%           26.7         6.0         18.0%           26.7         6.0         18.0%           26.7         6.0         18.0%           18.2         3.4         17.5%           26.7         6.0         18.0%           27.3         17.5%           27.9         4.2         17.5%           27.9         4.2         17.4%           27.9         4.8         17.4%           27.0         27.0         17.4%           27.5         4.8         17.4%
Bundle
Bundle wt(g)         wt(g)         riper wt           wt(g)         wt(g)         (g)           35.40         26.4         5.1           35.40         26.4         5.1           37.70         27.4         5.7           30.50         22.2         4.9           29.00         21.4         4.7           27.20         19.6         3.6           24.40         18.6         3.4           26.00         24.6         5.7           33.80         24.6         5.7           26.10         18.6         3.4           30.60         26.7         6.0           33.80         24.6         5.7           26.10         18.8         3.6           25.40         18.8         3.6           25.40         18.2         3.8           25.40         18.8         3.6           25.00         22.3         4.9           26.00         19.1         4.3           26.00         19.1         4.3           26.20         22.3         4.8           26.80         20.2         3.4           26.80         20.2         3.4
wt(g)         wt(g)           35.40         26.4           35.40         26.4           37.70         27.4           30.50         22.2           29.00         21.4           27.20         19.6           24.40         18.6           24.40         18.6           24.40         18.6           33.80         24.6           29.10         21.0           30.60         22.3           25.40         18.2           25.40         18.2           25.40         18.3           25.40         18.3           25.40         18.3           25.40         18.3           25.40         18.3           25.40         18.3           25.50         24.9           30.40         22.3           30.40         22.3           30.40         22.3           26.80         20.1           26.20         19.2           26.20         19.2           27.0         14.8           27.0         14.8           24.60         17.6           25.2         19.2
35.40     26.4       37.70     27.4       30.50     22.2       29.00     21.4       27.20     19.6       24.40     18.6       36.00     26.7       36.00     24.6       29.10     22.3       26.10     18.8       26.10     18.8       26.10     22.3       26.00     24.9       26.00     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       26.80     20.1       26.20     18.1       26.20     19.2       26.20     19.2       26.20     18.5       26.20     19.2       26.20     18.5       26.20     18.5       24.00     17.6       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
37.70     27.4       30.50     22.2       29.00     21.4       27.20     19.6       24.40     18.6       36.00     26.7       33.80     24.6       29.10     21.0       30.60     22.3       26.10     22.3       26.00     19.1       27.60     20.1       26.00     19.1       26.00     22.3       26.00     19.1       43.50     22.3       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.2       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       24.60     18.5       20.40     14.7       30.70     16.7       30.70     16.7       1
30.50       29.00       29.00       24.40     18.6       36.00     24.6       36.00     26.7       30.60     24.6       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.8       25.40     18.8       25.40     18.8       25.60     20.1       30.40     22.3       26.00     19.1       26.00     19.1       26.00     19.1       26.00     19.1       26.20     18.1       26.20     18.1       26.20     21.5       31.20     23.0       26.20     19.2       26.20     18.1       26.20     18.1       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       26.20     18.5       27.00     18.5       20.
29.00     21.4       27.20     19.6       24.40     18.6       36.00     24.6       33.80     24.6       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.8       25.40     18.8       25.40     18.2       25.40     18.2       27.60     24.9       26.00     19.1       43.50     22.3       26.00     18.1       26.00     18.1       26.20     18.1       26.20     18.1       26.20     18.1       26.20     18.1       26.20     18.1       26.20     18.1       26.20     18.5       26.20     19.2       26.20     19.2       26.20     19.2       26.20     18.5       24.00     17.6       21.70     16.0       21.70     16.0       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7
27.20     19.6       24.40     18.6       36.00     26.7       33.80     24.6       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.2       25.40     18.2       25.40     18.2       25.40     18.2       25.60     20.1       30.40     22.3       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.2       26.20     18.1       26.20     19.2       26.20     19.2       26.20     19.2       26.20     19.2       26.20     19.2       26.20     18.5       24.00     17.6       21.70     16.0       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7
24.40     18.6       36.00     26.7       33.80     24.6       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.2       25.40     18.2       25.40     18.2       25.60     24.9       26.00     19.1       43.50     24.9       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.20     19.2       26.20     19.2       26.20     19.2       26.20     19.2       26.20     19.2       24.00     17.6       21.70     16.0       20.40     14.7       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7       30.70     16.7
36.00     26.7       33.80     24.6       29.10     21.0       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.2       27.60     20.1       27.60     24.9       26.00     19.1       43.50     22.3       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.20     18.1       26.20     19.2       26.20     19.2       26.20     19.2       24.00     17.6       21.70     16.0       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7
33.80     24.6       29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.2       27.60     20.1       26.00     19.1       43.50     32.4       30.40     22.3       26.00     19.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.90     18.1       26.10     14.8       26.20     14.8       24.00     17.6       24.60     18.5       20.40     16.0       20.40     16.0       20.40     16.0       20.40     16.0       20.40     16.0       20.40     16.7       30.70     16.7       16.7     16.7
29.10     21.0       30.60     22.3       26.10     18.8       25.40     18.2       25.40     18.2       27.60     20.1       32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.2       26.80     20.2       26.80     23.0       26.20     18.1       28.10     23.0       26.20     14.8       24.00     17.6       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
30.60       26.10     18.8       25.40     18.2       25.40     18.2       25.40     18.2       29.60     20.1       32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       26.80     20.2       26.80     20.2       26.20     18.1       26.20     19.2       26.20     19.2       26.20     19.2       26.20     19.2       26.20     18.5       24.00     17.6       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
26.10 18.8 25.40 18.2 29.60 20.1 32.50 24.9 26.00 19.1 43.50 32.4 30.40 22.3 26.80 20.1 26.80 20.1 26.80 20.1 26.80 20.2 26.80 20.2 26.80 20.2 26.80 20.2 27.60 18.1 29.20 19.2 24.00 17.6 31.40 23.4 24.60 18.5 24.60 18.5 24.60 16.0 30.70 22.2
25.40     18.2       29.60     22.5       27.60     20.1       32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       26.80     20.1       26.80     20.1       26.20     18.1       26.20     19.2       26.20     19.2       26.20     19.2       24.00     17.6       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
29.60     22.5       27.60     20.1       32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       25.60     18.1       29.20     21.5       31.20     23.0       26.20     19.2       26.20     19.2       26.20     14.8       24.00     17.6       21.70     16.0       20.40     14.7       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7
27.60     20.1       32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       25.60     18.1       25.60     18.1       26.20     21.5       31.20     23.0       26.20     19.2       26.20     14.8       24.00     17.6       21.70     16.0       20.40     14.7       20.40     14.7       20.40     14.7       30.70     22.2       30.70     16.7
32.50     24.9       26.00     19.1       43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       25.60     18.1       29.20     21.5       31.20     23.0       28.10     20.2       26.20     19.2       26.20     19.2       26.20     17.6       31.40     23.4       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
26.00 19.1 43.50 32.4 30.40 22.3 26.80 20.1 25.60 18.1 29.20 21.5 31.20 20.2 26.20 19.2 26.20 19.2 26.20 19.2 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 20.40 14.7 30.70 22.2
43.50     32.4       30.40     22.3       26.80     20.1       26.80     20.1       25.60     18.1       29.20     21.5       31.20     23.0       28.10     20.2       26.20     19.2       24.00     17.6       31.40     23.4       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
30.40     22.3       26.80     20.1       25.60     18.1       29.20     21.5       31.20     23.0       28.10     20.2       26.20     19.2       24.00     17.6       31.40     23.4       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
26.80 20.1 25.60 18.1 29.20 21.5 31.20 23.0 28.10 20.2 26.20 19.2 20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 30.70 22.2
25.60 18.1 29.20 21.5 31.20 23.0 28.10 20.2 26.20 19.2 20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 24.60 18.5 20.40 14.7 30.70 22.2
29.20 21.5 31.20 23.0 28.10 20.2 26.20 19.2 20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 20.40 14.7 30.70 22.2
31.20     23.0       28.10     20.2       26.20     19.2       20.10     14.8       24.00     17.6       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
28.10 20.2 26.20 19.2 20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 20.40 14.7 30.70 22.2
26.20 19.2 20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 20.40 14.7 30.70 22.2
20.10 14.8 24.00 17.6 31.40 23.4 24.60 18.5 21.70 16.0 20.40 14.7 30.70 22.2
24.00     17.6       31.40     23.4       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
31.40     23.4       24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
24.60     18.5       21.70     16.0       20.40     14.7       30.70     22.2       30.70     16.7
20.40 16.0 20.40 14.7 30.70 22.2 30.70 16.7
30.70 14.7 30.70 22.2 30.70 16.7
30.70 22.2 30.70 16.7
30.70 16.7
23.40 16.7

	Seed	Yield	(kg/ha)
Fiber	Yield	(kg/ha)	þ/
	Fiber % of	Unretted	Straw
		Fiber wt	(g)
	Retted	Bundle	wt (g)
7.	Dry	Bundle	wt (g)
	Salvagable	Straw Wt	(kg/ha) /c
	Unretted	1m <sup>2</sup> wt	q/ (b)
	Straw	Length	(cm) /a
			Variety
			Rep
			Plot

Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre.

39.368 bushels per tonne, 1000kg per tonne, 4047 m² per acre. Plots were seeded May 24/01 at 40 kg/ha

a/ Straw length is approximately average from ground level b/ All 1m $^2$  weights have roots and seed attached and are double the  $\%\text{m}^2$  weights

c/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted ½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg

Table A-5 - Results of Seeding Rate Trial Sorted on Fiber Yield

	(6)	1	<i>Y</i> ′														_					_		_			_
•	Seed	Yield	(kg/ha)	329.3	253.0	250.0	257.3	229.3	95.9	510.5	174.2	138.9	154.0	131.3	179.3	275.0	161.6	427.5	128.8	194.4	179.3	70.7	174.2	261.8	176.7	2.5	42.9
Fiber	Yield	(kg/ha)	þ/	516.5	497.9	430.0	380.2	344.3	310.8	290.5	281.4	277.6	266.5	239.1	230.2	214.3	205.0	195.8	163.0	162.6	155.8	151.1	146.9	143.3	119.7	61.7	51.8
Fiber %	of	Unretted	Fiber	21.8%	21.3%	20.4%	21.1%	17.5%	11.2%	11.6%	14.2%	16.8%	15.4%	15.3%	20.9%	11.2%	17.4%	14.0%	16.7%	11.5%	8.8%	8.6%	10.5%	8.8%	13.3%	16.7%	10.0%
		Seed	Wt (g)	0.261	0.201	0.198	0.204	0.182	0.076	0.405	0.138	0.110	0.122	0.104	0.142	0.218	0.128	0.339	0.102	0.154	0.142	0.056	0.138	0.208	0.140	0.002	0.034
		Fiber	wt (g)	5.7	5.4	4.9	5.5	4.4	3.6	2.7	3.3	4.1	3.2	3.1	3.6	2.0	3.4	2.0	2.0	1.9	2.0	1.9	1.7	1.6	1.8	1.3	0.8
		Retted	wt (g)	22.0	22.3	21.1	22.2	21.0	25.7	18.5	18.9	19.9	17.6	16.7	14.7	15.3	16.0	12.3	10.6	13.6	18.1	17.5	13.4	14.6	11.4	7.1	7.5
	Dry	Bundle	wt (g)	28.2	27.9	26.4	29.1	27.5	34.7	25.2	25.8	26.8	23.1	22.6	19.5	20.3	21.9	16.5	14.0	18.9	25.3	24.4	18.4	20.6	15.7	10.4	10.7
	Salvagable	Straw Wt	(kg/ha) /c	2374.0	2342.0	2106.0	1804.0	1972.0	2780.0	2496.0	1978.0	1652.0	1732.0	1566.0	1100.0	1918.0	1176.0	1400.0	978.0	1412.0	1776.0	1750.0	1400.0	1630.0	898.0	370.0	518.0
	½m²	wt (g)	Q	118.7	117.1	105.3	90.2	98.6	139.0	124.8	98.9	82.6	86.6	78.3	55.0	95.9	58.8	70.0	48.9	9.07	88.8	87.5	70.0	81.5	44.9	18.5	25.9
	Straw	Length	(cm) /a	39.5	48.0	39.5	38.0	42.0	34.0	28.0	25.0	33.0	43.0	32.5	34.0	29.0	37.0	30.0	27.5	28.0	26.0	28.5	24.0	26.0	34.0	30.0	24.0
	Seeding	Rate	(kg/ha)	80	40	120	120	80	120	80	120	120	40	40	80	40	120	40	80	80	80	40	120	40	40	80	120
		Seeding	Method	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row
			Variety	Hermes	Hermes	Hermes	Hermes	Hermes	Flanders	Flanders	Flanders	Hermes	Hermes	Hermes	Hermes	Flanders	Hermes	Flanders	Hermes	Hermes	Flanders Row						
			Rep	3	3	3	4	2	2	3	3	2	4	1	1	3	1	4	4	7	2	2	1	1	2	4	4
1143			ŏ																								

٠		Seed	Yield	(kg/ha)
	Fiber	Yield	(kg/ha)	/d/
	Fiber %	of	Seed Unretted	Fiber
				Wt (g)
			d Fiber wt	(a)
			Retted	wt (g)
		Dry	Straw Wt Bundle wt	(a)
		Salvagable	Straw Wt	(kg/ha) /c
		2	½m²wt	q/ (b)
		Straw	Length	(cm) /a
		Seeding	Rate	(kg/ha)
			Seeding	Method
7				Variety
				Rep
				lot

ofes:

lots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 9.368 bushels per tonne, 1000kg per tonne, 4047 m<sup>2</sup> per acre. lots were seeded May 24/01 at 40 kg/ha

I Straw length is approximately average from ground level

I All 1 $\mathfrak{m}^2$  weights have roots and seed attached and are double the  $k\mathfrak{m}^2$  weights

I Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted

½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg

Table A-6 - Results of Seeding Rate Trial Sorted on Seed Yield

× ×	7	1																																
,	Seed	Yield	(kg/ha)	510.5	427.5	329.3	275.0	261.8	257.3	253.0	250.0	229.3	194.4	179.3	179.3	176.7	176.7	174.2	174.2	161.6	154.0	154.0	138.9	133.8	131.3	131.3	128.8	126.2	126.2	95.9	93.4	88.4	80.8	78.3
Fiber	Yield	(kg/ha)	p/	290.5	195.8	516.5	214.3	143.3	380.2	497.9	430.0	344.3	162.6	230.2	155.8	119.7		281.4	146.9	205.0	266.5		277.6		239.1		163.0			310.8				
Fiber %	of	Unretted	Fiber	11.6%	14.0%	21.8%	11.2%	8.8%	21.1%	21.3%	20.4%	17.5%	11.5%	20.9%	8.8%	13.3%		14.2%	10.5%	17.4%	15.4%		16.8%		15.3%		16.7%			11.2%				
		Seed	Wt (g)	0.405	0.339	0.261	0.218	0.208	0.204	0.201	0.198	0.182	0.154	0.142	0.142	0.140	0.140	0.138	0.138	0.128	0.122	0.122	0.110	0.106	0.104	0.104	0.102	0.100	0.100	0.076	0.074	0.070	0.064	0.062
		Fiber	wt (g)	2.7	2.0	5.7	2.0	1.6	5.5	5.4	4.9	4.4	1.9	3.6	2.0	1.8		3.3	1.7	3.4	3.2		4.1		3.1		2.0			3.6				
		Retted	wt (g)	18.5	12.3	22.0	15.3	14.6	22.2	22.3	21.1	21.0	13.6	14.7	18.1	11.4		18.9	13.4	16.0	17.6		19.9		16.7		10.6			25.7				
-	Dry	Bundle	wt (g)	25.2	16.5	28.2	20.3	20.6	29.1	27.9	26.4	27.5	18.9	19.5	25.3	15.7		25.8	18.4	21.9	23.1		26.8		22.6		14.0			34.7				
	Salvagable	Straw Wt	(kg/ha) /c	2496.0	1400.0	2374.0	1918.0	1630.0	1804.0	2342.0	2106.0	1972.0	1412.0	1100.0	1776.0	898.0		1978.0	1400.0	1176.0	1732.0		1652.0		1566.0		978.0			2780.0				
(	1/2m <sup>2</sup>	wt (g)	/D	124.8	70.0	118.7	95.9	81.5	90.2	117.1	105.3	98.6	9.07	55.0	88.8	44.9		6.86	70.0	58.8	86.6		82.6		78.3		48.9			139.0				
	Straw	Length	(cm) /a	28.0	30.0	39.5	29.0	26.0	38.0	48.0	39.5	42.0	28.0	34.0	26.0	34.0		25.0	24.0	37.0	43.0		33.0		32.5		27.5			34.0				
100	Seeding	Rate	(kg/ha)	80	40	80	40	40	120	40	120	80	80	80	80	40	40	120	120	120	40	40	120	80	40	120	80	80	80	120	120	40	120	120
		Seeding	Method	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Broadcast	Row	Row	Row	Row	Broadcast	Row	Broadcast	Row	Broadcast	Row	Broadcast	Broadcast	Row	Broadcast	Broadcast	Broadcast	Broadcast
			Variety	Flanders	200		10						in		100	Hermes	Hermes	Flanders			Hermes	Flanders	Hermes	Flanders	Hermes	Flanders	Flanders	Flanders	Hermes	Flanders	Flanders	Hermes	Hermes	Hermes
			Rep	3		3			4	60	8	2	_	-	2	2	2	8	_	-	4	4	2	8	1	2	4	1	4	2	4	4	-	ဗ
			lot	~	9		6		00			6			(0	44	8	7			CI	2	7	0	0	0			7	0	m	4		က

0 0	13.37			0.7	9.0	9.0	9.0	C	0.5	J	0.3	0.3	0.3	0.3	0.1		0
riber Yield (kg/ha) /d	151.1				51.8												61.7
	8.6%				10.0%												16.7%
Seed Wt	0.056	0.050	0.048	0.036	0.034	0.030	0.030	0.026	0.024	0.022	0.018	0.014	0.014	0.014	0.006	0.004	0.002
wt (g)	1.9				0.8												1.3
wt (g)	17.5				7.5												7.1
Bungle wt (g)	24.4				10.7												10.4
(kg/ha) /c	1750.0				518.0												370.0
d/ (g)	87.5				25.9												18.5
(cm) /a	28.5				24.0												30.0
(kg/ha)	40	80	40	80	120	80	40	120	40	80	40	120	40	120	120	80	80
Seeding	Row	Broadcast	Broadcast	Broadcast	Row	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Broadcast	Row
Variety	Flanders	Flanders		Flanders	Flanders	Hermes	Flanders	Flanders	Hermes	Hermes	Flanders	Flanders		Hermes	Hermes	Hermes	Hermes
Rep	2	4	3	2	4	_	3	3	1	3	1	1	2	2	4	2	4
	(kg/ha) (cm) /a (g) /b (kg/ha) /c wt (g) wt (g) wt (g) wt (g) wt (g)	Method (kg/ha) (cm) /a (g) /b (kg/ha) /c wt (g) wt (g) wt (g) wt (g) wt (g)   Fiber   Fiber	Nethod (kg/ha) (cm) /a (g) /b (kg/ha) /c wt (g) w	Securing         Rate         Length         21 aw         VI         Duning         Retted         Fiber         Securing         Unretted         Fiber         Priber         Securing         On 10 are         On 10 are </td <td>Securing         Rate         Length         Zeron         Action         Cm) /a         (g) /b         (kg/ha) /c         wt (g)         riber Seed Wt         Onested Fiber           S Row         40         28.5         87.5         1750.0         24.4         17.5         1.9         0.056         8.6%           Broadcast         80         0.050         0.050         0.048         0.048         0.036         0.036</td> <td>Securing         Rate         Length         Zeron         Action         Cm) /a         (g) /b         (kg/ha) /c         wt (g)         resea wt         resea wt</td> <td>Securing         National (kg/ha)         Cem) /a         (g) /b         (kg/ha) /c         wt (g)         wt (g)</td> <td>Securing         Rate         Length         ZITAW VI.         Building         Relied         Fiber         Composition           S Row         40         28.5         87.5         1750.0         24.4         17.5         1.9         0.056         8.6%           S Broadcast         80         80         80         8.6%         8.6%         8.6%         8.6%           S Broadcast         80         25.9         518.0         10.7         7.5         0.03         10.0%           S Row         120         24.0         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         80         0.034         10.0%         0.030         0.030         0.030</td> <td>Securing         Rate         Length         ZITAW VVI         Duffulle         Relied         Fiber         Prine         Duffulle         Prine         Prine         Prine         Duffulle         Prine         Duffulle         Prine         Duffulle         Prine         Duffulle         Prine         Prine         Prine         Duffulle         Prine         Prine         Prine         Prine         Prine         Duffulle         Prine         Prine</td> <td>Securing         Nate Length         Length         All (kg/ha)         (kg/ha)</td> <td>Securing         National (kg/ha)         Cem) /a         (g) /b         (kg/ha) /cm /cm /cm /cm /cm /cm /cm /cm /cm /cm</td> <td>Securing         Nate Action         Length (a)/b (b)/b (b)/b (c)/b         (kg/ha)/c         vx (g)         &lt;</td> <td>Securing         Nate         Length         Ztraw Wt         Dufful         Nat (g)         wt (g)         Fiber           S Broadcast         80         24.0         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         120         120         120         120         120         120         120         120         120         120         120         120</td> <td>Sedulity         Nate Action         Centify (a) / b         Centify (b) / b         Centify (c) / b</td> <td>Securing         National Method         (kg/ha) (cm) /a         (g) /b         (kg/ha) /c         wt (g)         respect to the properties of the prop</td> <td>Securing         Nate Length         Length         Straw Wildle         National Method         (Kg/ha)         (Cm) /a         (g) /b         (Kg/ha)         (Kg/ha)</td> <td>Securing         Nate Action         Length         Zolidow Wit (g)         Wt (g)</td>	Securing         Rate         Length         Zeron         Action         Cm) /a         (g) /b         (kg/ha) /c         wt (g)         riber Seed Wt         Onested Fiber           S Row         40         28.5         87.5         1750.0         24.4         17.5         1.9         0.056         8.6%           Broadcast         80         0.050         0.050         0.048         0.048         0.036         0.036	Securing         Rate         Length         Zeron         Action         Cm) /a         (g) /b         (kg/ha) /c         wt (g)         resea wt         resea wt	Securing         National (kg/ha)         Cem) /a         (g) /b         (kg/ha) /c         wt (g)         wt (g)	Securing         Rate         Length         ZITAW VI.         Building         Relied         Fiber         Composition           S Row         40         28.5         87.5         1750.0         24.4         17.5         1.9         0.056         8.6%           S Broadcast         80         80         80         8.6%         8.6%         8.6%         8.6%           S Broadcast         80         25.9         518.0         10.7         7.5         0.03         10.0%           S Row         120         24.0         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         80         0.034         10.0%         0.030         0.030         0.030	Securing         Rate         Length         ZITAW VVI         Duffulle         Relied         Fiber         Prine         Duffulle         Prine         Prine         Prine         Duffulle         Prine         Duffulle         Prine         Duffulle         Prine         Duffulle         Prine         Prine         Prine         Duffulle         Prine         Prine         Prine         Prine         Prine         Duffulle         Prine         Prine	Securing         Nate Length         Length         All (kg/ha)         (kg/ha)	Securing         National (kg/ha)         Cem) /a         (g) /b         (kg/ha) /cm	Securing         Nate Action         Length (a)/b (b)/b (b)/b (c)/b         (kg/ha)/c         vx (g)         <	Securing         Nate         Length         Ztraw Wt         Dufful         Nat (g)         wt (g)         Fiber           S Broadcast         80         24.0         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         25.9         518.0         10.7         7.5         0.8         0.034         10.0%           S Broadcast         40         120         120         120         120         120         120         120         120         120         120         120         120         120	Sedulity         Nate Action         Centify (a) / b         Centify (b) / b         Centify (c) / b	Securing         National Method         (kg/ha) (cm) /a         (g) /b         (kg/ha) /c         wt (g)         respect to the properties of the prop	Securing         Nate Length         Length         Straw Wildle         National Method         (Kg/ha)         (Cm) /a         (g) /b         (Kg/ha)         (Kg/ha)	Securing         Nate Action         Length         Zolidow Wit (g)         Wt (g)

ofoc

lots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre.

9.368 bushels per tonne, 1000kg per tonne, 4047 m² per acre.

I Straw length is approximately average from ground level I  $^2$  weights and seed attached and are double the  $\%\mathrm{m}^2$  weights

f Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted

½m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg

Table A-7 - Results of Seeding Rate Trials Sorted on Fiber %

T.	1																										
	Cook	Vield	(kg/ha)	329.3	253.0	257.3	179.3	250.0	229.3	161.6	138.9	128.8	2.5	154.0	131.3	174.2	427.5	176.7	510.5	194.4	95.9	275.0	174.2	42.9	261.8	179.3	70.7
Fiher	Vield	(ka/ha)	p/	516.5	497.9	380.2	230.2	430.0	344.3	205.0	277.6	163.0	61.7	266.5	239.1	281.4	195.8	119.7	290.5	162.6	310.8	214.3	146.9	51.8	143.3	155.8	151.1
Fiher %	of .	Ilnreffed	Fiber	21.8%	21.3%	21.1%	20.9%	20.4%	17.5%	17.4%	16.8%	16.7%	16.7%	15.4%	15.3%	14.2%	14.0%	13.3%	11.6%	11.5%	11.2%	11.2%	10.5%	10.0%	8.8%	8.8%	8.6%
		S.	Wt (g)	0.261	0.201	0.204	0.142	0.198	0.182	0.128	0.110	0.102	0.002	0.122	0.104	0.138	0.339	0.140	0.405	0.154	0.076	0.218	0.138	0.034	0.208	0.142	0.056
		Fiber	wt (g)	5.7	5.4	5.5	3.6	4.9	4.4	3.4	4.1	2.0	1.3	3.2	3.1	3.3	2.0	1.8	2.7	1.9	3.6	2.0	1.7	0.8	1.6	2.0	1.9
		Retted	wt (g)	22.0	22.3	22.2	14.7	21.1	21.0	16.0	19.9	10.6	7.1	17.6	16.7	18.9	12.3	11.4	18.5	13.6	25.7	15.3	13.4	7.5	14.6	18.1	17.5
	2	Bindle	wt (g)	28.2	27.9	29.1	19.5	26.4	27.5	21.9	26.8	14.0	10.4	23.1	22.6	25.8	16.5	15.7	25.2	18.9	34.7	20.3	18.4	10.7	20.6	25.3	24.4
	Salvanahle	Straw Wf	(kg/ha) /c	2374.0	2342.0	1804.0	1100.0	2106.0	1972.0	1176.0	1652.0	978.0	370.0	1732.0	1566.0	1978.0	1400.0	898.0	2496.0	1412.0	2780.0	1918.0	1400.0	518.0	1630.0	1776.0	1750.0
	1/2m 2	Wf (a)	9	118.7	117.1	90.2	55.0	105.3	98.6	58.8	82.6	48.9	18.5	9.98	78.3	6.86	0.07	44.9	124.8	9.07	139.0	626	70.0	25.9	81.5	88.8	87.5
	Straw	l enoth	(cm) /a	39.5	48.0	38.0	34.0	39.5	42.0	37.0	33.0	27.5	30.0	43.0	32.5	25.0	30.0	34.0	28.0	28.0	34.0	29.0	24.0	24.0	26.0	26.0	28.5
	Speding	Rate	(kg/ha)	80	40	120	80	120	80	120	120	08	80	40	40	120	40	40	80	80	120	40	120	120	40	80	40
		Seeding	Method	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row								
			Variety	Hermes	Flanders	Hermes	Hermes	Hermes	Flanders	Flanders	Hermes	Flanders															
			Rep	3	3	4	1	3	2	1	2	4	4	4	1	3	4	2	3	1	2	3	1	4	1	2	2
			ō	_	^1	~		_	~		2	~	_	_,		_	~	-	~			~		~	^1	<b>~</b>	

		,	
]	Seed	Yield	(kg/ha)
		Fiber Yield	Fiber (kg/ha) /d (kg/ha)
	Fiber % of	Fiber Seed Wt Unretted Fiber Yield	Fiber
		Seed Wt	(8)
		Fiber	wt (g)
		Retted	wt (g) wt (g)
	Dry	Bundle	wt (g)
	Salvagable	Straw Wt Bundle Retted	(kg/ha) /c wt (g)
	Î	1/2m2 wt	q/ (b)
	Straw	Length	(cm) /a
	Seeding	Rate	(kg/ha)
		Seeding	Method
			Variety
			Rep

lots were 4ft X 23ft =  $92 \text{ ft}^2$  =  $8.6 \text{ m}^2$  = 0.00086 ha = 0.000348 acre.

9.368 bushels per tonne, 1000kg per tonne, 4047 m² per acre.

I Straw length is approximately average from ground level I All 1m  $^2$  weights have roots and seed attached and are double the  $1 \, \rm Mm^2$ 

/ Based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted 2 m² total plant weight times 2 times 10,000 m² per hectare divided by 1,000g per kg

Table A-8 Results of Seeding Rate Trials Sorted on Straw Length

Seed	Yield	(kg/ha)	3.8	2.3	3.4	6.4	3.7	3.8	2.4	1.4	2.7	2.6	2.1	2.0	6.4	0.0	4.1	1.1	7.6	2.9	1.9	2.7	3.9	2.6	2.6	9.0
() <del></del>	Fiber Yield	(kg/ha) /d (l	497.9	266.5	344.3	516.5	430.0	380.2	205.0	310.8	230.2	119.7	277.6	239.1	195.8	61.7	214.3	151.1	290.5	162.6	163.0	155.8	143.3	281.4	146.9	51.8
Fiber % of	Unretted	Fiber	21.3%	15.4%	17.5%	21.8%		21.1%	17.4%	11.2%	20.9%	13.3%	16.8%	15.3%	14.0%	16.7%	11.2%	8.6%	11.6%	11.5%	16.7%	8.8%	8.8%	14.2%	10.5%	10.0%
	Fiber Seed Wt	(g)	0.201	0.122	0.182	0.261	0.198	0.204	0.128	0.076	0.142	0.140	0.110	0.104	0.339	0.002	0.218	0.056	0.405	0.154	0.102	0.142	0.208	0.138	0.138	0.034
	Fiber	wt (g)	5.4	3.2	4.4	5.7	4.9	5.5	3.4	3.6	3.6	1.8	4.1	3.1	2.0	1.3	2.0	1.9	2.7	1.9	2.0	2.0	1.6	3.3	1.7	0.8
	Retted	wt (g)	22.3	17.6	21.0	22.0	21.1	22.2	16.0	25.7	14.7	11.4	19.9	16.7	12.3	7.1	15.3	17.5	18.5	13.6	10.6	18.1	14.6	18.9	13.4	7.5
D.	Bundle	wt (g)	27.9	23.1	27.5	28.2	26.4	29.1	21.9	34.7	19.5	15.7	26.8	22.6	16.5	10.4	20.3	24.4	25.2	18.9	14.0	25.3	20.6	25.8	18.4	10.7
Salvagable	Straw Wt	(kg/ha) /c	2342.0	1732.0	1972.0	2374.0	2106.0	1804.0	1176.0	2780.0	1100.0	0.868	1652.0	1566.0	1400.0	370.0	1918.0	1750.0	2496.0	1412.0	978.0	1776.0	1630.0	1978.0	1400.0	518.0
,	1/2m <sup>2</sup> wt	q/ (b)	117.1	86.6	98.6	118.7	105.3	90.2	58.8	139.0	55.0	44.9	82.6	78.3	70.0	18.5	95.9	87.5	124.8	9.07	48.9	88.8	81.5	98.9	70.0	25.9
Straw	Length	(cm) /a	48.0	43.0	42.0	39.5	39.5	38.0	37.0	34.0	34.0	34.0	33.0	32.5	30.0	30.0	29.0	28.5	28.0	28.0	27.5	26.0	26.0	25.0	24.0	24.0
Seeding	Rate	(kg/ha)	40	40	80	80	120	120	120	120	80	40	120	40	40	80	40	40	80	80	80	08	40	120	120	120
	Seeding	Method	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row	Row							
		Variety	Hermes	Flanders	Hermes	Hermes	Hermes	Hermes	Flanders	Hermes	Flanders	Flanders	Flanders	Flanders		Flanders	Flanders	Flanders	Flanders	Flanders						
		Rep	3	4		3	3	4	_	2	1		2	1	4	4		2	3	1	4	2	1	3	1	4
		Plot		42	19	34	31	48	2	20	4	24	17	10	46	41	29	14	33	8	38	16	12	27	2	39

Notes: Plots were 4ft X 23ft = 92 ft<sup>2</sup> = 8.6 m<sup>2</sup> = 0.00086ha = 0.000348acre. 39.368 bushels per tonne, 1000kg per tonne, 4047 m² per acre.

al Straw length is approximately average from ground level bl All  $1m^2$  weights weights have roots and seed attached and are double the  $2m^2$  weights c based on average amount of straw that is usable when plants are short and grown under stressed conditions times the unretted

 $\%\mathrm{m}^2$  total plant weight times 2 times 10,000 m $^2$  per hectare divided by 1,000g per kg

## Results of Regression Equations Used to Test Significant Relationships Appendix B

### Variety Trial Regressions

Equation B-1 - Seed Yield as a Function of Variety

Regression Statistics	atistics						
Multiple R							
R Square	0.22						
Adjusted R Square	(0.02)						
Standard Error	71.41						
Observations	64.00						
ANOVA							
	df	SS	MS	F	Significance F		
Regression	15.00	68,686.58	4,579.11	0.90	75.0		
Residual	48.00	244,783.53	5,099.66				
Total	63.00	313,470.12					
The second secon							114
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%
Intercept	194.00	35.71	5.43	0.00	122.21	265.79	122.21
Víkina =1	57.30	50.50	1.13	0.26	(44.23)	158.83	(44.23)
Electra =1	55.55	50.50	1.10	0.28	(45.98)	157.08	(45.98)
Diane = 1	17.68	50.50	0.35	0.73	(83.85)	119.21	(83.85)
Hermes = 1	8.35	50.50	0.17	0.87	(93.18)	109.88	(93.18)
Jitka = 1	7.67	50.50	0.15	0.88	(93.86)	109.20	(93.86)
Evelin = 1	(1.28)	50.50	(0.03)	0.98	(102.81)	100.24	(102.81)
llona = 1	(7.79)	50.50	(0.15)	0.88	(109.32)	93.74	(109.32)
Valour = 1	(9.74)	50.50	(0.19)	0.85	(111.26)	91.79	(111.26)
Escalina = 1	(16.12)	50.50	(0.32)	0.75	(117.65)	85.41	(117.65)
Laura = 1	(25.95)	50.50	(0.51)	0.61	(127.48)	75.58	(127.48)
Elise = 1	(33.86)	50.50	(0.67)	0.51	(135.39)	67.67	(135.39)
Flanders = 1	(38.44)	50.50	(0.76)	0.45	(139.97)	63.08	(139.97)
Caeser = 1	(43.51)	50.50	(0.86)	0.39	(145.04)	58.02	(145.04)
Alba = 1	(47,38)	50.50	(0.94)	0.35	(148.91)	54.15	_
Opaline = 1	(60.87)	50.50	(1.21)	0.23	(162.40)	40.66	(162.40)

109.88 109.20 100.24 93.74 91.79

158.83 157.08 119.21

Upper 95.0%

85.41 75.58 67.67 63.08

54.15 40.66 58.02

Opaline = 1 (60.87)
NOTE: Arriane was used as intercept

Equation B-2 - Straw Length as a Function of Variety

	;; ;;							
Regression Stati	Stics							
Multiple R	0.84							
R Square	0.70							
Adjusted R Square	0.61							
Standard Error	3.29							
Observations	64.00							
ANOVA								
	df	SS	MS	u.	Significance F			
Regression	15.00	1,204.98	80.33	7.44	00.0			
Residual	48.00	518.25	10.80					
Total	63.00	1,723.23						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	2
Intercept	34.50	1.64	21.00	0.00	31.20	37.80	31.20	
Electra =1	7.75	2.32	3.34	00.0	3.08	12.42	3.08	
Diane = 1	2.50		1.08	0.29	(2.17)	7.17	(2.17)	
Hermes = 1	0.75	2.32	0.32	0.75	(3.92)	5,42	(3.92)	
Opaline = 1	0.13	2.32	0.05	0.96	(4.55)	4.80	(4.55)	
Elise = 1	(0.50)	2.32	(0.22)	0.83	(5.17)	4.17	(5.17)	
Caeser = 1	(0.75)	2.32	(0.32)	0.75	(5.42)	3.92	(5.42)	
Laura = 1	(0.75)	2.32	(0.32)	0.75	(5.42)	3.92	(5.42)	
Evelin = 1	(1.25)	2.32	(0.54)	0.59	(5.92)	3.42	(5.92)	
Ilona = 1	(2.12)	2.32	(0.91)	0.36	(6.80)	2.55	(6.80)	
Jitka = 1	(2.37)	2.32	(1.02)	0.31	(7.05)	2.30	(7.05)	
Escalina = 1	(2.37)	2.32	(1.02)	0.31	(7.05)	2.30	(7.05)	
Aba = 1	(4.75)	2.32	(2.04)	0.05	(9.42)	(0.08)	(9.42)	
Viking =1	(6.50)	2.32	(2.80)	0.0	(11:17)	(1.83)	(11.17)	
Valour = 1	(8.00)	2.32	(3.44)	0.00	(12.67)	(3.33)	(12.67)	
Flanders = 1	(12.00)	2.32	(5.16)	0.00	(16.67)	(7.33)	(16.67)	

Upper 95.0%

Flanders = 1 (12.00)
Note: Arriane was used as intercept

(0.08) (1.83) (3.33) (7.33)

5.42 4.80 4.17 3.92 3.92 3.42 2.30 2.30 2.30

Equation B-3 - Fiber % of Unretted Straw as a Function of Variety

Regression Statistics	Statistics							
Multiple R								
R Square	0.81							
Adjusted R Square	0.75							
Standard Error	0.02							
Observations	64.00							
ANOVA								
	ďf	SS	MS	1	Significance F			
Regression	15.00	90'0	0.00	13.31	0.00			
Residual	48.00	0.01	0.00					
Total	63.00	0.07						
					a para di dana			
	Coefficients	Standard Error	t Staf	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 9
Intercept	0.17	0.01	19.51	0.00	0.15	0.18	0.15	
Electra =1	0.05	0.0	4.36	0.00	0.03	0.08	0.03	
Hermes = 1	0.05	0.01	3.01	0.00	0.02	0.07	0.02	
Diane = 1	0.04	0.01	3.63	0.0	0.02		0.02	
Evelin = 1	0.02	0.01	1.91	0.06	(0.00)		(0.00)	
Opaline = 1	0.02	0.01	1.74	0.09	(0.00)	0.05	(0.00)	
Caeser = 1	0.02	0.01	1.34	0.19	(0.01)		(0.01)	
Jitka = 1	0.02	0.01	1.25	0.22	(0.01)		(0.01)	
Escalina = 1	0.01	0.01	0.73	0.47	(0.02)		(0.02)	
Laura = 1	0.00	0.01	0.35	0.72	(0.02)		(0.02)	
Elise = 1	(0.00)	0.01	(0.27)	0.79	(0.03)		(0.03)	
Ilona = 1	(0.01)	0.01	(0.62)	0.54	(0.03)		(0.03)	
Alba = 1	(0.02)	0.01	(1.51)	0.14	(0.04)	0.01	(0.04)	
Viking =1	(0.03)	0.01	(2.16)	0.04	(0.05)	(0.00)	(0.05)	_
Flanders = 1	(0.05)	0.0	(3.93)	0.00	(0.07)	(0.02)	(0.07)	
Valour = 1	(0.06)	0.01	(4.60)	0.00	(0.08)	(0.03)	(0.08)	_
		the second of th	The second secon			Section 1	The second secon	*

0.08 0.08 0.07 0.07 0.05 0.04 0.03 0.03 0.03 0.02 0.03

(0.00) (0.02) (0.03)

NOTE: Arriane was used as intercept

Equation B-4 - Fiber Yield as a Function of Variety

0.88 0.78 0.71 38.60 64.00

> R Square Adjusted R Square Standard Error

Observations

Regression Statistics Multiple R

ANOVA								
and the second s	Οf	SS	MS	щ	Significance F			
Regression	15.00	250,880.34	16,725.36	11.22	0.00			
Residual	48.00	71,533.62	1,490.28					
Total	63.00	322,413.96						
								***************************************
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	200.47	19.30	10.39	0.00	161.66	239.28	161.66	239.28
Electra =1	82.54	27.30	3.02	0.00	27.63	137.40	27.63	137,40
Diane 11	81.59	27.30	2.99	0.00	26,71	136.48	26.71	136.48
Hermes = 1	54.51	27.30	2.00	0.05	(0.37)	109.40	(0.37)	109.40
Caeser = 1	34.76	27.30	1.27	0.21	(20.12)	89.65	(20.12)	89.65
Evelin = 1	23.81	27.30	0.87	0.39	(31.08)	78.69	(31.08)	78.69
Opaline = 1	12.21	27.30	0.45	0.66	(42.67)	67.10	(42.67)	67.10
Jitka = 1	10.65	27.30	0.39	0.70	(44.24)	365.53	(44.24)	365.53
Laura = 1	(1.43)	27.30	(0.05)	0.96	(56.31)	43.46	(56.31)	43.46
Escalina = 1	(14.06)	27.30	(0.51)	0.61	(68.94)	40.83	(68.94)	40.83
Elise = 1	(16.99)	27.30	(0.62)	0.54	(71.88)	37.89	(71.88)	37.89
llona = 1	(25.15)	27.30	(0.92)	0.37	(80.03)	29.74	(80.03)	29.74
Viking =1	(30.56)	27.30	(1.12)	0.27	(85.45)	24.32	(85.45)	24.32
Alba = 1	(35.73)	27.30	(1.31)	0.20	(90.62)	19.15	(90.62)	19.15
Flanders = 1	(141.69)	27.30	(5.19)	0.00	(196.57)	(86.80)	(196.57)	(86.80)
Valour = 1	(147.08)	27.30	(5.39)	0.00	(201.96)	(92.19)	(201.96)	(92.19)
Note: Arriane was used as intercept	used as intercep	į						

# Regressions - Seeding Rate X Method X Variety Trial

Equation B-5 - Seed Yield as a Function of Seeding Method

Regression Statistics	Statistics							
Multiple R	0.61							
R Square	0.37							
Adjusted R Square	0.36							
Standard Error	87.78							
Observations	48.00							
ANOVA								
	df	SS	MS	ıL	Significance F	_		
Regression	1.80	211,326,77	211,326.77	27.42	,			
Residual	46.00	354,458.96	7,705.63					
Total	47.00	565,785.73						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Upper 95% Lower 95.0% Upper 95.0%	Upper 95.0
Intercept	67.22	1.20	22.84	0.00	25.00	30.00	25.00	30.00
Row = 1	132,70	25.34	5.24	00.0	81.70	183.71	81.70	183.71

Equation B-6 - Straw Length as a function of Variety

Multiple R R Square Adjusted R Square	0 10							
R Square Adjusted R Square	0							
Adjusted R Square	0.61							
	0.59							
Standard Error	4.17							
Observations	24.00							
ANOVA								
	ďf	SS	MS	Ħ	Significance F			
Regression	1.00	605.01	605.01	34.78	00.0			
Residual	22.00	382.73	17.40					
Total	23.00	987.74						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Upper 95.0%
Intercept	27.50	1.20	22.84	0.00	25.00	30.00	25.00	30.00
Flanders = 1	(10.04)	1.70	(2.90)	0.00	(6.51)	(13.57)	(6.51)	(13.57)

Equation B-7 - Fiber % of Unretted Fiber as a Function of Variety

GRISHES	0.80		0.62	0.03	
Regression Statistics	Multiple R	R Square	Adjusted R Square		

ANOVA								
	đ	SS	MS	Ŧ	Significance F			
Regression	1.00	0.03	0.03	38.55	00.00			
Residual	22.00	0.02	0.00					
Total	23.00	0.04						
	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95.0%	Lower 95.0% Upper 95.0%
Intercent	0.11	0.01	14.91	00.00	0.10	0.13	0.10	0.13
Flanders II 4	(0.07)	0.0	(6.21)	00.0	(0.04)	(60.0)	(0.04)	(0.09)
	(		()					

NOTE: Hermes was used as intercept

Equation B-8 - Fiber Yield as a function of Seeding Method X Rate X Variety

Regression	Statistics							
Multiple R	0.71							
Regression	Statistics							
Multiple R	0.84							
R Square	0.70							
Adjusted R Square	0.68							
Standard Error	85.44							
Observations	48.00							
ANOVA								
	ďf	SS	MS	Ą	Significance F			
Regression	4.00	746,928.43	186,732.11	25.58	00'0			
Residual	43.00	313,888.89	7,299.74					
Total	47.00	1,060,817.32						
	77.	The state of the s	+ 0+0+	D_walite	10Wer 95%	11nner 95%	Lower 95.0%	
	Coemcients	סומנוממות ביות	נפני	7 - 9 0 10 0	2000	CPP C	4 4 147	
Intercept	19.77	27.58	0.72	0.48	(35.84)	75.38	(35.84)	
ROW III	243.17	24.66	9.86	0.00	193.43	292.91	193.43	
80kg/ha = 1	15.99	30.21	0.53	09.0	(44.93)	76.91	(44.93)	
	1 1					1	Í	

Flanders ≂ 1 (54.23) 24.66 (2.20) Note: Broadcast Hermes Seeded at 120kg/ha was used as intercept (2.20)24.66 (54.23)

Upper 95.0% 75.38 **292.91** 76.91

66.97 (4.49)

193.43 (44.93) (54.87) (103.97)

80kg/ha = 1 40 kg/ha = 1

0.20

30.21

6.05

66.97

(54.87) (103.97)

0.84