

Short-Season Flax Breeding Co-op

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ABSTRACT

Due to its high vulnerability to early and late frosts, flax is a high-risk crop in the B.C. Peace River Region. With the rise in demand for flax products, especially the push for the omega-3 fatty acid, it has the potential of becoming a high value crop: making it a desirable option for many producers. The goal to develop a line of flax 14 days earlier than the 2001 check was unfortunately not accomplished. However, a couple of notable early lines were seen in the early years of the project, none of which furthered, therefore with the potential of producing early lines, a flax trial will continue.

INTRODUCTION

Once again, the Peace River Region's main limiting factor is the short growing season, and the limited amount of heat units available. A line of flax has yet to be developed to thrive under these conditions; therefore with the assistance of Dr. Scott Duguid's flax breeding program out of Morden, Manitoba, this project hopes to initiate and develop early maturing lines of linseed flax, which will consistently produce a high value crop in this region. The goal of this project is to produce three or more lines of linseed flax, selected specifically for the short, cool growing season in the B.C. Peace. These new lines need to be 14 days earlier in maturity than the average maturity of the check as entered in 2001 while, improving linseed oil and fiber quality parameters.

Knowing that this goal would be difficult to meet in a five-year study, a secondary study was set-up and completed to determine whether or not there is any value in continuing on with an early flax project. This secondary study will look at each year separately, using the regional variety check as a comparison point. The goal of this study is to find a potentially early variety with decent yields, recording its responses in the following years.

MATERIALS AND METHODS

Two farm sites are used to collect data: the first is located in the South Peace at Dawson Creek, the other is in the North Peace at Fort St. John. The sites are kept as identical as possible and are treated equally throughout the season. Plots are

planted, maintained, analyzed and harvested according to proper research protocol.

The rating system for maturity is as follows: a scale of 1 to 5 is used.

One is the most mature; ideally 100 percent of the plot is brown, however often it is the brownest plot in comparison.

Five is the latest variety; ideally 100 percent of the plot is green, often it is the fullest or darkest green plot in comparison.

This is completed as soon as visual differences can be seen, normally it occurs one month prior to harvest. At times, the site is visited early to avoid data loss due to weather. In these cases the site will be visited twice, for the purpose of this study, these two maturity ratings were averaged. Each replicate of the trial was rated; therefore each variety has an average of at least three maturity values per site per year, as maturity in the Peace River region can be quite variable.

RESULTS

Norlin is the variety check for the regional trials, and was therefore used as a reference point, as it is known to be early. This could only be done because both the regional flax trial and the breeder's flax trials were planted side-by-side at each of the two sites. The maturity of Norlin for both sites can be seen in Table 1., as can the average, which was used as a comparison for the breeder's flax trials. To assist this, all ratings in flax were undertaken at the same time at each site so that a true comparison between the regional check and the breeder's trials could be extrapolated. All flax trials were treated the same way regarding all aspects including planting date, herbicide choices, fertilizer use, and site location.

Table 1. Maturity rates of Norlin, averaged between the two sites.

MATURITY	DC	FSJ	AVG.
2002	1	1.5	1.25
2003	2	1	1.5
2004		1	1
2005	1	1	1
2006		1.3	1.3

The following table lists those varieties from the Canadian Flax Evaluation Trials (CFET) and Preliminary trials, (breeder's trials), which were found to be less than or equal to Norlin in a given year.

Table 2. Flax varieties found to be earlier than Norlin.

VARIETY / Breeder ID	MATURITY (1-5 scale)	YIELD (g/plot)	YEARS ENTERED		
M6795	1.1	991.1	2002		
M6792	1.1	920.8	2002		
M6899	1.2	796.3	2002		
M6848	1.2	914.7	2002		
M6892	1.3	947.6	2002		
M6898	1.3	933.3	2002		
M6893	1.0	977.7	2002		
M6927	1.2	999.0	2002		
M6936	1.3	1067.4	2002		
M6929	1.3	924.6	2002		
M6930	1.3	921.4	2002		
M6928	1.2	954.4	2002		
M7352*	1.0	919.5	2002		
M7353*	1.0	816.9	2002		
M7376*	1.0	1025.9	2002		
M7382*	1.0	1002.2	2002		
M7383*	1.0	1014.2	2002		
M7414*	1.0	820.5	2002		
M7408*	1.0	971.5	2002		
M7416*	1.0	820.6	2002		
M7238*	1.2	872.4	2002		
M7250*	1.2	1031.1	2002		
M7242*	1.2	998.4	2002		
M7274*	1.0	760.0	2002	2003	
M7291*	1.0	906.3	2002	2003	
M7292*	1.2	919.8	2002	2003	
M7451	1.5	1249.7		2003	
M7443	1.5	1226.9		2003	
M7449	1.5	1265.3		2003	
M6552**	0.3				2006
M7815**	0.6				2006

* Data obtained from one site only. ** FSJ data only, and under severe drought conditions.

DISCUSSION

Unfortunately none of the lines grown over the period of this study met the goal of 14 days earlier than the 2001 check, however early varieties, especially in the first year of the trial, were seen as shown by Table 2. The majority of these varieties however did not last in the trial for more than one year. It is possible that due to the coding system set up by Dr. Duguid, varieties are unable to be tracked between years, however normally it is against protocol to change codes once lines are entered into cooperative testing, such as the CFET trials. Therefore it should be safe to assume these early materials did not move forward in testing. There are many reasons a line may be dropped; inconsistency between sites across the whole array of sites or poor seed oil quality. This type of information is not collected at this research site, and is therefore left to the breeder to use to his discretion. Furthermore, adverse weather conditions and/or wildlife damage that occurred over the five-year period of the project often hindered the ability to collect maturity and/or yield from either site.

With respect to wildlife damage, it seems any crop that is later in maturity has not only to contend with adverse weather conditions but also with hungry foraging wildlife. Often the natural sources of food may be in limited supply or offering less than equal opportunity in comparison. The level of wildlife allowed to exist in an agricultural area producing this pressure on such high value crops is open to debate; raising cultural, ethical, social and political issues and therefore will not be addressed here. Suffice it to say however that any healthy and tasty commodity destined for human consumption is likely to be enjoyed by marauding wildlife. It will require a strategy to deal with just such a situation outside the realm of genetic enhancement to the crop itself.

Throughout the five-year study, the odd variety would prove to have potential: two of these can be seen in Table 2. Both M7250 and M7376 from 2002 entries showed both promising yield and early maturity; both were taken into 2003, but are

then no longer traceable. Also included in Table 2 are M6552 and M7815 from the 2006 trial. The data was collected from the Fort St. John site only and was grown under severe drought conditions. Unfortunately, neither of these varieties will be grown for a second year, as 2006 was the end of the project.

The BC Grain Producers know that growing flax in the Peace River Region is a difficult, but not impossible feat. The challenge being that the lower heat units necessitates shorter growing season requirements and can also trigger a second flush of flowering that can lower the quality of the seed come harvest. This risk however is also an opportunity: growing flax in a cooler climate significantly enhances the fatty acid profile therefore increasing the valuable and quantity of omega-3 fatty acids while reducing saturated fatty acids. With the aid of Dr. Paul Dribnenki in the new flax project starting April 1st, 2007, the goal to find a variety, which will survive and excel in the northern climate, will be continued.