

MPSG ANNUAL EXTENSION REPORT

PROJECT TITLE: Variation in soybean seed quality parameters: The Manitoba advantage.

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PART 1: PRINCIPAL RESEARCHER

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PART 2: EXECUTIVE SUMMARY

While Manitoba now grows primarily industrial soybean for crushing and meal, in the future farmers may want to take advantage of the lucrative food-grade export market valued at nearly 1 billion dollars annually. Soybean for food are usually from non-GMO varieties with high quality appearance. Seeds that are dark in colour or stained are not purchased at a premium price. Other factors that can be considered are protein and oil contents and their profiles. Minerals such as iron and selenium may also influence buyer preference. Human health compounds such as isoflavones and tocopherols, may receive a premium. Our objective was to determine if short-season, food-type soybean varieties grown in Manitoba differ in yield or seed quality characteristics from those grown in Eastern Canada. These results may show that there are specific quality profiles that will promote Manitoba soybean for food export. This may also help plant breeders to improve characteristics that may be lacking from Manitoba varieties. In 2015, six short-season soybean varieties were grown at Roblin, Portage la Prairie, Morden, and Arborg in MN and Ottawa ON and Ste. Anne de Bellevue QC, in eastern Canada. Seed was harvested and was analyzed for quality characteristics. With the exception of Roblin, there were few difference in yield, the east had higher protein and Manitoba greater sugar content, seeds were rounder but smaller and darker from Manitoba. Seeds from Morden did not differ from those grown in eastern Canada. Earlier varieties are needed for Roblin. Future tests will examine protein and oil profiles, health compounds and mineral content. This will be repeated in 2016.

PART 3: PROJECT ACTIVITIES AND PRELIMINARY RESULTS

Project Activities 2015

Four locations in Manitoba and one in Quebec agreed to grow the test in 2015. Two more locations indicated that they would be interested in growing the test in 2016. Soil was sent to Brandon RDC for mineral analysis and seed was sent to Ottawa RDC for grinding, analysis and a portion sent to Brandon for mineral analysis.

Preliminary Results (Table 1., Appendix A.)

Yield: There were no significant differences in mean soybean yield among the two eastern locations, Portage and Morden. Roblin produced half the yield of the other Manitoba locations and Arborg did not submit yield data to date. Morden required a similar number of days to reach maturity as Ottawa, while Portage and the Ste. Anne sites were similar and Roblin the latest location.

Protein, Oil and Sugar: Generally protein content was greater in the east than it was in Manitoba with the exception of Portage. Oil content was highest at Morden and lowest at Roblin and Portage. Seed sugar content was higher in Manitoba than it was in the east.

Seed brightness and colour: A spectrophotometer was used to judge seed colour. Morden, Portage and Ottawa produced seed similar in brightness followed by Ste. Anne, Arborg and Roblin. Seed brightness is a measure of the luster of the seed not its colour. Over all seed colour was compared to a standard chosen from the brightest variety grown at Ottawa, Prudence. When the seed score values differ by more than 2.3 units the eye can discern total seed appearance differences. Visibly, seed from Morden was similar to seed from Ottawa while seed from Ste. Anne, Arborg, Portage and Roblin was darker.

Seed size and shape: Image analysis was used to measure seed dimensions. Seed from Ottawa was larger in area than from other locations, followed by Ste. Anne, Portage Morden, Arborg and Roblin. Roundness was calculated from a width to length ratio. The seed from Roblin was the most football shaped while seed from Portage the roundest. Seed shape and size is highly genetically controlled and something that can be improved upon in short-season soybean varieties.

Conclusion: The Roblin location is outside of the region for soybean growth in Manitoba at least with these MG 00 type soybean. While yield was respectable at Roblin, seed protein was low, size small and colour very dark. Seed from Morden, Portage and Arborg could be sold for export, although Arborg and Portage produced visibly darker seed than Morden and Ottawa. Tests for oil and protein profiles, health benefit compounds and minerals will be done in the coming months. It is hoped that two more locations will be added to this test for 2016. There were no deviations from the planned activities.



APPENDIX

Table 1. Seed yield and seed quality traits of the mean of 6 short-season varieties grown across six locations.

Seed Trait	Roblin	Portage	Morden	Arborg	Ottawa	Ste. Anne	LSD‡ _{0.05}
Yield (kg ha ⁻¹)	1641	3467	3481	--	3415	3497	228
Days to Maturity	142	121	100	--	103	115	1
Protein (%)	37.1	42.8	38.6	39.7	43.0	43.2	0.8
Oil (%)	18.6	18.3	21.8	20.6	20.3	20.1	0.2
Sugar (%)	14.8	13.7	13.3	13.3	11.8	11.8	0.3
Seed area (mm ²)	26.0	32.7	30.6	31.0	34.4	33.0	0.9
Seed roundness† (0 to 1)	0.75	0.82	0.79	0.79	0.77	0.80	0.01
Seed brightness (0 to 100)	58	60	62	59	61	59	1
Seed colour difference	4.5	4.4	1.4	3.4	1.1	3.0	

† Seed Roundness = seed width/length, Seed colour was compared to Prudence grown at Ottawa and a difference of > 2.3 results in a visibly darker seed coat colour than the standard.

‡ LSD_{0.05} = least significant difference between results within a seed trait category.

