Protein Content Variation Among Soybeans Grown in Morden and Ottawa

Manitoba-grown soybeans had 3.4% lower protein on average than Ottawa-grown soybeans.

SOYBEAN PROTEIN IS an important seed quality component and marketing determinant. The protein basis for commodity export to China, for example, is 39% on a dry basis (% d.b.) for commodity soybeans and 48% d.b. for food-type soybeans. However, soybean protein levels may vary among varieties and environments. Short growing seasons are expected to result in lower soybean protein content and higher oil content. Soybean seed protein and oil content values are reported by the Canadian Grain Commission from its voluntary sampling program.

However, scientific evaluation is required to assess statistical differences in seed quality between regions and soybean lines, especially early-maturing lines that have been developed more recently.

In this study, 32 soybean breeding lines were evaluated for protein and oil content at two geographically distinct sites – Morden and Ottawa – from 2015 to 2017. These 32 lines consisted of 12 early-maturing lines from Ottawa and 20 early-maturing lines from Morden.

Ottawa-grown soybeans had significantly higher protein content than Morden-grown soybeans. Average protein content of all 32 soybean lines for all three years combined, was 3.4% lower at Morden (39.8% d.b) than at Ottawa (43.2% d.b) (Table 1). However, no significant differences in oil content were found between the two sites. There was some variation in protein from year-to-year at each site, likely due to differences in growing conditions. More precipitation can result in higher protein content. However, more precipitation did not always correspond with higher protein in this study, possibly due to differences in the timing of precipitation.

Morden-grown soybean lines had lower seed weight than Ottawa-grown soybeans (Table 1). Despite seed weight differences, average yields between sites were not significantly different overall (Table 1). This suggests that the inverse relationship between soybean yield and protein can be inconsistent. The average growing season length at Morden was 117 days compared to 105 days at Ottawa. However, Morden received 91% of the corn heat units (CHU) received at Ottawa during the growing season. This may be one of many environmental factors responsible for the seed protein difference between the two sites.

Low soybean protein content is a growing concern among Manitoba farmers. The results from this study confirm that there is lower protein in Manitoba compared to Ontario likely due to environmental differences. Materials and knowledge generated by this study are useful in future soybean breeding and agronomy research. MPSG has invested in research that will address this question about seed quality differences among commercial soybean varieties and environments in which they are grown. Soybean samples from the annual, multi-location variety performance trials will be analyzed for key attributes, including crude protein, amino acid, oil and moisture content.

Table 1. Soybean seed protein, oil, yield, seed weight and environmental conditions at Morden and Ottawa (2015–2017).

Site	Year	Protein (%)	Oil (%)	Yield (bu/ac)	Seed Weight (g/1000 seeds)	Precipitation (mm) Jun 1– Sep 30	CHU Jun 1–Sep 30
Morden	2015	40.0	20.4	20.6	159	211	2502
	2016	41.6	20.0	41.4	174	395	2608
	2017	37.7	18.5	36.0	154	209	2695
	Average	39.8	19.6	32.7	162	272	2602
Ottawa	2015	42.2	20.2	41.7	179	359	2795
	2016	43.9	20.0	26.0	181	258	2912
	2017	43.5	19.0	35.7	200	253	2886
	Average	43.2	19.7	34.5	187	290	2864
	LSD (0.05)	0.7	0.4	4.1	9.4	–	–

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MPSG INVESTMENT $144,000

DURATION 3 years