MPSG ANNUAL EXTENSION REPORT

PROJECT TITLE: Mitigating soybean harvest losses through enhancing podding height

PROJECT START DATE: 2 April 2018   **PROJECT END DATE: 31 March 2021**

DATE SUBMITTED: 9 March 2020

PART 1: PRINCIPAL RESEARCHER

PRINCIPAL

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PART 2: EXECUTIVE SUMMARY

Outline the project objectives, their relevancy to pulse and soybean farmers, and a summary of the project to date, including methods and preliminary results.

Soybean has become the third largest field crop of Manitoba in terms of farm cash receipts. However, its production is constrained by a number of factors that causes yield reduction including harvest losses. The majority of harvest losses occur at the header due to, for example, low pod height, which is referred to as stubble loss - a problem known to be more prevalent in short season varieties. Owing to Manitoba's short growing season, soybean producers are restricted to grow short season varieties that are characterized by low podding height of the lowest pods, and this makes stubble loss a recurrent problem for Manitoban soybean producers. Therefore, developing strategies that reduce stubble losses will have a significant impact in maximizing soybean yield. Plant growth is controlled by plant produced compounds often referred to as plant hormones, and some of these compounds are implicated in enhancing plant height or stem lengthening. Thus, increasing pod height and thereby decreasing stubble losses may be achieved by altering the status of these hormones in soybean plants through application of their naturally occurring or synthetic forms, also known as plant growth regulators (PGRs). Using experiments that involved soybean cultivars with varying pod heights and controlled growth conditions, this study is aimed at developing a PGR-based strategy for increasing height of lowest pods in soybean and thereby decreasing the associated harvest losses. The findings of this project will therefore have the potential to mitigate the problem and deliver significant savings to Manitoban soybean producers.

PART 3: PROJECT ACTIVITIES AND PRELIMINARY RESULTS

Outline project activities, preliminary results, any deviations from the original project and communication activities. You may include graphs/tables/pictures in the Appendix.

Graduate student training
The project involves the training of an M.Sc. student. The student's project is progressing well. Some of the project activities accomplished todate are listed below.

Project Activities
1) Testing different PGR types with the potential effect on podding height
The effects of four different types of PGRs on enhancing the heights of the cotyledonary and first nodes, and the height of the lowest pods have been examined. The candidate PGRs have been tested either individually or in combination for their effect on all the parameters investigated. Identification of the candidate PGRs involved the use of a soybean cultivar that is characterized as having the lowest pod height, cultivar (TH37004). Selection of this soybean cultivar was performed in consultation with Ms. Kristen MacMillan, a Research Agronomist in the area of soybean and pulse crop agronomy at the University of Manitoba.

2) Identification of specific PGRs and their optimal concentrations to achive an increase podding height
Of all the four different types of PGRs tested, the study has identified a specific PGR (designated as PGR1) with desired effects on heights of the cotyledonary and first nodes, and the height of the lowest pods. Selection of the specific PGR (PGR1) was performed based on experiments involving treatment of soybean seeds with the PGR in consideration.

3) Optimizing conditions for efficient application of the identified PGRs
One of the factors studied during this reporting period include selection of a specific concentration of the selected PGR. The study involved testing the PGR at different concentrations to determine the dose-effect relationships, and therefore identify of a specific concentration as an optimum concentration to induce the desired effects on the parameters described above. In addition, the study examined the effect of the selected concentration of PGR1 on stem thickness, which indicated that the PGR treatment does not have marked negative effect on stem thickness.

Conference presentation
1. Thapar A, Tuan PA, Ayele BT (Feb 2020) Investigating effects of plant growth regulators on pod height in soybean. Canadian Society of Plant Biology Western Regional Meeting, Canmore, Alberta, Canada.

Knowledge transfer/Media interview
1. Rise up, rise up: seeking a solution to soybean header losses by raising the height of the lowest pods (October 2019). Top Crop Manager 45 (10): 34-37.

Include up to 1 page of tables, graphs, pictures.

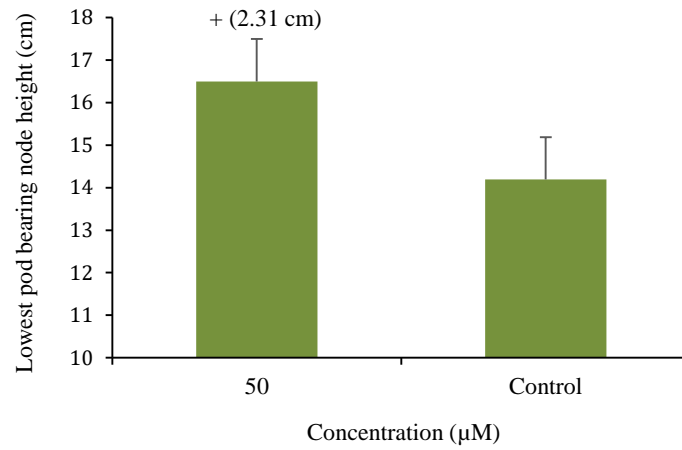**Figure 2.** Effect of selected concentration of PGR1 on the height of the lowest pod bearing node (measured from the base of the plant)
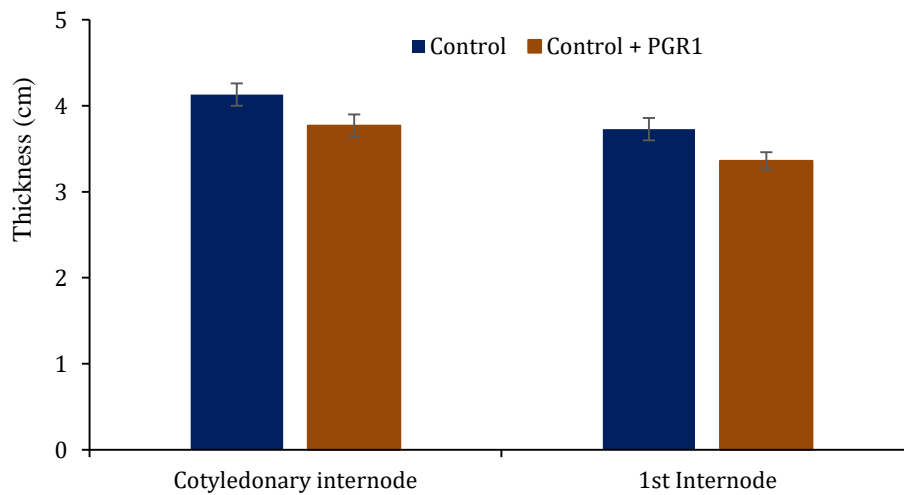

Figure 2. Effects of selected concentration of PGR1 on the thickness of cotyledonary and first internodes