**MPSG ANNUAL EXTENSION REPORT**

**Predicting Soybean Phenology in Manitoba**

**PROJECT TITLE:**

|  |  |
| --- | --- |
| **PROJECT START DATE: 1 April 2017** | **PROJECT END DATE: 31 March 2020** |

**DATE SUBMITTED: 30 April 2018**

***PART 1: PRINCIPAL RESEARCHER***

**PRINCIPAL**

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| --- | --- | --- | --- |
| **NAME:** | Yvonne Lawley | **NAME:** | Malcolm Morrison |
| **POSITION:** | Assistant Professor | **POSITION:** | Oilseed Physiologist |
| **INSTITUTION:** | University of Manitoba | **INSTITUTION:** | Agriculture & Agri-Food Canada |
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PART 2: EXECUTIVE SUMMARY

Soybean requires short days (<14 hours) to stimulate flowering. Maturity group classifications (often not established in Manitoba) are usually based on time (days) or Crop Heat Units (CHUs) to maturity and do not always accurately predict critical crop growth stages (such as the beginning of flowering or maturity) in Manitoba. In Manitoba, MG 000 to MG I can be grown depending on the amount of CHUs received. Each MG classification is further sub-divided into decimal units. The objective of this project will be to confirm differences in soybean phenologial development in Manitoba and then use this information to develop a more accurate model to predicting critical growth stages for farmers and agronomists. This model will be based crop heat units, photoperiod (latitude), and soybean maturity groups. The model will be used by farmers and agronomists to accurately predict critical growth stages of soybean in Manitoba.

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

***PART 3: PROJECT ACTIVITIES AND PRELIMINARY RESULTS***

Twelve varieties of soybean representing MG 000 to MG I were planted at Carman and at Ottawa in 2017 and 2018 growing seasons. They included:

Trt # Cultivar Maturity Group

1 90AO1 00.0

2 DUNDAS 0.8

3 M. PRESTO 000.9

4 RODEO 0.3

5 MONTCALM 00.7

6 ALTA 00.4

7 ROLAND 0.0

8 9063 0.5

9 0702-11 1.3

10 M. RIDGE 00.3

11 22-60RY 000.9

12 23-11RY 000.9

Planting date was coordinated to synchronize the time of year and the rate of day length change between the locations . Agronomy such as plant population, row width, and weed control were as similar as possible. Weed control was with conventional herbicides as the majority are not hebicide tolerant lines. Detailed phenological notes were taken every 3 days at each location based on the Fehr and Caviness scale. Weather was recorded at each location and the daylength calculated based on latitude. Plants were harvested at maturity and the seeds centrally processed at Ottawa for protein and oil content.

A graduate student, Nate Ort, was recruited by Dr. Lawley for the project and he began is program at the University of Manitoba in January 2018. The data collected by Dr. Morrison from 2008 to 2010 at Morden RDC and Ottawa RDC has been coalated by the MSc student and is to be included in the model preparation. The 2017 experiment results have been summarized for both the Carman (Table 1) and Ottawa locations (Table 2). The highest yielding variety in Ottawa was Dundas, a 0.8 MG vareity. At Carman, the highest yielding vareity was 22-60RY a 000.9 MG variety. The phenology data collected for each vareity was analyzed to identify the proportion of time each variety spent in the vegetative, flowering, and seed fill stages. Averaged over all varieties tested, the proportion of time soybeans remained in the vegetative stage was longer at Carman than in Ottawa (Table 3). This confirms previous trends observed by Dr. Morrison.

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

***APPENDIX***

Table 1: Performance of 12 Soybean Varieties with a range of maturity groups at Carman, MB in 2017

|  |  |  |  |
| --- | --- | --- | --- |
| **Variety** | **Maturity Group** | **Expected Accumulated CHU to R8** | **Carman** |
| **Days to Maturity** | **Yield (kg/ha)** | **Thousand Seed Weight (g)** | **Oil (%)** | **Protein (%)** |
| 22-60 RY | 000.9 | 2275 | 111 | 2016 | 119.85 | 23.13 | 40.28 |
| 23-11 RY | 000.9 | 2300 | 108 | 1915 | 121.06 | 23.50 | 39.00 |
| Maple Presto | 000.9 | 2380 | 108 | 1489 | 118.73 | 21.83 | 40.75 |
| 90A01 | 00.0 | 2400 | 106 | 1339 | 115.23 | 23.33 | 42.33 |
| Maple Ridge | 00.3 | 2460 | 106 | 1506 | 118.07 | 21.85 | 41.68 |
| Alta | 00.4 | 2480 | 105 | 1468 | 136.10 | 23.80 | 38.43 |
| Montcalm | 00.7 | 2540 | 111 | 1596 | 119.70 | 23.30 | 41.38 |
| Roland | 0.0 | 2600 | 110 | 1743 | 125.29 | 24.48 | 39.63 |
| Rodeo | 0.3 | 2660 | 116 | 1714 | 115.60 | 24.05 | 41.75 |
| 9063 | 0.5 | 2700 | 120 | 1901 | 127.94 | 22.85 | 39.00 |
| Dundas | 0.8 | 2760 | 121 | 1905 | 123.23 | 22.88 | 41.55 |
| CeryxRR | 1.3 | 2860 | 124 | 1706 | 113.23 | 23.63 | 39.35 |
| **LSD** | **-** | **343** | **6.30** | **0.61** | **1.46** |

Table 2: Performance of 12 Soybean Varieties with a range of maturity groups at Ottawa, ON in 2017

|  |  |  |  |
| --- | --- | --- | --- |
| **Variety** | **Maturity Group** | **Expected Accumulated CHU to R8** | **Ottawa** |
| **Days to Maturity** | **Yield (kg/ha)** | **Thousand Seed Weight (g)** | **Oil (%)** | **Protein (%)** |
| 22-60 RY | 000.9 | 2275 | 108 | 2306 | 176.39 | 21.04 | 42.95 |
| 23-11 RY | 000.9 | 2300 | 108 | 2488 | 168.12 | 21.06 | 42.71 |
| Maple Presto | 000.9 | 2380 | 103 | 1728 | 165.11 | 20.45 | 43.75 |
| 90A01 | 00.0 | 2400 | 103 | 2174 | 159.01 | 21.46 | 44.57 |
| Maple Ridge | 00.3 | 2460 | 103 | 1815 | 171.90 | 20.77 | 44.10 |
| Alta | 00.4 | 2480 | 108 | 2022 | 210.87 | 21.86 | 42.71 |
| Montcalm | 00.7 | 2540 | 108 | 2079 | 168.83 | 21.38 | 44.55 |
| Roland | 0.0 | 2600 | 121 | 2876 | 178.65 | 22.18 | 42.74 |
| Rodeo | 0.3 | 2660 | 108 | 2972 | 181.40 | 22.93 | 44.28 |
| 9063 | 0.5 | 2700 | 108 | 2407 | 184.95 | 21.41 | 43.62 |
| Dundas | 0.8 | 2760 | 117 | 3177 | 179.14 | 22.18 | 43.72 |
| CeryxRR | 1.3 | 2860 | 123 | 2716 | 157.77 | 21.76 | 42.53 |
| **LSD** | **-** | **391** | **6.31** | **0.46** | **0.66** |

Table 3: Percent of growing season that soybean spent in the vegetative, flowering, and seed fill stages in 2017 at Carman, MB and Ottawa, ON averaged over the 12 varieties tested.

|  |  |  |
| --- | --- | --- |
| Growth Stage | Ottawa, ON | Carman, MB |
| Percent of Growing Season |
| Vegetative | 40 | 46 |
| Flowering | 30 | 20 |
| Seed Fill | 30 | 34 |