MANITOBA Pulse Soybean GROWERS

P.O. Box 1760, Carman, MB
Canada R0G 0J0
T 204.745.6488
F 204.745.6213
@MbPulseGrowers
www.manitobapulse.ca

MPSG ANNUAL EXTENSION REPORT

PROJECT TITLE: **Evaluation and selection of adzuki beans for adaptation and production in Manitoba**

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

DATE SUBMITTED: 6 February 2019

PART 1: PRINCIPAL RESEARCHER

PRINCIPAL

NAME:	Anfu Hou	**NAME:**	Robert Conner
POSITION:	Research Scientist	**POSITION:**	Research Scientist
INSTITUTION:	AAFC Morden RDC	**INSTITUTION:**	AAFC Morden RDC
EMAIL:	anfu.hou@canada.ca	**EMAIL:**	robert.conner@canada.ca
PHONE:	204-822-7528	**PHONE:**	204-822-7521

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.

Introduction and evaluation of adzuki beans may provide a new alternative crop and benefit the Manitoba pulse growers and industry with sustainable value-added production. In 2018, 22 of the select lines were re-evaluated at three locations (Morden, Winkler, Portage). The trials involved multiple environmental conditions including dry soils during seeding, and serious weeds resulting in reduced germination and emergence; and drought conditions during seed filling stage in August, which reduced the yield of adzuki beans. The edible bean check's yield was less affected because their seed filling occurred earlier prior to the severely dry weather. In general, the adzuki bean yield was significantly lower than the edible bean checks. At Winkler site, the average adzuki yield was 596 kg/ha with the highest yield of 960 kg/ha, compared to 1102 kg/ha of Envoy, and 1817 of T9905. At Portage, the average yield of adzuki beans was 681 kg/ha, compared to 2840 kg/ha for Envoy and 3188 kg/ha for T9905. The data of Morden site was discarded due to an extremely high CV (>50%) value. On average, the adzuki beans matured two weeks later than the checks. The adzuki bean lines showed a high level of resistance to dry bean common bacterial blight as screened in an inoculated disease nursery. The trials will be repeated in 2019 for further evaluation of the superior lines under various environments.

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.

In 2018, 22 of the select adzuki bean lines were re-evaluated at Morden, Winkler, and Portage. Envoy and T9905 were included as checks. Each entry was planted in four rows with three replications in a randomized complete block design. The row length was 5 m, and row spacing was 50 cm. The plant density was approximately 110,000 plants per acre. The field was pre-sprayed with Edge®; and with Centurian® and Basagran® after emergence. All four rows were harvested and used for seed yield and seed quality analysis. Field notes were taken for flowering date, plant height, growth type, lodging, shattering, disease resistance, maturity, seed yield, size, color and quality following standard breeding protocols.

The lines were also evaluated for resistance to common bacterial blight (CBB) in an inoculated disease nursery at Morden. The entries were grown in one 5 m single row plots with three replications in a randomized complete block design. OAC Rex and HR45 were included as resistant checks. The plots were inoculated at the fourth trifoliate leaf stage with suspensions of X. axonopodis pv. phaseoli (isolates BXP118, BXP18, and BXP98) from dry bean. The inoculation was performed by spraying the leaves with a suspension of 107 CFUs ml-1 inoculum. In the absence of rains, the nursery was sprinkler-irrigated once a week from flowering to maturity. The incidence of leaves with symptoms (percent of leaves infected) and CBB severity were rated twice on August 7 (R4-5), and August 21 (R7), respectively. The disease severity was rated based on leaf area infection with a 0 to 5 scale where 0 = no symptoms, 1 = <5%, 2 = 5-10%, 3 = 10-25%, 4 = 25-50%, and 5 = 50-100%.

Results and Discussion

Due to the dry soil conditions during seeding, the emergence rate at all sites was poorer than in 2017. The trial at Morden was heavily infested with weeds despite repeated spraying with herbicides and hand hoeing. Only data from Winkler and Portage were analyzed for this report.

The lines displayed again both determinate and indeterminate growth types. No shattering or significant disease symptoms were observed in the tests. The entries generally flowered 60 days after planting, while Envoy took only 53 days and 55 days for T9905. The average plant height was 47 cm at Winkler (Envoy: 41 cm; T9905: 58 cm), and 33 cm at Portage (Envoy: 41 cm; T9905: 49 cm). The adzuki bean plants were generally upright. The maturity ranged from 97 - 100 days at Winkler (Envoy: 81; T9905: 83); and 110 – 126 days at Portage (Envoy: 97; T9905: 101).

At Winkler, the yield ranged from 229 kg/ha (MAZ-3329) to 960 kg/ha (MAZ-3320), compared to 1102 of Envoy and 1817 of T9905. At Portage, the yield ranged from 192 kg/ha to 687 kg/ha (MAZ3316), compared to 2840 of Envoy and 3188 of T9905. The low-yield lines were generally determinate type with short plant architecture. The average seed weight of the entries (Winkler) was 126 g/1000 seeds, which was significantly smaller than Envoy (158, P = 0.05) and T9905 (160). The largest seed weight was 155 g/1000 seeds, which was similar to navy beans.

In the CBB inoculation screening, the adzuki bean lines generally showed similar or better ratings than the resistant checks of HR45 (Severity: 2.7; Incidence: 3.7) and OAC Rex (Severity: 3; Incidence: 10); and significantly higher levels of resistance than Envoy. The 2018 adzuki bean trials were severely affected by environmental conditions, revealing poor competition of the adzuki beans compared to dry beans against weeds especially during seedling stages. In the disease nursery screening, adzuki beans showed high levels of resistance to CBB, which may provide a good alternative for pulse production in areas with serious CBB infection. In 2019, the field trials will be repeated again at two or three sites, and further evaluation and selection will be made.

APPENDIX

Include up to 1 page of tables, graphs, pictures: Agronomic traits of adzuki beans grown at Winkler and Portage, MB

ID	Plant Height (cm)	Days to Maturity	1000 Seed Weight	2018 Yield (kg/ha)	2017 Yield (kg/ha)	CBB Severity (1-5)	CBB Incidence (%)
Envoy	41	89	159	1971	2212	5	77
T9905	54	92	161	2502	-	-	-
MAZ-3303	45	112	141	762	1820	0	0
MAZ-3320	40	109	117	773	1767	0	0
MAZ-3335	40	112	113	390	1741	1	0.3
MAZ-3323	43	111	119	568	1733	0	0
MAZ-3311	47	112	112	551	1711	0	0
MAZ-3345	38	111	121	314	1561	1	0.3
MAZ-3338	41	112	108	429	1539	1	0.3
MAZ-3304	48	112	116	530	1439	0	0
MAZ-3340	39	108	120	502	1406	3	1.7
MAZ-3317	39	104	110	483	1393	0	0
MAZ-3344	35	107	117	329	1311	2	0.7
MAZ-3339	23	104	134	212	1299	3	9
MAZ-3301	48	112	111	407	1292	0	0
MAZ-3330	31	107	118	460	1280	1.7	3.7
MAZ-3307	46	113	155	463	1171	0	0
MAZ-3316	32	104	128	630	1157	0	0
MAZ-3329	39	113	128	287	1148	0	0
MAZ-3318	25	103	155	305	1033	3	7
MAZ-3313	33	110	123	436	1030	1	0.3
MAZ-3301	49	112	106	550	684	0	0
Overall Mean	40	108	126	639	1353.4	-	-
C.V.%	6.5	3.8	8.5	36	18.7	11.2	45.1
LSD (.05)	5.4	3.8	21.1	461	383.2	0.5	2.3