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MPSG ANNUAL EXTENSION REPORT

PROJECT TITLE: **Building knowledge and achieving genetic improvements to overcome the effect of drought and salinity on soybean.**

PROJECT START DATE: 1 April 2019 **PROJECT END DATE: 31 March 2022**

DATE SUBMITTED: 31 January 2020

PART 1: PRINCIPAL RESEARCHER

PRINCIPAL

NAME:	Claudio Stasolla	**NAME:**	
POSITION:	Professor	**POSITION:**	
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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.

This project, aiming at assessing basic morpho-physiological events related to tolerance to both drought and salinity in soybean, consists of two separate objective. In the first objective, commercial varieties of soybean will be screened to examine their behavior when grown under limited water conditions, imposed by applications of the osmotic agent polyethylene glycol, and salt under hydroponic conditions. Lines tolerant or susceptible to the stress will then be selected for future studies, which include the measurement of the expression level of phytoglobin, a hemoglobin-line protein found in plants and known to modulate stress conditions. The selected lines will be used to measure gas exchange parameters, such as rate of photosynthesis, transpiration, and stomatal conductance, as well as measuring the amount of specific metabolites required to alleviate stress conditions, and the cellular antioxidant system employed to remove excessive levels of reactive oxygen species generated during both drought and salinity conditions. In the second experiments lines in which the level of phytoglobin was elevated or reduced using a transgenic approach will be utilized in similar experiments to evaluate how altered levels of phytoglobin influence plant response to both drought and salinity.
Over the past few months we have empirically optimized the hydroponic growth conditions and the level of polyethylene glycol needed to produce an adequate level of stress that would allow us to screen the lines. Screening of the line for drought is almost completed.

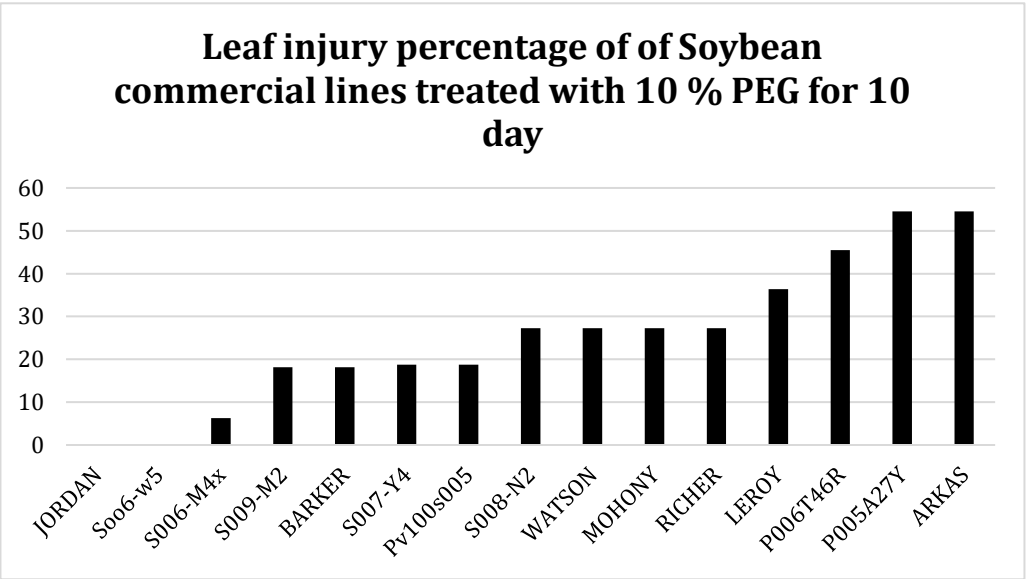
PART 3: PROJECT ACTIVITIES AND PRELIMINARY RESULTS

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

We have optimized the hydroponic growing conditions to impose drought stress and screened the commercial varieties using polyethylene glycol. After using different levels of polyethylene glycol (PEG) we have identified the concentration of 10% as the most suitable to screen the soybean varieties. Morpho-physiological analyses were performed after plants (at the VC stage of development were grown for 10 days (corresponding to the V1 stage of development) under stress conditions and compared to "unstressed" conditions (0% PEG). The following data were collected: Fresh weight and dry weight of roots and shoots, total trifoliate leaf area, leaf injury, and osmotic potential. It was observed that the level of leaf injury represented the most suitable and consistent parameter to evaluate plant behaviour (susceptibility or tolerance) to the imposed stress (see Figure below). Leaf and root tissue was also collected at different time points during stress and will be shortly used to determine the expression of phytoglobin level to assess the relationship between plant performance and expression of the same gene. We are at a point where we have successfully selected lines with high levels of tolerance or susceptibility to drought. These lines will be used for further studies to identify the molecular events responsible for the observed behavior.

While there are no significant deviations from the original project, we have experienced some delays. Dr. Youssef, the Post-Doc supported in the project was supposed to arrive from Egypt in April, but due to some delays in obtaining his visa it only arrived the end of October. As a result, the project was delayed, despite the help of three part time students: Ms. Smith, Mr. Southerland, and Mr. Layte.

Projected expenses from Feb1st-March 31th will include more supplies and chemicals (in the order of about 7k), travel (1k) and greenhouse charge fee (4k). In addition, I am requesting that 15K allocated to the salary of Dr. Youssef (who started late his project) be carried over and utilized to support summer and part -time students to further assist Dr. Youssef during the second year of the project. This will accelerate the progress of the project.



APPENDIX

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