

Washington Grain Commission
Wheat and Barley Research Annual Progress Reports and Final Reports
Format

Project #:3144

Progress Report Year: *1_ of _3*

Title: ***Breeding Wheat Varieties With Efficient Control of ROS Production***

Cooperators: *N/A*

Executive summary: *This project aims to advance toolbox for breeding drought and heat tolerant spring wheat varieties. Our approach is based on the fact that harsh environmental conditions, including heat and drought, increase production of free radicals also known as Reactive Oxygen Species (ROS). ROS damage plant cells and in this way diminish the yield. Plants with good capacity to alleviate the impact of ROS using so-called "scavenging" mechanisms are expected to yield better in hot and dry climates. We want to develop technology for identification of genotypes with efficient ROS scavenging. Previously, our laboratory developed a technique for measuring capacity of plants to scavenge ROS under the greenhouse condition. During the first year we tested suitability of our technique for plants grown under field conditions using 7 soft white and 7 hard spring wheat varieties: Diva, Louise, Melba, Ryan, Whit, Seahawk, Tekoa, LCS Luna, SY Selway, Alum, Chet, Dayn, Glee and Kelse. All varieties were grown by the WSU Variety Testing Program at three locations: Spillman Farm, Lind, and Moses Lake. We collected half of a square inch of flag leaf from 15 plants at each location. Then we measured the efficiency of ROS homeostasis in the total extracts from the collected material. The most robust ROS scavenging was in the varieties Diva, Melba, Alum, Chet and Glee whereas less robust ROS scavenging was in varieties LCS Luna, SY Selway, and Whit. Varieties Louise, Ryan, Dylan, Kelse, Tekoa and Seahawk had a medium efficiency of the ROS scavenging. During this year we build the foundation for analyzing breeding lines in year 2.*

Impact: *We demonstrated: (i) our technique for measuring ROS scavenging is applicable to plants growth in the field; (ii) there is genetic diversity of ROS scavenging trait amongst the tested varieties; and (iii) climate has a considerable impact on activity of ROS scavenging system. Measurable impacts: post-doctoral scientist (Taras Nazarov) and professor (Andrei Smertenko) were trained to collect and analyzed the field-grown plants.*

WGC project number: 3144
WGC project title: **Breeding Wheat Varieties With Efficient Control of ROS Production**
Project PI(s): Smertenko
Project initiation date: June 10, 2019
Project year (X of 3-yr cycle): 1 of 3

Objective	Deliverable	Progress	Timeline	Communication
Objective#1. Determine correlation between peroxisome abundance and ROS homeostasis under drought and heat stress.	Measure peroxisome abundance in spring wheat varieties grown under different climate condutions.	Measured peroxisome abundance in 7 soft white and 7 hard sping wheat varieties Diva, Louise, Melba, Ryan, Whit, Seahawk, Tekoa, LCS Luna, SY Selway, Alum, Chet, Dayn, Glee and Kelse grown at Spillman Farm, Moses Lake, and Lind.	Completed	Will be communicated at the annual 2020 Review Meeting.
	Measure gene expression	This taks is posponed untill summer 2020. We will collect leaf material for this task during 2020 growth season.	Scheduled to be completed in August 2020	Will be communicated at the annual 2021 Review Meeting.
	Measure ROS homeostasis	This taks is posponed untill summer 2020. We will collecte leaf material for this task during 2020 growth season.	Scheduled to be completed in August 2020	Will be communicated at the annual 2021 Review Meeting.