

Project #: 126593

Progress Report Year: *1 of 3 years (maximum of 3 year funding cycle)*

Title: Intelligent Prediction and Association Tool to Facilitate Wheat Breeding

PI: *Dr. Zhiwu Zhang*

Cooperators: *Dr. Michael Pumphrey, Dr. Kimberly Campbell, and Xianming Chen*

Executive summary: *We updated one software package (GAPIT), released one new software package (MMAp), and published two articles partially under the support of this project in this fiscal year. The GAPIT software package updated for new functions for both GWAS (Genome Wide Association Study) and GS (Genomic Selection) (<http://zzlab.net/GAPIT>). GAPIT has received over 1500 citations, including the breeders at WSU and USDA-ARS. The manuscript of update GAPIT (version 3) was published by [Genomics, Proteomics, and Bioinformatics](#). MMAp makes it easy for breeders to conduct molecular breeding (<http://zzlab.net/MMAp>). Users can simply upload genotype and genotype data and download breeding values when the computation is complete on the platform. The MMAp was published by [Bioinformatics](#).*

Impact: *Our collaborative research positions the WSU/USDA-ARS research team as one of the world's leading institutions to conduct fundamental and applied research, publish academic articles, and update and release software packages. Our project's success not only benefits Washington but will also benefit the entire world through the dissemination of knowledge. In short term, breeders can conduct the most of data analyses without frustration on data formatting and selecting different analytical functions. They have more opportunities to find the causative genes controlling traits of interest. They have more confidence to eliminate lines with low genetic potentials to reduce the cost of field trials. In long term, breeders have more chances to retain the genetic lines with desirable genes and recombine them to create superior varieties.*

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WGC Project title: **Intelligent Prediction and Association Tool to Facilitate Wheat Breeding**
Project PI(s): *Zhiwu Zhang, Michael Pumphrey, Arron H. Carter, Kimberly Campbell, and Xianming Chen*
Project initiation date: 1-Jul-21
Project year: 1 of 3

Objective	Deliverable	Progress	Timeline	Communication
1) Enhance Genomic Prediction with Artificial Intelligence	An updated cloud computing platform MMAP implementing both conventional and artificial intelligence genomic prediction methods and conducting optimization to improve prediction accuracy.	We updated the cloud computing platform MMAP with multiple conventional genomic prediction methods and artificial intelligence methods. The platform (https://zzlab.net/MMAP) consists multiple servers using Java Script. One peer review article was published by Bioinformatics, which acknowledged the support from WGC.	December 31, 2021: Add artificial intelligence genomic prediction methods to MMAP cloud computing platform; June 30, 2022: Optimize among conventional and intelligence genomic prediction methods.	1) One article for Wheat Life; 2) One presentation at WGC annual meeting; 3) One presentation at national/international conference; and 4) one paper on academic journal