



both traits. We intend to include these differences in yield predictions of synthetics to better manage and exploit heterotic yield increase in faba bean.

### **WS39: Enhancing faba bean (*Vicia faba* L.) germplasm for resilience to temperature extremes**

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The Western Regional Plant Introduction Station (WRPIS) is one of the four regional plant introduction stations in the US Department of Agriculture-ARS National Plant Germplasm System (NPGS) with the mission of acquiring, documenting, maintaining, characterizing, evaluating and distributing plant genetic resources to the global research community to improve agricultural productivity for food security. Our research on enhancement of faba bean (*Vicia faba* L.) has the objectives of increasing resilience to temperature extremes and improving nutritional quality. We conduct traditional field/greenhouse experiments and adopt contemporary genomics approaches in our independent and collaborative research projects. In collaboration with the International Center for Agricultural Research in the Dry Areas, Terbol, Lebanon and supported by a grant from the CGIAR-U.S. University Linkages Program, we collected data for eight agronomic traits on a Generation Challenge Program (GCP) reference set of 140 faba bean accessions grown under high temperature at different locations in Lebanon and USA. We also genotyped the reference set with the genotyping by sequencing (GBS) technique which produced approximately 4 million reads per genotype on an Illumina HiSeq 2500 Sequencer. The single nucleotide polymorphism (SNP) marker calling program UNEAK (Universal Network Enabled Analysis Kit) found 10,950 variant loci from the sequence data. Genome-Wide Association Study (GWAS) using the program TASSEL identified one to five SNP markers that have significant associations with plant height, number of seeds per plant and seed size. Currently, the reference set is being evaluated along with some advanced breeding materials for winter survival at Pullman Washington, USA.