

Objective of activity and intended output (1-2 sentences)

Two GWAS panels were assembled that represent a sample of Jordanian barley landraces accessions (150 landraces) for drought tolerance and yield and a collection of ICARDA elite material (288 lines) for disease resistance including YR, and blotches and yield. Molecular analysis was carried out to study genetic diversity and population structure and to identify genetic markers associated with grain yield and yield components and disease resistance.

Materials and methods (very brief and succinct, 3 sentences at the most)

Two GWAS panels were assembled as described above. The first panel included 150 Jordanian landraces that were evaluated under dry areas across Jordan. Nine field trials were conducted in three locations for three years. Yield and Yield components were recorded and data analysis was carried out to identify superior genotypes. The panel was genotyped ~~with~~ by using the 9k Illumina iSelect SNP assay. Genetic diversity and population structure was analyzed by using NTSys software and structure. GWAS was carried out using a mixed-model approach (MLM) to control type I errors, accounting for genetic relatedness or kinship by using TASSEL 3 (<http://www.maizegenetics.net>).

A GWAS panel including 288 ICARDA elite lines was used to conduct association study to identify markers associated with resistance against yellow rust (Yr) and spot blotch (SB). For this purpose, the panel was screened for resistance against different Yr races under controlled conditions in collaboration with India NARS collaborators and for Yr and SB resistance under field conditions in two research stations for two growing seasons. The GWAS panel was genotypes by using the genotyping by sequencing (DArT-seq). Markers-traits association was carried out as described above.

Results and interpretation (again succinct, maximum of 250 words). Include data in the form of graphs, tables or pictures.

The Jordanian barley accessions exhibited significant variation for all traits studied. Three accessions with high yield, cultivar superiority and stability under specific environments were identified with accession G69 is the highest yielding and superior for Madaba and overall environments, G144 is the highest yielding at Ramtha and G52 at Ghweer. The results showed that the most superior accessions are of the 2-row type, which are more adapted to drought conditions. The GWAS analysis identified significant markers-traits associations for multiple traits including GY with four QTLs located at 2H, 3H, 5H and 7H, which seems important for dry environments (Figure 1).

For the second GWAS panels, markers associated with YR and spot blotches resistance were identified. The identified markers were aligned with previous QTL associated with YR resistance and SB. Further analysis is ongoing to identified markers associated with agronomical and quality traits in ICARDA elite material (Figure 2).



Figure 1

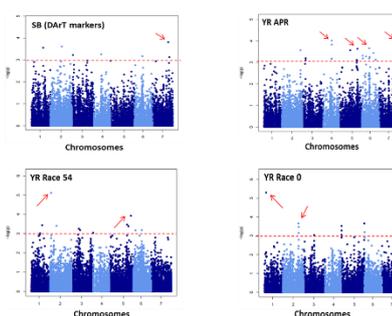


Figure 2

Next steps (1-2 sentences)

Two publications were prepared. The Jordanian landraces panel MS is currently under revision in BMC plant biology. The second GWAs panel manuscript is ready and will be submitted very soon.