"Wheat alleles from the Ethiopian highlands: from old generation farming to next generation sequencing"

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Ethiopian durum wheat landraces are mostly an untapped resource for wheat breeding, both for Ethiopia and worldwide. Here I will discuss a long-lasting effort in characterizing the many aspects of their genotypic and phenotypic diversity, eventually promoting their potential for breeding in local and global wheat. We started by characterizing a representative collection of Ethiopian genetic materials coming from different agro-ecologies in the country, observing their marked diversity from the international wheat allele pools. We then characterized the collection for traits of agronomic relevance and for disease resistance in multiple locations in the Ethiopian highlands, and used a genome wide association (GWA) approach to describe novel loci associated with phenology, yield, and Septoria resistance. We involved local smallholder farmers traditionally cultivating wheat, and had them quantitatively evaluate the genetic material for their preference. This approach allowed us to break down farmer appreciation on metric traits, understanding women and men choice processes on local wheat. We have selected a set of 50 representative landraces bearing traits of interest, which were intercrossed to an elite wheat genotype to produce a large nested association mapping (NAM) population. Such a population, named The Ethiopian wheat NAM (EtNAM) is a powerful tool for breeding as well as for mapping of quantitative trait loci (QTL). We genotyped a subset of 1,200 EtNAM lines, phenotyping them for agronomic and disease resistance traits. I discuss promising results, and propose our integrated method as a mean to empower rapid and efficient uptake of landraces alleles in wheat breeding.