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CHARACTERIZATION OF TETRAPLOID WHEAT LANDRACES FROM SICILY USING A HIGH-DENSITY 90K SNP ARRAY, AGRO-MORPHOLOGICAL AND SEED QUALITY TRAITS

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Durum wheat (*Triticum turgidum* ssp. *durum*) is grown on more land area than any other crops worldwide. It is a member of the *Gramineae*, included in the *Triticeae* tribe belongs to the *Triticum* genus. Based on cytology, *Triticum turgidum* is believed originated from a natural hybridization between *Triticum urartu* (AA genome, n=7) and an unknown diploid species (BB genome, n=7) close related to *Aegilops speltoides*. Durum wheat is a self-pollinated allotetraploid cereal (harboring two genomes with genomic formula: AABB) with 28 chromosomes (2n=4x=28), mainly cultivated in Mediterranean, Northern and Central America areas. In the middle of last century, the widespread of modern wheat cultivars drastically reduced the cultivation of the "ancient" landraces, nowadays confined in niches area of cultivation. However, the preservation of "old cultivars" and/or landraces could be pivotal for future breeding programs, due to their resilience against biotic and abiotic stresses compared to modern variety.

Different durum wheat landraces are still cultivated in Sicily, because of a higher adaptability to extreme Mediterranean environments and characterized by a genetic structure typical of a self-pollinated population (mixture of different genotypes). Detailed knowledge about genetic diversity of durum wheat landraces cultivated in Sicily should be the starting point for an efficient management of these genetic resources. However, this genetic diversity needs to be described and measured before using effectively in breeding and management of plant genetic resources and for avoiding misclassification compared to the varietal description by de Cillis.

The aim of the present study was to characterize the durum wheat collection (29 entries) from the "Experimental Sicilian Station for Durum Wheat" throughout the 90k SNP array, together with agro-morphological, phenological and qualitative traits; cvs. Simeto and Claudio were utilized as testers and the hexaploidy landrace Cuccitta as outgroup.

After removing SNPs with a number of NC (not-call) higher than 10% and monomorphic SNPs (around 50%), the final dataset resulted in 18,170 polymorphic SNPs. Cluster and Principal Coordinates Analysis (PCoA) allowed us to discriminate among genotypes, identifying 4 main clusters across durum wheat germplasm, among which a private cluster included modern and commercial varieties. Likewise, Discriminant Analysis of Principal Components (DAPC) was able to distinct the ancient varieties to the others, grouping the entries belonging to three groups. Furthermore, PCA was able to separate tester cultivars from the ancient germplasm and Cuccitta; gluten, brown, red, and yellow index results the main components in agreement with Pearson correlations.

The multidisciplinary approach has been useful to classify and evaluate the Sicilian ancient wheat germplasm, in order to preserve these genetic resources, providing certainly genetic fingerprints useful to avoid commercial frauds and to sustain the economic profits for the farmers.