Proceedings of the LXVI SIGA Annual Congress
Bari, 5/8 September, 2023
ISBN: **978-88-944843-4-2**

Poster Communication Abstract – 4.20

ROOT SYSTEM ARCHITECTURE IN ITALIAN MAIZE INBRED LINES: TOWARD APPLICATIONS IN BREEDING PROGRAMS

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root system architecture RSA, selection criteria, maize germplasm, drought

Identifying genotypes with efficient Root System Architecture (RSA) and resilient to drought and heat stresses could mitigate the negative effects of climate change and contribute to adapt to new hostile environments. Preliminary investigations showed a vast genetic and phenotypic variability in root traits among elite cultivars and germplasm populations that could be used as source of useful alleles for stress tolerance. The goal of this study is to define phenotypic and genomic selection criteria to discover drought tolerant root ideotypes through a deep evaluation of root traits.

A panel of 340 inbred lines adapted to Northern Italy climates, 90 derived from open pollinated populations maintained by local farmers before 1950s (GRM) and 250 elite inbred lines (ELT) selected in the last 25 years within the CREA breeding programs were evaluated for root traits in rhizotrons under control condition. Through a multitrait linear phenotypic selection index (LPSI) we selected 32 inbred lines with deep-like or shallow-like RSA. The same lines were also evaluated in field condition through a shovelomics-based root phenotyping protocol. Genome-wide association study (GWAS) was performed based on 20,397 GBS polymorphic SNPs. The results showed substantial variation for root traits, with medium-high heritabilities. No major QTL were identified, thus suggesting a complex control of the traits. As applied output, this study may contribute to the setting of selection criteria to identify hybrid combinations with improved

root efficiency and stress tolerance.

Financial support of Regione Lombardia -Progetti di ricerca in campo agricolo e forestale Bando 2018 d.d.s. n. 4403 del 28/03/2018). Project “MIRALO (2020 – 2024) Analisi di linee di Mais per lo sviluppo di Ibridi con efficiente apparato RAdicale da utilizzare nell’areale Lombardo”.