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Genomic architectures of phenotypic plasticity in response to abiotic stress in alfalfa *(Medicago sativa L.)*

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Plant phenotypic plasticity is the ability for plants to cope with environmental factor variability. However, mechanisms by which phenotypic plasticity affects plant adaptation to environmental change remain largely unknown. It is important to identify plant functional traits in which plasticity may play a critical role in plant response to the environmental change. In the present study, we characterized agronomic traits in alfalfa populations and analyzed the phenotypic plasticity on these traits in response to drought and salt stresses. The Plasticity Index (PI) varied among the traits with the highest PI value (1.1) for K content and lowest (0.2) for dry matter. Fiber contents such as lignin, ADF and NDF decreased as drought increased. In contrast, energy traits were increased as drought increased. Genomic architectures were characterized using genotyping by sequencing and genome-wide association studies. Single nucleotide polymorphisms associated with the traits were identified. Genomic architectures for phenotypic plasticity were analyzed for each trait and compared between the traits. Genomic regions responsible to the traits with higher plasticities were identified and discussed.

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