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NEW TECHNOLOGIES IN ACHIEVING HEAT AND DROUGHT RESILIENT OILSEED PRODUCTION, THE CASE OF CAMELINA

PlantEd COST Action CA18111 Genome Editing in Plants

Camelina [*Camelina sativa* (L.) Crantz] also known as “false flax” or “gold of pleasure”, is a self-pollinated, annual oilseed that belongs to the *Brassicaceae* family. Camelina is native species of Eurasia, which is gaining interest world-wide due to its better cold, heat and drought tolerance, and less susceptibility to disease and pests than oilseed rape. The most of research work on camelina has been carried out in northern America and continental Europe. Consequently, there are not many data on evaluation of suitability of camelina genotypes for cultivation in southern Europe. Two breeding groups (IFVCNS and BOKU) and one group focusing on the agronomy development of the crop (DISTAL) just recently started research activities focusing on development of new genotypes more adapted for southern regions of Europe and evaluation of their productivity in these, more arid regions.

The hexaploid oilseed crop *Camelina sativa*, which has three closely related expressed subgenomes, is an ideal species for investigation of gene dosage as an important cause of phenotype variation. Targeted mutagenesis of the three delta-12-desaturase (FAD2) genes was recently achieved in camelina by CRISPR-Cas9 gene editing, leading to combinatorial association of different alleles for the three FAD2 loci. As a result, a large diversity of camelina lines was obtained with various lipid profiles, ranging from 10% to 62% oleic acid accumulation in the oil. Using the same approach, the different allelic combinations of genes associated with heat or drought stress tolerance may provide a unique source of genetic variability for creation of climate resilient camelina. ‘Omics’ studies which are in progress will identify the genes of interests, proteins, and metabolites in developing seeds that are impacted by heat or drought stress. Such studies, along with effective agronomic management system would pave the way in developing crop genotypes/varieties with improved productivity under drought and/or heat stresses. This would lead to prevention of high risk scenarios in the future production of oilseed crops, due to inability of the staple oilseed crops to adapt to high temperatures and drought.

Acknowledgements: This work is part of the project supported by Ministry of Education, Science and Technological Development of Republic of Serbia, grant number 451-03-9/2021-14/200032, and COST Action CA18111.

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Funded by the Horizon 2020 Framework Programme of the European Union