PROJECT TITLE

Phenotypic evaluation of different tomato genotypes grown under water, nitrogen and combined water and nitrogen stress

CONSORTIUM

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SUMMARY OF THE REPORT

The world's population is exponentially growing and may double in the next 100 years. Agronomic production should increase in order to answer food demand. In this scenario, it is imperative to increase and improve agricultural practices in food production that allow sustainable production where the available resources must be used efficiently. Irrigated agriculture uses 80% of the world´s freshwater resources, which are becoming increasingly scarce. Along with the high-water use, large amounts of fertilizers are applied to the crops in order to have high yields. In a world, with a growing population, and with a changing climate there is an urgent need for developing integrated and sustainable approaches to increase agricultural production with lower input of water (i.e. higher water use efficiency; WUE) and higher nitrogen use efficiency (NUE) to minimize fertilizer loss. Despite water and nitrogen (N) being two of the most important factors limiting plant growth/biomass, only a few studies have addressed the complex interactions between both abiotic stresses, and new insights are required to improve their use efficiency. Genetic variability within species is a valuable tool for screening and breeding for WUE and NUE. Thus, the identification of contrasting tomato genotypes for those traits and understanding their physiological and molecular basis that can be used for the development of marker-assisted breeding strategies is of utmost urgency.

Regarding this EPPN 2020 program, the purpose was to perform a pre-experiment to optimize the APPP-C (large plants) platform for tomato growth, including image acquisition tools, as this crop was never grown there before. After that, it was our goal to perform a screen with ten genotypes with contrasting behaviors, where we aimed to exploit the natural phenotypic and genotypic variation in WUE and NUE in order to understand the main physiological, biochemical and molecular mechanisms involved in the tolerance of some tomato genotypes exposed to water, nitrogen and/or combined water nitrogen stress. However, although the pre-experiment has been performed, due to the Covid pandemic situation the main experiment had been to be canceled and will be now performed in a bi-lateral collaboration if we find a feasible time