PROJECT TITLE

Use of biostimulant to increase tomato plant performances under combined abiotic stresses

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SUMMARY OF THE REPORT

Abiotic stresses can cause a substantial decline in fruit quality due to negative impacts on plant growth, physiology and reproduction. Results from a variety of biotic and abiotic stresses as well as their interactions show that the impact of climate changes on crop production are complex and diverse. Drought and heat stress are reported to be major abiotic stresses limiting crop yield worldwide [1]. The occurrence of high temperature or soil water depletion can result in a range of morphological, anatomical, physiological and biochemical changes in plants. It can directly induce alterations in existing physiological processes, or indirectly promote alterations in the pattern of the plant's development [2]. Moreover, abiotic stress caused by adverse environmental conditions, such as drought, heat, heavy metal toxicity, and high light, do not directly affect photoinhibition but rather facilitate the inhibition of photosystem II (PSII) damage repair [3].In particular, tomato (*Solanum lycopersicum*), one important vegetable crop widely grown worldwide, is regarded as a heat sensitive crop, although this sensitivity varies among genotypes . We investigated physiological responses of two different tomato genotypes (E42 and LA3120) that were cultivated in the greenhouses and treated with the biostimulant CycoFlow.We hypothesize that the use of an amino acid-based biostimulant, like Cycoflow, could enhance plant performances under combined abiotic stress adaptation because of its putative cytokinin-like action and its high concentration of glycine betaine known to mitigate the effect of heat stress [4,5]. The aim of this study was to: (a) understand physiological response mechanisms of tomato genotypes to combined abiotic stresses (b) identify genotypes that are resilient to combined abiotic stresses (c) identify a possible strategy, such as the use of biostimulant, in order to improve tomato performances under combined abiotic stresses. The application of the biostimulant stimulated growth (plants up to 11.86% taller under combined stress) and number of leaf (up to 29.89% under combined stress). In LA3120 plants treated with the biostimulant, net photosynthetic rate (P_N) were higher compared to non-treated plants under drought stress. For almost all the traits studied, the effect of the biostimulant depended on the stress applied. The outcomes of this work will be important for the selection and breeding of tomato genotypes tolerant to abiotic stresses and will suggest the useful management practise to be used to improve plant performances and final yields.