P-102 - EFFECT OF THE INOCULATION OF PLANT GROWTH PROMOTING BACTERIA ON MAIZE PLANTS TO IMPROVE THEIR GROWTH UNDER DROUGHT STRESS

Daniela Abreu[1]; Pereira Sofia[1]; Helena Moreira[1]; Alberto Vega[1]; Paula Castro[1]

1 - Centro de Biotecnología e Química Fina – Laboratório associado, Escola Superior de Biotecnologia – Universidade Católica Portuguesa/Porto

Background

According to the United Nations, by 2050 the world population will reach approximately 9.6 billion people, which implies a major challenge for the agricultural sector to improve crop production and to ensure food availability in the near future. However, global warming and bad agricultural practices are impairing food productivity. Drought is one of the major limiting factors for plant growth, causing dehydration and nutrient deficiency. Therefore, the application of sustainable practices in agriculture is essential to maintain soil fertility and to increase crop productivity. It has been demonstrated that plant growth promoting bacteria (PGPB) have positive effects on plants growing under drought conditions.
The aim of this work is to evaluate the effect of two PGPB inocula size on maize growth and nutrient content under different water regimes (80, 60 and 40% of soil water holding capacity (WHC)).

Method

Thirteen PGPB were screened *in vitro* for osmotic tolerance and indole acetic acid (IAA) production under different osmotic potentials. Strains *Pseudomonas fluorescens* S3X and *Ralstonia eutropha* 1C2 were inoculated in maize under greenhouse conditions. Different bacterial treatments and two inocula sizes (2.5×10^6 and 3.3×10^3 cell. g^{-1} dry weight) were applied on plants growing at 80, 60 and 40% of soil WHC. Plants were harvested after 13 weeks. Dry biomass and the accumulation of N and P on roots and shoots were determined. The activity of soil enzymes, such as catalase, and the fluorescein diacetate (FDA) hydrolysis were also evaluated.

Results & Conclusions

Maize growth was affected by the water regimes applied, especially at 40% of WHC. Bacterial inoculation enhanced some biometric parameters at 80 and 60% of WHC, however, the effects observed were similar for both inocula size applied. It was observed a severe reduction of FDA activity at 40% WHC, which indicates that the microbial activity was negatively affected by low soil moisture.

References & Acknowledgments

This work was supported by National Funds through FCT under the project UID/Multi/50016/2013. S.I.A. Pereira received an individual research contract within the project "Biological tools for adding and defending value in key agro-food chains (bio – n2 – value)", nº NORTE-01-0145-FEDER-000030, funded by Fundo Europeu de Desenvolvimento Regional (FEDER), under Programa Operacional Regional do Norte - Norte2020. A. Vega had the support of PhytoSudoe grant SOE1/P5/E0189 funded by FEDER, under Programa INTERREG SUDOE. H. Moreira had the support of FCT grant SFRH/BPD/105152/2014. D. Abreu thanks to ADP Fertilizantes for finantial support.

Keywords: plant growth promoting bacteria, drought stress, maize