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EFFECTS OF TWO INNOVATIVE BIOSTIMULANTS ON MAIZE SEED GERMINATION AND PLANT GROWTH

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Maize (*Zea mays* L.) is one of the most important crops in the world, used to provide food, forage, pharmaceuticals, and other industrial products. Its yield is frequently hampered by abiotic stress, thus the increased stress tolerance in this plant is of great importance. Biostimulants are new generation products that, when applied to plants or the rhizosphere, are able to stimulate natural processes to enhance abiotic stress tolerance.

In this study, we evaluated the effects of two new biostimulants (GHI_16_Bex2 and GHI_16_A70V30), containing plant-derived amino acids and molybdenum, on mayze seed germination and plant growth.

Trascriptional expression levels of genes involved in seed germination and coding for isocitrate lyase (*ZmICL*), malate synthase (*ZmMS*), aconitase (*ZmACN*), citrate synthase (*ZmCS*) and malate dehydrogenase (*ZmMDH*) were measured by quantitative real time PCR (qPCR) using total RNA, isolated from treated and untreated seeds incubated 48 hours at 28°C in the dark.

In addition, to evaluate physiological responses at late developmental stages, transcript levels of genes related to photosynthesis (*ribulose biphosphate carboxylase small* and *large subunit, ZmRbcS* and *ZmRbcL,* and *phosphoenolpyruvate carboxylase, ZmPEPC*) and stress responses (*ZmHSP1, ZmHSP82, ZmHSP101* and *AP2-EREBP transcription factor, ZmAP2-EREBP*) were measured on total RNA extracted from leaves of 12-day old plants grown from treated and untreated seeds in a growth chamber.

In general, the application of both prototypes affected the expression levels of the genes in analysis, however GHI_16_Bex2 showed a stronger effect than GHI_16_A70V30. In particular, the treatment with GHI_16_Bex2 modulated the expression of *ZmICL, ZmMS* and *ZmCS* in germinating seeds, and increased the transcript level of *ZmRbcS*, *ZmRbcL,* and *ZmHSP82* in leaves, suggesting a possible role of this new biostimulant in improving seed germination, plant growth and stress tolerance in maize.

In conclusion, the application of these innovative biostimulants could help plants to counteract abiotic stress and improve yield also when germination occurs in adverse climate conditions.