

## Methodology for evaluation of biostimulants effects on maize root system

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Biostimulants have increasingly been used in modern agriculture as plant growth promoters and can be extracted from several sources. Biostimulants have the potential to stimulate growth, to mitigate biotic and abiotic stresses, and to increase yield. Among agricultural products, biostimulants still do not have a clear definition due to the complexity of their compounds and different responses induced by interactions with the plant, rhizosphere and environmental factors. It is fundamental to establish a robust methodology to evaluate their action in different regulatory and functional systems of plants. In this context, this study aimed to establish a root morphology evaluation protocol for maize seedlings under humic substances (HS) and aminoacid biostimulants. Initially, we evaluated root morphology aspects and dry weight of two maize commercial cultivars, L521236/CMSM036 (Genotype 1) and L521274/CMSM033 (Genotype 2), grown in nutrient solution with biostimulant A (HS), B and C (Aminoacids) in a paper pouch system. This test indicated that the paper pouch system was not suitable for biostimulants assessment. In later experiments, we used the floating system with various concentrations of biostimulants and treatment times. In addition, we evaluated maize seedlings with an acclimatization period. After different tests, we determined that the most suitable methodology for biostimulants evaluation was an acclimatization of maize plantlets from genotype 1 for seven days with ½ Hoagland's nutrient solution in a floating system, with the addition of 54.4, 5.0, 5.0  $\mu\text{L L}^{-1}$  of the biostimulants A, B and C, respectively, leaving the plantlets in the system for more seven days. In this condition, there were an increase in root total surface area, surface area of fine roots and total dry weight. This method will allow the development of molecular and physiological experiments that will shed a light on biostimulants action mechanisms.

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