TITLE: DRY HEAT TREATMENT EFFECT ON MAIZE SEED BACTERIOME AND SEEDLING GROWTH

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ABSTRACT:

There is a group of microorganisms associated with plants but little explored in the literature: the seed-borne bacteria. These bacterial communities can be transmitted horizontally, through the environment, or vertically from the mother plant. The goal of this study was to evaluate the effect of dry heat treatment on indigenous microbiota of maize seeds considering also the physiological quality of seedlings. For this purpose, maize seeds *Zea mays* cv. DKB 177 were treated in a dry heat oven at 60°C and 70°C for 72 and 96 hours. Two ways of imbibition were tested: immersion in distilled water for 5h and imbibition between filter paper with 2.5 times the paper weight of distilled water. The seeds were germinated in BOD for 7 days and seed germination parameters were measured. The seed vigor was determined through the tetrazolium biochemical test. The bacteria quantification was analyzed by counting colony-forming units (CFU) in NB solid media and the McCrady table for JNFb semi-solid media. To evaluate biofilm formation, the bacterial isolates were grown in NB liquid medium containing glass wool and it was stained with 1% safranin solution for visualization under optical microscope. The bacterial growth curve was measured by optical density in a spectrophotometer at 600nm. Treated and untreated seeds were grown under greenhouse conditions for 13 days with the plant biometric parameters calculated. The method of imbibition between filter paper was the most suitable for not damaging the seed vigor. Dry heat treatment caused a modulation in the bacterial communities of maize seeds according to each temperature and time used. There was no statistical difference in bacterial counts, but the shape and color of the colonies were different in each treatment and the cellular variability was confirmed through optical microscopy. The treatment 70°C 72h presented a bacterial isolate with high EPS production. According to the optical density assay and plant biometric parameters, the treatment at 70°C 72h reduced the seed microbiome and it was less harmful to the seedling growth. The 60°C 96h treatment was the most damaging when placed under standard greenhouse conditions. These results contribute to the study of how maize seed microorganisms respond to temperature stresses and how it affects seedling growth. The isolation of EPS-producing bacteria has biotechnological potential for inoculant formulations for plants under water stress and high temperatures conditions.

Keywords: seed-borne bacteria, thermotherapy, plant microbiota

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