The Effect of Organic Plant Extracts on Seed Germination and Seedling Growth

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Current tissue culture techniques use labor intensive propagation of seedlings which require lab-grade equipment and sterile environments. North American farmers are estimated to lose millions of bushels of corn and soybeans annually from pests, diseases, and drought, amounting to more than 46 billion dollars lost in harvest yields. Innovative medias were made from five organic plant extracts and applied to tissue culture and seeds in soil. Their growth was compared to three gold standards used in today's tissue culture and agriculture industry: Murashige and Skoog (MS) media base, nitrogen fertilizer, and phosphorous and potassium fertilizer. The willow and aloe vera medias used together in micropropagation consistently indicated an average of 4.6 times more corn plantlets and 4.3 times more soybean plantlets than plantlets produced by MS shoot multiplication and MS nutrient media. In soil, corn plants fertilized with willow and aloe indicated 6.5 times more corn harvest and 5.6 times more soybean harvest than fertilizer controls. Pest and weed damage was noted to be significantly less in willow and aloe propagated medias. Five of fifteen tissue cultures trials were exposed to non-sterile air. Even so, the willow and aloe vera cultures harbored no visible microbial contamination and produced the most growth, making it possible for the first time to perform in vitro techniques in non-sterile environments. In this study, the cost of the new media was 98% less than the cost of Murashige and Skoog medias, and 67% cheaper than corn and soybean fertilizers. This new media will be a boon to farmers and tissue culture scientists in the world.

Awards Won:
Fourth Award of $500
U.S. Agency for International Development: USAID Science for Development Second Place Award of $3,000.
Arizona State University: Arizona State University Intel ISEF Scholarship
University of Arizona: Tuition Scholarship Award