Growth Promotion and Yield Enhancement of Crop Seeds with Plant Products: Effects of Extracts, Endophytic Symbionts, and Endosperm

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This study addresses the global demand for crop supply by enhancing germination and harvest yield of Zea mays (maize) and Glycine max (soybean) seeds with plant extracts, endophytes, and endosperm. This year's study consists of two parts. Part one of this study identified a fungi strain, Cladosporium cladosporioides, with growth enhancing effects on maize and soybean seeds. Results suggested a dry biomass increase of 155% for maize and 139% for soybean seeds compared to nutrient controls. Part two of this study investigated the ability of certain endosperm transfer cells to provide efficient nutrient transport in cell culture and to transfer genes horizontally. Germination is a systemic response which involves bidirectional interactions between embryo and endosperm. Results found that plant cell culture on endosperm increased shoot and root production and plantlet biomass of maize and soybean. Specialized transfer cells facilitated efficient nutrient uptake. Results also suggested that diploid embryonic cells from parasitic plants transferred genes to zygotic embryos of maize and soybean. The quality traits expressed, such as water-stress tolerance, longevity, high biomass production, and weed resistance, can be attributed to genes transferred from endosperm of other plants to corn and soybean embryos. This study demonstrates the growth promoting effects of Cladosporium cladosporioides on maize and soybean seeds. It also points to the unique role some endosperm tissues play on maize and soybean embryo development. These novel findings can assist plant scientists in the production of more robust and prolific maize and soybean crops. Future application of this study can boost crop yields to feed the world population, estimated to reach 10 billion people by 2050.

Awards Won:

Third Award of $1,000

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