# Analysis of the Effect of Rhizobium Bacterial Spp. on Seed Germination and Plant Growth of Non-Legume Monocotyledon and Dicotyledon Plants

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Farmers resort to using chemicals and conventional techniques globally to expedite crop growth to satisfy large populations. Currently, available chemical fertilizers are endangering farmers' and consumers' health in addition to being expensive. Techniques to increase crop yield are in progress but are not feasible on large-scale farms or are difficult for farmers themselves to apply. Rhizobium spp. bacteria present an affordable and sustainable solution to boost growth in staple crops while improving the overall health of the plant. A novel method of using the root nodules containing the bacteria was developed in this experiment. Three experiments were conducted. This project investigated the effectiveness of Rhizobium leguminosarum root nodules fluid applied in techniques such as immersion and injection in non-legume monocot (maize) and dicot (pumpkin) seeds in Experiment 1. DR1 and DR2 bacteria were developed for easy accessibility and tested in Experiments 2 & 3. DR1 and DR2 bacteria were created by employing techniques of air-drying. Seeds were placed in a self-made incubator (Phases 1.1 and 2.1) initially and later in soil (Phases 1.2 and 2.2) for Experiments 1 & 2. Experiment 3 was conducted in soil only. Maize seeds treated with R. leguminosarum root nodules fluid promoted increased growth in plumule, radicle, and seminal roots by 10-25mm however, all pumpkin seeds showed no growth. Results support that root nodules containing R. leguminosarum, including DR1 and DR2, can promote growth in staple crops, particularly maize, therefore, the bacteria represents a suitable alternative to chemicals and fertilizers used for faster crop yield.

**Awards Won:**