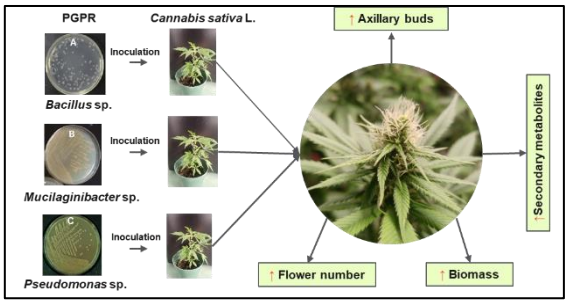

The Response of *Cannabis sativa* L. to Three Novel Plant Growth-Promoting Rhizobacteria: Yield and Cannabinoid and Terpene Profile

Oral Defence by PhD Candidate Dongmei Lyu

Plant Science

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Abstract

Cannabis production is increasing worldwide, as a result of legalization, to varying degrees, in many countries, including both as industrial hemp and medicinal marijuana. Therapeutic use of cannabis has focused production on flower yield and quality, as the key behavior-modifying secondary metabolites are biosynthesized in flowers. Application of plant growth-promoting rhizobacteria (PGPR) is a sustainable strategy to enhance plant growth and development. Strains of PGPR, *Bacillus* sp., *Mucilaginibacter* sp., *Pseudomonas* sp. were applied onto cannabis (cv. CBD Kush) cuttings at the vegetative stage to evaluate the rooting speed, flower yield and formation. Metabolomics and proteomics were used as analytical approaches to study secondary metabolites and proteins that are synthesized and expressed in the cannabis flowers. Furthermore, the effectiveness of PGPR applied in liquid King's B bacterial growth medium on the growth of cannabis also was investigated to provide a more efficacious technology for efficient industrial production. We observed that PGPR can alter cannabis plant growth via: 1) enhancing rooting of cannabis cuttings at the vegetative stage, 2) improving plant photosynthesis, 3) increasing the flower numbers and axillary bud outgrowth and final flower biomass, 4) altering the accumulation of key cannabinoids and terpenes, and 5) regulating the expression of the relevant proteins in cannabis flowers related to the plant growth and secondary metabolites synthesized.

Dongmei Lyu holds a master's degree in Crop Science from Yangzhou University, China. In May 2018, she joined McGill University as Master student in Plant Science under supervision of Dr. Donald Smith at McGill University. She is currently a PhD candidate studying in the plant-microbe interaction. She is interested in developing sustainable agricultural techniques to cope with the climate change.