NANYANG TECHNOLOGICAL UNIVERSITY SINGAPORE | Nanyang Environment and Water Research Institute

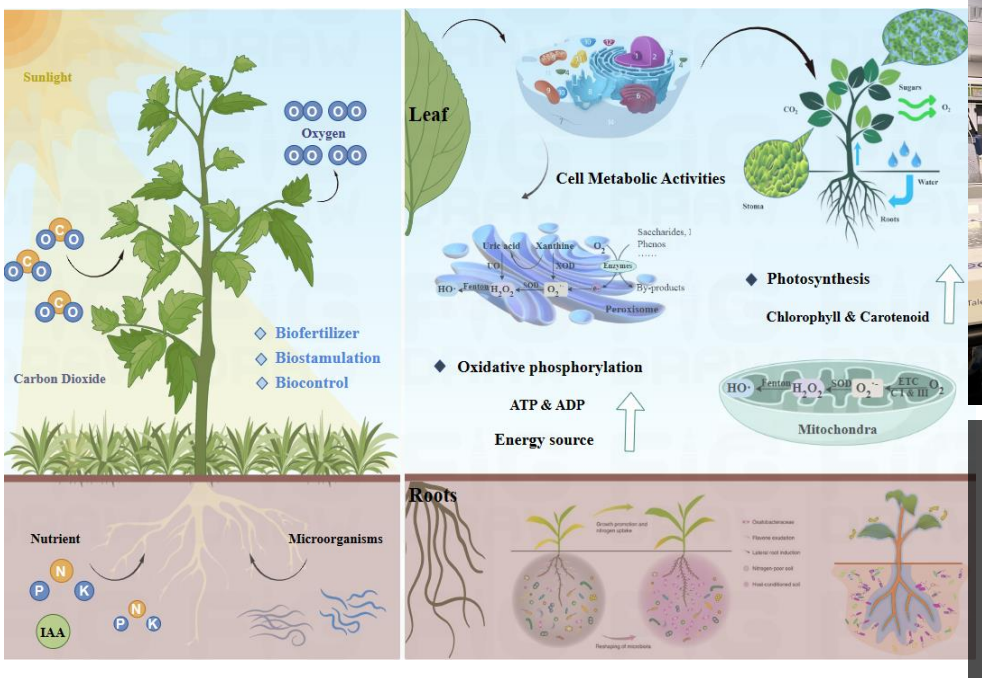
PURPLE PHOTOTROPHIC BACTERIA FOR PLANT GROWTH

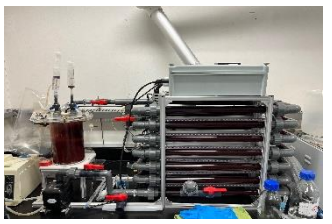
Abstract

Currently, approximately one billion people (16% of global population) suffer from chronic hunger, and the demand for food becomes increasing urgent with the global population continuing to rise. Before 2050, the food production must be increased by 70% on already over exploited finite infrastructures. However, this goal faces formidable challenges owing to the ever-increasing nutrient requirement in farmland soil, and the up-coming mineral exhaustion in next decades. Therefore, there is an urgent need to develop the cost-effective and eco-friendly fertilizers to increase food production and ensure global food security.

Purple phototrophic bacteria (PPB) are a metabolically diverse group of proteobacteria containing the pigments bacteriochlorophyll *a* and *b*, which enable them to harvest light energy efficiently. They are highly versatile, capable of using sulfur, hydrogen, iron, or organic compounds as electron donors during light-driven reactions. Beyond their metabolic flexibility, PPB contribute to soil enrichment by increasing the availability of organic carbon, nitrogen, and phosphorus. Additionally, they secrete plant hormones such as salicylic acid, indoleacetic acid, and gibberellin, which promote plant cell division and enhance the synthesis of photosynthetic pigments. Their ability to assimilate a broad range of small molecular weight organic and inorganic carbon compounds further supports efficient growth, making PPB a promising biological platform for applications in sustainable agriculture and environmental biotechnology.

Purple Photosynthetic Bacteria Shows Stimulating-performance On Plant Growth





Note: CF and PPB denote the treatments with chemical fertilizer and purple photosynthetic bacteria, respectively, while CK denotes the treatment without chemical fertilizer and purple photosynthetic bacteria.

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