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THE PROMOTED EFFECT OF *STREPTOMYCES SP.* IN WHEAT PLANTING

Rhizosphere and plant growth – promoting bacteria (PGPR) are important biological concepts, which have become one of the research hotspots of soil microbiology and microecology. Long-term studies have found that microorganisms in plant root environment have their unique characteristics in species and function. They are more closely related to plants and affect the growth and development of plants. The core microbial communities in plant rhizosphere were mainly *Arthrobacter, Bacillus, Bradyrhizobium, Flavobacterium, Pseudomonas, Sphingomonas, Sporidium, Stenotrophomonas, Streptomyces sp.*, mutant *genus* and followed by fungi at a small proportion rate (Araujo et al., 2020). Studies have shown that PGPR can activate soil nutrients, improve soil physical and chemical properties, increase soil fertility, enhance salt and drought resistance, regulate the expression of plant-related genes, be resistant to heavy metal toxicity and promotes crop growth and development (Barnawal et al., 2017; Ren et al., 2019; Richardson et al., 2009; Zhu et al., 2015). These physiological and ecological effects of PGPR are affected by other organisms including PGPR strains, soil conditions and agronomic measures. *Bacillus subtilis* in rhizosphere can induce and improve the drought resistance of plant seedlings (Barnawal et al., 2013; Wang et al., 2019). *Burkholderia ambiaria* isolated from barley rhizosphere can use fusaric acid as the sole carbon source and energy source, and control plant fusarium wilt and root rot caused by *Fusarium* species (Simonetti et al., 2018). The growth of wheat seedlings under salt stress was significantly promoted by

Enterobacter and *Bacillus* (Liu et al., 2015; Sarkar et al., 2018; Upadhyay et al., 2015).

The actinomycetes in rhizosphere is mainly *Streptomyces* sp. which plays a significant role in plant growth, development and stress resistance. *Streptomyces roschei* IDWR19, *Streptomyces carinii* IDWR 53 and *Streptomyces thermolilacinus* IDWR 8 isolated from wheat rhizosphere could increase soil enzyme activity and promote wheat growth (Jog et al., 2012). *Streptomyces* D74 and Act12 could be colonized in the rhizosphere of wheat, which could significantly promote the growth of wheat and enhance the induced resistance of wheat (Li, Y. L. et al., 2020). The growth of wheat was promoted by the treatment of *Streptomyces fulvissimus* FU14 in greenhouse (Araujo et al., 2020). *Streptomyces olivaceoviridis*, *S. rimosus* and *S.rochei* had higher ability to produce auxin, gibberellin and cytokinin-like substances, and had higher amylase and protease levels, which could improve the growth vigor and yield of wheat plants (Aldesuquy et al., 1998). The culture filtrate of *Streptomyces olivaceus* seems to be the most effective in this respect. These *Streptomyces sp.* play an indirect role in the production of plant growth regulators, affecting the growth and yield of wheat. Under drought stress, *Streptomyces pactum* Act12 could affect drought resistance in drought-sensitive wheat (Triticum aestivum L.) cultivar Xinong 979 by considering both its effects and underlying mechanisms(Li, H. Y. et al., 2020).

In our study, a *Streptomyces* strain HU2014 exhibited the excellent promoted effect on wheat. In qualitative and quantitative experiments, the strain HU2014 produced siderophore and chitinase, enhanced the phosphate solubilization (199.65μg/mL) and produced indole-3-acetic acid (29.01μg/mL). In the pot experiment, the strain significantly increased the height and chlorophyll content of wheat plants.

Several PGPR preparations have been commercialized and widely used to promote plant growth and control soil borne diseases. It lays a solid foundation for the further industrialization and broad application prospects in crop production and promoting the sustainable development of agriculture.