

## 论文

## 内生真菌对甜菜主要农艺性状及氮糖代谢关键酶活性的影响

史应武<sup>1,2</sup>, 娄恺<sup>2\*</sup>, 李春<sup>1</sup>

1石河子大学农学院/新疆兵团化工绿色过程重点实验室, 新疆石河子832003; 2新疆农科院微生物应用研究所, 新疆乌鲁木齐830091

## 摘要:

采用内生真菌F11液浸种、喷叶及灌根处理方法, 调查其对甜菜栽培品种KWS2409的主要农艺性状及对甜菜氮、糖代谢关键酶即硝酸还原酶(NR)、谷氨酰胺合成酶(GS)、蔗糖合酶(SS)和蔗糖磷酸合酶(PS)活性的影响。结果表明, 内生真菌F11菌株对甜菜的含糖量有明显的提高作用, 其中以灌根处理效果最好, 其叶鲜重、叶绿素含量、单根重、含糖率和产糖量的平均值分别提高了66.67%、47.42%、6.96%、17.46%和25.63%。在整个生育期, 内生真菌F11显著提高了氮糖代谢酶活性, 其中NR和GS活力分别呈“M”型双峰曲线和抛物线型变化, 而SS和GS活力呈单峰曲线变化, 后期根部SS合成活力明显高于分解方向活力, 生育前期SPS活力高于后期。叶丛形成期达到最高峰, 说明NR、GS、SS和SPS活性的增强是甜菜含糖量升高的主要生理原因。

关键词: 甜菜 内生真菌F11 氮、糖代谢关键酶

Effects of Endophytic Fungus on Sugar Content and Key Enzymes Activity in Nitrogen and Sugar Metabolism of Sugar Beet (*Beta vulgaris* L.)

1Key Laboratory for Green Processing of Chemical Engineering of Xinjiang Bingtuan/Agriculture College of Shihezi University, Shihezi 832003, china; 2Institute of Microbiology, Xinjiang Academy of Agriculture Science, Urumqi 830091, China

1Key Laboratory for Green Processing of Chemical Engineering of Xinjiang Bingtuan/Agriculture College of Shihezi University, Shihezi 832003, china; 2Institute of Microbiology, Xinjiang Academy of Agriculture Science, Urumqi 830091, China

## Abstract:

We investigated the agronomic traits and determined the activity of key enzymes in sugar and nitrogen metabolisms in beet leaf and root with treatments of by using *Plectosphaerella cucumerina* F11 solution seed soaking, leaf spraying and root watering. The results showed that the strain F11 obviously promoted growth of beet seedlings, the effect with the better in root watering treatment than in others. The leaf fresh weight, content of chlorophyll, fresh weight per root, sugar content and sugar yield of beet increased significantly ( $P < 0.05$ ) by 66.67%, 47.42%, 6.96%, 17.46%, and 25.63%, respectively; F11 enhanced evidently the activities of key enzymes in sugar and nitrogen metabolisms of beet during whole growth period. The changes of activities of nitrate reductase (NR) and glutamina synthetase (GS) presented the curves of M-shape and parabola shape, respectively. The changes of activities of sucrose synthase (SS) and sucrose phosphate synthase (SPS) in beet displayed the single peak curve. The synthesis activity was much higher than the decomposition activity for SS in roots of beet at late growth stage. The activity of SPS was higher at early growth stage than at late growth stage, and the activity of SPS was the highest during phyllome formation period. It was concluded that the strain F11 not only enhanced activities of key enzymes in sugar and nitrogen metabolisms of beet, but also promoted the growth, yield and sugar accumulation of beet.

Keywords: Sugar beet Endophytic fungus F11 Key enzymes of nitrogen and sugar metabolisms

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