

不同氮形态和氮水平对水田与旱地烤烟烟叶糖含量及相关酶活性的影响

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Effects of nitrogen fertilization on carbohydrate content and related metabolic enzymes of flue-cured tobacco in paddy field and highland

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摘要

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摘要 采用田间小区试验, 研究了硝态氮和铵态氮两种氮肥形态和5个施氮水平对水田与旱地烤烟在团棵期、旺长期、脚叶采收期、腰叶采收期和顶叶采收期烟叶中可溶性总糖、蔗糖、果糖含量, 蔗糖磷酸合成酶 (SPS) 和蔗糖合成酶 (SS) 活性的变化动态及烤后烟叶中可溶性总糖、总氮和烟碱的浓度的影响。结果表明, 当施用硝态氮和铵态氮后, 水田与旱地施氮量分别在0~120和0~112.5 kg/hm²范围内均能明显提高烤烟烟叶中的可溶性总糖、蔗糖和果糖含量; 硝态氮和铵态氮的肥效相当。水田烤烟在生育期内烟叶的糖分含量明显高于旱地烤烟。施用氮肥还能明显促进SS和SPS活性, 加速烟叶中碳水化合物代谢。烘烤后旱地烟叶中的可溶性总糖含量(332~383 mg/g, DW)显著高于水田烟叶的含量(305~342 mg/g, DW)。施用铵态氮, 旱地与水田可溶性总糖含量(分别为366.5、331.3 mg/g, DW), 显著高于硝态氮处理(分别为358.9、317.2 mg/g, DW); 而旱地烤烟烟叶的总氮和烟碱浓度(12~16 mg/g, DW)却低于水田烟叶烟碱浓度(16~20 mg/g, DW); 旱地烤烟烟叶的可溶性总糖/总氮或烟碱比值高于水田烟叶。

关键词: 烤烟 硝态氮 铵态氮 水田 旱地 碳水化合物 酶活性 烤烟 硝态氮 铵态氮 水田 旱地 碳水化合物 酶活性

Abstract:

Nitrogen is one of the most important elements for tobacco growth and development. In order to reveal effects of nitrogen fertilization on soluble carbohydrate, sucrose, fructose, sucrose-phosphate synthase (SPS) and sucrose synthase (SS) of tobacco leaves at rosette, rapid growth, and lower, middle and upper stalk position harvesting stages, and on total soluble carbohydrate, total nitrogen, and nicotine concentrations of flue-cured leaves in paddy field and highland conditions, field experiments were conducted with split design which two nitrogen sources, nitrate and ammonium nitrogen, are severed as main plot and five nitrogen levels are severed as split plot. Results show that concentrations of soluble carbohydrate, sucrose, and fructose of tobacco leaves are increased significantly when nitrate and ammonium nitrogen are applied into paddy field and highland from 0 to 120 and 0 to 112.5 kg/ha, respectively. The impact of nitrate and ammonium nitrogen applications on tobacco carbohydrate accumulation is not markedly different in both lands, while carbohydrate concentration of tobacco leaves in paddy field is higher than that in dry land. Moreover, SS and SPS activities are also increased when nitrogen fertilizer applied. Total soluble carbohydrate (305–342 mg/g, DW). Furthermore, carbohydrate concentration under ammonium applications in both lands (averagely, 366.5 and 331.3 mg/g, DW) is much higher than that under nitrate applications (averagely, 358.9 and 317.2 mg/g, DW). However, leaf total nitrogen and nicotine (12–16 mg/g, DW) in highland are much lower than those in paddy field (16–20 mg/g, DW), which would result in the unbalance between soluble carbohydrate concentration and nitrogen containing compounds.

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