

甘蔗/大豆间作减量施氮对甘蔗产量、品质及经济效益的影响

李志贤^{1,2,3}, 王建武^{1,2,3*}, 杨文亭^{1,2,3}, 舒迎花^{1,2,3}, 杜清^{1,2,3}, 刘丽玲^{1,2,3}, 舒磊^{1,2,3}

1华南农业大学热带亚热带生态研究所, 广州 510642|2华南农业大学农业部生态农业重点开放实验室| 广州 510642|3华南农业大学广东省高等学校农业生态与农村环境重点实验室| 广州 510642

Effects of reduced nitrogen application on the yield, quality, and economic benefit of sugarcane intercropped with soybean.

LI Zhi-xian^{1,2,3}, WANG Jian-wu^{1,2,3}, YANG Wen-ting^{1,2,3}, SHU Ying-hua^{1,2,3}, DU Qing^{1,2,3}, LIU Li-ling^{1,2,3}, SHU Lei^{1,2,3}

1Institute of Tropical and Subtropical Ecology, South China Agricultural University, Guangzhou 510642, China|2Ministry of Agriculture Key Laboratory of Ecological Agriculture, South China Agricultural University, Guangzhou 510642, China|3Key Laboratory of Agroecology and Rural Environment of Guangdong Regular Higher Education Institutions, South China Agricultural University, Guangzhou 510642, China

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摘要

在大田栽培条件下,研究了减量施氮对广州地区不同甘蔗/大豆间作模式下甘蔗产量、品质、生物量动态变化及甘蔗群体经济效益的影响。结果表明:氮肥和种植模式对甘蔗产量、品质均无显著影响,各处理甘蔗产量、品质均无显著差异。不同施氮水平的甘蔗/大豆间作系统较单作甘蔗提高了土地利用效率,其土地当量比(LER)为1.36~2.12。各处理甘蔗总生物量的动态积累随生育期的推进均符合“S”型生长曲线,低氮水平下间作甘蔗的生物量动态积累特征参数最协调,高氮水平下,甘蔗生长高峰期提前,快速生长最大持续期缩短,甘蔗产量下降,因此,可以通过调整氮素的投入量来改善生物量的增长参数,从而获得高产。低氮处理甘蔗/大豆间作系统经济效益比高氮处理高3.2%~26.3%,说明减量施氮可有效提高群体经济效益。甘蔗/大豆1:2间作模式的经济效益最好。

关键词: 甘蔗/大豆间作 减量施氮 产量 品质 经济效益 广州

Abstract:

A two-factor field experiment of randomized block design was conducted in Guangzhou to investigate the effects of reduced nitrogen application on the yield, quality, and total biomass dynamic of sugarcane as well as the economic benefit of the sugarcane population under different sugarcane/soybean intercropping patterns. Neither N application nor intercropping pattern had significant effects on the yield and quality of sugarcane, and no significant differences were observed in the yield and quality of sugarcane among all treatments. The land equivalent ratio (LER) of sugarcane/soybean intercropping at different N application levels was from 1.36 to 2.12, suggesting that sugarcane/soybean intercropping had higher LER than monoculture sugarcane. The total dry matter (except root) of sugarcane in all treatments increased with plant growth, and the growth pattern fitted sigmoid function. At lower nitrogen application level, the eigenvalues of the dynamic dry matter accumulation model were more coordinative, compared with those at higher nitrogen application level, which meant that in the later case, sugarcane had an advanced peak growth time and shortened fast-growth duration, and thereby, its yield decreased. Therefore, it was possible to reasonably adjust nitrogen application level to improve the eigenvalues of the sugarcane dynamic dry matter accumulation model, and accordingly, to achieve high yield. The population economic benefit under sugarcane/soybean intercropping was 3.2%-26.3% higher at lower than at higher nitrogen application level, suggesting the increase of the economic benefit of sugarcane population under reduced nitrogen application. Among the treatments, 1:2 sugarcane/soybean intercropping had the best economic benefit.

Key words: sugarcane/soybean intercropping reduced nitrogen application yield quality economic benefit Guangzhou

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