

蚕豆/玉米间作系统经济生态施氮量及对氮素环境承受力(简报)

Nitrogen environmental endurance and economically-ecologically appropriate amount of nitrogen fertilizer in faba bean/maize intercropping system

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中文摘要:

通过河西走廊灌区田间试验, 对不同施氮水平下蚕豆/玉米间作系统的生产力、氮素吸收利用率及土壤无机氮累积量进行了研究, 并利用线性加平台模型探讨了间作系统的经济生态施氮量。结果表明间作系统的生产力与施氮量的线性加平台模型的相关性达到极显著水平($P < 0.001$), $0 \sim 160$ cm 土壤无机氮累积量与施氮量间以二次曲线模型相关性最高; 种间互作显著提高系统生产力和氮素吸收, 增幅分别为23%和33%; 间作系统生产力、养分吸收量及土壤无机氮量随着施氮量的增加而增加; 高氮肥量和种间互作使作物发生氮素“奢侈吸收”。如果充分考虑到生产、生态和经济效益, 则间作系统适宜施氮量为186 kg/hm², 对应生产力为 10.6×10^3 kg/hm², 增产14%, 节约38%氮, 减少75%土壤无机氮残留。

英文摘要:

The effects of nitrogen application rates on the productivity, nitrogen uptake and utilization, and soil inorganic nitrogen accumulation were investigated in faba bean/maize intercropping system through field experiment conducted in Hexi Corridor of Gansu Province. The economically-ecologically appropriate amount of nitrogen fertilizer applied was further studied on the basis of linear plus plateau model. The results showed that the correlations between the productivity and soil inorganic nitrogen accumulation and nitrogen fertilizer were significant by linear plus plateau model and quadratic curve model respectively. Compared with sole cropping system, intercropping significantly increased system productivity and nitrogen acquisition by 23% and 33%, respectively. The productivity, nitrogen uptake and utilization efficiency, and soil inorganic nitrogen accumulation of intercropping increased with the increase of nitrogen application rate, indicating that over abundant nitrogen uptake existed under high nitrogen fertilizer and intercropping. The optimized nitrogen application rate was 186 kg/hm², considering both ecological and economic benefits. Under this nitrogen application rate condition, the intercropping productivity was 1.06×10^4 kg/hm², increasing by 14%, saving 38% nitrogen input, and decreasing by 75% inorganic nitrogen accumulation, compared with sole cropping system.

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