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日光温室番茄氮素资源综合管理技术研究

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Integrated nitrogen management in greenhouse tomato production

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摘要 根据养分资源综合管理原理,应用氮素供应目标值结合PSNT(Presidedress.Soil.Nitrate.Testing)技术对日光温室春、秋季番茄主要生育时期0—30.cm土壤硝态氮进行实时监测并进行氮素追施调控。试验设计为:当春季目标产量为84.t/hm^{2}时,在第一、二、三穗果膨大期每次追肥时采用N.300.kg/hm^{2}的氮素供应目标值(0—30.cm土层NO_3^--N+灌溉水带入氮素+追施化肥氮素),之后每次追肥采用N.200.kg/hm^{2}的氮素供应目标值;当秋季目标产量为75.t/hm^{2}时,在第一、二、三、四穗果膨大期每次追肥时采用N.200.kg/hm^{2}的氮素供应目标值,之后每次追肥采用N250.kg/hm^{2}的氮素供应目标值。结果表明,与传统氮素处理相比,由于充分利用了来自环境的氮素养分(包括矿化态有机氮和灌溉水中氮素),氮素追施调控处理的番茄在春季生长后期(3至6穗果生长时期)、秋季生长前期(1至3穗果生长时期)没有追施氮肥;在氮肥总投入量分别减少62%和78%的情况下,番茄产量不降低,但显著降低了土壤—蔬菜体系中氮素表观损失量,作到了氮素资源的综合管理与作物的高效利用,减轻了过量施氮对环境产生的负面影响。

关键词: 养分综合管理 氮素供应 PSNT NO3$_3^-$-N 日光温室番茄 追施 养分综合管理 氮素供应 PSNT NO3$_3^-$-N 日光温室番茄 追施

Abstract: Field experiments were conducted in a greenhouse of Shouguang,Shandong province to validate integrated nitrogen management and PSNT(Presidedress Soil Nitrate Testing) techniques in monitoring nitrate dynamic in root zone and corresponding recommendation of sidedressing N fertilizer for greenhouse tomato in spring and autumn seasons in 2004.Considering the target yield level,FW 84 t/ha,in spring,the rate of N supply(soil NO_3^--N in root zone + N through irrigated water + sidedressed N) were N 300 kg/ha of each sidedress at the first,second and the third cluster fruit expanding stage(CFES),and N 200 kg/ha in the later growing stage.Similarly,when the target yield was FW 75 t/ha,in autumn,the rate of N supply were N 200 kg/ha of each sidedressing at the first,second third and the fourth CFES,and N 250 kg/ha in the later growing stage in autumn season.Including organic manure application as conventional way,optimized N treatment reduced N application rate by 62% and 78% of total N fertilizer in spring and autumn season,respectively,compared to conventional treatment,because environmental N(N released from organic N pool and N from irrigated water etc.) contributed considerable N to tomato growth.Compared to conventional N treatment,apparent N loss in soil-vegetable crop system significantly reduced in optimized N treatment while the yield was the same as that of conventional treatment.It was concluded that integrated nitrogen management,together with PSNT technique,was very useful in increasing nutrient efficiency and reducing the risk of environmental pollution.

Keywords:

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