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不同施氮模式对日光温室番茄产量、品质及土壤肥力的影响

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Effects of different models of applying nitrogen fertilizer on yield and quality of tomato and soil fertility in greenhouse

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摘要 在日光温室栽培条件下，研究了不同施氮模式对番茄产量、品质及土壤肥力的影响。结果表明，与当地习惯施肥模式（N1）相比，分别减施化肥氮26%（N2）、减施化肥氮26% 结合调节土壤C/N（N3）、减施化肥氮26% 结合调节土壤C/N和采用滴灌（N4）、减施化肥氮45% 结合调节土壤C/N和采用滴灌（N5）的集成模式对产量和品质无显著影响； 减氮模式下植物吸收的总氮量、氮素利用率和氮肥农学效率均高于习惯施肥模式，其中N5模式的氮素利用率和氮肥农学效率显著高于N1模式（P<0.05），说明减少化肥氮的施用量结合调节土壤C/N和/或滴灌措施能够保证番茄的产量和品质，达到减肥增效的目的。结果还看出，番茄拉秧后0—100 cm土层累积的硝态氮含量低于习惯施肥模式，对0—20 cm表层土壤碱解氮、速效磷、速效钾含量和土壤脲酶和蔗糖酶活性的影响不显著； 减氮条件下，N3和N5模式土壤细菌/真菌比值高于N1模式。综上研究结果表明，N3和N5 两个集成模式具有明显优势。

关键词： 番茄 日光温室 施氮模式 土壤肥力

Abstract： Continuously excessive nitrogen (N) input in greenhouse is one of the major problems in China, especially in Shouguang, Shandong province，a famous vegetable production base, and this led to deteriorate fertilization profit, product quality and soil quality, etc. Aiming at those problems, a field experiment was conducted to study the effects of different models of applying N fertilizer on yield and quality of tomato and soil fertility in greenhouse in Shouguang to provide better approaches and models to develop the sustainable utilization of soil. Compared with the local farmer's conventional model of applying N fertilizer (N1), the treatments of reducing 26% chemical N fertilizer (N2), reducing 26% chemical N fertilizer combined to adjust soil C/N ratio (N3), reducing 26% chemical N fertilizer combined to adjust soil C/N ratio and adopting drip irrigation measure (N4) and reducing 45% chemical N fertilizer combined to adjust soil C/N ratio and adopting drip irrigation measure (N5) respectively, could ensure the yield and quality of tomato. Total N uptake by plant, N use efficiency and N agronomic efficiency of the models to reduce N fertilizer application were higher than those of local farmer's, N5 treatment was significant higher in N use efficiency and N agronomic efficiency than N1（P<0.05）. The results showed that reducing N fertilizer combined with soil C/N ratio adjustment and/or drip irrigation can reduce chemical N application, increase the yield and quality of tomato. The nitrate accumulation of the treatment of N3, N4 and N5 were lower than that of N1. During winter-spring season, there were no significant difference in the contents of soil alkali-hydrolysable N, available phosphorus (P) and available potassium (K) and in soil urease activity and invertase activity, however, soil bacterium/fungi (B/F) ratio was higher under the integration models of N3 and N5. The results of all the above-mentioned indicated that reducing N fertilizer combined with agronomic measures can reduce the waste of fertilizer resource and remit degeneration of the soil quality, without loss of yield and quality compared to farmer's conventional fertilization approach. Above all the results showed that the integration models of N3 and N5 have a promising future and can provide the basis of the theory for studying the reduction of N fertilizer application, ensuring high grade and yield of the vegetable and soil sustainable utilization.

Keywords： tomato;greenhouse models of applying nitrogen fertilizer soil fertility

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