

控释氮肥养分控释效果及合理施用研究

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Nutrient releasing characteristics of controlled-release nitrogen fertilizer and its rational application

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摘要 试验采用{3,3}单形重心设计方法,研究了普通尿素和2种包膜尿素D90、D60配比对土壤 NH_4^+ -N、 NO_3^- -N及矿质态氮(Nmin)含量的影响。结果表明,供试的7种包膜肥料初期溶出率均<12.0%,微分溶出率在0.26%~2.49%之间。各处理土壤 NH_4^+ -N含量均随时间逐渐降低,而 NO_3^- -N和Nmin含量随时间逐渐增加。整个培养期内单独施用尿素处理,土壤 NH_4^+ -N、 NO_3^- -N及 N_{min} 含量最高;2种控释肥单施或其配比施用土壤 NH_4^+ -N、 NO_3^- -N及 N_{min} 含量最低;尿素与控释肥配合施用,土壤 NH_4^+ -N、 NO_3^- -N及 N_{min} 含量居中。不同时期内土壤 NH_4^+ -N的来源不同,0~20d内,尿素对土壤 NH_4^+ -N含量贡献最大;30~50d内,土壤 NH_4^+ -N主要来自D60;整个培养期内尿素对土壤 NO_3^- -N和 N_{min} 的贡献均最大。肥料配比中随着尿素比例的减少,土壤 NH_4^+ -N、 NO_3^- -N及Nmin均逐渐减少。研究结果初步验证了混料设计在肥料配比研究中的可行性。

关键词: 控释肥料 氮肥 养分释放 合理施用 控释肥料 氮肥 养分释放 合理施用

Abstract: Soil incubation experiment designed with {3, 3} simplex centroid design method was adopted to assess the effects of combination of urea and two kinds of CRFs (polymer-coated urea, D90 and D60) on the contents of NH_4^+ -N, NO_3^- -N and mineral N(N_{min}) in soil. The initial solubility of seven CRFs used in this experiment was less than 12.0%, and differential solubility was between 0.26% and 2.49%. During the soil incubation, the NH_4^+ -N in soils of all treatments decreased; while NO_3^- -N and N_{min} in these soils increased. The contents of NH_4^+ -N, NO_3^- -N and N_{min} in soil were highest when only conventional urea were added, and lowest when only D90 and D60 or their combination were added; the contents of NH_4^+ -N, NO_3^- -N and N_{min} in treatments combined conventional urea with CRFs were in the middle. The NH_4^+ -N in soils derived from different sources during the incubation; in the early 20 days incubation the NH_4^+ -N mainly came from the conventional urea; and during the 30 to 50 days incubation more portion of NO_3^- -N from D60; and the conventional urea had more important effects on the NO_3^- -N and N_{min} in soil during the whole incubation. As the proportion of conventional urea in the combinations of different fertilizers was decreased, the contents of NH_4^+ -N, NO_3^- -N and N_{min} in soils also became lower. It is concluded that the mixture design is a useful method to evaluate the nutrient release characteristics of CRFs and their rational application.

Keywords:

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