

石灰性土壤起始 NO_3^- -N对土壤供氮能力测定方法的影响叶优良^{1,2};李生秀¹

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Influence of initial nitrate-nitrogen on methods of measuring soil nitrogen supplying capacity in calcareous soils

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摘要

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摘要 在陕西省的澄城、永寿、杨陵 3地区选取有机质、全N、硝态N含量差异较大的 17个石灰性土壤,分别在淋洗与未淋洗土壤起始 NO_3^- -N后,利用盆栽试验探讨土壤 NO_3^- -N淋洗前、后,不同方法测定的已矿化N和可矿化N与小麦吸N量之间的相关性。结果表明,未淋洗土壤起始 NO_3^- -N,用KCl直接浸取、KCl煮沸法所浸取以及通气培养前 CaCl_2 所淋洗的起始 NO_3^- -N均与小麦吸N量密切相关,相关系数(r)分别为 0.934, 0.856和 0.862,均达1%显著水准。与此相反,通气培养、淹水培养、沸水煮沸、碱性高锰酸钾、酸性高锰酸钾及碱解扩散等方法所提取的可矿化N与小麦吸N量间无显著相关。淋洗土壤起始 NO_3^- -N后,用KCl直接浸取、KCl煮沸法浸取以及通气培养前 CaCl_2 所淋洗的起始 NO_3^- -N与小麦吸N量之间的相关系数明显降低,达不到 5%的显著水准。而通气培养、淹水培养、沸水煮沸、碱性高锰酸钾、酸性高锰酸钾及碱解扩散等方法所提取的可矿化N与小麦吸N量之间相关系数却明显提高,都达到 5%或 1%的显著水平。其中变化最明显的是淹水培养 1周矿化出的 NH_4^+ -N、通气正式培养 2周矿化出的 NO_3^- -N及碱解扩散出的 NH_4^+ -N,其与小麦地上部吸N量之间的相关系数(r)分别由淋洗前的0.443, 0.119, 0.259增加到淋洗后的 0.866, 0.767, 0.763。说明可矿化N反映土壤供N能力不佳是因为受起始 NO_3^- -N的干扰和影响,在土壤 NO_3^- -N含量较高的情况下,要正确评价可矿化N测定方法必须考虑 NO_3^- -N的作用。

关键词: 土壤 起始 NO_3^- -N 供氮指标 测定方法 土壤 起始 NO_3^- -N 供氮指标 测定方法

Abstract: Seventeen calcareous soils representing different organic matter, total N and NO_3^- -N contents were sampled from Chengcheng, Yongshou and Yangling area of Shanxi Province, and the soils with and without leaching of NO_3^- -N were used for pot experiments using wheat as indicator to discuss the relationship between initial NO_3^- -N and mineralizable N determined by various methods with wheat uptake N. The results showed that when initial NO_3^- -N were not leached, soil initial NO_3^- -N extracted by KCl directly and KCl boiling method, and leached by CaCl_2 before aerobic incubation were closely related with wheat N uptake, the correlation coefficients were 0.934, 0.856, 0.862, respectively, all reached at 1% significant level. On the contrary, it was no good relationship between mineralizable N extracted by aerobic incubation, water logging method, boiling water method, alkaline permanganate extraction, acid permanganate extraction and NaOH hydrolyzation diffusion method with wheat uptake N. When initial NO_3^- -N were leached, the correlation coefficient between initial NO_3^- -N extracted by KCl directly and KCl boiling method, and leached by CaCl_2 before aerobic incubation with wheat uptake N were decreased greatly, and could not reach 5% significant level. However, the correlation coefficients between mineralizable N extracted by aerobic incubation, water logging method, boiling water method, alkaline permanganate extraction, acid permanganate extraction and NaOH hydrolyzation diffusion method with wheat uptake N were raised obviously, and all reached 5% or 1% significant level. Of which, the NH_4^+ -N mineralized by one week waterlogging and NO_3^- -N leached by two weeks formal aerobic incubation, as well as NH_4^+ -N extracted by Conway method varied greatly. The correlation coefficients between mineralizable N and uptake N of wheat above ground raised from 0.443, 0.119, 0.259 to 0.866, 0.767, 0.763, respectively. It showed that the poor effects of mineralizable N on reflecting soil N capacity were influenced and disturbed by initial NO_3^- -N, warning researcher to pay more attention to correctly evaluate the function of mineralizable N when soil initial NO_3^- -N is higher.

Keywords:

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