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暗管不同埋管间距对苏打草甸碱土的改良效果

Improvement effects of subsurface pipe with different spacing on sodic-alkali soil

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中文摘要:

针对松嫩平原苏打草甸碱土改良这一难题，该文采用暗管改碱技术，同时在施用农家肥（猪粪34 m3/hm2）和改良剂（15 t/hm2）等配套措施条件下，研究了暗管不同埋管间距（5、10、20和40 m）对苏打草甸碱土表层的土壤渗透性、有机质含量以及碱化度（ESP）、钠离子吸附比（SAR）等理化性状的影响。结果表明：（1）与CK（无暗管和无配套措施）相比，CK1（无暗管和有配套措施）的渗透性显著提高；与CK1相比，L1（有配套措施，暗管间距5 m）、L2（有配套措施，暗管间距10 m）和L3（有配套措施，暗管间距20 m）的渗透性显著提高，但L4（有配套措施，暗管间距40 m）增加较小，不显著，且L1渗透系数最高。（2）与CK相比，CK1的有机质、速效钾含量和CEC显著提高；与CK1相比，L1、L2和L3处理的有机质含量显著提高，而碱解氮、速效钾含量以及CEC除L1外，其余各处理的作用不显著。（3）密布暗管处理能降低土壤pH值、电导率（EC）、总碱度（TA）、ESP和SAR；且L1处理的效果最为显著，其pH值、EC、TA、ESP和SAR最低，分别为7.85、0.15 mS/cm、2.34 cmol/kg、39.47%和2.41。综上，在暗管埋深0.8 m，水稻种植和配套措施相同的条件下，间距5 m处理的改良效果最好，到第3年时土壤表层pH值已经降到8.0以下。这些成果基本解决了苏打草甸碱土改良的难题，为提高土地生产能力以及探讨暗管改碱技术在苏打盐碱土区应用的可行性提供了重要的理论依据和技术支持，促进了暗管改碱技术的发展和应用推广。

英文摘要:

Abstract: According to the worldwide difficult problem of soda meadow alkaline soil improvement, the paper used the technology of subsurface drainage and desalination, and studied the effects of different spacing (L1 with 5 m, L2 with 10 m, L3 with 20 m and L4 with 40 m) on soil permeability, organic matter content and exchangeable sodium percentage (ESP), sodium adsorption ratios(SAR), and other physical-chemical characters of soda meadow alkaline soil. Supplementary measures contained applying farmyard manure (34 m3 / hm2) and modifier (15 t/hm2). Pipe spacing was obtained by the below three means of Dacey law，pipe spacing numerical method of experience and the relational expression between pipe buried depth and pipe spacing. The results showed that: 1)compared with CK (no subsurface drainage and no supporting measures), CK1 (no subsurface drainage but having supporting measures) improved the soil permeability significantly; compared with CK1, the soil permeability of L1, L2 and L3 was improved significantly; and the soil permeability coefficient （K10）of L1 treatment is higher than others; 2) compared with CK, the organic matter content, available potassium content and cation exchange capacity (CEC) of CK1 was increased significantly; compared with CK1, the organic matter content of L1, L2 and L3 was increased significantly, and the alkaline nitrogen content, available potassium content and CEC of L1 increased significantly; 3) the treatment of subsurface pipe being densely buried can decrease the soil pH, electrical conductivity (EC), total alkalinity (TA), ESP and SAR of soil. Effects of treatment L1 on the soil pH, EC, TA, ESP and SAR of soil were the most obvious among the treatments, and pH, EC, TA, ESP and SAR of L1 treatment were the minimum with 7.85, 0.15 mS/cm, 2.34 cmol/kg, 39.47% and 2.41 (mmol/L) 1/2 respectively. In general, under the conditions of subsurface drainage with burial depth 0.8 m, and the same rice-planting and supporting measures, subsurface drainage spacing of 5 m had the best improvement effect，and pH value of the surface soil dropped to below 8.0. This research preliminarily solved the problem of soda meadow alkali soil improvement, providing an important theoretical basis and technical support for ameliorating sodic soil, improving land capability and discussing the feasibility of subsurface pipe technology using for amelioration of sodic soil in soda saline-alkali soil region, and promoting the development, popularization and application of the subsurface drainage and desalination soil technology.

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