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CAN BIOCHAR FULFILL THE NITROGEN NEED OF MAIZE UNDER REDUCED NITROGEN INPUT?

Lu Liu, Zhihua Liu, Shiyao Wang, Yufei Liu, Mengrui Sun, Yingjie Dai*

*College of Resources and Environment, Northeast Agricultural University,
No.600 Changjiang Road, Xiangfang District, Harbin 150030, China*

Abstract

Nitrogen (N) is very important to support the yields of maize, however, the yields remain a relative stable level along the increasing input of N fertilizer. This brings a waste of resources and environmental risks. Biochar (BC), a carbon-rich products, had a positive effect on the growth of maize. So, we want to detect that whether BC can satisfy the N need of maize under reduced N input. The field trials were conducted, which located in Heilongjiang Province, northeast of China. Taking the farmer's N fertilizer application rate ($112 \text{ kg} \cdot \text{hm}^{-2}$, N1) as control, the N fertilizer amount was reduced by 30% ($78.4 \text{ kg} \cdot \text{hm}^{-2}$, N₂), with two levels of BC addition (B1 and B2) based on N₂. The soil total nitrogen (TN), ammonium N ($\text{NH}_4^+\text{-N}$) and nitrate N ($\text{NO}_3^-\text{-N}$) content of N₂B1 are at the same level as the TN, $\text{NH}_4^+\text{-N}$ and $\text{NO}_3^-\text{-N}$ of the farmers' N application (N1) at the jointing stage ($P>0.05$). We found that the yield of maize in N₂B1 increased by 4.33 % compared to that in N1. And BC increase significantly field N use efficiency (N accumulation, N fertilizer use efficiency, N fertilizer agronomic efficiency and N fertilizer partial productivity). The results showed that the application of BC can meet the needs of maize under reduced N conditions and increase the yield of maize. There will be the optimum dosage for BC application.

Key words: biochar, maize, nitrogen fertilizer, soil

Received: March, 2022; Revised final: October, 2022; Accepted: October, 2022; Published in final edited form: November, 2022

* Author to whom all correspondence should be addressed: e-mail: dai5188@hotmail.com; Phone: +86 451 5519 0825; Fax: +86 451 5519 0825