عنوان مقاله:

Stimulated fine root growth benefits maize nutrient uptake under optimized nitrogen management

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خلاصه مقاله:

Optimized nitrogen (N) management reduces total N application without sacrificing cropyield. However, the underlining mechanisms have not been well investigated, especially lackingthe evidence from roots. Here we performed a two-year field experiment with maize grownunder zero-N, conventional N and optimized N applications and examined grain yield, N,phosphorous (P) and potassium (K) uptake and root length in diverse diameter classes. Resultsshowed that both conventional N and optimized N managements significantly increased plantnutrient contents and grain yield compared with zero-N treatment, but no obvious differencewas observed between the two N-fertilized treatments. Notably, the response of differentnutrients to N application was not synchronous temporally over the growth period, followingthe order of N first, P second and K last. Though N application generally had minor impact ontotal root length and root biomass, optimized N regime significantly increased fine root(diameter ≤ 0.2 mm) length compared with conventional N at the eighth leaf emerged stage. Thestimulated fine root growth under optimized N management is beneficial for adequate N uptakeduring the key growth stage, which determines subsequent PK acquisition and final crop yield.Our findings highlight the importance of fine roots in maize NPK uptake and a betterunderstanding of the response of fine roots to changes in N availability may therefore be criticalfor optimizing N input in maize farming system

کلمات کلیدی:

Root length, Phosphorous (P), Potassium (K), Leaf area, Grain yield, Zea mays L