

Research Article

Yield attributes, chlorophyll content and biometric yield of maize (*Zea mays* L.) as influenced by silicon application under cadmium contaminated soil

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Summary

A pot study was conducted on maize in net house of the Department of Soil Science and Agricultural Chemistry, BACA, AAU, Anand to study the effect of Si application on yield attributes and yield of maize under Cd-contaminated soil. The leaf area of maize was significantly increased at all silicon levels (Si_{100} to Si_{300}) over control (Si_0) and it was 19.28 per cent at Si_{300} level over control, whereas root length was significantly influenced at Si_{200} and Si_{300} level over Si_0 level, however, both were at par with Si_{100} level. The chlorophyll content at 30 DAS of maize leaf was significantly increased at Si_{200} and Si_{300} levels over control (Si_0), both were at par with each other. Among different combinations of Cd x Si, Cd_0Si_{300} registered significantly the highest leaf area (394.56 Cm^2) and chlorophyll content at 60 DAS (15.23 cci). The Si application @ 300 mg Si kg^{-1} soil gave significantly higher dry shoot weight than control, but it was at par with Si_{200} level. The dry shoot weight (35.98 g pot^{-1}) was increased to the tune of 19.5 per cent over control (Si_0) under Si_{300} level irrespective of Cd levels. The dry root weight was significantly increased at Si_{100} , Si_{200} and Si_{300} levels over control. The highest mean dry root weight (4.69 g pot^{-1}) was observed at Si_{300} level, which was at par with Si_{200} level. Amongst yield attributes, the leaf area (cm^2), root length (cm), root : shoot ratio, chlorophyll content (cci) at 30 and 60 DAS were significantly decreased at all Cd levels (Cd_5 to Cd_{80}) over control (Cd_0) except chlorophyll content at 30 DAS, which was significantly reduced up to Cd_{20} level. The green and dry shoot weight, fresh and dry root weight were significantly decreased at all the levels of Cd over Cd_0 (control), while dry shoot was significantly decreased above Cd_5 level. The decrease in dry shoot weight due to Cd_{30} level was to the tune of 19.7 per cent over control (Cd_0) irrespective of Si levels. The phytotoxic effect of Cd on shoot and root weight of maize was observed at Cd_{10} and above levels but combined application of Cd with different Si levels, could reduce adverse effect on growth and yield of maize. The overall result pointed out an antagonistic effect of Si on Cd which can be favorably exploited in mitigating the ill effects of Cd contaminated soils through application of silicon @ 200 to 300 mg kg^{-1} soil through calcium silicate. Application of Si helped to maintain nutrient balance in soil and plant also.

Key words : Silicon, Cadmium, Maize, Root length, Leaf area, Chlorophyll content, Yield

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