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Diverse Silicon Effects on Above- and Under-ground Parts in Soybean (*Glycine max* L.) Cultivars

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[Introduction]
Silicon (Si) application is a beneficial element for plant growth and development, however its effect on soybean is poorly understood. Therefore, we investigated the effects of Si treatment on four soybean (*Glycine max* L.) cultivars.

[Materials and methods]
Plants were grown in greenhouse condition and when the seedlings attained 1st trifoliate leaves phase, 100 ml of 2 mM Si solution was applied on soil and leaf for a Si treatment while same volume of water was applied to soybean plants as control for a week. Thus our experiment consists i) control, and ii) Si treatment (soil + leaf) and each treatment composed of 5 replications (n=5). Various shoot-root morphology and photosynthesis related parameters were measured at four different time periods (1 DAT, 3 DAT, 5DAT and 7DAT). A portable photosynthesis system (Li-6800, Li-Cor, Inc. USA) was used for measuring photosynthetic attributes. For collection of root phenotypes, 2 dimension (2D) root image was used and it was harvested at 7DAT. Acquired root images were analyzed by an image analysis software (WinRHIZO pro, Regent Instruments Inc. Canada).

[Result and Discussion]
In the case of plant height and stem width, significant differences were observed in Si treated-Mallikong in comparison with control. Those result was caused by short period to obtain significant changes in shoot morphology. However, shoot area was significantly increased in Mallikong and Somyongkong as compared to that of control. According to net-photosynthesis (P_N) value at 7DAT, the Geomjeongsaeol and Taesean showed 14% higher P_N value in the Si application on the other hands Mallikong showed gradual decrease P_N in Si treatment as compared to control. The Si treatment induced change of root morphological traits in soybean. In the Geomjeongsaeol and Taesean, total root length respectively showed 46% and 26% increase in the Si application as compared to that of control while, it showed significant decrease in Somyongkong or no significant difference in Mallikong in Si treatment as compared to control. The cultivars showed similar pattern for root surface area and number of root tips and forks. In conclusion, out of the four, two cultivars (Geomjeongseol and Taesean) showed positive response to Si application, while the other two cultivars (Somyongkong and Mallikong) showed negative response to Si application for several root and shoot characteristics. Therefore, our results suggested that various soybean cultivars may respond differently to Si application.

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