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Effect of Heavy Metal Resistant and Halotolerant Rhizobacterium *Bacillus safensis* KJW143 on Soybean under Salinty and Cadmium Exposure

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Cadmium and salt exposure to crops is considered vulnerable for production as well as consumption. To address these challenges, the current study aimed to mitigate the toxicity induced by salt and cadmium in soybean plants through the application of bacterial strain *Bacillus safensis* KJW143 isolated from the rhizosphere of oriental melon..The bioassay analysis revealed that KJW143 is a highly salt-tolerant and cadmium-resistant (Cd) strain with an innate ability to produce melatonin, gibberellin (GA3), Indole-3-Acetic Acid (IAA), and organic acids (i.e., acetic, succinic, lactic, and propionic acids). Soybean plants at 20 days old were treated with KJW143 in a different form (pellet, broth, and together) and their effect on plant performance was investigated. Inoculation with KJW143enhanced plant biomass and growth attributes in soybean plants compared to the control (non-treated). In particular, we observed that only pellet-treated showed 65%, 27.5%, and 28.7% increase in growth (shoot fresh weight) compared to broth, broth with pellet, and control. In addition, bacterial strain KJW143 treatment (only pellet) modulated the physiochemical apparatus of soybean plants by increasing glucose (390%), arabinose (166%), citric acid (22.98%) and reducing hydrogen peroxide (29.7%), catalase (32.1%), salicylic acid (25.6%) compared to plants with combined stressed plants (cd and salinity). These findings suggest that bacterial strain KJW143 could be usedas a biofertilizer to minimize the probable risk of heavy metal and salinity stress on crops.

[Acknowledgement]
This work was supported by the National Research Foundation of Korea (NRF) grant funded by the Korea government (MSIT) (No. 2022R1A2C1008993).

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