Halotolerant Bacteria Oc2 Enhance Plant Salt Tolerance

Guo, You-Yu (School: Kaohsiung Municipal MingHua Junior High School)
Lai, Yu-Jin (School: Kaohsiung Municipal MingHua Junior High School)
Chung, Yu-Chun (School: Kaohsiung Municipal MingHua Junior High School)

In this study, a salt-tolerant bacterium, Oceanobacillus aidingensis, referred as Oc2, was isolated from wetlands in Taiwan. In the absence of plant, Oc2 does not reduce soil salinity; however, when coincubated with plants, Oc2 triggers a mechanism to lower soil salinity by approximately 12% and enhance plant salt tolerance, suggesting a special interaction between Oc2 and plants. Our further studies reveal that Oc2 produces IAA, attracting plant roots to grow toward it, and facilitating its entry into the roots. Under salt stress, Oc2 stimulates plants to synthesize proline in the roots, resulting in proline levels that increase twofold. This enhancement of proline boosts root osmotic pressure, while Oc2 also elevates carotenoid and flavonoid levels in the leaves, thereby increasing the plant's antioxidant capacity. There are multiple interactions between Oc2 and plants under salt stress. Chemicals released from plants under salt stress trigger Oc2 to produce more IAA, resulting in a approximately 17% increase. This increase may stimulate root development , leading to improved water absorption. Additionally, the presence of Oc2 enhances amylase activity in the roots by up to 88%, breaking down starch to produce soluble sugars for Oc2's use. These findings suggest a mutually beneficial relationship between the two. This study highlights a new interaction between salt-tolerant bacterium and plants, suggesting the potential to improve saline-affected agricultural land and increase crop yields.

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