

Exploring the Potential of *Serratiasp.* as Bioherbicide agent to Control *Dactyloctenium Aegyptium* (L.) P. Beauv.

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Abstract—Weeds are vigorous competitors of various host crops and widely distributed in the agriculture lands. Currently, the application of chemical herbicide is considered as the most efficient tool for weed management, although it brings along with several serious concerns of environment health. Microbial weed control represents an innovative ecofriendly method to manage troublesome weeds. As a novel approach, our research focused on using microbes for controlling weeds. In the present study, endophytic bacteria were isolated from the root nodule of soybean and screened for the weedcidal activity against *Dactyloctenium aegyptium* in dual agar plate assay. In search of volatile metabolites and hydrolytic enzymes targeting plant cell wall, the isolates were screened for HCN production, cellulase and pectinase production. The host specificity of isolate KAW3 was evaluated with wheat, rice and soybean under in vitro condition. Results showed that the VOCs produced by isolate KAW3 showed significant growth inhibitory effect with 80% reduction in the germination percentage of *D. aegyptium*. The isolate KAW3 was positive for cellulase, pectinase, and chitinase production. However, there was no hydrogen cyanide production was observed for the isolate KAW3, so the evaluation of other possible growth inhibitory volatiles has to be done with GC-MS analysis. The 16S rRNA gene amplification and sequencing of isolate KAW3 confirmed its similarity with *Serratiasp.*, deposited in GenBank with accession number KY351610. The host specificity assay revealed that isolate KAW3 is inhibitory towards the rice seedlings and significantly decrease the root length (up to 92%). However, it was found to promote the growth of wheat and soybean seedlings. Our results suggest that the isolate KAW3 could be employed as potential bioherbicide agent to suppress the growth of *D. aegyptium* and could meet the future challenges of sustainable agriculture for effective weed management.

Keywords: Bioherbicide, *Serratia*, volatiles, weed.