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A proposal for the unification of two strains of cyanobacteria genus *Nostoc* to the same species

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Studies of cyanobacteria are important to the global scientific community because of their ecological and applied importance. Amongst the different cyanobacterial orders, the *Nostocales* and *Stigonematales* orders are especially important as they fix atmospheric nitrogen and thus contribute to the fertility of agricultural soils worldwide. However, in spite of their ecological importance and environmental concerns, their identification and taxonomy is still problematic and confusing, often being based on current morphological and physiological studies, which generates confusing classification systems based on plastic characters that vary with the environmental and cultural conditions. The present research aimed to investigate through a polyphasic approach, the differences in morphological and genotypic features of two cyanobacteria strains isolated from paddy fields of Iran, belonging to the family *Nostocaceae* (subsection IV. I). Based on the description of the morphology provided by Desikachary (1959), the two strains were identified as *Nostoc ellipsosporum* and *Nostoc muscorum*. Challenges arose when the two *Nostoc* strains could not be discriminated by 16S rRNA and ITS genes sequencing. The results of sequencing of the cloned bacterial 16S rRNA fragment strongly indicated that the current morphological classification of the two Nostoc species is invalid. Moreover, phylogenetic study of these two *Nostoc* strains has demonstrated that genetic relationships are in conflict with the morphological classification. Besides, after doing DNA-DNA re-association experiments, we concluded that the two Nostoc strains investigated might possibly be united into one species.

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Plant parasitic weed endophytic bacteria triangle

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Phelipanche and *Orobanche* species (broomrapes) are holoparasitic plants that connect to the vascular systems of their hosts, allowing the transfer of various substances including a possible exchange of endophytic bacteria that inhabit the internal tissues of both plants. To shed light on the microbial aspects of the parasitic interaction between *Phelipanche aegyptiaca* and its host, tomato, we characterized the endophytic composition in both plants before and after attachment using mass sequencing analysis. Endophyte communities of the parasitic weed were significantly different from that of the non-parasitized tomato root but no significant differences were observed between the parasite and its host, parasitized tomato root, suggesting bacterial exchange between these two plants. In addition to molecular analysis, isolation of endophytic bacteria from the parasitic weed-host plant system enabled to examine whether these isolates can affect the dynamics of host-parasite interaction. Endophytic bacteria isolates were examined for their ability to secrete substances that may affect the dynamics of this system and indeed, a few isolates inhibit the growth of the parasitic weed. The current study focuses on the bacterial aspect of host-parasite interaction and highlights the potential of exploiting alternative environmentally friendly approaches for parasitic weed control.

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