

Transcriptional regulation of genes involved in the symbiosis between *Nostoc* and *Oryza*



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ABSTRACT

Motivation: Cyanobacteria of the genus *Nostoc* are capable of establishing symbiosis relationships with many different types of plants. In these mutualistic relationships the cyanobacterium provides the plant with fixed nitrogen, while the plant provides the cyanobacterium with protection from hostile environments and carbon compounds as energy for N₂ fixation. It has recently been described that *Nostoc punctiforme* performs a stable symbiosis with *Oryza sativa* (Álvarez et al., 2020). In order to know the molecular mechanisms involved in the recognition between the plant and the cyanobacterium, a proteomic study was carried out in the early stages of co-culture of both organisms. In this study, proteins with homology to the Nod factors of *Rhizobium* sp. were identified in *Nostoc*, which could be related to signaling in the plant. The aim of this work is to study the regulation of the expression of the genes encoding these Nod proteins by means of RT-qPCR.

Methods: The expression of *Nostoc punctiforme* Nod genes was studied in response to the presence of the plant at 1, 2, 3, 5 and 7 days of co-culture. On the one hand, a *Nostoc punctiforme* culture grown at 25°C in Roux flasks with 1% CO₂, continuous illumination and at 30°C was prepared. On the other hand, *Oryza sativa* seedlings were obtained germination of seeds under axenic conditions. At one week of growth, the seedlings were transplanted into flasks with hydroponic medium. Co-culture was performed by adding a fixed amount of *Nostoc* to the *Oryza* culture medium, and incubating the mixture in thermostated chambers at 25°C, 12h light/dark cycles and 75% relative humidity. RNA was extracted from *Nostoc* samples that had been in contact with the plant. As a control, *Nostoc* incubated without the plant was used. After RNA retrotranscription, the resulting cDNA was used to evaluate the expression of the genes of interest.

Results: It was observed that the expression of certain Nod genes is activated in the presence of *Oryza*, although there are other Nod genes whose expression remains unchanged in response to inoculation with the plant.

REFERENCES

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