

**Title:** How *Azospirillum brasilense* interferes in the maize gene expression during the inhibition of indole-acetic acid production by the plant

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### **Abstract**

Maize is among one of the most used plant species in human food. For this reason, ways to increase its production without increasing the planted area are always necessary. One way of achieving this is by using plant growth promoting bacteria. Among them are the bacteria of the genus *Azospirillum*. These bacteria are found in the rhizosphere of grasses and cereals both in the tropics and in temperate climates. They have as main characteristics the ability to fix the gaseous nitrogen and to produce hormones that can be used by the plants. It is believed that both processes are responsible for stimulating the increase of the final mass of the plants. The present study aimed to better understand the genetic relationship between *Azospirillum brasilense* and maize during a situation of inhibition of indole acetic acid (IAA) production by the plants. For this, the chemical compound Yucasin [5- (4-chlorophenyl) -4H-1,2,4-triazole-3-thiol] was applied to the plants. It is an inhibitor of one of the IAA production pathways in plants. The genetic expression of the bacterium and plant during this situation was analyzed by Dual RNA-Seq. The data obtained by the transcriptome sequencing of both plant and bacterium were analyzed using a combined analysis approach. With this methodology, it was possible to observe genes involved in response to biotic and abiotic stresses being repressed. On the other hand, genes that coding for transcription factors MYB29, TYFY 3B, and WRKY71, involved in the biotic and abiotic stress responses, were upregulated in some experimental situations, indicating that the plant was responding to the presence of the bacterium and the Yucasin. We also observed that many uncharacterized loci were strongly up and downregulated ( $\log_2\text{FoldChange} > 4$ ). For the bacteria, we were able to detect genes involved in the transmembrane transport being differentially expressed.

**Keywords:** Dual RNA-Seq; *Azospirillum brasilense*; *Zea mays*; Plant Growth Promoting Bacteria; IAA.

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