

**TITLE:** TRANSCRIPTOME ANALYSES OF *Herbaspirillum seropedicae*, STRAIN HRC54, GROWN IN THE PRESENCE OF SUGARCANE APOPLASTIC FLUID.

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**ABSTRACT:**

The sugarcane is considered one of the most important crops for Brazil agribusiness. However, there has been a reduction in productivity levels in recent years as a consequence of low soil fertility for main crop areas. The use of fertilizers can improve yield but also elevate the production cost and contribute for environmental problems. The application of inoculants with endophytic diazotrophic bacteria can provide nitrogen for the plant as well as act as plant growth promoters. The *Herbaspirillum seropedicae* can be used as bacteria inoculum for several grasses, including the sugarcane. However, despite the beneficial effects of its inoculation, there is still a low consistency of response. Thus, identify which bacteria metabolic pathways can improve plant growth and biological nitrogen fixation is important. The bacteria growth using tissues or plant fluids has been used as an alternative to study the microbe behavior during the interaction process. In this context, RNA-Seq experiments were performed with *H. seropedicae*, strain HRC54, grown in the presence of apoplastic liquid from sugarcane, variety RB867515. The analysis of the RNA-Seq data showed that the 5,648 genes present in the genome of the bacterium, 137 were differentially expressed, with 81 induced and 56 repressed in the presence of apoplastic fluid. The growth of the strain HRC54 of *Herbaspirillum seropedicae* in the presence of sugarcane apoplastic fluid changed the expression pattern of genes associated to oxidoreductase, binding protein, transcriptional regulator, transferase, hydrolase, and transport proteins. In general, the expression pattern observed suggests that the bacteria change the expression of several genes related to metabolic pathways necessary to adaptation for endophytic life style. This data will also be confirmed by RT-qPCR, enabling to suggest a possible metabolic model for plant microbe interaction.

**Keywords:** Sugarcane; *H. seropedicae*; RNA-Seq; RT-qPCR.

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