Artemisinin, a sesquiterpene endoperoxide lactone known for its antimalarial effects, is extracted from Artemisia annua L. This plant, belonging to the family of Asteraceae, naturally grows in Asia and has been used for centuries by traditional Chinese medicine for the treatment of fever. Currently, artemisinin is one of the drugs used in therapies known as ACT (Artemisinin Combined Therapy) recommended by WHO. In the plant, artemisinin is sequestered in glandular trichomes covering the surface of leaves and flowers, unfortunately, at relatively low concentrations (0.1-1% dry weight). On the other hand, its chemical synthesis is difficult to obtain. It is therefore of considerable interest to develop biotechnological approaches to increase the availability of artemisinin. Many studies have been conducted to clarify the biosynthetic pathway of artemisinin in order to increase the production of this metabolite in the plants and in cell cultures of Artemisia annua, or to induce its in vitro synthesis by engineered microorganisms. Recently, some of the enzymes involved in artemisinin biosynthesis and the related genes have been identified. Cell cultures are a valuable tool for a thorough study of the biosynthetic pathways of plant metabolites, since they allow to operate in well defined and controlled experimental conditions. The aim of our research work was to evaluate the artemisinin content and the expression of biosynthetic genes of A. annua suspension cultures subjected to different treatments. Particularly, suspensions of A. annua were treated for different intervals with methyl jasmonate (MeJa) and miconazole (Mic). The HPLC analysis of the artemisinin content, revealed that both compounds increased the artemisinin production of suspension cultures already after one hour treatment. Real Time-PCR was carried out to analyze the expression of the artemisinin biosynthetic genes CYP71AV1, CPR and Dbr2, coding for the enzymes cytochrome P450 monooxygenase/amorpha 4,11 diene oxygenase, cytochrome P450 reductase and artemisinic aldehyde reductase, respectively. The results revealed a 4-fold increase of the CYP71AV1 expression level after 30 min MeJa treatment compared to the control, while no significant changes were observed for both CPR and Dbr2 genes. On the contrary, the Mic treatment enhanced the expression of CPR and Dbr2, while CYP71AV1 was down regulated. These results can be useful to shed light on the control of the important artemisinin biosynthetic pathway.