



**Efficiency of Five Different Agrobacterium Rhizogenes Strains on Hairy Root Induction in *Perovskia Abrotanoides* Karel.**

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*Perovskia abrotanoides* Karel. (Lamiaceae), which is known locally as Barazambal in Iran, is a medicinal plant containing some important pharmaceutical secondary metabolites such as diterpenoid tanshinones and phenolic acids. Recently, reports have confirmed some therapeutic properties of *Perovskia* species such as leishmanicidal, antibacterial, antifungal and antiplasmodial effects, which were mainly attributed to their secondary metabolites. Agrobacterium-mediated hairy root cultures represent an effective tool for secondary metabolites production, compared to their parent plants. For this reason, the present study was aimed to establishment of an efficient hairy root culture protocol in *P. abrotanoides*. Mature seeds were harvested from wild plants, and after sterilization were cultured on free hormone solid MS basal medium. Five *A. rhizogenes* strains (A4, A7, ATCC15834, LBA9402 and R1000) were used to infect the leaf and internodal explants, as well as nodes on one-month old plants of *P. abrotanoides*. Wounded explants and nodes were inoculated with bacterial suspensions and then were cultured on MS medium for 48h at 25°C under 16:8 light: dark period. After 48h of co-cultivation, 1-1.5 cm long tip roots were excised and cultured on the ½MS semi-solid medium containing cefotaxim (400 mg/L) for 15 day to remove residual bacteria. Transgenic hairy roots lines developed in MS liquid medium were confirmed by PCR amplification of rolC as the target gene. The percentage of hairy root induction was recorded after 20 days of culture in MS medium containing cefotaxim and the results showed that bacterial strains had significant effects ( $P < 0.05$ ) on frequency and time of hairy root formation. The obtained results showed that, all strains of *A. rhizogenes* were used in this study were able to induce hairy roots on the wounded nodes and their Ri plasmids were integrated into the genome of host cells. Four days after inoculation, the first hairy root lines were emerged on the wounded nodes infected with A4 strain. Based on our findings, *A. rhizogenes* A4 strain was the most efficient strain in transformation and initiation of hairy roots with the frequency of 77.77% follow by A7 (66.67%) and ATCC15834 (58.33%). The lowest percentage of root induction was achieved with LBA9402 (33.33%) strain at the 9th day of induction. In conclusion, our results supported that with the application of efficient *A. rhizogenic* strains and suitable culture conditions, it could be possible to establish potent hairy root cultures in *P. abrotanoides*.

**Keywords:** *Perovskia abrotanoides* Karel., Agrobacterium rhizogenes, Hairy root culture