



8th National Congress on Medicinal Plants
24, 25 April 2019
Tehran, Iran



Age-dependent Variations of Phenolic Acids and Associated Enzyme Activities in *Salvia leriifolia* Benth.

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Medicinal plants are commonly rich in phenolic compounds such as phenolic acids, flavonoids, tannins and lignins. The amount of phenolic compounds varies with plant organ, age, phenological stage and environmental conditions. *Salvia leriifolia* Benth. (Lamiaceae) is a medicinal plant native to Iran and Afghanistan. Pharmaceutical properties of this species is due to its phenolic compounds, particularly phenolic acids [1]. The present study was aimed to investigate the variations in phenolic acid composition and activity of biosynthesis-related enzymes including phenylalanine ammonia lyase (PAL), tyrosine aminotransferase (TAT) and rosmarinic acid synthase (RAS) in *Salvia leriifolia* Benth. at different growth stages. Mature seeds were collected from wild grown plants in Sarogh area of Razavi Khorasan province. The seeds were planted in controlled greenhouse condition and the plant materials were harvested at 8-, 16- and 24-leaf stages. The dried leaf samples were extracted with methanol (80%) by cold maceration and then were analyzed for five individual phenolic acids including rosmarinic acid (RA), salvianolic acid A (Sal A), salvianolic acid B (Sal B), lithospermic acid (LA) and caffeic acid (CA) by HPLC method. The enzyme extracts were obtained from the frozen samples and used for determination of PAL and TAT activities by a spectrophotometric method and RAS activity with the HPLC technique. An age-related increase was observed in the content of all phenolic acids and in the activity of TAT and RAS enzymes. The highest contents of RA (3.84±0.33 mg/g DW), LA (0.48±0.04 mg/g DW), SalA (0.19±0.00 mg/g DW), SalB (0.10±0.00 mg/g DW) and CA (0.024± 0.00 mg/g DW) were measured at 24-leaf stage. The plants carrying 24 leaves showed the highest activities of PAL (8.7± 0.79 nkat/mg protein), TAT (168.15±13.6 nkat/mg protein) and RAS (12.27±0.71 nkat/mg protein). PAL activity decreased from the value of 8.3±0.56 nkat/mg protein at 8-leaf stage to 5.04±0.51 nkat/mg protein at 16-leaf stage and then elevated again up to 8.7±0.79 nkat/mg protein at 24-leaf stage. In conclusion, age-dependent enhancement in the phenolic acid contents might be possibly due to the elevated activities of related enzymes.

Keywords: *Salvia leriifolia*, phenolic acid, PAL, TAT, RAS

References

[1] Hashemi, M. M., Hosaeni, B., Hasani, A., Gholenezhad, R., Ghost, Y., Sirousmehr, A. R. *Eco. J. Med. Plant.* **2016**, 7: 67- 78.