



ADJUSTMENT EFFECTS OF DROUGHT STRESS ON THE HERBAL PLANTAGO
(*PLANTAGO PSYLLIUM* L.) WITH SALICYLIC ACID

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Drought stress is one of the most important factors that limit crop production [۱]. Exogenous application of salicylic acid (SA) has been found very effective in reducing the adverse affects of drought stress. Salicylic acid is a conservative compound of some biological stresses and it is important molecular signal for adjustment plants reaction to environmental stresses [۲]. This study was conducted to examine the possible role of exogenous salicylic acid on germination and seedling stage of *Plantago* (*plantago psyllium* L.) as herbal medicinal plant under drought stress. Thus for this purpose, an experiment design in case of factorial (AB) base completely randomized design (CRD) with three replications at Seed technology laboratory in Shahed University were conducted. Combination of salicylic Acid hormone levels (۰، ۰.۳ and ۰.۶ mM) and drought stress levels (۰، ۰.۴، ۰.۸، ۱.۲ and ۱.۶ Mpa) on germination and seedling growth as factors were applied. The results showed that the effect of drought stress, salicylic acid and its interaction on germination and seedling growth including (germination percentage, germination rate, shoot length, root length, shoot weight, root weight and some soluble components as proline content was significant ($P < 0.01$)).

In which, with applying drought stress up to ۱.۶ Mpa, most parameters of germination and plant growth decreased so in drought conditions, the highest and lowest of germination percentage were obtain in control (۹۸.۲۲% and at ۱.۶، was ۰.۸۸%), respectively. Overall, results showed that the priming treatments of salicylic acid (۰.۳ mM) on seeds of herbal *Plantago Psyllium* can increase its tolerance to drought in germination and plant seedling stage. In other words, it seems that salicylic acid were able to enhance the tolerant ability of the *plantago* plant to drought stress.

References

- [۱] Abedi, T.; Pakniyat, H; *Czech J. Genet. Plant Breed.* ۲۰۱۰، ۴۶(۱)، ۲۷-۳۴.
[۲] Baby, J; D. Jini; Sujatha, S. *Asian journal of Crop Science.* ۲۰۱۰، ۱(۱)، ۲۲۶-۲۳۵.

ANTIOXIDANT ACTIVITY AND TOTAL PHENOLICS OF STEM AND ROOT EXTRACTS OF
DESCURAINIA SOPHIA L. (FLIXWEED) GROWING WILD IN NORTH OF IRAN

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Descurainia sophia (flixweed) is an annual species belonging to family Brassicaceae (Cruciferae). This species is only species of the genus *Descurainia* in Iran and distributes in all parts of Iran from below sea level up to ۳۰۰۰ m [۱]. It has traditionally been used as a folk medicine in many countries and in Iran [۲]. The aerial parts of *D. sophia* are also used as vegetable in north of Iran. Up to now, several phytochemical studies have identified the presence of various compounds [۳-۴]. There is a report on the essential oil analysis of aerial parts of *D. sofia* in the literature [۵]. In previous investigation [۶], we showed that the leave extracts of this plant are include high antioxidant activity. The aim of the present study was to evaluate the antioxidant properties of the stem and root extracts of this valuable plant.

Water, methanol, ethanol and acetone were used as solvent and antioxidative effects measured by using ۲,۲-diphenyl-۱-picrylhydrazyl (DPPH), reducing power, total antioxidant activity and linoleic acid assays. In all the assays, polar solvents exhibited stronger activities than less-polar solvents. Methanol proved to be the most effective solvent for extraction of antioxidants from *D. sophia* stems and roots as it contained the high amount of phenolic compounds (5.76 ± 0.04 mg GAE/dry matter for stems and 5.33 ± 0.02 mg GAE/dry matter for roots) and also exhibited the strong antioxidant capacity in all the assays used. Although the antioxidant action of this extract was lower than that of ascorbic acid and BHT. Generally, the stem and root extracts shoewd relatively similar antioxidant activity.

References

- [۱] Hedge, I.; Rechinger, K. H. Cruciferae (۵۷); Rechinger, K. H., Ed.; *Flora Iranica*, Graz, ۱۹۶۸.
[۲] (a) Zargari, A. *Medicinal Plants*. (۵rd ed.); Tehran: Tehran University Publications, ۱۹۹۲; Vol. ۱، pp. ۱۴۶-۱۴۷. (b) Ghorbani, A. *J. Ethnopharm.* ۲۰۰۵، ۱۰(۲)، ۵۸-۶۸.
[۳] Chen, Y. Q.; Li, R. Z.; Wang, Y. W. *Acta Pharm. Sin.* ۱۹۸۲، ۱(۶)، ۶۲-۶۴.
[۴] Mohamed, N. H.; Mahrous, A. E. *Rec. Nat. Prod.* ۲۰۰۹، ۳(۱)، ۵۸-۶۷.
[۵] Li, J.; Liu, X.; Dong, F.; Xu, X.; Zheng, Y.; Shan, W. *Molecules*, ۲۰۱۰، ۱۵، ۲۳۲-۲۴۰.
[۶] Mohadjerani, M.; Hosseinzadeh, R.; Tajbakhsh, M.; Naqinezhad, A.; Tavakoli, R. *Medicinal Plants Natural Congress*, Sari Agricultural Sciences and Natural Resources University, Sari, ۲-۳ March ۲۰۱۱; pp. ۱۱۵۸.