

Study the effect of methanolic extract of some medicinal plant on evening primrose (*Oenothera biennis*) and tomato (*Solanum lycopersicum*) seedlings growth in in-vitro

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Introduction: The effects of medicinal plants were notable from ancient times. In contrast, indiscriminate use of chemical compounds in different aspects has caused huge environmental pollution that replace or change them with lovely natural compounds is inevitable (Khanh et al., 2005). It has been revealed that plants could affect other plant around them self by producing some special compounds. This mechanism or behavior is called Allelopathy (Pan et al., 2015). Due to the mentioned mechanism, plants could affect increasing or decreasing growth by producing and releasing specialized compounds that had been called allelopathy (Mahboobi et al., 2016). Allelochemical compounds produced by plants can be classified as tannin, phenolic compounds, terpenes, alkaloids, etc. that nowadays have been called specialized compounds (Da silva et al., 2015). So, the present study estimated the effect of the methanolic extract of some medicinal plants like Juniperus (*Juniperus sabina*), dandelion (*Taraxacum officinale*), rhubarb (*Rheum ribes*), red root (*Allium jesdianum*), kondol kahi (*Dorema aucheri*) and bottonwood (*Conocarpus erectus*) on evening primrose and tomato seed germination and growth in in-vitro conditions.

Materials and methods: The pure extract of the mentioned medicinal plants was prepared according to the (Sohrabi et al., 2025) (Figure 1). The extraction solvent used was methanol, and the extraction period lasted 24 hours. Filtration was performed using paper, and concentration was carried out with a rotary evaporator. Finally, a freeze dryer was used to obtain a pure powder extract. Due to the sensitivity of extract to temperature (autoclave conditions), 45 micron filter was used to add extract to Murashige and Skoog (MS) culture medium at 50 and 100 ppm concentrations. Then, the seeds of tomato variety “CH” and evening primrose variety “Another” were disinfected. The sterilized seeds were cultured in ½ MS culture medium containing plant extract. Ten seeds were placed in each jam jar in three replicates. After germination, germination percentage and seedling growth indices were evaluated (Ghasemnezhad et al., 2011) (Figure 1). The experiment utilized a completely randomized design with ten replications, and mean comparisons were conducted using the Least Significant Difference (LSD) method. Data analysis was done by SAS software and graphs and tables were drawn by Excel.

Conclusion: Based on the obtained results medicinal plant extracts can be considered as stimulating agents in germination of seed and seedling growth and can be used as pre-germination agents.

Results and Discussion: Results revealed that aside from the acceleration in germination (two days earlier than the control samples); no significant difference was observed between the samples treated with plant extracts in terms of germination percentage. However, the effect of the extract on seedling growth showed a significant difference. Results showed that the maximum growth of tomato seedlings (8.9 cm) was observed in treatment with 50 mg/L Juniperus sabina extract in comparison with control (7.2 cm). Notably, there was no significant difference between some treatments (Figure 2). In addition, analysis variance reveals that seedling stem length was not affected by treatments. In addition, the effect of plant extract differed on root length. For example, the maximum root growth was observed in control. In contrast, the evening primrose control recorded minimum length. As is shown in figure 2, reveals that plant extract showed a decreased effect on tomato seed and an increased effect on evening primrose seed. It could be found that different plants have different reactions to specialized compounds. Also, the result has shown that the maximum number of leaf in tomato was observed in *Conocarpus erectus* extract at the concentration of 100 mg/L. In contrast, *Juniperus sabina* 50 mg/L and *Allium jesdianum* 100 mg/L showed the maximum number of leaf. As result shown in Figure 2, there is a positive effect of treatments on the fresh weight in tomato. Results revealed that plants that have more leaf number (*Conocarpus erectus* 50 & 100 mg/L), have maximum fresh weight (Figure 2). Briefly, the physiologic effect of plant extracts differs from plant to plant which refers to organic and non-organic compounds, plant growth regulators and specialized compounds. Compounds like amino acids that cause stimulating plant growth, saponins, vitamins, plant growth regulators, etc. (Paradikovic et al., 2019). Generally, growth is an output of cell division and enlargement. These two processes are closely related to the amount of internal plant growth regulators of plant, like auxin and cytokinin (Taiz et al., 2015). Plant extracts have a variety of compounds that can be involved in plant biological pathways.

Keywords: plant for plant, germination, seed, medicinal plant, specialized compound.

References: Da Silva, J. A. T., Karimi, J., Mohsenzadeh, S., & Dobranszki, J, (2015)....

Table 1. Statistical analysis of the effect of treatments on the tomato and evening primrose seedling development in <i>in-vitro</i>									
SOV	df	Stem length		Root length		Leaf number		Seedling fresh weight	
		E.P	Tomato	E.P	Tomato	E.P	Tomato	E.P	Tomato
treatment	12	1.55 ^{ns}	1.54 ^{**}	5.91 ^{**}	0.71 ^{**}	2.25 ^{**}	3.01 ^{**}	0.0029 ^{ns}	0.0025 ^{**}
error		1.45	0.06	0.98	0.13	0.5	0.36	0.0025	0.0004
CV		102	3.46	25.8	11.7	12.9	12.5	88.04	11.6

ns non-significant and * and ** are significant at 5 and 1 % probability levels, respectively, E.P: Evening primrose

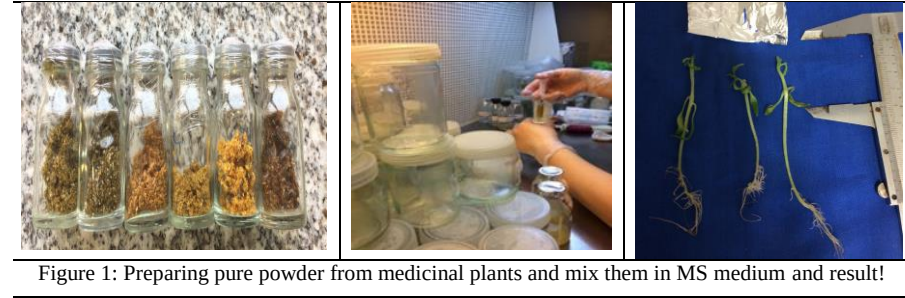
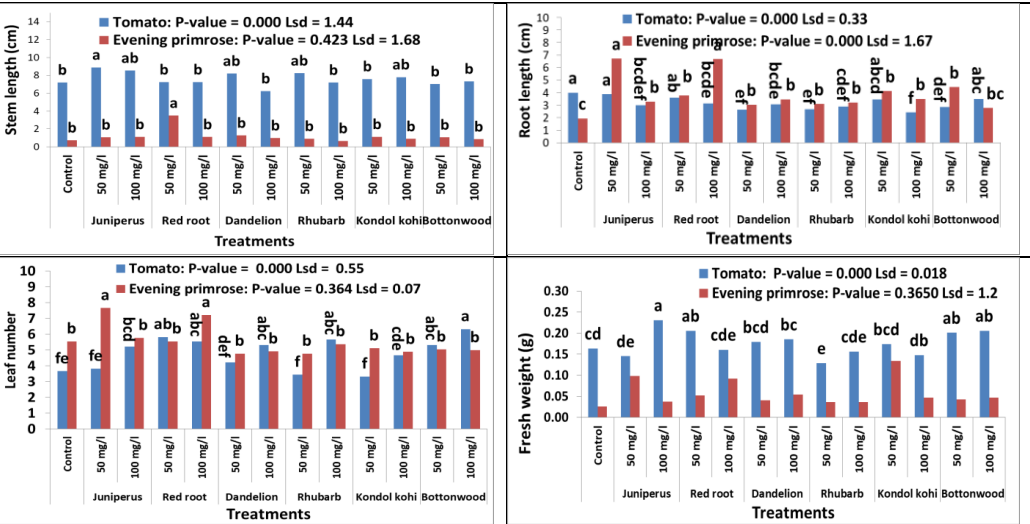


Figure 1: Preparing pure powder from medicinal plants and mix them in MS medium and result!

Figure 2: Mean comparison of effect of plant extracts on different traits in evening primrose and tomato seedling