



## Effects of Allelopathic three Medicinal Plants on Germination and Seeding Growth of *Portulaca oleracea*

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(Received 09 April, 2015, Accepted 15 May, 2015)

(Published by Research Trend, Website: [www.researchtrend.net](http://www.researchtrend.net) f.bidarnamani65@uoz.ac.ir)

**ABSTRACT:** The use of plants allelopathic properties is one of the methods of weeds control against each other which nowadays is performed vast research about that. In this research, the effect of essential oils as medical plants *Artemisia annua* L., *Rosmarinus officinalis* L. and *Lavandula vera* L. with 5 level (0, 250, 500, 750, 1000ppm) was evaluated on weeds of *Cynodon dactylon* L. Result indicated different concentration essential oils plants *Artemisia annua* L., *Rosmarinus officinalis* L. and *Lavandula vera* L. had strong reduce in germination rate, Radicle length and plumule length weed. The highest concentration (1000ppm) essential oil of *Artemisia annua* L., *Rosmarinus officinalis* L. and *Lavandula vera* L. lead to germination deterrency, with 81, 76 and 64 respectively. The low concentration essential oil *Artemisia annua* with 8 respectively reduce germination. It was concluded that *Artemisia annua* has strong allelopathic to control germination and seeding weed it can be used as a herbicide in organic culture of the agricultural crops.

**Key words:** *Portulaca oleracea*, essential oil, allelopathic, germination, weed

### INTRODUCTION

Weeds are unwanted plants in a variety of human activities interact with the environment, agriculture and human habitats have adapted and the most important threats to the cultivation and development of crops that fight weeds, was one of the most important steps in Agriculture (Quaswmand Foy, 2001). Allelopathy is defined as direct or indirect interaction, whereby chemicals and their breakdown metabolites released by one plant or organism influence the physiological processes of another neighboring plants and/or organisms (Molisch, 1937; Rice, 1984; Challa and Ravindra, 1998). Allelochemical combination play numerous physiological and biochemical processes such as transitive and germination inhibition, inhibition of cell division and elongation, Gibberellin and auxin-induced growth inhibition, inhibition of respiration and photosynthesis, stomatal inhibition, inhibition of protein synthesis and hemoglobin, changes in membrane permeability and inhibition of enzyme activity (Narval, 1996).

Allelochemical compositions, are responsible for physiological and biochemical processes such as transitive and germination inhibition, inhibition of cell division and growth inhibition induced by auxin or gibberellins inhibition of respiration and

photosynthesis, stomatal inhibition, inhibition of protein synthesis and oxygen permeability of the membrane and the inhibitory activity of enzymes (Narwal and Tauro, 1996). Several reports show that various species of *Artemisia* and *Rosemary* have allelopathic properties (Duke *et al.*, 1987; Rice, 1995). The results of the study (Ramezani *et al.*, 2008) showed that *Rosemary* has significant effect on the germination of *Acroptilon repens*, *Amaranthus retroflexus* and *Portulaca oleracea* weeds. Thus, allelopathy is one strategy to reduced commercial herbicide dependency in practical weed control programs (Farooq *et al.*, 2011). In addition, natural compounds are considered to be more environmentally benign than most synthetic herbicides (Duke *et al.*, 2000; Macías *et al.*, 2007). However, only a small percentage of the plant species have been phytochemically analyzed despite the fact that plants provide a rich source of biologically active compounds (Hostettmann and Wolfender, 1997; Ambrosio *et al.*, 2006).

The purpose of this study was to evaluate the allelopathic effect of essential oils of *rosemary*, *lavender* and *purslane* plant on germination and growth of weeds to control its the damage and reduce the use of chemical pesticides.

## MATERIAL AND METHOD

To extract the oil, leaves were dried and then ground into a powder electric crusher. Oil of 50 g of each leaves of each plant individually along with 1200 ml of distilled water was extracted by Clevenger Apparatus at 100°C. Essential oil extraction time for each sample was 3 hours oil collected from each plant was dewatered using sodium sulfate and were kept in a refrigerator at 4° C in 7 ml glass jar with Aluminium lid.

To run the tests, for each treatment 50 seeds of weed were placed into four Petri dish and each petri dish is considered to be a repeat. Seed grown in petridishes with a diameter of 180 and a thickness of 15 ml was performed. After adding oil, doors and glass Petri dishes were placed in a growth chamber with dark, temperature 25-20°C and humidity of 70 percent-were placed. Traits such as germination, the mean time to germination and radicle and plumule of the weeds.

The experiment was conducted in a completely randomized design with 3 repetitions. Data were analyzed by software MATAT-C.

## RESULT

### The effect of the herb *Artemisia* extracts on germination and growth of *Portulaca oleracea*.

Analysis of variance showed that the percentage of germination of seeds under the influence of purslane herb wormwood extract significantly decreased. The comparison showed that purslane seed germination under oil concentrations higher than 500ppm stopped (Table 1) results also showed a concentration of 250 ppm *Artemisia* reduced *Portulaca oleracea* seed germination up to 8 percent. The results showed that the mean time to germination *Portulaca oleracea* using various concentrations of *artemisia* significantly decreased. Also, mean concentration comparison showed that increase in concentration of *Artemisia* has significant decreases on radicle and plumule.

**Table 1: Mean Squared at weed common purslane (*Portulaca oleracea*) traits under different concentrations of essential oil of *Artemisia*.**

Sources of variation	Degrees of freedom	Mean-square of measured traits						
		Germination percentage	Average days of germination (days)	Rootlet length (mm)	Shoot length (mm)	Plant fresh weight (g)	Plant dry weight (g)	Plant height (mm)
Treatment control	4	651.45**	87.48**	38.20**	91.46**	32.11**	7.91**	87.45**
	14	251.1	9.53	7.86	11.54	4.97	1.08	8.4

\* And \*\* indicate significant differences in the level five and one percent

### Herb *Artemisia* essential oils influence on germination and growth of *Portulaca oleracea*.

Results showed that *Portulaca oleracea* seeds germination and growth by the different concentrations of rosemary essential oil significantly decreased.

1000 ppm Rosemary decreased *Portulaca oleracea* seed germination to 76 percent. The comparison showed that the seed germination of *Portulaca oleracea* using rosemary essential oils significantly decreased (Table 2).

**Table 2: Mean Squared at weed purslane traits under different concentrations of essential oil of rosemary.**

Sources of variation	Degrees of freedom	Mean-square of measured traits						
		Germination percentage	Average days of germination (days)	Rootlet length (mm)	Shoot length (mm)	Plant fresh weight (g)	Plant dry weight (g)	Plant height (mm)
Treatment control	4	951.39**	165.49**	81.71**	127.91**	71.65**	8.41**	71.74**
	14	64.43	8.43	9.77	24.84	8.48	1.32	8.75

\* And \*\* indicate significant differences in the level five and one percent.

Although this reduction was not significant at some concentrations. The results showed that the radicle and plumule of *Portulaca oleracea* under different concentrations Rosemary significantly reduced. Concentrations of 500 ppm and 750 ppm, respectively, radicle length were reduced to 61 and 42 percent, respectively.

#### Herb lavender essential oils influence on germination and growth *Portulaca oleracea*

Results showed that *Portulaca oleracea* seeds germination and growth by the different

concentrations of lavender essential oil significantly decreased. The comparison showed that the concentrations of 250, 500, 750 and 1000 ppm essential oils, *Portulaca oleracea* seed germination 3, 34, 48 and 64% decrease compared to control respectively (Table 3). The results showed that the mean time to seed germination of *Portulaca oleracea* significantly reduced with the use of *Portulaca oleracea* essential oils. Although this reduction was not significant at some concentrations.

**Table 3: Mean Squared at weed purslane traits under different concentrations of essential oil of lavender.**

Sources of variation	Degrees of freedom	Mean-square of measured traits						
		Germination percentage	Average days of germination (days)	Rootlet length (mm)	Shoot length (mm)	Plant fresh weight (g)	Plant dry weight (g)	Plant height (mm)
Treatment control	4	784.79**	264.79**	38.09**	79.34**	11.08**	11.34**	94.58**
	14	9.59	9.59	14.79	36.79	15.73	23.72	35.11

\* And \*\* indicate significant differences in the level five and one percent

#### DISCUSSION

Allelopathic potential of plants depend on various factors, including species, varieties, plant growth stage and the type of plant (Rashed Mohasel *et al.*, 2009). The results of a recent survey showed that Artemisia, rosemary and lavender strong allelopathic on the *Portulaca oleracea*. Artemisia and lavender essential oils, decreased dry weight of shoots of *Portulaca oleracea* but effectiveness for Rosemary wasn't as well as The other two plants this result could be explained by the phenomenon of allelopathy added is highly dependent on the type, concentration and sensitivity of the target plant (Regosa and Pedrol, 2002). Generally Artemisia and lavender essential oils have strong allelopathic effects and prevents weed germination and growth of the *Portulaca oleracea* which it would be promising results in the organic cultivation of crops to be followed and it can be used in the production of herbicides with natural origin.

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