

# The Inhibitory Effect of Some Wild Plant Species on the Germination of Convolvulus L. Wild Plant Seeds

<sup>1</sup>Yawooz Hameed Mahmood<sup>2</sup>, Khalid Mohammed Abbas<sup>3</sup>, Shaima Hassan Ali<sup>4</sup>, Al- Abbasi Ali Talib Hassan Al-Naqib<sup>5</sup>, Abdulhamead Adnan Majeed Al-Majmaei

<sup>1,3,4,5</sup>Biology Department, College of Education University of Samarra, Iraq.

<sup>1</sup>Salah al-den Education Directorate, IRAQ

<sup>2</sup>kerkuk07@hotmail.com

<sup>3</sup>shaimaa.h.ali1986@gmail.com

<sup>4</sup>ali.t.hassan1998@gmail.com

<sup>5</sup>Abdulhamead.a.majed1998@gmail.com

## Abstract

All plant extracts affected the percentage of germination of Bindweed or Wild plants (*Cynanchum*) seeds. The 50% concentration recorded a 40% germination rate in the genus *C. murale*, *Eu. peplus* and *Me. indicus*, while *E. vesicaria* did not record any significant percentage of germination, but at 100% concentration the species were *C. murale*, *Eu. peplus*, *M. parviflora*, *Me. indicus* and *So. oleraceus* had 20% germination rate, while *E. vesicaria*, *L. draba* and *P. lanceolata* species did not record any significant germination. As for the control treatment, it out-performed all other treatments, as it recorded the highest germination rate of 60%. As for the effect of plant extracts in killing the seeds of the longevity, the concentration 50% recorded the highest killing rate in *E. vesicaria* extract that reached 100%, while the treatments *A. maritima*, *L. draba* and *M. parviflora*, any significant killing rate, while the concentration 100% recorded the highest killing rate of 100% in each of the species *E. vesicaria*, *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum*, while none of the species *E. vesicaria*, *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum* did. While, *A. maritima* as well as control did not records any significant killing rate. As for the effect of plant extracts on stem and root lengths, the 50% concentration recorded the highest stem length of 6.5 cm in *P. lanceolata*, while *L. draba* recorded the lowest stem length at 1.5 cm, while the 100% concentration recorded *A. maritima* and *So. oleraceus* had the highest stem length of 3.5 cm, while the control treatment was superior to all treatments, as it recorded the highest stem length of 8.6 cm. As for the root length, the two species *A. maritima* and *L. draba* recorded the lowest root length of 1.0 cm, while *P. lanceolata* recorded the highest root length. It reached 3.0 cm at 50% focus. In the 100% concentration, *So. oleraceus* extract recorded the highest root length of 2.5 cm, while *C. murale* was the lowest, recording 1.3 cm, while the control treatment outperformed all studied treatments in recording the highest root length of 6.3 cm. As for the effect of plant extracts on the fresh and dry weights of tall stalks, *C. murale* recorded the highest fresh weight of 66 mg at the 50% concentration, while *L. draba* recorded the lowest fresh weight of 30 mg at the 50% concentration and at the 100% concentration. *So. oleraceus* had the highest fresh weight of 65 mg, while the control treatment recorded the highest fresh weight of 81 mg, while the lowest dry weight was for type *Me. indicus*, where it recorded 13 mg at the 50% concentration, and the highest dry weight in treatment *C. murale* was 31 mg, while the 100% concentration recorded the highest dry weight for the type *So. oleraceus* reached 27 mg, while the control treatment outperformed all studied treatments, amounting to 40 mg, while the fresh and dry weights of the roots were recorded as type *Me. indicus* the highest weight of the fresh root was 5.1 mg at the concentration 50% and at the 100% concentration it was 4.9 mg.

**Keywords:** Plant extracts, Wild plants, *Convolvulus arvensis*.

## 1. Introduction

Given the increased risks associated with the indiscriminate use of synthetic herbicides, researchers are looking for alternative weed control strategies. Allelopathy is a natural phenomenon that can be exploited for biological weed management in field crops. Aqueous extracts of allelopathic plants may provide selective inhibition of weed growth. [Perveen et al. \[1\]](#) demonstrated through the use of the selective toxic effect of *Delonix regia* aqueous plant, ethyl acetate and freeze-dried leaf extract against *Convolvulus L. arvensis*. The

results showed that the concentrations of the leaf extract were low to medium (2.5 and 5%) and ethyl acetate (50 (500 and 1000 ppm) inhibited field weeds germination, root length, plant height and dry winter biomass by 35-48%, 42-59%, 45% and 52%, respectively. He showed that low to medium concentrations of *Delonix regia* extract and leaves can be used safely for natural control of field weeds in wheat, reducing reliance on synthetic herbicides. Plant essential oils have recently been exploited as bio-herbicides due to their documented allelopathic effects and the use of the essential oil of the *Artemisia* plant, which belongs to the family of Asteraceae

and is considered a biocide for the control of field weeds [2].

Sodaeizadeh and his group (2009) explained that the aqueous extract of *Peganum* can be used as a natural herbicide to control longevity and thus reduce dependence on synthetic herbicides because it contains phenolic acids in the leaves, including gallic acid, vanillic acid and 4-hydroxybenzoic acid. p-Hydroxybenzoic acid, 3,4-dihydroxybenzoic acid hydroxy-3--4, caffeic acid, syringic acid and ferulic acid in *Peganum harmala* leaf extracts where the concentration of these acids is higher in leaf extracts compared to stem extracts. The root and therefore, this explains that the inhibitory activity of the leaves is higher than the stems and roots by affecting the plant of the long.

## 2. Materials And Methods

Seed collection.

*C. arvensis* seeds were collected from Salah Al-Din governorate for the year 2021 in the stage of maturity. It is worth mentioning that this plant was diagnosed as long based on the flora of Iraq [3]. The diagnosis was also confirmed by the experts of the Iraqi National Herbarium and the Kurdistan Herbarium in northern Iraq.

Seed sterilization.

*Cynanchum* seeds were sterilized with (commercial sodium hypochlorite) at a concentration of 6% by adding one volume of it to two volumes of sterile distilled water and left for two minutes. A sterile petri that contains sterile filter papers of the type (Whatman No.1) for the purpose of drying them from water [4].

Seed viability test.

For the purpose of calculating the percentage of germination of the tested seeds, 10 seeds of *Cynanchum* seeds were placed on filter papers moistened with sterile distilled water (10 ml) in Petri dishes with a diameter of 9 cm and with two duplicates. The percentage of germination was calculated after 20 days of sowing [5].

Germination percentage = number of germinated seeds/ total number of seeds X 100

Killing rate was calculated by:

Killing percentage = number of killed seeds/ number of germinated seeds X 100

Preparation of plant extracts.

After collecting, cleaning and preparing the plant samples to prepare the plant extracts, an aqueous extract was prepared as follows:

Extraction method.

The aqueous extract was prepared according to the method of Rios et al. [6] as follows:

Weighing 40 g of the plant model, then 160 ml of hot water was added to it and placed in a glass beaker, taking into account the tightness of closure. All experiments were carried out in the laboratories of Samarra University. Leave the mixture in the refrigerator for 24 hours for the purpose of soaking. Then filtered through several layers of gauze and then filtered again using whatman No.5 filter paper to get rid of the uncrushed plant parts remaining in the mixture.

Pour the extract into sterilized glass dishes and put in an

electric oven at a temperature not exceeding 40°C until used.

The extract, after drying, was placed in glass bottles with a tight lid and kept in the refrigerator until use [5].

Sterilization of the extracts and preparation of the concentrations used in the study.

Mitscher and his group followed the 1972 method in preparing and sterilizing the Stock Solution. 1 gm of dry plant extract was taken and dissolved in 10 ml of sterile distilled water. So we had a stock solution with a concentration of 100 mg/ml, and the solution was sterilized by filtration using sterile Millipore filters with a diameter of 0.22 µm to get rid of the bacterial contaminants in it and other concentrations were prepared from it [7].

Soil preparation and disinfection.

Mixed soil was selected from the same place from which the samples were collected and sieved using sieves with a diameter of 0.5-1 mm and sterilized with sterilizer for an hour, then the sterilization was repeated on the next day for an hour as well. The soil was left for 7 days before use in sterilized containers, then the soil was distributed on sterile Petri dishes with a diameter of 9 cm by 30 g/a plate moistened before planting with 10 ml of sterile distilled water using a sterile syringe and left for two days, then the soil of the dishes was planted with 10 seeds of long In one dish, plant extracts and fungal filtrates were added using a sterile syringe at a rate of 10 ml/dish, at 50% dilution and 100% concentration.

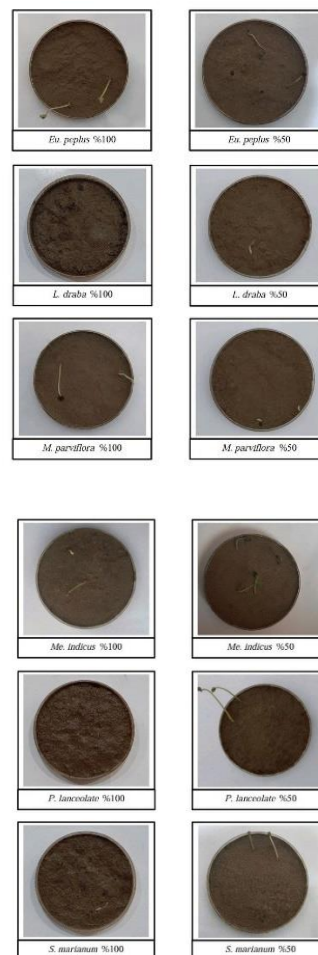
## 3. Result And Disruption

The results of the research shown in (Table 1, picture 1) indicate that there is a high inhibitory effect of plant extracts on germination and killing characteristics of long bush seeds. Where the percentage of germination at concentrations 50 and 100% (10%) for *A. maritima* plant and when treating seeds with aqueous extract of *C. murale*, the percentage of germination at concentration 50% (40%) and at concentration 100 reached (20%) and when treating seeds with aqueous extract For *E. vesicaria*, the percentage of germination was at the concentrations 50 and 100% (0%) and when the seeds were treated with *L. draba* extract, where the percentage of germination was at the concentrations 50 and 100% (0% and 10%), respectively, while the percentage of germination was 20% at Treating the seeds with the aqueous extract of *M. parviflora* at concentrations 50 and 100%, and when treating them with the aqueous extract of *Me. indicus*, the percentage of germination was 50 and 100% (40% and 20%), respectively, and when treated with aqueous extract of *P. lanceolata*, the percentage of germination reached (20% and 0%) at both concentrations 50 and 100%, respectively, compared to the control sample that The percentage of germination is 60%. The percentage of germination at concentrations 50 and 100% when treated with aqueous extract of *S. marianum* was (20%, 10%), respectively compared to the control sample, and the percentage of germination at concentrations 50 and 100% reached (30%, 20). %) respectively compared to the control sample. In terms of the killing rate, the extract A.

*maritima*, *L. draba* and *M. parviflora* at the concentration 50% achieved the lowest killing rate of 0%, while the extract *E. vesicaria* achieved the highest killing rate at the 50% concentration reaching 100. While at 100% concentration, the killing rate was 0% when the seeds were treated with *A. maritima* extract, and the extracts *E. vesicaria* and *Eu. Peplus*, *L. draba*, *P. lanceolate* and *S. marianum*, the highest killing rate at 100% concentration reached 100%, while the rest of the extracts fluctuated killing rates among these extracts, whereas the results indicate that there are significant differences in germination rates and killing rates when treating the seeds of *Cynanchum* with plant extracts. The extract of the watercress plant *E. vesicaria* outperformed the rest of the extracts for its high inhibitory ability. The higher it contains alkaloids, phenols, flavonoids, terpenes and others, and this agrees with [8].

**Table 1: Effect of plant extracts on germination and killing rates of *Cynanchum* seeds during the study period (20 days)**

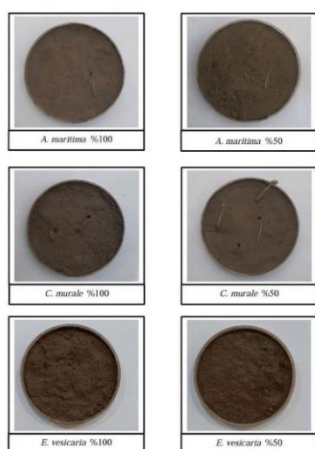
No	Plant extracts	%Germination rate		%Killing rate	
		Concentration on 50%	Concentration on 100%	Concentration on 50%	Concentration on 100%
1	<i>A. maritima</i>	10	10	0	0
2	<i>C. murale</i>	40	20	50	50
3	<i>E. vesicaria</i>	0	0	100	100
4	<i>Eu. peplus</i>	40	20	75	100
5	<i>L. draba</i>	10	0	0	100
6	<i>M. parviflora</i>	20	20	0	50
7	<i>Me. indicus</i>	40	20	50	50
8	<i>P. lanceolata</i>	20	0	50	100
9	<i>S. marianum</i>	20	10	50	100
10	<i>So. oleraceus</i>	30	20	33.3	50
	Control	60		0	



Picture 1. Effect of plant extracts on germination rates of *Cynanchum* seeds

Effect of plant extracts on the longest stems and roots of the plant during the study period (20 days).

The plant extracts had an inhibitory effect on the longest and tallest stems (Table 2). It achieved significant differences compared to the control, which recorded the highest average stem length of 8.6 cm and root length of 6.3 cm. The following plant extracts achieved *P. lanceolata* and *so. oleraceus* had the highest stem length at 50% concentration, respectively, 6.5 cm and 4.8 cm compared to the control sample. The following plant extracts *E. vesicaria*, *L. draba* and *M. parviflora* achieved the lowest stem length, which reached 0 cm, 1.5 cm and 1.7 cm, respectively. Compared to the control sample. The rest of the studied plant extracts fluctuate in their values between the aforementioned extracts at the 50% concentration compared to the control sample, where both *A. maritima* extract and *So. oleraceus* extract achieved. *So. oleraceus* had the highest stem length at 100% concentration (3.5 cm and 3.5 cm, respectively) compared to the control sample, achieved by *E. vesicaria* and *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum* had the lowest stem length at 100% concentration compared to the control sample 0% cm, 0% cm, 0% cm, 0% cm and 0% cm. *P. lanceolata* and *So. oleraceus* had the highest root length, with the longest reaching 3.0 cm and 2.6 cm, respectively, at the concentration 50% compared to the control sample. *E. vesicaria*, *A. maritima* and *L. draba* extracts achieved the lowest root length of 0 cm, 1.0 cm and 1.0 cm at Concentration 50%. At 100%



concentration, the highest root length was 2.5 cm and 2.0 cm for *So. oleraceus* extracts and *A. maritima*, respectively, compared to the control sample. Both *E. vesicaria* and *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum* had the lowest root length of 0% cm, 0% cm, 0% cm, 0% cm and 0% cm, and the rest of the plant extracts fluctuated their values between these extracts at 100% concentration compared to a sample the control. The results of the research showed that the extract of the watercress plant *E. vesicaria* is superior to the rest of the extracts due to its high inhibitory effect on the roots and stems of the stalk at the concentrations 50% and 100%. And alkaloids, tannins, soaps, resins, flavonoids, terpenes and steroids have a high inhibitory effect on plant seed embryos, and this is consistent with [9-11].

**Table 2. Effect of plant extracts on stem and root lengths during the study period (20 days)**

No	Plant extracts	cm Root length		cm Stem length	
		Concentration on 50%	Concentration on 100%	Concentration on 50%	Concentration on 100%
1	<i>A. maritima</i>	1.0	2.0	2.5	3.5
2	<i>C. murale</i>	1.7	1.3	2.8	2.7
3	<i>E. vesicaria</i>	-	-	-	-
4	<i>Eu. peplus</i>	1.5	-	2.5	-
5	<i>L. draba</i>	1.0	-	1.5	-
6	<i>M. parviflora</i>	1.2	1.8	1.7	3.0
7	<i>Me. indicus</i>	2.0	1.7	3.6	2.6
8	<i>P. lanceolata</i>	3.0	-	6.5	-
9	<i>S. marianum</i>	1.5	-	3.7	-
10	<i>So. oleraceus</i>	2.6	2.5	4.8	3.5
	Control	6.3		8.6	

The effect of plant extracts on the weights of fresh and dry stems during the study period (20 days).

Table 3 shows the inhibitory effect on the fresh and dry weights on the plant, where the plant extract *C. murale* and *M. parviflora* achieved the highest fresh weight at 50% concentration, 66 mg and 56 mg, respectively, compared to the control sample that received the highest fresh weight of 81 mg. In the dry weight at the 50% concentration, the *C. murale* extract achieved the highest dry weight of the stem 31 mg compared to the control sample that received a dry weight of 40 mg, and the plant extract *E. vesicaria* and *L. draba* recorded the lowest fresh weight at the 50% concentration, which was 0 mg. and 30 mg, respectively, compared to the control sample, and in the dry weight at a concentration of 50%, the extract of *E. vesicaria* and *L. draba* recorded 0 mg and 7 mg, respectively, compared to the control sample. At the 100% concentration, the plant extract achieved *So. oleraceus* had the highest fresh weight, which reached 65 mg, as well as the highest dry weight, which reached 27 mg, compared to the control sample. As for the extracts, *E. vesicaria* and *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum* achieved the lowest fresh and dry weight at

100% concentration, each of which weighed 0 mg compared to the control sample. The results of the study showed that the plant extract *E. vesicaria* reduced the fresh and dry weight by 100% for both concentrations. 50% and 100%, and this is in agreement with Sodaeizadeh and his group (2009), where he explained that plant extracts may contain high concentrations of phenolic acids, which had a high inhibitory role in reducing weight

**Table 3. Effect of plant extracts on the weight of fresh and dry stems during the study period (20 days)**

No	Plant extracts	Fresh stems mg		Dry stem mg	
		Concentration on 50%	Concentration on 100%	Concentration on 50%	Concentration on 100%
1	<i>A. maritima</i>	41	51	12	16
2	<i>C. murale</i>	66	60	31	21
3	<i>E. vesicaria</i>	-	-	-	-
4	<i>Eu. peplus</i>	41	-	14	-
5	<i>L. draba</i>	30	-	7	-
6	<i>M. parviflora</i>	65	60	20	15
7	<i>Me. indicus</i>	48	56	25	13
8	<i>P. lanceolata</i>	54	-	23	-
9	<i>S. marianum</i>	58	-	24	-
10	<i>So. oleraceus</i>	56	65	16	27
	Control	81		40	

The effect of plant extracts on the weights of fresh and dry roots during the study period (20 days).

Table 4 indicates the inhibitory effect achieved by plant extracts on the fresh and dry root weight of the plant, where it achieved significant differences compared to the control sample, which recorded the highest fresh weight of 67.3 mg and the highest dry weight of 35.1, where at the concentration of 50%, the extract achieved *Me. indicus* and *M. parviflora* had the highest fresh weight of 5.1 and 4.6, respectively, compared to the control sample, and the same extracts achieved the highest dry weight of 2.8 and 3.2 mg, respectively. As for the extracts, *E. vesicaria* and *L. draba*, it achieved the lowest fresh and dry weight of the roots at the concentration of 50%, which reached 0 and 2.4, respectively, for the fresh weight and 0, 1.2, respectively, for the dry weight. At the concentration of 100%, the extracts achieved *Me. indicus* and *So. oleraceus* had the highest fresh weight of 4.9 and 4.7 mg, respectively, compared to the control sample, and the same extracts achieved the highest dry weight of 3.4 for *So. oleraceus* plant extract and 3.1 for *Me. indicus* plant extract.

Compared to the control sample, either *E. vesicaria* or *Eu. peplus*, *L. draba*, *P. lanceolata* and *S. marianum* achieved the lowest fresh and dry weight at 100% concentration, reaching 0%, where the percentage of inhibition when treated with these extracts reached 100%, and this is

what the results of our study showed. The reason for this is due to the effective chemicals that these extracts contain it, which affected root weights, and this agrees with the study of Perveen and his group (2019) through the use of the toxic effect of the plant *Delonix regia* and dried leaf extract against *C. arvensis*.

**Table 4. Effect of plant extracts on the weight of fresh and dry roots during the study period (20 days).**

No	Plant extracts	Fresh roots mg		Dry roots mg	
		Concentration on 50%	Concentration on 100%	Concentration on 50%	Concentration on 100%
1	A. maritima	3.5	4.2	1.3	2.5
2	C. murale	2.3	2.1	1.9	1.3
3	E. vesicaria	-	-	-	-
4	Eu. peplus	3.6	-	2.2	-
5	L. draba	2.4	-	1.2	-
6	M. parviflora	4.6	3.8	3.2	2.4
7	Me. indicus	5.1	4.9	2.8	3.1
8	P. lanceolata	3.2	-	1.8	-
9	S. marianum	2.6	-	1.5	-
10	So. oleraceus	2.7	4.7	1.6	3.4
	Control	67.3		35.1	

## 4. Conclusions

The concentration of 100% of all plant extracts exceeded the concentration of 50% in all treatments. Significant decrease in biomass in all treatments compared to the control treatment. Decrease in the length ratios of roots and stems in all treatments compared to the control treatment.

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