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EFFECTS OF SPRAYING AQUEOUS EXTRACTS OF SOME CROP PLANTS ON GROWTH OF FOUR TYPES OF WEEDS

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Abstract

Allelopathi is a biological phenomenon that affects neighbouring plants or that is followed it in agriculture through the production of chemical compounds which is one of the main factors limiting the growth of plants, can benefit from this phenomenon in reducing the growth of the weeds using crops have Allopathic effect, the studies found many crops that possess the effect of Allopathic (wheat, sunflower, sorghum, barley, corn). For that we saw that necessary to studied the effect of spraying aqueous extract of plant residues of wheat (*Triticum aestivum* L.), barley (*Hordeum Spp.* Desf.), Corn (*Zea mays* L.) on germination and early seedling growth of (*Panicum repens* L., *Silybum. marianum* L. *Lolium rigidum* L *Sonchus oleraceus* L.) Three concentrations were used, 0, 10.15% for the aqueous extracts. The experiment was designed using the design of a complete random sector with four replicates per treatment. Data were collected and analyzed for shoot total length, root total length, seedling weight, leaf area, number of leaves per plant and weeds control efficiency (%) (EWC). Comparisons were made using the Duncan test.

The results showed significant differences between the concentrations of the aqueous extracts of wheat (*Triticum aestivum* L.), barley (*Hordeum Spp*. Desf.) And corn (*Zea mays* L.) for all traits. The shoot length of *Sonchus oleraceus* L. was lower than by effect of spraying with barley extract at 15% concentration.

The results also showed that the aqueous extract of wheat at 10% concentration give the highest in the weed control efficiency in these studied.

Keywords: Allelopathy, spraying, wheat, Barley, Corn, growth, weeds

Introduction

Plants that grow in an unsuitable location known weeds and that compete the plants that are grown with them to space, light, and food Al-Jubouri (2002). These weeds accompany the crops that grow in the field so it is necessary to fight them because of the negative effects on the production of crops. mechanical methods and chemical methods considered as the common methods in the control of the weeds, the two methods have many disadvantages of, for example, the use of chemical control is one of the economically costly methods in addition to causing pollution in the environment, that affecting human health and the ecosystem, the continuous use of chemical herbicides creates generations of weeds resistant to those herbicides AL-Jehaishy (2017) for that studies have tended to find alternatives that are less expensive and environmentally friendly, as well as not affecting the genetic makeup of weeds, That alternative is the biologic control using the allelopathic compounds released from different parts of the plant, which can inhibit and reduce the growth of some weeds Mandel (2000). Biological control of the weeds using allelopathic compounds as herbicides has been widely used as a safe, useful and less costly method, It is also an important way to reduce the use of herbicides and to protect and improve the environment, which contributes to the development of agricultural systems Farooq *et al.* (2008). Allelopathy is a natural environmentally favourable may proved to be a distinctive method for controlling weeds and decreased dependence on synthetic pesticides, improving crop yield.

Considers (wheat, barley, oats, maize, sorghum, sunflower, and rice)from crops that have an allelopathic effect to limit and control the growth of the weeds Nawaz et al (2014) the reason for use as herbicides for the weeds is difference the chemical nature of the compounds that released and the mechanism of their effect, found Naeem et al. (2018). that the use of sorghum + sunflower extracts at 12 liters per hectare had a significant effect on the control of growing weeds in the wheat fields and increased production of the wheat crop. Allelopathic compounds released by leaching, root exudation, decomposition and volatilization have the same effect as the chemical herbicides of the weeds. These studies show the allelopathic compounds released by leaching, root exudation, decomposition, and volatilization have the same effect as the chemical herbicides of the weeds.

Materials and Methods

The study was conducted at Biology Department College of science University of Mosul in 2018,Three crops namely Wheat, Barley and Corn were chosen for the experimental work, Choose these particular crops was based in our area their well-established allelopathic potential against other plant species and on their availability. Collected Plants residues for testing their Allelopathic activity from the fields of Mosul after harvested and were taken to the laboratory and crushed, Dry materials were blended and soaked in distilled water 10 g in 100 ml,15g in100ml – 1 for 24 h at 25 °C. Then solutions were first filtered through a double layer of muslin cloth and then through Whatman No. 1 filter paper. These 10%, 15% (w/v)water extracts

The effects of different concentrations of the aqueous extracts effect of aqueous exudation of Wheat (*Triticum aestivum* L.), Barley (*Hordeum* Spp. Desf.), Corn (*Zea mays* L.) on germination and early seedling growth of (*Silybum marianum* L., *Lolium rigidum* L., *Panicum repens* L., *Sonchus oleraceus* L.) were studied in a glasshouse. For this, 10 seeds were planted in Plastica pot diameter (20 cm) and height (25 cm), for each of the Weeds (*Silybum marianum* L., *Lolium rigidum* L., *Panicum repens* L. *Sonchus oleraceus* L.) at 0.5 cm depth from the surface of the soil, and then irrigated with water, and put in a glass house at a temperature of 20 ± 2. after (20 days) from cultivation was spraied with

aqueous extracts of (Wheat, Barley and Corn) and distilled water as the control. with three replication for each treatment, spraying process was repeated again after two months old. After 60 days of germination, the plants were cut off, the Shoot was separated from the roots. The percentage of inhibition was calculated from the comparison (for all attributes) according to the following equation:

Inhibition ratio=(con - treat /con)×100 Chung *et al*. (2001).

Characteristics studied.

1. Efficiency Weed Control(%) (EWC) according to the following equation :

EWC %= A-B\A×100

A=dry weight for control

B=dry weight of the treatment

2. Shoot length (cm).

3. Root length (cm).

4. Leaves area (cm^2): Depending on the machine equations:

Leaf area (cm^2) = leaf length ×max width leaf× 0.905. Kemp *et al*. (1966).

5. Number of leaves per plant.

6. Dry weight of the plant (g).

Static analysis

The experiment was carried out according to the design of complete random sectors (R.C.B.D.) as a global experiment and conducted a statistical analysis of data according to the SAS program. The Duncan multi-range test was used at a 5% probability of differentiation between the average of transactions Antar (2010).

Results

The results in table (1) show inhibition effect in the Shoot length of the four weeds (*Silybum marianum* L., *Lolium rigidum* L., *Panicum repens* L., *Sonchus oleraceus* L.) by effect of aqueous extract of Wheat (*Triticum aestivum* L.), Barley (*Hordeum* Spp. Desf.), Corn (*Zea mays* L.) in all treatments, we saw inhibition in all concentrations but was higher effect in 10%.

Highest percentage inhibition was observed in *Sonchus oleraceus* L. treated with Barley aqueous extract at aconcentration15% by (91%), so then Barley considers is one crops to inhibit weed growth by allelopathic interactions, barley effect on growth of other crops and weeds resulted from allelochemical compounds that released from the different parts for plants Jabran (2018).

Several studies have shown that plants have allelopathic qualities, among those: oat, sorghum, wheat, rye and barley (Narwal, and Tauro, 1996), Rizivi *et al.,* 1999).

Result showed *Sonchus oleraceus* L. is more sensitive for treatment compared with other weeds, While *Silybum marianum* L. was less sensitive that due to differences in genotype of weeds.

Table (2) Indicated a reduction in Root length of the four weeds *Silybum marianum* L., *Lolium rigidum L., Panicum repens L. Sonchus oleraceus* L treated with aqueous extract of Wheat(*Triticum aestivum* L.), Barley Hordeum Spp. Desf.), Corn (*Zea mays* L.). all results shows that the highest percentage inhibition in *Lolium rigidum* L. at concentration 10% of Wheat extract that is(67.5%).

Results in this study similar to that find by Refreshing (2001). that showed wheat extract prevented weed germination, the results are shown that the concentration effect of 10% is more than 15%in most coefficients, It is apparent that *Lolium rigidum* L. was more sensitive for treatments, While *Silybum marianum* L. was less sensitive may be due that to differences in genotype.

The results in table (3) showed that different aqueous extracts of crops that used in this study caused inhibitat effect strong in leaf area in all weed the treated by aqueous extraction of Wheat, Barley, Corn, and that effect ascribe to effect of allelopathic compounds in cell division and elongation, and the effect at IAA activity AL-Jehaishy(2017), the table show increased inhibition effect with increased concentration. the highest inhibition observed in *Sonchus oleraceus* L. by effect the aqueous extract Barley that is 92.89% at concentration 15% aqueous extract of crops was displaying various degrees from inhibit effect in dry weight of *Silybum marianum L., Lolium rigidum L., Panicum repens L.and Sonchus oleraceus* L. that effect depends on a concentration. the greatest inhibition was observed at the 10%w:v concentration(Table4). that decrease may be due to the presence of allelopathic compounds, which interfered with the various growth mechanisms and inhibited the process of photosynthesis, which led to low dry weight.

When treatment with aqueous extract of Wheat at a concentration 10%w:v decreased the dry weight of *Sonchus oleraceus* L. by 91%, as well as decrease the dry weight of *Silybum marianum* L. treated with aqueous extract of Wheat at a concentration 10%w:v by 90% compared with others weed. the inhibition effect may be due to the wheat content of phenols compounds such as (Hydroquinone, P-Hydroxy benzoic acid, Quercetin, Salicylic acid) Hussein *et al* (2018).

Spraying with aqueous exudation of crops (Wheat (*Triticum aestivum* L.), Barley(*Hordeum Spp*. Desf.), Corn (*Zea mays* L.) significantly reduced leaves numbers of weeds in more treatments. the lower in leaves numbers in all treatments that show in (Fig. 1, Fig. 2, Fig3, Fig4). The highest reduced in leaves numbers clearly in *Sonchus oleraceus* L. that treated with Wheat aqueous exudation in 15% .That effect may be because the allelopathic compounds affect the growth of some weed

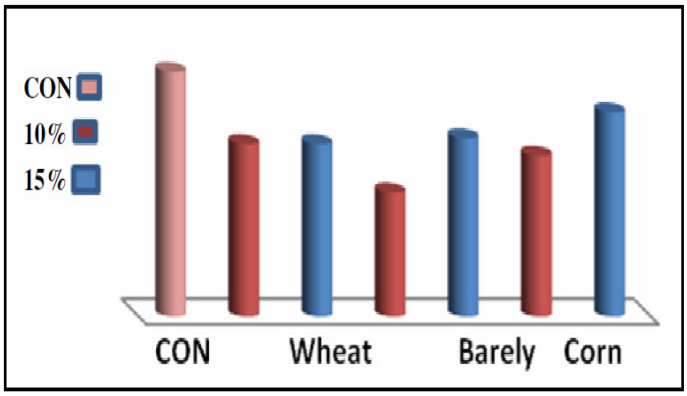

Fig. 1 : Effect spraying aqueous extract of (Wheat, Barley and corn) in leaves numbers of *Silybum marianum* L.

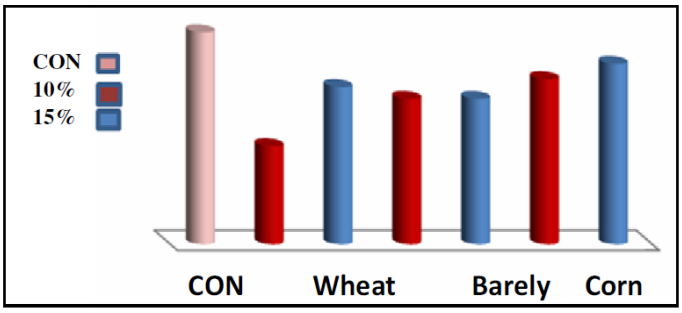

Fig. 2 : Effect spraying aqueous extract of (Wheat, Barley and corn) in leaves numbers of *Lolium rigidum* L.

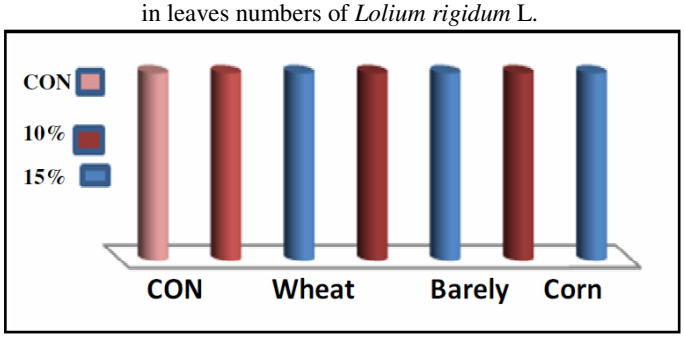

Fig. 3 : Effect spraying aqueous extracts of (Wheat, Barley and corn) in leaves numbers of *Panicum repens* L.

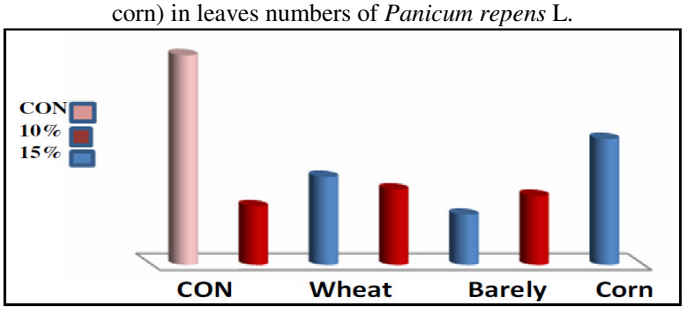

Fig. 4 : Effect spraying aqueous extract of (Wheat, Barley and corn) in leaves numbers of *Sonchus oleraceus* L.

The results in table (5) showed effect efficiency of sprayed by aqueous extracts of Wheat (*Triticum aestivum* L.), Barley (*Hordeum Spp.* Desf.), Corn(*Zea mays* L.) in weed control (%), saw the highest Percentage efficiency at the treatments in reducing the weeds caused by aqueous extraction of wheat at concentration 10% in *Sonchus oleraceus* L., As the results showed aqueous extraction of wheat at 10% at superior efficiency to reducing the tested weeds.

The results of the study indicated the difference in the weeds their response to the treatment (inhibitory effect) of crop residues, that difference may be due to the nature of the plant and the differences in genetic factors.

The reduction that observed in the results may be due to allelopathic compounds activity that releases from Wheat (*Triticum aestivum* L.), Barley (*Hordeum Spp. Desf.*), Corn (*Zea mays* L.), that contain many allelopathic compounds, including organic acids, aldehydes and aromatic acids Aromatics, simple unsaturated lactones, collars, olivonates, flavonoids, tannins, alkaloids or terpenoids And steroid as well as some toxic gases Putnam and Tang (1986). Which have revealed their presence in plant residues for (wheat, barley, maize) Hussein *et al.* (2018) this may justify inhibitory effect of this crops, this study results consistent of with the study Khan *et al.* (2015). That shown leaf water extracts of (Sorghum, Sunflower, Shishum, Eucalyptus, Acacia) may significantly suppressed weed growth by reducing weed density

Table 1 : Effect of spray by aqueous extracts for some crops in shoot length (cm) in kinds of weed.

Aqueous extracts	Concentration	Wheat	Barely	Corn	Effect of Concentration
Silybum marianum	0.0	9.60a	9.60a	9.60a	9.60a
	10%	8.7c	9.1b	8.22c	8.67b
	%15	7.15e	7.65d	4.7f	6.5c
Aqueous extracts effect		8.48b	8.78a	7.50c	
Lolium rigidum	0.0	30.25a	30.25a	30.25a	30.25a
	10%	10.72e	14.1c	12.9d	12.57c
	%15	9.81f	15.7b	12.8d	12.77b
Aqueous extracts effect		16.92c	20.1a	18.65b	
Panicum repens	0.0	20.15a	20.15a	20.15a	20.15a
	10%	9bc	7.2f	8.51d	8.23c
	%15	9.5b	7.8e	8.35d	8.55b
Aqueous extracts effect		12.88a	11.71c	12.33b	
Sonchus oleraceus	0.0	8.2a	8.2a	8.2a	8.2a
	10%	3.6e	4.72c	3.82e	4.04c
	%15	7.4b	4.75c	4.42cd	5.52b
Aqueous extracts effect		6.4a	5.89b	5.48c	

Table 2 : Effect of spraying by aqueous extracts for (Wheat, Barely, Corn) in Root length (cm) in kinds of weed.

Aqueous extracts	Concentration	Wheat	Barely	Corn	Effect of Concentration
Silybum marianum	0.0	7.1a	7.1a	7.1a	7.1a
	10%	3.91e	4.12d	2.9f	3.64c
	%15	4.07d	4.65c	4.83b	4.51b
Aqueous extracts effect		5.02	5.29	4.94	
Lolium rigidum	0.0	18.4a	18.4a	18.4a	18.4a
	10%	15.3 b	11.80d	12.87c	13.32b
	%15	12.76c	9.97e	12.93c	11.88c
Aqueous extracts effect		15.48	13.39	14.73	
Panicum repens	0.0	14.0a	14.0 a	14.0 a	14.0a
	10%	5.03g	8.91e	9.9c	7.94c
	%15	9.14d	5.91f	10.72b	8.59b
Aqueous extracts effect		9.34	9.60	11.54	
Sonchus oleraceus	0.0	3.38a	3.38a	3.38a	3.38a
	10%	0.55d	0.74b	0.31c	0.53b
	%15	0.70b	0.30c	0.78b	0.59b
Aqueous extracts effect		1.54a	1.47b	1.49b	

Table 3 : Effect of spraying by aqueous extracts for (Wheat, Barely, Corn) in leaf area (cm^2) in kinds of weed

Aqueous extracts	Concentration	Wheat	Barely	Corn	Effect of Concentration
Silybum marianum	0.0	11.4a	11.4a	11.4a	11.4a
	10%	5.79c	5.56d	6.10b	5.81b
	%15	2.71g	4.07f	5.29e	4.02c
Aqueous extracts effect		6.630c	7.011b	7.590a	
Lolium rigidum	0.0	4.07a	4.07a	4.07a	4.07a
	10%	2.54c	1.99d	3.58b	2.7b
	%15	0.54g	1.08f	1.55e	1.05c
Aqueous extracts effect		2.383	2.380	3.066	
Panicum repens	0.0	8.42a	8.42a	8.42a	8.42a
	10%	5.00c	6.29b	3.51e	4.73b
	%15	5.26c	1.70f	4.29d	3.75c
Aqueous extracts effect		6.228a	5.471b	5.408bc	
Sonchus oleraceus	0.0	3.52a	3.52a	3.52a	3.52a
	10%	0.45c	0.32d	0.32d	0.363b
	%15	0.54b	0.25e	0.31d	0.366b
Aqueous extracts effect		1.503a	1.363b	1.383c	

Table 4 : Effect of spraying by aqueous extracts for some crops in Dry weight(gm) in kinds of weed

Aqueous extracts	Concentration	Wheat	Barely	Corn	Effect of Concentration
Silybum marianum	0.0	1.0313a	1.0313a	1.0313a	1.0313
	10%	0.1011	0.7056	0.6216	0.482
	%15	0.2437	0.7274	0.7040	0.558
Aqueous extracts effect		0.458	0.282	0.785	
Lolium rigidum	0.0	0.3239	0.3239	0.3239	0.3239
	10%	0.0762	0.1278	0.2717	0.158
	%15	0.3039	0.1129	0.3643	0.262
Aqueous extracts effect		0.5032	0.188	0.319	
Panicum repens	0.0	0.199	0.199	0.199	0.199
	10%	0.087	0.103	0.199	0.129
	%15	0.173	0.097	0.089	0.119
Aqueous extracts effect		0.153	0.133	0.162	
Sonchus oleraceus	0.0	0.1424	0.1424	0.1424	0.1424
	10%	0.0115	0.0131	0.0174	0.014
	%15	0.0340	0.0253	0.0887	0.049
Aqueous extracts effect		0.062	0.060	0.088	

Table 5 : Efficiency of spray by aqueous extracts for (Wheat, Barley and Corn) in weed control (%)

Weed species	Concentration	Wheat	Barely	Corn	Weed effect
Silybum marianum	0.0	0.0	0.0	0.0	**32**
	10%	90	31	39	
	%15	76	29	31	
Lolium rigidum	0.0	0.0	0.0	0.0	**24**
	10%	76	60	16	
	%15	4	65	0.0	
Panicum repens	0.0	0.0	0.0	0.0	**24**
	10%	56	48	0.0	
	%15	13	51	55	
Sonchus oleraceus	0.0	0.0	0.0	0.0	**51**
	10%	91	90	87	
	%15	76	82	37	

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