PAPER • **OPEN ACCESS**

Effect of Spraying with Extract of Water Hyacinth and Silverleaf on Dry Weight of Weeds and Specific Characteristics of Sunflower (*Helianthus annuus* L.)

To cite this article: W K Houry *et al* 2021 *IOP Conf. Ser.: Earth Environ. Sci.* **904** 012063

View the article online for updates and enhancements.

You may also like

- Effect of Spraying with Water Hyacinth and Silverleaf Extractson Growth and Yield of Sunflower (*Helianthus annuus* L.)
W K Houry, A M A Alkaisy and A F Almehemdi
- Water hyacinth as a possible bioenergy resource: A case of Lake Victoria, Kenya
George Adwek, Gane Julius, Boxiong Shen et al.
- Rivers running green: water hyacinth invasion monitored from space
Niels Janssens, Louise Schreyers, Lauren Biermann et al.

This content was downloaded from IP address 185.143.42.46 on 15/10/2022 at 19:08

Effect of Spraying with Extract of Water Hyacinth and Silverleaf on Dry Weight of Weeds and Specific Characteristics of Sunflower (*Helianthus annuus* L.)

W K Houry*[1], A M A Alkaisy[2], A F Almehemdi[2]

[1] Anbar Agriculture Directorate, Department of Planning, Anbar, Iraq
[2] Centre of Desert Study, University of Anbar, Anbar, Iraq

*Corresponding author's e-mail: m_kh201116@yahoo.com

Abstract. A field experiment was carried out in one of the special fields Al-Jazirah - Al-Budhiyab located at latitude 38.28º north and longitude 43.19º east, to find out the effect of different concentrations of the extract of the Water hyacinth and silverleaf plants in three varieties of sun flower. The experiment was applied using a split-plate arrangement within an RCBD design with three replications. The main plots were represented by the varieties Ishaqi, Sakha, and Iqmar, and the sub plots included the spray concentrations (0, 5, 15 and 25 mg L^{-1}). The results showed that there were no significant differences between the cultivars in both the spring and fall seasons. As for the extracts, Water hyacinth gave the highest average dry weight of the weeds (0.076 and 0.028 g m^2) in both seasons, respectively. The silverleaf herb extract reduced the dry weight of the weeds (0.057 and 0.020 g m^2) in both seasons, respectively. While silverleaf in the fall season gave the highest average percentage of oil and carbohydrates (3.85 and 67.48%) for the two grades, respectively. Also, the concentrations 5 and 15 mg L^{-1} were increased from the dry weight of the weeds (0.078 g m^2) of the two concentrations, respectively. Whereas, the concentration increased by 25 mg L^{-1} from the dry weight of the weeds (0.033 g m^2) in the fall season. Whereas, the concentration reduced 0 mg L^{-1} of the dry weight of the weeds (0.035 and 0.015 g m^2) in both seasons respectively. We conclude that there is fluctuation in the effect of the extracts on the behavior of the varieties and their manifestation of the results due to the overlap of study factors and in different directions, so it is recommended to single out the factors in their influence on the varieties to know more accurately the behavior of those varieties.

1. Introduction

The sun flower *Helianthus annuus* L. is one of the most important oil crops, as it occupies the first place in terms of oil productivity because its seeds contain a high percentage of it, estimated at more than 50%, depending on the cultivar cultivated. And because it contains Omega3 fatty acids, it is an important food for humans, as it has no side effects on human health, in addition to being rich in unsaturated fatty acids such as Oleic acid and Linoleic acid and vitamins A, D and E, in addition to containing a high percentage of its gain. Of protein 36% and carbohydrates 20-22%, so it is a great fodder for animals and poultry. Its fields are used as pastures for beekeeping [1]. The productivity rate of sunflower in Iraq is still low despite its importance and multiple nutritional uses for humans and animals, as its

Content from this work may be used under the terms of the Creative Commons Attribution 3.0 licence. Any further distribution of this work must maintain attribution to the author(s) and the title of the work, journal citation and DOI.
Published under licence by IOP Publishing Ltd

productivity rate reached 2.11 ha^{-1} compared to global production, which reached 7.5 ha^{-1} [2]. Water hyacinth, whose scientific name is *Eichhornia crassipes*, is one of the floating water weeds plants of the

family Pontindriceae, and it is an exotic weed to the environment in Iraq. The diversity of weeds plants has great negative effects on crop growth, yield reduction and quality, especially the invasive weeds of the Iraqi environment, such as the silverleaf plant and the Water hyacinth, as they are from the invasive weeds [3]. The danger of this herb and other invasive weeds is that it has many and varied properties that enable it to compete and among these mechanisms is the presence of chemical inhibitory compounds in this herb. Native plants, insects and other pathogens [4]. The Water hyacinth herb may have anti-allopathic effects against some algae, as Shanab et al. [5] noted that the crude extract of this plant had an inhibitory effect against green algae such as (*Chlorella vulgaris* and *Dictyochloropsis splendida*) and some types of cyanobacteria such as (*Spirulina platensis* and *Nostiscinocale*). Some compounds possessing these properties have been identified and isolated using gas chromatography techniques combined with a mass spectroscopy diagnostic system. Gul et al. [6] noticed that Water hyacinth extracts reduced the germination of wild oats to zero and cress Lettuce to 10%, and the length of fescue reduced to zero in wild oats by 0.06 g, while the weight of the feathery in Kalgan increased by 0.08 g, and in the low concentrations of extracts The Water hyacinth increased the root weight of wild oats and cress Lettuce by 7.7 and 5.7 g, respectively. They also concluded that the extracts of this plant may be used as pesticides to combat the weeds in the wheat fields due to the allelopathic effort that this weed has towards the malicious weeds of it. The vegetative parts of the Water hyacinth herb may also be used in the production of biofuels, with 80% of the regular diesel added, which showed high efficiency equivalent to the efficiency of diesel prepared from other sources in terms of calorific value and emission of gases such as HC and CO [3]. As for the herb, the Silverleaf Nightshade, whose scientific name is *Solanum elaeagnifolium*, is one of the terrestrial weeds invasive to the environment in Iraq and belongs to the Solanaceae family, as it is found in many areas of western Iraq [7]. This herb has numerous allelopathic effects that enable it to compete with some field crops by inhibiting growth and development [8, 9]. In addition, it reduces the value of agricultural land, which causes many farmers to leave the infested land [10];[11]. Balah, and AbdelRazek [12] found that silverleaf herb negatively affects the growth of some weeds associated with the wheat crop, and the reason for this plant to have allelopathic effects is due to its content of secondary compounds such as alkaloids [13, 14] and flavonoids clacosides, [15, 16] and phenolic compounds such as gallic acid and chloroginc [17-20]. The concentration of these active compounds may increase with the effect of some mechanical tightening, as wounds have increased caryophyllene [21], and the vegetative parts of silverleaf contain Saponins and glycoside alkaloids such as □-solamarine [22] as well as Coumarin. And Steroids and terpenoids [23]. The use of chemical manufactured compounds such as pesticides led to environmental and health damages, as a result of its imbalance in the environmental balance and caused deadly diseases, which led to an increase in demand and voices were raised for the use of sustainable agriculture and environmentally friendly alternatives instead of manufactured chemical compounds. In crop and forest management and control, and reducing the excessive use of synthetic weeds pesticides or industrial growth regulators. Among the effects of allelopathy antagonism affect chlorophyll synthesis and inhibition of cell division, plant hormone production and membrane permeability [24]. Therefore, this study came with the aim of determining the negative or positive response of some sun flower varieties to the extract of the Water hyacinth herb and silverleaf, and to determine the stimulating or inhibiting concentration of the specific characteristics of the crop, and the dry weight of the associated weeds.

2. Materials and Methods

2.1. Materials

A field experiment was carried out in a private field in the area of Buddhism / Ramadi Island, located at latitude 38.28.2 north and longitude 43.19º east and on the banks of the Euphrates River in the spring and fall seasons of 2020. To study the spraying of plant extracts of the two herbs of the Water hyacinth and silverleaf and their effect on the growth and yield of three varieties of the sun flower and the weeds accompanying it. The experiment was carried out in a randomized complete block design (R.C.B.D) with the arrangement of the Split Plots Design. The main plots included the spraying concentrations of the plant extract which are 0, 5, 15 and 25 mg L^{-1}. The categories (Ishaqi, Iqmar and Sakha) were

represented in the secondary panels Sub plots. The number of experimental units reached 72 units, resulting from the compatibility of the study factors with three replicates. Several concentrations were prepared from the extract obtained from the two herbs with the concentrations specified in the study, which are (0, 5, 15 and 25) mg L^{-1} and the symbol for Water hyacinth (T1) and silverleaf (T2). The solution of each level was sprayed on the plants until the leaves of the plant were completely wet in the early morning using a 16liter sprayer. A diffuser (bright cleaning solution) was added to the spray solution at a volume of 3 cm 3 per 20 liters, to reduce the surface tension of the water and to ensure complete wetness. I sprayed it with distilled water only, spraying the herbal extract at the stage of four leaves. The experiment land was prepared from plowing, smoothing and leveling, then it was divided into experimental units. The area of the experimental unit for the Sunflower experiment was (3 x 4) m^2, each experimental unit contained seven lines, the distance between one line and another 60 cm and between plants and another 40 cm.

2.2. Extracts preparation

100 grams of aboveground parts were weighed for each weed and placed in an electric mixer, 200 ml of methanol was added to it and mixed with a shaker mixer, for 25 minutes, then the mixture was transferred to a beaker and tightly covered with plastic paper and then left for an hour in order to precipitate the extractant in it, then separate the scent from the extract of the two weeds from the sediment material (marc) with a dull cloth and purify the scent extract again by passing through a filter paper (no:1) placed in the Buchner funnel. appropriate amount of the extract from each weed was prepared, resulting extract of 100% full-strength. The plant extracts were kept in $0\pm2^{\circ c}$ to protect the extract and prevent microbial deterioration. The extraction process was repeated several times to prepare an appropriate and sufficient quantity of the extract. The data were recorded on the dry weight of the weeds at 90 days (gm^{-2}), the percentage of ash (%), the percentage of oil (%), the percentage of carbohydrates (%) and the total oil yield (ton ha^{-1}).

2.3. Statistical analysis

Data were analysed according to analysis of variance according to the design of randomized main plot in the arrangement of split-split design using the least significant difference test ($P\leq 0.05$) to statistically compare the arithmetic averages at a probability concentration of 0.05 [25] and using the statistical program (Genstat-2014).

3. Results and Discussion

3.1. Dry weight of the weeds at 90 days (g m^2)

The results of Table (1) show the effect of spraying with plant extracts of Water hyacinth and silverleaf on the dry weight of the weeds after 90 days (g m^2) of sun flower, to the absence of significant differences between varieties in the spring and fall seasons. The results also showed that there were significant differences between the species in the spring and fall seasons, as the Water hyacinth in the spring and fall seasons gave the highest average dry weight of the weeds, which reached 0.076 and 0.028 g m^2 for the two seasons respectively. While silverleaf in the spring and fall seasons gave the lowest average dry weight of the weeds, which was 0.057 and 0.020 g m^2 for the two seasons respectively. The results showed that there were significant differences between the concentrations of spraying in the spring and fall seasons, as the two concentrations 5 and 15 mg L^{-1} gave the highest average dry weight of the weeds, which reached 0.078 g m^2 for the two concentrations, respectively. While the concentration of 25 mg L^{-1} in the fall season gave the highest average dry weight of the weeds, which was 0.033 g m^2. While the comparison treatment (0 mg L^{-1}) in the spring and fall seasons gave the lowest average dry weight of the weeds, which was 0.035 and 0.015 g m^2 for the two seasons respectively. The bilateral overlap between the varieties and species gave significant differences between them in the spring and fall seasons. The double overlap between the Ishaqi cultivar and the silverleaf in the spring and fall seasons gave the highest average dry weight of the weeds, which was 0.068 and 0.021 g m^2 for the two seasons, respectively.

Table 1. Effect of spraying with plant extracts of Water hyacinth and silverleaf on the dry weight of the weeds at 90 days (g m^2) for sunflower.

cultivars	weeds	Spring 2020 concentration mg L^{-1} 0	5	15	25	mean	Fall 2020 concentration mg L^{-1} 0	5	15	25	mean
Ishaqi	Silverleaf	0.000	0.078	0.102	0.093	0.072	0.000	0.029	0.028	0.025	0.022
	Water hyacinth	0.060	0.080	0.077	0.085		0.026	0.015	0.015	0.033	
Iqmar	Silverleaf	0.000	0.072	0.064	0.080	0.061	0.000	0.018	0.018	0.040	0.024
	Water hyacinth	0.072	0.078	0.065	0.053		0.024	0.023	0.024	0.045	
Sakha	Silverleaf	0.000	0.077	0.064	0.054	0.067	0.000	0.032	0.022	0.028	0.027
	Water hyacinth	0.077	0.084	0.093	0.089		0.038	0.042	0.025	0.025	
P≤ 0.05			N.S			N.S		0.012			N.S
cultivars	Ishaqi	0.030	0.079	0.091	0.090		0.013	0.022	0.022	0.029	
	Iqmar	0.063	0.075	0.065	0.067		0.012	0.021	0.021	0.042	
	Sakha	0.039	0.080	0.079	0.072		0.019	0.037	0.024	0.027	
P≤ 0.05			N.S					0.010			
weeds	Silverleaf	0.000	0.076	0.077	0.076		0.000	0.026	0.023	0.031	
	Water hyacinth	0.070	0.080	0.078	0.076		0.030	0.026	0.021	0.034	
P≤ 0.05			0.021					0.011			
mean		0.035	0.078	0.078	0.076		0.015	0.026	0.022	0.033	
P≤ 0.05			0.016					0.005			

cultivars	weeds Silverleaf	weeds Water hyacinth
Ishaqi	0.068	0.075
Iqmar	0.054	0.067
Sakha	0.049	0.086
P≤ 0.05	0.020	
Mean	0.057	0.076
P≤ 0.05	0.011	

cultivars	weeds Silverleaf	weeds Water hyacinth
Ishaqi	0.021	0.023
Iqmar	0.019	0.029
Sakha	0.021	0.032
P≤ 0.05	0.010	
Mean	0.020	0.028
P≤ 0.05	0.003	

While the variety Sakha and silverleaf in the spring season gave the lowest average dry weight of the weeds, which reached 0.049 g m^2. In the fall season, Iqmar and silverleaf gave the lowest average dry weight of the weeds, which was 0.019 g m^2. Whereas, in the spring and fall seasons, Sakha and Water hyacinth gave the highest average dry weight of the weeds, which reached 0.086 and 0.032 g m^2 for the two seasons respectively. While the overlap between the Iqmar variety and the Water hyacinth in the spring season and the overlap between the Ishaqi variety and the Water hyacinth gave the lowest average dry weight of the weeds, which was 0.067 and 0.023 g m^2 for the two seasons and for the two interactions respectively. The results of the double overlap between species and concentrations showed significant

differences between them in the spring and fall seasons. The bilateral interaction between silverleaf and the concentration of 25 mg L^{-1} in the spring season gave the lowest average dry weight of the weeds, which was 0.076 g m^2, which did not differ significantly from the concentration of 5 mg L^{-1}, which gave 0.076 g m^2. Whereas, the interaction between Water hyacinth and the concentration of 5 mg L^{-1} gave the highest average dry weight of the weeds, which was 0.080 g m^2. While the interaction between Water hyacinth and the comparison treatment gave the lowest average for the trait, which was 0.070 g m^2. In the fall season, the bilateral interaction between silverleaf and the concentration of 25 mg L^{-1} and the Water hyacinth and the same concentration gave the highest average dry weight of the weeds, which was 0.031 and 0.034 g m^2 of the two herbs, respectively. While the interaction between silverleaf and concentration 15 mg L^{-1} and Water hyacinth and concentration 15 mg L^{-1} gave the lowest average dry weight of the weeds, which was 0.023 and 0.021 g m^2 for the two herbs and for the two interactions respectively. It was also found from the results of the bilateral overlap between the varieties and the concentrations that there were no significant differences between them in the spring season, but there were significant differences between them in the fall season. The Iqmar cultivar with a concentration of 25 mg L^{-1} gave the highest average dry weight of the weeds, which was 0.042 g m^2. While the bilateral interaction between the cultivar Iqmar and the concentration 0 mg L^{-1} gave the lowest mean for the trait, which was 0.012 g m^2. As for the results of the triple overlap between varieties, species and concentrations, the results indicate that there are no differences between them in the spring season, while there were differences between them in the fall season. 0.045 g m^2. While the triple interaction between Ishaqi cultivar and Water hyacinth and concentration 5 and 15 mg L^{-1} gave the lowest mean for the trait, which was 0.015 g m^2. The concentration increased from 5 to 15 mg L^{-1} of the dry weight of the weeds at 90 days in the spring season [Table 1], while the concentration of 25 mg L^{-1} gave the highest average dry weight of the weeds in the fall season [Table 1]. The reason may be attributed to the active ingredients in The extract increases its inhibitory effect when increasing the concentration, which affected the formation of the vegetative growth of the weeds, which reduced the vital material of the weeds. Also, the different compounds content of the two herbs affected their allelopathic ability

3.2. The percentage of Ash (%)

The results of Table (2) showed the effect of spraying with Water hyacinth herb extracts and silverleaf extracts on the percentage of ash (%) for sun flower. The absence of significant differences between varieties, concentrations, and species, overlap between varieties, concentration, overlap between species and concentrations, overlap between varieties and species, as well as the absence of significant differences for the triple overlap between varieties, species and concentrations in both the spring and fall seasons.

Table 2. The effect of spraying with the plant extract of the Water hyacinth and silverleaf herbs on the percentage of ash (%) for sunflower.

cultivars	weeds	Spring 2020 concentration mg L-1 0	5	15	25	mean	Fall 2020 concentration mg L-1 0	5	15	25	mean
Ishaqi	Silverleaf	1.77	1.63	1.70	1.70	1.70	1.80	1.63	1.73	1.93	1.74
	Water hyacinth	1.70	1.77	1.70	1.76		1.63	1.63	1.80	1.73	
Iqmar	Silverleaf	1.63	1.77	1.63	1.73	1.68	1.80	1.77	1.67	1.80	1.73
	Water hyacinth	1.67	1.70	1.67	1.67		1.73	1.63	1.63	1.83	
Sakha	Silverleaf	1.70	1.63	1.77	1.67	1.69	1.73	1.80	1.67	1.60	1.68
	Water hyacinth	1.67	1.60	1.77	1.70		1.77	1.73	1.57	1.53	
P≤ 0.05		N.S				N.S	N.S				N.S
cultivars	Ishaqi	1.73	1.70	1.70	1.68		1.72	1.63	1.77	1.83	
	Iqmar	1.65	1.73	1.65	1.70		1.77	1.70	1.65	1.82	
	Sakha	1.68	1.62	1.77	1.68		1.75	1.77	1.62	1.57	
P≤ 0.05		N.S					N.S				
weeds	Silverleaf	1.70	1.68	1.70	1.70		1.78	1.73	1.69	1.78	
	Water hyacinth	1.68	1.69	1.71	1.68		1.71	1.67	1.67	1.70	
P≤ 0.05		N.S					N.S				
mean		1.69	1.68	1.71	1.69		1.74	1.70	1.68	1.74	
P≤ 0.05		N.S					N.S				

cultivars	weeds	Spring 2020 Silverleaf	Spring 2020 Water hyacinth	Fall 2020 Silverleaf	Fall 2020 Water hyacinth
	Ishaqi	1.70	1.71	1.78	1.70
	Iqmar	1.69	1.68	1.76	1.71
	Sakha	1.69	1.68	1.70	1.65
P≤ 0.05		N.S		N.S	
mean		1.69	1.69	1.74	1.69
P≤ 0.05		N.S		N.S	

3.3. The percentage of oil (%)

The results of Table (3) indicated the effect of spraying with extracts of Water hyacinth herb and silverleaf on the oil percentage (%) of sun flower. The absence of significant differences between varieties and concentrations, the overlap between varieties, the concentration, the overlap between species, the concentrations, the overlap between the varieties and the species, as well as the absence of significant differences for the triple overlap between varieties, species and concentrations in both the spring and fall seasons. While noticing significant differences between species in the fall season, there were no significant differences between them in the spring season, as silverleaf gave the highest average percentage of oil at 3.85%, while Water hyacinth herb gave the lowest average percentage of oil, which reached 3.74%.

Table 3. The effect of spraying with the plant extract of the Water hyacinth and silverleaf herbs on the oil percentage (%) for sunflower.

cultivars	weeds	Spring 2020 concentration mg L^{-1} 0	5	15	25	mean	Fall 2020 concentration mg L^{-1} 0	5	15	25	mean
Ishaqi	Silverleaf	3.77	3.70	3.67	3.73	3.7	4.00	3.80	3.87	4.03	3.84
	Water hyacinth	3.63	3.77	3.73	3.57	0	3.70	3.67	3.83	3.80	
Iqmar	Silverleaf	3.67	3.80	3.67	3.70	3.6	3.90	3.83	3.80	3.90	3.82
	Water hyacinth	3.60	3.63	3.70	3.73	9	3.83	3.80	3.63	3.83	
Sakha	Silverleaf	3.70	3.63	3.73	3.63	3.6	3.73	3.87	3.77	3.73	3.74
	Water hyacinth	3.73	3.53	3.70	3.67	7	3.80	3.83	3.63	3.53	
P≤ 0.05		N.S				N.S	N.S				N.S
cultivars	Ishaqi	3.70	3.73	3.70	3.65		3.85	3.73	3.85	3.92	
	Iqmar	3.63	3.72	3.68	3.72		3.87	3.82	3.72	3.87	
	Sakha	3.72	3.58	3.72	3.65		3.77	3.85	3.70	3.63	
P≤ 0.05		N.S					N.S				
weeds	Silverleaf	3.71	3.71	3.69	3.69		3.88	3.83	3.81	3.89	
	Water hyacinth	3.66	3.64	3.71	3.66		3.78	3.77	3.70	3.72	
P≤ 0.05		N.S					N.S				
mean		3.68	3.68	3.70	3.67		3.83	3.80	3.76	3.81	
P≤ 0.05		N.S					N.S				

cultivars	weeds Silverleaf	Water hyacinth	weeds Silverleaf	Water hyacinth
Ishaqi	3.71	3.68	3.93	3.75
Iqmar	3.71	3.67	3.86	3.78
Sakha	3.68	3.66	3.77	3.70
P≤ 0.05	N.S		N.S	
mean	3.70	3.67	3.85	3.74
P≤ 0.05	N.S		0.079	

It is noted from the above results that the Water hyacinth herb is superior to the dry weight of the weeds in the spring and fall seasons [Table 1]. In the fall season, silverleaf also gave the highest average percentage of oil (%) and the percentage of carbohydrates (%) in the fall season [Table 3and 4]. The reason may be attributed to plant species that inhibited growth due to their containment. Active substances inhibiting the growth of weeds. The genotypes of the varieties may differ in their response to the allelopathic properties of the weeds due to the extracts containing a wide range of active compounds that may adversely affect the growth of these crops [26].. The difference, the content of the components of the active substances, differs in the two types according to the genetic difference and the two varieties, being from two different families, which causes the production of certain compounds for each of them that may be inhibitory and in the other stimulating. It affected cell division and expansion and decreased chlorophyll content [27]. It contains active compounds such as alkaloids, flavonoids, and tannins [28]. It may also be attributed to the difference and nature of the genetic material of the varieties in response to a certain level of growth and stress inputs, including allelopathic stress resulting from different concentrations of plant extracts [29]. This is in line with [30] who showed that plant species differ in their content of allelopathic compounds, as these species contribute to the elective and that the

low concentration of 1.75 mM of L-tryptophan is the inhibitory concentration of root growth in wheat. The results also showed that the bilateral overlap between the cultivar Isaac and silverleaf in the spring and fall seasons was higher than the average dry weight of the weeds [Table 1]. Crops [31]. It is noted from the results that the interaction between the Water hyacinth and the concentration of 5 mg L^{-1} gave the highest average dry weight of the weeds in the fall season [Table1], which may be attributed to the effect of the different plant species on the metabolic pathways, which produces different active compounds in the two species that affect within a certain amount. It is part of the physiological processes of the weeds, and thus physiologically affects those weeds by absorbing it into the plant and reaching the places of energy production [32];[33]. The overlap between cultivar Iqmar and the concentration of 25 mg L^{-1} in the fall season gave the highest average dry weight of the weeds [Table 1]. The reason may be attributed to the inhibition of the genetic material of the cultivars to express themselves under the influence of allelopathic stress at different concentrations. It was found that allelopathic compounds compete with other compounds in the second light system and at different concentrations and for several genotypes [34]. This is in line with what was stated by [35] who showed that spraying the extracts after 30 and 60 years of planting increased the yield components in wheat by decreasing the density of the weeds and its dry weight. The reason may also be attributed to the fact that the genetic material of the varieties differs in expressing itself and showing its ability under allelopathic stresses by increasing the concentration, as low concentrations act as growth-stimulating materials, under whose influence the genetic material works naturally [29].

3.4. The Percentage of carbohydrates (%)

The results of Table (4) showed the effect of spraying with extracts of Water hyacinth herb and silverleaf on the percentage of carbohydrates (%) of sun flower. The absence of significant differences between varieties and concentrations, the overlap between varieties, the concentration, the overlap between species, the concentrations, the overlap between the varieties and the species, as well as the absence of significant differences for the triple overlap between varieties, species and concentrations in both the spring and fall seasons. The results found that there were significant differences in the fall season between plant species, while there were no significant differences between them in the spring season. Silverleaf gave the highest average percentage of carbohydrates in the fall season, which was 67.48%, while Water hyacinth herb gave the lowest average percentage of carbohydrates at 66.24%. The results of Table (5) show the effect of spraying with extracts of Water hyacinth herb and silverleaf on the percentage of ash (%) for sun flower. The absence of significant differences between varieties, concentrations, and species, overlap between varieties, concentration, overlap between species and concentrations, overlap between varieties and species, as well as the absence of significant differences for the triple overlap between varieties, species and concentrations in both the spring and fall seasons.

Table 4. Effect of spraying with plant extracts of Water hyacinth and silverleaf on the percentage of carbohydrates (%) for sunflower.

cultivars	weeds	Spring 2020 concentration mg L^{-1} 0	5	15	25	mean	Fall 2020 concentration mg L^{-1} 0	5	15	25	mean
Ishaqi	Silverleaf	67.53	66.40	66.67	67.13	66.90	67.97	66.77	67.90	69.40	66.93
	Water hyacinth	66.50	67.90	67.07	66.00		62.63	66.47	67.33	66.97	
Iqmar	Silverleaf	66.50	68.37	65.97	66.73	66.79	68.43	67.00	66.73	68.17	67.19
	Water hyacinth	66.10	66.97	66.93	66.77		67.80	66.03	65.83	67.53	
Sakha	Silverleaf	66.87	66.23	67.47	65.80	66.63	66.43	68.53	66.53	65.93	66.47
	Water hyacinth	66.93	65.07	67.50	67.17		67.40	67.33	65.30	64.27	
P≤ 0.05		N.S				N.S	N.S				N.S
cultivars	Ishaqi	67.02	67.15	66.87	66.57		65.30	66.62	67.62	68.18	
	Iqmar	66.30	67.67	66.45	66.75		68.12	66.52	66.28	67.85	
	Sakha	66.90	65.65	67.48	66.48		66.92	67.93	65.92	65.10	
P≤ 0.05		N.S					N.S				
weeds	Silverleaf	66.97	67.00	66.70	66.56		67.61	67.43	67.06	67.83	
	Water hyacinth	66.51	66.64	67.17	66.64		65.94	66.61	66.16	66.26	
P≤ 0.05		N.S					N.S				
mean		66.74	66.82	66.93	66.60		66.78	67.02	66.61	67.04	
P≤ 0.05		N.S					N.S				

cultivars	weeds Silverleaf	Water hyacinth	weeds Silverleaf	Water hyacinth
Ishaqi	66.93	66.87	68.01	65.85
Iqmar	66.89	66.69	67.58	66.80
Sakha	66.59	66.67	66.86	66.08
P≤ 0.05	N.S		N.S	
mean	66.81	66.74	67.48	66.24
P≤ 0.05	N.S		0.849	

3.5. Total oil yield (ton ha^{-1})

The results of Table (5) show the effect of spraying with extracts of Water hyacinth herb and silverleaf on the percentage of ash (%) for sun flower. The absence of significant differences between varieties, concentrations, and species, overlap between varieties, concentration, overlap between species and concentrations, overlap between varieties and species, as well as the absence of significant differences for the triple overlap between varieties, species and concentrations in both the spring and fall seasons.

Table 5. The effect of spraying with the plant extract of the Water hyacinth and silverleaf herbs on the total oil yield (ton ha^{-1}) for sunflower.

cultivars	weeds	Spring 2020 concentration mg L^{-1}				mean	Fall 2020 concentration mg L^{-1}				mean
		0	5	15	25		0	5	15	25	
Ishaqi	Silverleaf	0.171	0.170	0.148	0.146	0.149	0.109	0.108	0.111	0.120	0.106
	Water hyacinth	0.153	0.154	0.116	0.137		0.103	0.093	0.095	0.108	
Iqmar	Silverleaf	0.114	0.163	0.176	0.150	0.153	0.099	0.097	0.095	0.095	0.097
	Water hyacinth	0.122	0.177	0.154	0.171		0.103	0.104	0.082	0.100	
Sakha	Silverleaf	0.139	0.129	0.176	0.166	0.152	0.091	0.109	0.085	0.095	0.091
	Water hyacinth	0.152	0.143	0.158	0.150		0.101	0.096	0.075	0.079	
P≤ 0.05		N.S				N.S	N.S				N.S
cultivars	Ishaqi	0.162	0.162	0.132	0.141		0.106	0.100	0.103	0.114	
	Iqmar	0.118	0.170	0.165	0.161		0.101	0.100	0.088	0.097	
	Sakha	0.145	0.136	0.170	0.158		0.096	0.102	0.080	0.087	
P≤ 0.05		N.S					N.S				
weeds	Silverleaf	0.141	0.154	0.166	0.154		0.099	0.105	0.097	0.103	
	Water hyacinth	0.142	0.158	0.143	0.153		0.102	0.098	0.084	0.096	
P≤ 0.05		N.S					N.S				
mean		0.142	0.156	0.154	0.153		0.101	0.101	0.091	0.099	
P≤ 0.05		N.S					N.S				

cultivars	weeds			weeds	
		Silverleaf	Water hyacinth	Silverleaf	Water hyacinth
	Ishaqi	0.159	0.140	0.112	0.100
	Iqmar	0.151	0.156	0.096	0.097
	Sakha	0.152	0.151	0.095	0.088
P≤ 0.05		N.S		N.S	
mean		0.154	0.149	0.101	0.095
P≤ 0.05		N.S		N.S	

4.Conclusion

The tow weeds species possessed inhibitory effect on dry weight of weeds 90 days after spray. Which silverleaf gave lost average dry weight of weeds in the tow season. Qualitative properties didn't be improved by using the tow weeds extracts. The allelopathic effect of the tow weeds extracts due to it contents of active compounds that possessed inhibitory on other weeds or crops. These weed extracts could be used to cease weeds growth that compete crops. Furthermore, the weeds species gave stimulatory effect on oil and carbohydrates in fall season.

Reference

[1] Nasrallah, AY, Al-Halfi, H, Al-Aboudi H, Muhammad AA, and Mahmoud AM 2014, The effect of spraying some plant extracts and catechins on the growth and yield of sunflower. *Journal of Agricultural Sciences*.**45**(7),651 – 659.

[2] Food and Agriculture Organization (FAO) 2013, FAOSTAT statistics database, [Online]. Available at http://faostat.fao.org.

[3] Venu, H, Venkataraman D, Purushothaman P, and Vallapudi DR 2019, Eichhornia crassipes biodiesel as a renewable green fuel for diesel engine applications: performance, combustion, and emission characteristics. *Environmental Science and Pollution Research*., **26**(18), 18084- 18097.
[4] Xie, L J, Zeng RS, Bi HH, Song YY, Wang RL, Su YJ, and Liu YH 2010, Allelochemical mediated invasion of exotic plants in China. *Allelopathy Journal*., **25**(1), 31-50.
[5] Shanab, SM, Shalaby EA, Lightfoot DA, and El-Shemy HA 2010, Allelopathic effects of water hyacinth *(Eichhornia crassipes). PloS one*., **5**(10), e13200.
[6] Gul, B, Saeed M, Khan H, Khan H, Khan MI, and Khan I 2017, Impact of water hyacinth and water lettuce aqueous extracts on growth and germination of wheat and its associated troublesome weeds. *Applied Ecology and Environmental Research*., **15**(3), 939-950.
[7] Rezania, S, Ponraj M, Talaiekhozani A, Mohamad SE, Din MF, Taib SM, and Sairan FM 2015, Perspectives of phytoremediation using water hyacinth for removal of heavy metals, organic and inorganic pollutants in wastewater. *Journal of environmental management*., **163**(41), 125- 133.
[8] Robinson, AF, Orr CC, and Heintz CE 1978, Distribution of (Nothanguina phyllobia) and its potential aZ a biological. *Journal of Nematology*., **10**, 361-366.
[9] Qasem, JR, and Foy CL 2001, Weed Allelopathy, Its Ecological Impact and Future Prospects. *Journal of Crop Production*., **4**, 43-119.
[10] Parsons, WT 1981, Noxious Weeds of Victoria. Inkata press. Melbourne (AU).
[11] Brunel, IS 2001, Pest risk analysis for (*Solanum elaeagnifolium*) and international management measures proposed. *EPPO Bulettin*, **41**(2), 232-242
[12] Balah, MA, and AbdelRazek GM 2019, Pesticidal activity of (*Solanum elaeagnifolium*) Cav. Leaves against nematodes and perennial weeds. *Acta Ecologica Sinica*., **40**(5), 373-379.
[13] Burrows GE, Tyrl RJ, and Edwards WC 2001, Toxic plants of Oklahoma-thornapples and nightshades. *Journal of Oklahoma Veterinary and medical Association*., **23**, 106-109.
[14] Al-Burni, NME 2012, The allelopathic effect of (*Solanum elaeagnifolium*) wild eggplant extracts. On germination and growth of wheat seedlings. *Tishreen University Journal for Research and Scientific Studies*. **34** (4), 147-164.
[15] Hawas, UW, Soliman, GM, Abou El-Kassem LT, Farrag, ARH, Mahmoud K, and León F 2013, A new flavonoid C-glycoside from (*Solanum elaeagnifolium*) with hepatoprotective and curative activities against paracetamol-induced liver injury in mice. *Zeitschrift für Naturforschung C*., **68**(1-2), 19-28.
[16] Badawy, A, Zayed R Ahmed S, and Hassanean H 2013, Phytochemical and pharmacological studies of (*Solanum elaeagnifolium*) growing in Egypt. *Journal of Natural Products*., **6**, 156-167.
[17] Elabbar, FA, Bozkeha NM, and El-Tuonsia AT 2014, Extraction, separation and identification of compounds from leaves of (*Solanum elaeagnifolium*) Cav.(Solanaceae). *International Current Pharmaceutical Journal*., **3**(3), 234-239.
[18] Feki, H, Koubaa I, and Damak M 2014, Secondary metabolites and antioxidant activity of seed extracts from (*Solanum elaeagnifolium*) Cav. *Mediterranean Journal of Chemistry*., **2**(5), 639-647.
[19] Houda, M, Derbré S, Jedy A, Tlili N, Legault J, Richomme P, and Saidani-Tounsi M 2014, Combined anti-ages and antioxidant activities of different solvent extracts of (*Solanum elaeagnifolium*) Cav (Solanacea) fruits during ripening and related to their phytochemical compositions. *EXCLI journal*., **13**, 1029-1042.
[20] Balah, AM 2015, Herbicidal activity of constituents isolated from *(Solanum elaeagnifolium*) (Solanaceae). *Journal of Crop Protection*., **4**(4), 487-496.

[21] Tsaballa, A, Nikolaidis A, Trikka F, Ignea C, Kampranis SC, Makris AM, and Argiriou A 2015, Use of the de novo transcriptome analysis of silver-leaf nightshade (*Solanum elaeagnifolium*) to identify gene expression changes associated with wounding and terpene biosynthesis. *BMC Genomics*., 16(1), 504.
[22] Njeh, F, Feki H, Koubaa I, Hamed N, Damak M, Ayadi A, and Mezghani-Jarraya R 2016, Molluscicidal activity of (*Solanum elaeagnifolium*) seeds against Galba truncatula intermediate host of Fasciola hepatica: *Identification of β-solamarine. Pharmaceutical Biology*., 54(4), 726-731.
[23] Kaunda, JS, and Zhang YJ 2019, The genus solanum: an ethnopharmacological, phytochemical and biological properties review. *Natural products and bioprospecting*., 9(2), 77-137.
[24] Li, X, Xi H, Sun X, Yang Y, Yang S, Zhou Y, and Yang Y 2015, Comparative proteomics exploring the molecular mechanism of eutrophic water purification using water hyacinth (*Eichhornia crassipes*). *Environmental Science and Pollution Research*., 22(11), 8643-8658.
[25] Steel, RGD, and JH, Torrie 1980, Principles and procedures of Statistic. Abiometrical Approach 2 and ed. *McGraw-HillBook Company, Inc*. U.S.A. P. 481.
[26] Duke, SO 2003, Ecophysiological aspects of allelopathy. Planta, 217(4), 529-539.
[27] Wu, XX, Zhang ZY, and Jin YG 2019, Physiological Mechanism of (*Eichhornia crassipes*) in Inhibiting the Growth of Microcytis aeruginosa. *Russian Journal of Plant Physiology*, 66(3), 433-439.
[28] Borca, DAE, Datcu AD 2020, Morphology, Bioactive Compounds And Uses Of *(Eichhornia Crassipes*). *West University of Timisoara. Biostudent*., 3(2),187-192.
[29] Weston, LA, and Duke SO 2003, Weed and crop allelopathy. *Critical Reviews in Plant Sciences*, 22(3-4), 367-389.
[30] Kato-Noguchi, H, Mizutani J, and Hasegawa K 1994, Allelopathy of oats. II. Allelochemical effect of L-tryptophan and its concentration in oat root exudates. *Journal of chemical ecology*, 20(2), 315-319.
[31] Duke, SO 2020, Poineer of Allelopathy XV. *Allelopathy Journal*, 51(1), 3-20.
[32] Almehemdi, AF, and Alsatoori AA 2019, Allelopathic Effect Of Caraway Essential Oil And Its Alcohol Extract On The Growth Of The Field Dodder Growth On The Lucerne. *Plant Archives*, 19(2), 657-663.
[33] Almehemdi, AF 2001, Response of Field dodder (*Cuscuta campestris*) grown on lucerne (*Medicago sativa* L.) To some plant extracts, addiitives and their interaction. *M. Sc. Thesis. Field crops*, College of Agriculture, University of Baghdad, Iraq. PP 105.
[34] Nimbal, CI, Pedersen JF, Yerkes CN, Weston LA, and Weller SC 1996, Phytotoxicity and distribution of sorgoleone in grain sorghum germplasm. Journal of Agricultural and Food Chemistry, 44(5), 1343-1347.
[35] Cheema, ZA, and Khaliq A 2000, Use of sorghum allelopathic properties to control weeds in irrigated wheat in a semi arid region of Punjab. *Agriculture, Ecosystems and Environment*, 79(2-3), 105-112.