Efficacy of Formulated Almond Oil against *Phalares minor* and *Rumex dentatus* weeds in *Triticum aestivum* crop Under Laboratory and Greenhouse Conditions

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Abstract: Almond oil contains significant proportions of mono and polyunsaturated fatty acids, e.g olic acid and amounts of tocopherol and phytosterol. Increasing of organic farming needs increase of bio herbicides to control weeds. Almond oil was prepared as oil in water emulsion (O/W 30%) and passed of all the specified physico- chemical properties. The phytotoxic effect of prepared almond oil against ***Ttriticum aestivum*** and ***Cucumis sativum*** seeds as patterns of mono and dicotyledonous crops were tested and the results displayed slightly inhibition against *T. aestivum* seeds germination (3.7%) for the highest concentration (5000 ppm), while it showed no any phytotoxic effect on *C. sativum* seed germination, roots and shoots length. Herbicidal efficacy against ***Phalares minor and Rumex dentatus*** were studied under laboratory conditions and the results revealed that great inhibition in seed germination, roots and shoots length and its values were: 95.78, 99.67, and 99.0%, respectively for concentration level (5000 ppm) against ***P. minor*** seeds. While it showed low inhibition in seed germination, roots and shoots length in ***R. dentatus*** seeds and its values were: 36.58 27.10, and 11.95%, respectively.

Greenhouse experiments conducted to evaluate the foliar phytotoxic effect of the prepared oil against germinated plants of ***T. aestivum*** and herbicidal efficacy against ***P. minor*** germinated plants. The results indicated that low percent stunting with *T. aestivum* plants was 5.12% after 7 days and decreased to 4.16% after 14 days of treatment, while the prepared almond oil showed great herbicidal efficacy in form burning of weed plants when sprayed against ***P. minor*** after 14 days of planting and its values were: 74.65 and 96.73% burning after 7 and 14 days of treatment respectively. Selective herbicidal efficacy of the prepared emulsion was tested against ***P. minor*** and ***T. aestivum*** germinated plants (planted in the same pot 5 kg capacity), and the results displayed excellent selectivity between crop plants ***T. aestivum*** and weed plants ***P. minor***, where the results showed no any phytotoxic effect (burning) observed with ***T. aestivum*** for all tested concentrations and all the time of experiment. The great herbicidal efficacy against ***P. minor*** plants was: 72.82, 93.78, and 98.85% after 7, 14, and 21 days, respectively for concentration 20000ppm. The IC_{50} values were: 8300.8378, 4577.8168, and 3838.4099 ppm, respectively. The reduction of shoot fresh weight of ***P. minor*** and ***T. aestivum*** was measured after21days of treatment: 88.96 and 7.33%, respectively. From all findings to be provided formulation is an efficacy alternative co-friendly selective herbicide against weeds. More studies are critical to complete information of this compound for field trials.

Keyword: almond oil, selective herbicides, oil in water emulsion, *Phalares minor* and *Rumex dentatus*

1.Introduction:

According to producers of organic farming, weeds are the most troublesome, expensive, and time-consuming production requirement. The demand for naturally occurring herbicides to manage weeds is rising as organic farming gains popularity. **Xiaoya Cai and Mengmeng Gu (2016).** Any plants that are grown improperly are considered weeds. They reduce crop yield by lowering the quality and quantity of crops, reduce the number of economically important crops by competing for nutrients and water, and release toxins that hinder crop promotion. They also interfere with machine harvesting, poison animals, and stop water flow. **(Abouziena and Haggag, 2016). Soltys et al., (2011)** showed that the effects of toxins on plants are different from those of allelochemical phytotoxicity, which involves altering physiological processes like respiration, photosynthesis, the production of reactive oxygen species, and cell division, all of which result in cell death. Plant promotion was disrupted when any of these pathways were suppressed. **Mounir Ouzir et al. (2021)** stated that oleic acid is the primary fatty acid in almond oil, which is an unsaturated oil that also

contains a variety of other fatty acids, including linoleic acid, palmitic acid, stearic acid, palmitoleic acid, vaccenic acid, myristic acid, and others.

The present study aims to prepare the almond oil in suitable formulation form and evaluate its phytotoxic effect on mono and dicotyledonous crops and its herbicidal efficacy against mono and dicotyledonous weeds under laboratory and greenhouse conditions as a natural alternative herbicide.

2. Materials and Methods:

2.1 -Tested chemicals:

Almond oils: Prunes dulcis var. dulcis: pure vegetable oil, surfactants (sodium dodecyl sulfate, toximol- R, Tween80; Poly ethylene glycol 600 di-oleate) and solvents (acetone, xylene, and dimethylformamide) were provided by EL- Gomhoria Co., Cairo, Egypt.

2.2-The physico-chemical characteristics of formulation components

2.2.1-Active ingredient:

Solubility was measured according to **(Nelson & Fiero, 1954)** and Free acidity or alkalinity measured using the method described by **WHO (1979)**.

2.2.2- Surfactants:

Surface tension measured using the method reported by ASTMD- 1331 (2001) while Hydrophilic – Lipophilic balance (HLB) measured using the method reported by (Lynch and Griffin, 1974).

Critical micelle concentration (CMC) measured using the method that determinate the ratio of surfactant which no reduction in surface tension by raising the ratio of surfactant, this method reported by **(Osipow, 1964)** and free acidity or alkalinity determined using the same method reported before.

2.3. Preparing almond oil as oil in water emulsion (O/W 30%) formulation

Physico- chemical properties for almond oil as an active ingredient and the suggested surfactant was measured to determine the type of suitable formulation and the surfactant could be used to prepare the needed formulation, many trial were done by varying ratios of active ingredient, surfactant and water according to (**Salvica G., et al., 2012**) **& (Eskander., 2019)**. Emulsion stability, foam, acidity, surface tension, and viscosity were measured before and after storage at 54±2 degrees Celsius for 14 days according to CIPAC (2002). To determine the stable and suitable formula for application.

2.4. Physico-chemical characteristics of almond oil formulation:

Viscosity measured using a Brookfield viscometer model DVII+Pro, the measurement was made using centipoises, in accordance with ASTM D-2196 (2005). Surface tension & Free acidity or alkalinity was measured as mentioned before. Emulsion stability test measured using the method described by FAO/WHO MT 36.3. (2010) while foam measured using the method described by (CIPAC 2002).

2.5. Physico-chemical characteristics of prepared formulation at (0.5 %):

Surface tension and viscosity measured using the same methods which described before. Electrical conductivity and salinity measured using the Cole-Parmer PH/Conductivity meter 1484-44 with µmhos serving as the unit of electrical conductivity, as reported by **Dobrat and Martijn (1995).**

2.6. Bioassay:

2.6.1. Laboratory experiments:

Inhibition effect assessments of almond oil 30% O/W formulation on seed germination, roots and shoots length was conducted using the method reported by **Powel and Spencer (1988)** with some developments. Series of concentrations. 5000, 2500, 1250, 625 ppm of the tested formulated almond oil were prepared by diluted in water. Ten seeds of *T. aestivum* or *C. sativum* as models for narrow and broad leaf crops, 0.25g of *P. minor* and *R. dentatus* seeds as models for narrow and broad leaf weeds were used. Each seeds specie distributed in petri dish (9 cm), lined with a dry filter paper, 6 ml of each previous prepared spray solution transferred on seeds and filter paper, then petri- dishes were sealed with sticking tape and storage in dark place. After 7 days of treatment, germination, roots and shoots length were measured. Three replicates for each concentration were done **(El- kady *et al*., 2000).**

2.6.2. Under greenhouse conditions:

2.6.2.1. Study the phytotoxic effect of prepared emulsion against *T. aestivum* and *P. minor*:

An experiment was conducted to determine the phytotoxic effect of almond oil as foliar application against *T. aestivum* germinated plants and herbicidal efficacy against *P. minor* germinated plants. Series concentrations of almond oil 30% O/W: 20000, 10000, 5000, and 2500 ppm were prepared and applied against both of *T. aestivum* and *P. minor* germinated plants separately in (pot 1 kg capacity was filled by peat moss and sand 1:3. Weight of 1gr/pot of *P. minor* seeds and

20 seeds of *T. aestivum* per pot). Five replicates for each treatment with both *T. aestivum* and *P. minor* were used. The germinated plants sprayed after 14 days of planting and irrigated with water as required. Toxicity symptoms (burning & stunting) on treated *T. aestivum* plants and herbicidal efficacy against treated *P. minor* were measured after 7 and 14 days of treatment compared with untreated plants. **(Eskander *et al.*, 2020)**

2.6.2.2. Study the selective herbicidal efficacy of almond oil 30% O/W.

Five replicates for each treatment of pot five kg capacity, five replicates for untreated were filled with peat moss and sand 1:3 (v/v). Weight of 3 g of *P. minor* seeds and 30 seeds of *T. aestivum* were planted in the same pot. After two weeks of planting, series concentrations: 20000, 10000, and 5000 ppm of formulated almond oil were prepared and sprayed by hand sprayer against pots contains *T. aestivum* and *P. minor* together. Herbicidal efficacy against *P. minor* and phytotoxic symptoms on *T. aestivum*, burning and shoots fresh weight of *T. aestivum* and *P. minor* were measured after 7, 14, and 21 days of treatment.

2.6.2.3. Statistical analysis:

Inhibition percentages were calculated by the method described by **Abbott's (1925)**, and the concentration inhibition regression lines were produced by using **Finney (1952).**

3.Results and discussion:

3.1 - Formulation part:

To prepare any active ingredient (a.i) must firstly measure its physico- chemical properties to determine the suitable formulation type. Data illustrated in Table (1) indicate that almond oil insoluble neither in water nor in organic solvent DMF but soluble in acetone and xylene. So it could be prepared as oil in water emulsion, and demonstrated as an acidic property evaluated as free acidity with value (0.049).

The physico- chemical characteristics of the suggested surfactants measured to determine the suitable with the characteristics of a.i (almond oil) to prepare it as oil in water emulsion. Data in Table (2) show that PEG 600DO and sodium dodecyl sulfate demonstrated an alkaline property evaluated as free alkalinity, with values of 0.32 and 0.03, respectively. Tween 80 and toximol-R revealed an acidic property which measured as free acidity with the values of 0.049 and 0.5, respectively. Also, Tween80 showed the greater surface tension value (41.8) while toximol- R displayed the lowest on 31.7. PEG 600DO revealed the greater value of CMC with 0.9 followed by tween 80 (0.5) while sodium dodecyl sulfate and toximol- R display the same CMC value (0.3). Sodium dodecyl sulfate and tween 80 revealed the same HLB values (>13), whereas PEG600DO and toximol-R showed the value (10- 12).

Table (1) Physico- chemical properties of the tested Crude oil

Compound	Solubilitiy				Acidity as H_2So_4
	Water	Acetone	Xylene	DMF	
Almond oil	N.S	soluble	soluble	N.S	0.049

N.S= non- soluble

Emulsion is a heterogeneous system contains at least one immiscible liquid distributed in another in form of droplet with help of surface active agent. Oil in water emulsion (O/W): Oil is dispersed phase while water is continuous phase**. (Jafari *et al*. 2008).** Data represented in Table (3) illustrate the physico- chemical properties of the prepared (O/W) oil in water emulsion formulation before and after accelerated storage at 52 ± 2^0C for 14 days, where it displayed complete

Table (2) Physico- chemical characteristics of the used surfactants

Surfactant	Free		Surface tension (dyne/cm)	CMC %	HLB
	Acidity % as H_2SO_4	Alkalinity % as NaOH			
PEG600DO	-	0.32	34.9	0.9	10-12
SDS	-	0.03	32.2	0.3	>13
Tween 80	0.049	-	41.8	0.5	>13
Toximol -R	0.5	-	31.7	0.3	10-12

PEG600DO= polyethylene glycol 600 dioleate SDS = sodium dodecyl sulfate

emulsion stability and no foam formed before and after storage with hard and soft water. The formulation displayed acidic property and its acidity value was (0.1545) before storage while it increased slightly after storage and its value was (0.1647). Slight increase in surface tension and viscosity after storage, where obtained with values of 31.744 dyne/cm and 33.64 centipoise before storage while they revealed values 32.566 dyne/cm and 4.16 centipoise after storage for surface tension and viscosity respectively. The previous results confirmed the suitability of the prepared almond oil 30% O/w emulsion for application under laboratory and field conditions.

Table (3) physico- chemical properties of local formulated oil in water emulsion before and after accelerated storage at 54±2 ^{0}C for 14 days

Parameter	Emulsion stability (ml. Cream Sep.)		Foam (cm3)		Acidity %as H_2So_4	Surface tension (dyne/cm)	Viscosity (centipoise)
	H.W	S.W	H.W	S.W			
Before storag	0	0	0	0	0.1545	31.744	33.64
After storage	0	0	0	0	0.1647	32.566	34.16

H.W= Hard water S.W. = Soft water

Physico-chemical characteristics of spray solution for the prepared oil in water emulsion of almond oil O/W 30% at field dilution rate 0.5% are illustrated in Table (4). Viscosity displayed greater value of (1.66) comparing with water viscosity, and surface tension revealed lower value of (34.23 dyne/cm) comparison with water (72dyne/cm). Salinity value was (0%) and displayed the electrical conductivity value of 3.9 µmhos. The previous properties of the spray solution have an evidence on the formulation behavior and the activity against the target pests, where the lower surface tension increased the biological activity of the pesticide **(Pereira *et al.*, 2016)**. Physico- chemical properties of spray solution effect on coverage of targets, adhesion of the active ingredient on the leave, and bounce of droplets **(Dorr *et al.*, 2015)**. Spray drift is affected by the droplet size spectra, as a result of the interaction between spray nozzle and spray solution, where decreasing droplet size increasing drift potential **(Miller & Butler Ellis, 2000; Hilz & Vermeer, 2013)**.

Table (4) Physico- chemical characteristics of formulated almond oil at (0.5%)

Formulation	Viscosity (centipoise)	Surface Tension (dyne/cm)	Electrical conductivity (µmhos)	Salinity %
Almond oil 30% (O/W)	1.66	34.23	3.9	0

3.2 - Biological part:

3.2.1 -Laboratory experiment:

The phytotoxicity of the prepared almond oil on *T. aestivum* seed germination, root and shoot length was carried out under laboratory conditions. Results in Table (5) illustrate that the highest concentration (5000 ppm) noticed the inhibition in seed germination, root length and shoot length by the following values: 3.7, 14.18, and 13.67%, respectively. The rest of tested concentrations revealed increased activation in root and shoot length independent on decrease of concentration.

The herbicidal activity against *P. minor* as narrow leaf weeds was carried out and the results in Tables (5, 6 and 7) indicate that, the highest concentration 5000 ppm displayed clear inhibition in seed germination, root and shoot length and their values were: 95.78, 99.67, and 99%, respectively, with IC_{50} values were:2052.3763, 630.8309, and 1025.8421 ppm respectively. Comparing with the results in Tables (5&6) concluded that formulated almond oil has slightly effect against *T. aestium* (3.7 % inhibition) in seed germination but gave great inhibition (95.78% in seed germination) against *P. minor* that indicated clearly the selective effect against *T. aestium* and *P. minor*.

Table (5) Percent of inhibition of germination, roots and shoots length in *T. aestivum*

Crop	Conc.(ppm)	% inhibition in Germination	Root length	Shoot length
T. aestivum	5000	+ 3.7	+ 14.18	+13.67
	2500	0	- 1.53	-2.56
	1250	0	- 5.44	-26.91
	625	0	-11.66	-27.28

(-) activation (+) inhibition

Table (6) Percent of inhibition of germination, roots and shoots length of *P. minor*

weeds	Conc. (ppm)	% inhibition Germination %	Root length (cm)	Shoot length(cm)
P. minor	5000	95.78	99.67	99.00
	2500	36.14	81.19	67.74
	1250	29.75	73.08	54.23
	625	16.98	51.66	38.57

Table (7) IC_{50}, IC_{90} and Slope of germination, roots and shoots length of *P. minor*

parameter	Germination %	Root length %	% Shoot length
IC_{50}	2052.3763	630.8309	1025.8421
IC_{90}	6985.1838	2833.4292	4330.3807
Slope	2.4094± 0.2281	1.9644± 0.2501	2.0491±0.2258

IC_{50}= medium inhibition concentration

The herbicidal activity against broad leaf weeds under laboratory conditions were conducted on *R. dentatus* seeds and data showed in Tables (8 & 9) illustrate that the highest tested concentration 5000 ppm displayed low efficacy against broad leaf weeds, *R. dentatus* and its inhibition values on seed germination, root and shoot length were: 36.58, 27.10, and 11.95% respectively, with IC_{50} values: 10581.7146, 147372.9638, and 66636.8958 ppm respectively. Data showed that the herbicidal activity against broad leaf weeds was weak. These finding were confirmed by the results in Table (10), where the phytotoxicity of prepared oil studied against broad leaf crop *C. sativus*. The results in Table (10) show 0% inhibition in *C. sativus*. Seed germination. While, it recorded an activation in roots and shoots length and this activation increased by decreasing the tested concentrations, where the ratio of activation in roots and shoots length were: 13.90 and 2.77%, respectively, for concentration 5000 ppm. The lowest concentration 625 ppm gave activation values of roots and shoots length 42.23 and 21.67%, respectively.

Table (8) Percent of inhibition in germination, roots and shoots length of *Rumex dentatus*

Conc. (ppm)	% Inhibition Germination seed (%)	Root length (cm)	Shoot length (cm)
5000	36.58	27.10	11.95
2500	29.27	25.63	3.51
1250	14.63	20.38	2.25
625	12.19	17.02	1.90

Table (9) IC_{50}, IC_{90} and Slope of germination, roots and shoot length of *R. dentatus*

parameter	Germination %	Root length %	% Shoot length

IC_{50}	10581.7146	147372.9638	66636.8958
IC_{90}	204862.0008	254442025.4	926338.3233
Slope	0.9959± 0.2163	0.3959± 0.2085	1.1212±0.3685

IC_{50}= medium inhibition concentration

Table (10) Percent of inhibition in germination, roots and shoot length of *C. sativus*.

Conc. (ppm)	% Inhibition		
	Germination seed (%)	Root length (cm)	Shoot length (cm)
5000	0	- 13.90	- 02.77
2500	0	- 18.88	- 05.18
1250	0	- 19.57	- 09.66
625	0	- 42.23	- 21.67

(-) means = activation

3.2.2. Greenhouse experiments:

Due to the results illustrated in laboratory experiments, greenhouse experiments were conducted to confirm the above results. Comparable experiments were carried out on both of economic crops (*T. aestivum*) and weeds (*P. minor*) to determine the side effects of prepared almond oil on *T. aestivum* and the herbicidal efficacy against *P. minor*. The results reported in Tables 11 and 12 display that no phytotoxicity burning noticed on *T. aestivum* for all tested concentration during the period of experiment, while little phytotoxic effect as formation of stunting in *T. aestivum* plants was noticed, where stunting value for the highest concentration was 5.12 and 4.16% after 7 and 14 days of application, respectively, comparing with untreated plants. However, the tested oil displayed excellent herbicidal efficacy against weeds (*P. minor*) as shown in Table (11) with the values: 74.65 and 96.73 % after 7 and 14 days of application. Whereas the IC_{50} values were: 8193.2784and 4033.3614 ppm after 7 and 14 days, respectively. While, the IC_{50} values for wheat stunting were 40607791.2319 and 822202.1892ppm after 7 and 14 days of application respectively.

Table (11) the phytotoxic effect of almond oil (O/W 30%) on *p. minor* and *T. aestivum* plants

Conc.	% burning (*P. minor*)		% stunting (*T. aestivum*)	
(ppm)	D7	D14	D7	D14
20000	74.65	96.73	5.12	4.16
10000	59.46	77.42	3.91	2.82
5000	37.81	56.54	2.65	1.16
2500	12.36	34.76	1.92	0.21

Table (12) IC_{50}, IC_{90} and Slope of the effect Almond oil O/W 30% on *P. minor* (burning) and on *T. aestivum* (stunting)

parameter	% burning (*P. minor*)		% Stunting (*T. aestivum*)	
	D7	D14	D7	D14
IC_{50}	8193.2784	4033.3614	40607791.2319	822202.1892
IC_{90}	36963.1011	16873.7752	16425106548.716	13916372.5257
Slope	1.9587± 0.2129	2.0620± 0.2331	0.4916± 0.3689	1.0432± 0.5076

IC_{50}= medium inhibition concentration

Due to the results of greenhouse experiment, other experiments were conducted to confirm the selective herbicidal effect of prepared almond oil, on crops (*T. aestivum*) and weed (*P. minor*) planted in the same pot 5kg capacity and sprayed after 14 days of planting after 7,14, and 21days of application. Results of this experiment illustrated in Tables 13, 14, 15, and 16 revealed that, no any symptoms of phytotoxic burning on *T. aestivum* plants observed till the end of experiment for all tested concentrations. The tested oil displayed excellent herbicidal efficacy against weeds (*P. minor*) plants increased by increasing the concentration and the time. The percent of *P. minor* burning for concentration 20000 ppm were: 72.82, 93.78, and 98.85% after 7, 14, and 21 days of application, respectively. The IC_{50} values were:

8300.8378, 4577.8168 and 3838.4099 ppm after the above time points, respectively.

Reduction of shoots fresh weight of both *T. aestivum* and *P. minor* plants at the end of experiment measured comparing with untreated plants. Formulated almond oil revealed weak effect in reduction of shoots fresh weight with *T. aestivum* plants with the highest concentration 20000 ppm its value was 7.33% and its IC_{50} value was 1335792.8084 ppm. However high reduction in shoots fresh weight of *P. minor* plants was obtained comparing with untreated plants and the reduction value was 88.96% after 21 days of application with IC_{50} value (4444.88 ppm), which indicating and confirming that the selective phytotoxic effect of almond oil against *T. aestivum* and its narrow leaves weeds (*P. minor*).

Table (13) the herbicidal efficacy of formulated almond oil (O/W 30%) on *P. minor* plants

Conc.(ppm)	% burning of *P. minor* after		
	D7	D14	D21
20000	72.82	93.78	98.85
10000	56.36	75.48	86.73
5000	35.42	54.82	64.18

Table (14) IC_{50}, IC_{90} and Slope of the efficacy of formulated almond oil (O/W 30%) on *P. minor* plants

Parameter	% burning of *P. minor*		
	D7	D14	D21
LC_{50}	8300.8378	4577.8168	3838.4099
LC_{90}	50702.0676	16785.382	10616.0541
Slope	1.6307 ± 0.3088	2.2712 ± 0.3641	2.9008 ± 0.4698

IC_{50}= medium inhibition concentration

Table (15) Percent of inhibition of treated *P. minor* and *T. aestivum* shoots fresh weight

Conc. (ppm)	% Inhibition of shoots fresh weight at D21	
	P. minor	***T. aestivum***
20000	88.96	7.33
10000	74.53	4.12
5000	53.82	2.72

Table (16) IC_{50}, IC_{90} and Slope of the inhibition of treated *P. minor* and *T. aestivum* shoots fresh weight

Parameter	D21	
	P. minor	***T. aestivum***
IC_{50}	4444.88	1335792.8084
IC_{90}	21492.9409	53144320.3821
Slope	1.8725 ± 0.3411	0.8011 ± 0.5281

IC_{50}= medium inhibition concentration

Conclusion:

After determined the physico- chemical characteristics of almond oil, it prepared as oil in water emulsion (O/W30%) and passed all specified testes which confirm its suitability for application in biological assessment under laboratory and field conditions, then many experiments were carried under laboratory condition to assess its efficacy against weed which grows in *T. aestivum* crop, and the phytotoxic effect on mono and dicotyledonous crops. The results displayed efficacy of the compound against narrow leaves weed *P. minor* while it doesn't affect broad leaf weed *R. dentatus*. No phytotoxic effect observed against *C. sativum* seeds germination, roots and shoots length as a model of broad leaves crops, whereas slightly effect was noticed for high concentration 5000 ppm against *T. aestivum* seed germination (3.7%). The foliar phytotoxic effects and herbicidal efficacy of prepared almond oil under greenhouse conditions were conducted and the results revealed that slightly stunting was noticed on *T. aestivum* plants. There was excellent herbicidal efficacy against *P. minor* (narrow leaves weed). From these results it is confirmed that prepared

almond oil showed selective herbicidal activity between *Minor* (narrow leaf weeds) and narrow leaf crop *T. aestivum*. While, no any phytotoxicity symptoms observed against *C. sativum* as a broad leaf crop. **Finally,** the prepared almond oil could be used as herbicide in organic farming and wheat crops and controlling narrow leaf weeds (*P. minor*) in dicotyledonous crops after completing the needed studies.

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فعالية زيت اللوز المجهز علي حشائش الفلارس مينور و روميكس دنتاتس في محصول تراتيكم ساتيفم تحت ظروف المعمل والصوبة

الملخص العربي:

يحتوي زيت اللوز على نسبة كبيرة من الأحماض الدهنية الأحادية والمتعددة غير المشبعة، حمض الأوليك كمركب رئيسي، وكمية من محتوى التوكوفيرول والفيتوستيرول. مع زيادة الزراعة العضوية فان هناك اهمية إلى زيادة المبيدات الحيوية لمكافحةالحشائش الضارة. تم تحضير زيت اللوز كمستحلب زيت في ماء ٣٠% واجتاز جميع اختبارات الخصائص الفيزيائية والكيميائية المحددة والتي تسمح بقابليتة للتطبيق والتخفيف بالماء. تم اختبار التأثير السام للنبات لمستحضرزيت اللوز ضد بذور القمح *T. aestivum* والخيار *Cucumis sativum* كنماذج للمحاصيل أحادية وثنائية الفلقة تحت ظروف المعمل وأظهرت النتائج تثبيطًا طفيفًا ضد إنبات بذورالقمح بنسبة ٣,٧٪ مع أعلى تركيز تم اختباره ٥٠٠٠ جزء في المليون، في حين لم يظهر أي تأثير سام للنبات ضد إنبات بذورالخيار ، طول الجذور والبراعم. تم دراسة التاثير الابادي للأعشاب ضد نباتات الفلارس *Phalares minor* ونباتات الحميض *Rumex dentatus* تحت ظروف المعمل وأظهرت النتائج تثبيط كبير في إنبات البذور وطول الجذور والبراعم وقيمها كانت: ٩٥,٧٨ و ٩٩,٦٧ و ٩٩,٠٪ على التوالي مع أعلى تركيز تم اختباره ٥٠٠٠ جزء في المليون ضد بذورالفلارس *P.minor*. بينما أظهرت انخفاض التثبيط في إنبات البذور وطول الجذور والبراعم مع بذور الحميض *R. dentatus* وقيمها كانت: ٣٦,٥٨ و ٢٧,١٠ و ١١,٩٥٪ مع أعلى تركيز ٥٠٠٠ جزء في المليون.

أجريت تجارب تحت ظروف الصوبة لتقييم التأثير السام للزيت المحضر رشا علي نباتات القمح وكذلك التاثير الابادي لحشيشة الفلارس .اشارت النتائج الي وجود نسبة تقزم وقيمتها كانت ٥,١٢% بعد ٧ ايام انخفضت الي ٤,١٦% بعد ١٤ يوم من المعاملة، بينما أظهر زيت اللوز المحضر تاثير ابادي علي حشيشة الفلارس في صورة حرق للاوراق عندما تم رشها علي النباتات عمر ١٤يوم وكانت قيمها ٧٤,٦٥ و ٩٦,٧٣ بعد ٧ و١٤ يوم من المعاملة علي التوالي.

تم اجراء تجربة تحت ظروف الصوبة لتاكيد التاثير الاختياري للمستحضر علي نباتات القمح وحشيشة الفلارس التى تم زراعتهما معا في نفس الاصص ، حيث اظهرت النتائج عدم وجود اي تاثير علي نباتات القمح بينما اظهر المستحضر نسبة ابادة عالية علي نباتات الفلارس وكانت القيم : ٧٢,٨٢، ٩٣,٧٨و ٩٨,٨٥% يعد ٧، ١٤، و ٢١ يوم من المعلملة مع اعلي تركيز ٢٠٠٠٠جزء في المليون. كذلك اظهرت النتائج خفض في الوزن للمجموع الخضري لكلا من نباتات القمح والفلارس بعد ٢١ يوم من المعاملة وكانت القيم ٧,٣٣ و ٨٨,٩٦% علي التوالي