Efficacy evaluation of fluazifop-p-butyle and glyphosate herbicides applied alone or in combination with fertilizers in faba bean fields

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ABSTRACT: The field experiments were conducted at Kafr El-Dawar District, El-Behera Governorate, during 2017-2018 and 2018-2019 seasons to evaluate the efficacy of Fusalide super 15% EC (fluazifop-p-butyle) and Round up 48% EC (glyphosate) herbicides at the recommended rates or at the half recommended rates in combination with urea and ammonium sulphate at 2% as additives to herbicides spray solutions in comparison with two hand hoeing and untreated control in faba bean fields. The predominant weed species identified in faba bean fields during the two studied seasons were, Malva parviflora, Sonchus oleraceus, Beta vulgaris, Rumex dentatus and Chenopodium album as broad-leaves weeds, and Phalaris minor and Lolium temulentum as narrow-leaved weeds. Broad-leaved weeds more dominant than narrow-leaved weeds during the both seasons. Results showed that hand hoeing treatment significantly gave the highest reduction in fresh weights of weeds and highest increase in plant height, 100-seed weight and grain yield of faba bean crop followed by fluazifop-p-butyle and glyphosate at the recommended rates in 2017-2018 and 2018-2019 seasons. Moreover, addition of urea and ammonium sulphate to the half recommended rates of the tested herbicides spray solution recorded satisfactory significant effect against weeds as well as increased yield and yield components of faba bean fields during these studies compared with the untreated check. Addition of ammonium sulphate to herbicides spray solution appeared more herbicidal activity against on weeds and increase in yield and yield components than urea.

Keywords: Broad bean, herbicides, hand hoeing, fertilizers, weeds, yield .

1.INTRODUCTION

Faba bean (Vicia fabae, L.) is grown and consumed principally in developing countries in Latin America, Africa and Asia. It is consumed for dry (mature) beans, shell beans (seeds at physiological maturity) and green pods. Also, it is a major source of dietary protein, rich in dietary fibers, minerals and certain vitamins **(Gepts et al., 2008).** Moreover, it is considered one of the most popular vegetable in the world. In Egypt, it is an important source of dietary protein, used in many popular dishes which consumed by a majority of peoples **(Shalaby** and **Abdou, 2015).**

Among many factors affecting faba bean crop, weed infestation is the devastating one.

Weeds are a serious pest that damages most of crops; moreover, it is everlasting problem for our agriculture. Weeds identified as the ubiquitous class of pests intrusive with crop plants through competition for light, nutrients, water and space. It competition in field crops is a key issue casual to direct loss in quality and quantity of production**.** It is caused low production and yield instability of faba bean.

Weed-faba bean competition reduced seeds yield as much as 83 % **(Arnold et al., 1993; Malik et al., 1993)** and can interfere with harvest process and cause staining and reduce seeds quality **(Burnside et al., 1994; Bauer et al., 1995; Urwin et al., 1996).** The growth of weed and delayed weeding reduced seeds yield of faba bean up to 80% **(Mohamed, 1995; Khalil, 1997).**

Several investigators have reported the excellent weed control in faba bean was achieved by application herbicides **(Arevalo et al., 1992** and **Cook et al., 1993).**

Chemical control of weeds are important to reduce weeds infestation, cause rapid and desirable control of weeds and today it is considered one of the most popular methods for controlling weeds **(Aboali and Saeedipour, 2015**).

Herbicides are highly efficient in controlling weeds, increasing yield and improving quality of faba bean crop **(Arevalo et al. 1992).** The recommended dose of herbicide is too expensive under the Egyptian conditions, so some evidence have been gathered that adding additives especially the nitrogen fertilizers to herbicides spray solution could increase its activity, consequently the dose could be lowered and its cost price could be reduced. Moreover, lowering the dose of herbicide is much appreciated to minimize environmental pollution (**El-Metwally et al., 2010).** Likewise**, El-Metwally et al., (2013)** reported that add ammonium sulphate or urea to herbicide spray solutions had higher efficacy against annual weeds and increased yield and yield components of faba bean crop.

The study aims to evaluate the efficacy of herbicides alone or in combination with urea or ammonium sulphate adjuvants for controlling weeds, improve yield components and grain yield of faba bean crop.

2.MATERIALS AND METHODS

The present work was carried out at Kafr El-Dawar District, El-Behera Governorate, Egypt, during

2017/2018 and 2018/2019 seasons to evaluate herbicidal activity of Fuslalide Super 15% EC (fluazifop- p-butyl) and Round up 48% EC (glyphosate) either at the recommended rate or the half recommended rate in combination with urea and/or ammonium sulphate, respectively at 2%, compared to hand hoeing and the weedy check in faba bean fields. Seeds of faba bean cv. Giza Blanca were sown in 11 and 13 November in the two successive seasons. The experiments were arranged in a Randomized Complete Blocks Design (RCBD) with three replicates for each treatment, each being $21m^2$. Herbicides were applied as post-emergence treatment (Fusilade super alone at the recommended rate or at the half recommended rate either with urea or ammonium sulphate both at 2% was sprayed at 30 days after sowing, while, Round up at the recommended rate or at the half recommended rate either with urea or ammonium sulphate both at 2 % at 60 days after sowing, using 5 liter knapsack sprayer at 200 L water fed^{-1}. Hoeing was done at 20 and 40 days after sowing (Table 1).

Table (1): Common names of herbicides used, trade names, rates and times of application.

Common names	Trade names	Rate fed^{-1}	Time of application
fluazifop-p-butyle 15% EC	Fusilade Super	2 L	Post-emergence
fluazifop-p-butyle 15% Ec+ urea	Fusilade Super + adjuvant	1 L + 2%	Post-emergence
fluazifop-p-butyle 15% EC+ammonium sulphate	Fusilade Super + adjuvant	1 L. + 2%	Post-emergence
glyphosate 48% EC	Round Up 48% EC	75 ml	Post-emergence
glyphosate 48 Ec+ urea	Round Up 48% EC + 2%	35.5 ml + 2%	Post-emergence
glyphosate 48% EC+ ammonium sulphate	Round Up 48% EC + 2%	35.5 + 2%	Post-emergence
Hand hoeing	--	Twice	20 and 40 DAS
Unweeded check	--	--	--

Weeds in one square meter were collected using a quadrate of 50 cm x 50 cm placed at 4 randomly selected spots in each experimental plot. Weeds were sorted, weighed, classified and the following parameters were assessed as follow:

Weed biomass = Average fresh weight of each weed gm m^{-2}.

Weed biomass %= average fresh weight of each weed/ average fresh weight of total weeds x 100**.**

Weed control efficiency $= \frac{C - T}{C} \times 100$

Where:

C = Mean weed fresh weight (gm) in each untreated plots.

T = Mean weed fresh weight (gm) in each treated plots.

Plant height and 100-seed weight were determined as follow:

Plant height was determined before harvest, plants air dried, then faba bean plants height was measured from 10 plants in each plot.

Weight of 100- seeds faba bean crop was considered mature when 90 % of the pods in the unweeded treatment had turned from green to golden color. Beans were harvested from each plot area, weighed and faba bean seed yields were adjusted to 13% moisture then, 100-seed-weight and grain yield were recorded and increase percent of grain yield was calculated as follow:

Increase %= T - C / T x 100

Where:

T= Mean weigh of faba bean grain in the treatment.

C= Mean weight of faba bean grain in the untreated check.

Statistical analysis of the collected data were subjected to analysis of variance (ANOVA) using MSTATC statistical software followed by means separation for their significant differences using the least significant differences (LSD) test according to **Steel** and **Torrie (1980).**

3.RESULTS AND DISCUSSION

3.1.Weed flora:

Data presented in **Tables (2** and **3)** showed that faba bean fields were found to be infested with different types of grasses and broad leaved weeds. The most dominant broad leaved weeds include Malva parviflora , Sonchus oleraceus , Beta vulgaris, Rumex dentatus and Chenopodium album, while, Phalaris minor and Lolium temulentum were the most predominant grassy weeds during the two experimental seasons. Broad-leaved weeds showed more predominant than grassy weeds. Among observed weeds, Rumex dentatus and Sanchus oleraceus weeds were the most dominant species. Similar results are reported by (**El-Metwally** and **Shalby, 2007; Alsadawi et al., 2013;** and **Mukhtar et al., 2013).**

3.2.Fresh weight of weeds

The data in Tables (2 and 3) showed that the fresh weight biomass (gm m^{-2}) of the predominant weeds significantly at (p=0.05) differed among the treatments. The maximum weeds fresh weight was recorded in the weedy check, fresh weight of Malva parviflora (433.55 and 461.41), Sanchus oleraceus (510.47 and 506), Beta vulgaris (380 and 533.90), Rumex dentatus (666.69 and 683.41), Chenopodium album (233.93 and 276.61), Phalaris minor (555.76 and 396.45) and Lolium temulentum (400 and 376.91) gm m^{-2} in 2017-2018 and 2018-2019, respectively. While, the lowest weed fresh weights was observed with herbicidal treated plots during the two application seasons.

3.3.Efficacy of herbicidal treatments:

3.3.1.Individual weeds:

Obtained results indicated that all the tested herbicides at the recommended rates or at the half recommended rates with adjuvants and hand hoeing treatment significantly decreased fresh weight (gm m^{-2}) of individual weeds in faba bean fields during the both seasons compared to the unweeded check (Tables 2 and 3)**.**

Hand hoeing treatment was the best option in controlling individual weeds during the both seasons, it gave 100, 93.96, 93.94, 100, 89.88, 85 and 96 % WCE of Malva parviflora, Sonchus oleraceus , Beta vulgaris, Rumex dentatus and Chenopodium album, while, Phalaris minor and Lolium temulentum, respectively, in 2017-2018 season. Similar trend of results was recorded in the second season.

Concerning the recommended rates of applied herbicides, results in Tables (2 and 3) indicated that Fusilade super and Round up significantly (p-0.05) affected the fresh weight of individual weeds and gave high weed control efficiency (WCE) in faba bean fields. Fusilade super treated plots recorded 88.04, 86.65, 85.15, 88.01, 82.11, 85.24 and 80.68% control of Malva parviflora, Sonchus oleraceus, Beta vulgaris, Rumex dentatus and Chenopodium album, while, Phalaris minor and Lolium temulentum in 2017/2018 season and 84.77, 86.02, 85.55, 88.18, 79.38, 83.82 and 85.00 % reduction in 2018/2019 season. Moreover, Round up treated plots reduced the fresh weights of these weeds by 82.74, 83.33, 81.46, 86.41, 76.31, 80.10 and 76.50 % in the first season. Similar trend of results was observed in the second season.

Considering the herbicides half recommended rates with adjuvants, results indicated that Fusilade super and Round up herbicides significantly gave a moderate WCE against individual weeds compared to the untreated plots during these studies. Fusilade super and Round up both at half recommended rates in combination with urea and ammonium sulphate both at 2% gave a moderate and significant effect against individual weeds compared to the untreated check.

Generally, all herbicidal treatments achieved a good herbicidal activity of individual weeds during the both tested seasons. In addition, Hand hoeing treatment was the best option in controlling individual weeds followed by Fusilade super and Round up both at the recommended rates. Fusilade super and Round up at the half recommended in combination with ammonium sulphate showed better herbicidal activity than mixing with urea adjuvant combined with herbicide spray solutions.

3.3.2.Effect on grassy weeds:

Data listed in Table (4) illustrate the effect of herbicides at the recommended rate, half recommended rate tank mix with urea and/or ammonium sulphate adjuvants and hand hoeing on grassy, broad-leaved and total weeds during 2017-2018 and 2018-2019 seasons. Results showed that all tested herbicides at all rates with or without adjuvants recorded significant WCE than the untreated (weed free). Hand hoeing treatment achieved maximum reduction in fresh weight of grassy weeds followed by Fusalide super and Round up at the recommended rates during the two studied seasons. Hand hoeing gave 89.74 and 88.87 % WCE. While, Fusalid super at the recommended rate recorded 83.28 and 84.85 % WCE. Moreover, Round up at the recommended rate achieved 78.95 and 80.34 % WCE. Adding urea and ammonium sulphate both at 2% to Fusalide super or Round up at the half recommended rates pray solutions significantly suppressed fresh weight of grassy weeds when compared to untreated control, gave WCE less than herbicides at the recommended rates without adding adjuvants. The best control of both grassy and broad-leaved weeds was achieved by pre-emergence herbicides which gave excellent weed control. Similar findings were reported by **Mohamed (1992)** and **Mohamed (1996)**. **El-Metwally et al. (2017)** found that fluazifop- p-butyle at 2 $L.fed^{-1}$ decreased the fresh weight of grassy weeds in faba bean fields.

3.3.3.Effect on broad-leaved weeds:

It is obvious from the data listed in Table (4) that all herbicidal treatments revealed significant effect on broad-leaved weeds during 2017-2018 and 2018-2019 seasons. Hand hoeing twice, Fusalide Super at 2 $L.fed^{-1}$and Round Up at 75 ml fed^{-1} recorded the highest WCE compared to the untreated check.

A moderate WCE of broad-leaved weeds was observed with urea and ammonium sulphate adjuvants at 2% with the half recommended rates of Fusalide Super and Round Up tank mix during the both seasons. Also, adding of ammonium sulphate in combination with the tested herbicides showed more herbicidal activity than urea against broad-leaved weeds in faba bean fields. **Mukhtar (1998)** found that pre-emergence application of herbicides were effective in controlling annual grasses and broad-leaved weed in faba bean fields. **Tu et al. (2001)** indicated that the effect of fluazifop-P-butyl herbicide was faster than glyphosate herbicide on the shoot system of weeds at the beginning of the experiment in faba bean fields. **El-Metwally and Shalaby (2007)** indicated that fluazifop-p-butyl alone +one hand hoeing treatments significantly decreased

Table (2): Effect of weed control treatments on individual weeds in faba bean fields in 2017/2018 season

Treatments	Rate fed.$^{-1}$	Malva parviflora		Sonchus oleraceus		Beta vulgaris		Rumex vesicarius		Chenibudium album		Phalaris minor		Lolium temulentum	
		F. W*.	R%	F. W.	R%	F. W.	R%	F. W.	R%	F. W.	R%	F. W.	R%	F. W.	R%
Fusalide super 15 % EC	**2 L**	51.66	88.04	67.12	86.85	56.41	85.15	79.89	88.01	41.85	82.11	82.00	85.24	77.25	80.68
Fusalide super 15 % EC + urea	**1 L + 2%**	136.45	68.52	154.45	69.74	115.94	69.48	187.56	71.86	63.33	72.92	186.00.	66.53	117.77	70.55
Fusalide super 15% EC + ammonium sulphateat	**1 L + 2%**	97.15	77.59	110.59	78.33	68.45	81.98	133.56	80.41	48.41	79.30	135.00	75.70	100.33	74.91
Round up 48 %	**75 ml**	76.00	82.47	85.33	83.23	70.44	81.46	90.56	86.41	55.41	76.31	110.55	80.10	94.00	76.50
Round up 48 % + urea	**35.3 ml + 2%**	147.86	65.89	174.00	65.91	127.00	66.57	215.15	67.72	90.51	61.30	198.00	64.37	138.12	65.47
Round up 48% + ammonium sulphate	**35.3 ml + 2%**	123.75	71.45	110.85	78.28	84.91	77.65	154.00	76.90	67.51	70.28	165.24	70.25	130.65	67.33
Handhoeing		00.00	100	30.81	93.96	23.00	93.94	00.00	100	23.67	89.88	82.22	85.20	15.99	96.00
Control		433.55		510.47	---	380	---	666.89	----	233.93	---	555.75	---	400	---
L.S.D at 5%		7.65	----	14.00	-----	8.99	----	17.50	----	11.00	----	19.45	----	15.60	----

F. W*.= weed fresh weight (gm m^{-2})

Table (3): Effect of weed control treatments on individual weeds in faba bean fields in 2018/2019 season

Treatments	Rate fed.$^{-1}$	Malva parviflora		Sonchus oleraceus		Beta vulgaris		Rumex vesicarius		Chenibudium album		Phalaris minor		olium temulentum	
		F. W*.	R%	F. W.	R%	F. W.	R%	F. W.	R%	.F W.	R%	F. W.	R%	.F W	R%
Fusalide super 15 % EC	**2 L**	70.24	84.77	170.7	86.02	77.11	85.55	80.73	88.18	57.00	79.38	64.13	83.82	53.00	85.00
Fusalide super 15 % EC + urea	**1 L + 2%**	156.61	66.05	180.00	64.42	137.23	74.29	177.00	74.10	98.44	64.39	146.00	63.17	135.63	74.01
Fusalide super 15% EC + ammonium sulphateat	**1 L + 2%**	110.99	75.94	159.00	68.57	107.85	79.79	147.00	78.49	85.61	69.03	123.29	74.94	114.11	69.72
Round up 48 %	**75 ml**	88.29	80.86	82.33	83.72	100.66	81.11	97.28	85.76	60.38	78.16	77.48	80.45	74.55	80.22
Round up 48 % + urea	**35.3 ml + 2%**	166.31	63.95	195.00	61.45	127.63	76.09	194.45	71.54	110.00	60.21	160.22	59.58	154.00	59.14
Round up 48% + ammonium sulphate	**35.3 ml + 2%**	123.53	73.27	170.00	66.40	115.57	78.35	157.15	77.00	95.13	65.59	133.56	66.31	97.66	74.08
Handhoeing		43.00	90.04	50.00	90.11	25.28	95.25	43.00	93.70	20.97	92.41	66.27	83.28	19.77	94.75
Control		461.41	---	506.00	---	533.91	----	683.41	---	276.51	-----	396.45	----	376.91	---
L.S.D at 5%		13.50	----	15.00	----	21.25	----	24.75	----	8.56	----	14.12	----	11.80	----

F. W*.= weed fresh weight (gm m^{-2})

Table (4): Effect of herbicides used alone or with additives on the total weeds in 2017/2018 season

Treatments	2017/2018 season						2018/2019 season					
	Grassy		Broad leaved		Total weeds		Grassy		Broadleaved		Total	
	W.B.*	R %	W.B.	R %	W.B.	R %	W.B	R %	W.B.	R %	W.B.	R %
Fusalide super 15 % EC at 2 L fed^{-1}	159.25	83.28	296.93	86.65	456.18	85.65	117.13	84.85	355.79	84.93	472.92	84.91
Fusalide super 15 % EC at 1 L+ urea at 2% fed^{-1}	303.77	68.21	657.73	70.43	961.5	69.76	281.63	63.58	749.28	68.62	1030.91	67.11
Fusalide super 15 EC at 1 L+ ammoniumsulphate at 2% fed^{-1}	235.33	75.37	458.16	79.40	693.49	78.19	237.4	69.30	610.45	74.14	847.85	72.95
Round up 48 % EC	204.55	78.95	377.47	83.03	582.02	81.69	152.03	80.34	428.94	81.86	580.97	81.46
Round up 48 % EC at 35.5 ml+ urea at 2% fed^{-1}	336.12	64.83	793.39	64.33	1075.51	66.18	314.22	59.36	748.39	68.30	1062.61	66.10
Round up 48 % EC at 35.5 ml+ ammonium sulphate at 2% fed^{-1}	295.89	72.80	541.02	75.68	837.00	73.68	231.22	70.10	661.38	71.99	892.6	71.52
Hand hoeing	98.12	89.74	85.48	96.15	138.69	95.63	86.04	88.87	182.25	92.28	268.29	91.44
Control	955.75	-----	2224.61	-----	3180.36	------	773.35	-------	2361.24	-----	3134.59	------
L.S.D at 5 %	21.23	-----	40.55	-----	57.00	------	27.00	------	49.50	-----	63.66	-----

W.B.*= Fresh weight of weeds (gm m^{-2})

number and dry weight of faba bean weeds as compared to control. These reductions may be due to the inhibition effect of application of herbicides and hand hoeing treatments on growth and development of weeds. These results are in harmony with those obtained by **Singh** and **Jolly (2004), Singh** and **Wright (2002); Mukhtar et al. (2013).** Pre-emergence applications of herbicides provided substantial control of broadleaf weeds in faba bean fields comparable to hand-weeded plots (**Ghosheh** and **El-Shatnawi, 2003).**

3.3.4.Effect on total weeds:

The obtained results in Table (4) indicated that all applied herbicides used alone or mixed with urea or ammonium sulphate and hand hoeing statistically controlled total weed in faba bean fields as compared to unweeded control. Hand hoeing treated plots gave the highest reduction in fresh weight of the total weeds (95.63 and 91.44%) during 2017/2018 and 2018/2019 season followed by Fusalide super at 2 L. fed^{-1} (85.65 and 84.91%) and Round up at 75 ml fed^{-1} (81.69 and 81.46%). Urea or ammonium sulphate tank mix with the tested herbicides at the half recommended rate gave significant and satisfactory WCE of total weeds when compared to the untreated check during these studies. WCE values are 69.76 and 67.11% in plots treated with urea with Fusilade super at the half recommended rate in 2017-2018 and 2018-2019 season. Likewise, addition of urea with Round up at the half recommended rate inhibited 66.18 and 66.10% of total weeds during the two seasons. Similarly, ammonium sulphate inhibited 78.19 and 72.95% of weeds when added to spray solution of Fusalide super treated plots and 73.68 and 71.52% reduction with Round up during the both experimental seasons. Also, mixing ammonium sulphate with herbicide spray solutions increased their efficacy against weeds than adding of urea adjuvants. These results are in agreement with those reported by **Faida et al. (2009)** who reported that hand hoeing was effective in controlling weeds and gave similar results to fluazifop-p and urea applied either alone or in combination. **El-Shahawy (2008)** stated that using nitrogen fertilizers has the most significant results on increasing the herbicidal activity of Fluazifop-p-butyle and glyphosate for controlling weeds in faba bean fields. **El-Rokiek, et al. (2015)** concluded that application of glyphosate with or without urea or ammonium sulphate significantly reduced Orbanche crenata infestation as well as increase faba bean yield. These results may be due to that urea or ammonium sulphate gave synergistic effect of herbicides resulted in higher decreased in weed growth. Likewise, **Suwnnamek** and **Parker (1975)** concluded that the synergistic action of urea or ammonium sulphate when mixed with glyphosate or fluazifop-p-butyle herbicides could be attributed to activation inside the weed plants. **Abouzeina et al. (2009)** mentioned that the adding of ammonium sulphate to glyphosate spray solution improved absorption and translocation of glyphosate up to 87 and 69%.

3.3.5.Effect on yield components:

Data presented in **Table (5)** show the effect of herbicidal treatments on plant height (cm) and 100-grain weight in faba bean fields during 2017-2018 and 2018-2019 seasons. Plant height is important in faba bean production as shorter plants have greater loss at the cutter bar of combine during harvesting process resulting in lowest seed yield. Obtained results indicated that there were significant differences between all tested herbicidal treatments and the weedy check. The tallest and shortest plants were recorded in the hand hoeing and unweeded plots with 97.00 and 54.75 cm in 2017/2018 season, and 96.00 and 53.60 cm in 2018/2019 season. Fusilade super recorded 95 and

93.50 cm plant height, while Round up at the recommended rate recorded 93.45 and 87.90 cm.

Concerning the half recommended rate in combination with adjuvants, our results showed that Fusilade super and Round up gave a moderate increase in plant height of faba bean plants with uera and ammonium sulphate at 2% with each herbicide. Moreover, ammonium sulphate showed more herbicidal activity than urea when tank mixed with the two herbicides during the two studied seasons. These results are in a good conformity with those reported by **Aboali** and **Saeedipour (2015).** Similarly**, Marwat et al. (2003). Larik et al. (1999)** reported that there were

Table (5): Effect of herbicidal treatments on plant heights (cm) and 100-seed weight (gm) in faba bean fields during 2017/2018 and 2018/2019 seasons

Treatments	2017-2018 season		2018-2019 season	
	plant height(cm)	100-seed weight (gm)	Plant height(cm)	100-seed weight (gm)
Fusilade super 15% EC at 2 L	95.00	81.50	93.50	80.11
Fusilade super 15% at 1 L+ urea at 2%	75.50.	66.60	76.60	64.50
Fusilade super 15% 1L + ammonium sulphate at 2%	84.75	74.60	80.66	73.15
Round up 48% at 75 ml	93.45	77.30	87.90	75.85
Round up 48% at 35.5 ml+ urea at 2%	72.33	62.50	70.85	62.00
Round up 48% at 35.5+ ammonium sulphate at 2%	63.60	70.50	61.95	68.70
Hand hoeing	97.53	91.50	96.00	90.88
Control	54.75	53.00	53.00	53.60
L.S.D at 5%	7.62	5.31	4.12	6.71

significant differences between application of herbicides and plant heights in faba bean crop.

Data in **Table (5)** also indicated that all tested herbicides applied alone at the recommended rates or at the half recommended rates with adjuvants significantly increased 100-seed weight of faba bean crop during 2017/2018 and 2018/2019 seasons. The maximum 100-seed weight was observed in hand hoeing treated plots followed by Fusilade super at 2 L fed^{-1} and Round up at 75 ml fed^{-1} .The lowest 100-seed weight was recorded in the unweeded treatment (53.00 and 53.60) gm in 2017/2018 and 2018/2019 season, while, on the other hand, hand hoeing treatment gave the maximum 100-seed weight (91.50 and 90.88) gm followed by Fusilade super and Round up at the recommended rate for each (81.50 and 77.30) gmin 2017/2018 season and (80.11 and 75.85) gm in 2018-2019. The half recommended rates of Fusilade super and Round up achieved satisfactory increase in 100-seed weight during these studies. Addition of ammonium sulphate to herbicide spray solutions improve their activity than the mixing of urea. The lowest 100-seed weight in the weedy check is due to high weed pressure in form weed density and biomass **(Alsaadawi et al., 2013).** In addition, **Mohamed et al. (1992)** found that the reduction in faba bean seeds yield due to presence of the weeds. Increase in faba bean 100–seeds weight due to application of herbicides is in agreement with the findings of **Mukhtar** and **Elamin (2011)**; **El-Metwally et al. (2017)** who concluded that application of herbicides in faba bean fields achieved excellent control of weeds and resulted in high seeds yield in comparison with the weedy control. Thes results could be attributed to the presence of the weeds which compete with the faba bean plants on nutrients, water, space and light which decreased plant growth and faba bean seeds yield.

3.3.6.Effect on faba bean grain yield (kg $plot^{-1}$):

The obtained results in **Table (6)** illustrate the effect of different weed treatments on grain yield of faba bean crop during 2017/2018 and 2018/2019 seasons. The highest increase in faba bean yield was achieved with hand hoeing treatment (37.90 and 36.88%) in 2017/2018 and 2018/2019 followed by Fusilade super (37.19 and 35.90%) and Round up (34.70 and 33.38%) at the recommended rates during the both tested seasons, respectively. Moreover, concerning the effect of the two tested herbicides at the half recommended rates with adjuvants, results indicated that Fusilade super at the half recommended rate gave 21.41 and 18.37% increase in combination with urea at 2% and 22.13 and 21.28 with ammonium sulphate at 2% in 2017/2018 and 2018/2019 season, respectively. While, Round up at the half recommended rate with urea at 2% increased grain yield of faba bean by 19.87 and 17.78 %, while, with ammonium sulphate at 2% gave 21.58 and 20.20%. Additionally, the two used herbicides appeared to be more effective against broad-leaved weeds in faba bean fields when applied in combination with ammonium sulphate than urea during the two studied season. The lowest faba bean yield was noted in the weedy check treatment. **El-Metwally** and **Shalby (2007)** revealed that weed control treatments gave significant increase

in yield and yield attributes of faba bean crop. Hand hoeing twice or fluazifop-p-butyl with one hand hoeing significantly increased seeds weight per plant and number of seeds per plant as compared to the other treatments. The increase in yield attributes by different weed control treatments may be due to increase in weed control of faba bean and reduced weed competition which gave suitable chance of faba bean growth and improved good characters. The increase effects of weed control treatments on growth characters of plants may be reflected on increasing the yield attributes of faba bean. **Baghestani *et al.* (2008)** and **Chhokar *et al.* (2008)** who reported that herbicides offer sizeable increase in crop productivity corresponding to their weed control capacity. **Behdarvandi** and **Modhaj (2007)** reported that controlling weeds and reduction in plant competition improvement in the micro climate could increase pods per plant, grains per pod and grain yield. These results are in coinciding with those reported by **Saad El-Din (2003)** and **Abd El-Razik (2006)**. In addition, **El-Rokiek *et al.* (2015)** who found that maximum yield was obtained with the addition of ammonium sulfate to glyphosate at 37.5 ml fed^{-1} or imazapic at 100 ml fed^{-1}.compared with the infected control. The increase in yield approaches to that of healthy control in 2011-2012 and 2012-2013. The increase in growth was associated by increase in pigment contents in faba bean leaves. Carbohydrates and protein contents in the yielded seeds were also increased.

Table (6): Faba bean grain yield (kg plot^{-1}) as influenced by different weed control treatments during 2017-2018 and 2018-2019 seasons

Treatments	2017-2018 season		2018-2019 season	
	grain yield (kg plot^{-1})	Increase %	grain yield (kg plot^{-1})	ncrease %
Fusalide superat 2 L fed^{-1}	30.25	37.19	30.00	35.90
Fusalide super at 1 L + urea at 2 % fed^{-1}	24.19	21.41	23.56	18.37
Fusalide super at 1 L+ ammonium sulphate at 2 % fed^{-1}	24.40	22.13	24.43	21.28
Round up 48 % EC 75 ml fed^{-1}	29.45	34.70	28.52	33.38
Round up 48 % EC at 35.5 ml + urea att 2% fed^{-1}	24.00	19.87	23.11	17.78
Round up 48 % EC at 35.5 ml + ammonium sulphate at 2% fed^{-1}	24.23	21.58	24.10	20.20
Hand Hoeing	30.60	37.90	30.47	36.88
Untreated (weed free)	19.00	---	19.23	---
L.S.D. at 5%	2.67	-----	3.11	------

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تقييم كفاءة مبيد حشائش فلوأزيفوب بى بيوتيل و جليفوزات منفردين او خلطا مع الأسمدة فى حقول الفول البلدى

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الملخص العربى:

تم إجراء التجارب الحقلية بمركز كفر الدوار محافظة البحيرة فى موسمى 2017-2018 و 2018- 2019 لتقييم كفاءة مبيد حشائش فلوأزيفوب بى بيوتيل (EC%15) بالمعدل الموصى 2 لتر للفدان) و جليفوزات EC%48 بالمعدل الموصى به 75 مل للفدان أو بنصف المعدل الموصى به خلطا مع سماد اليوريا أو سلفات الأمونيوم فى محلول رش هذين المبيدين بمعدل 2% مقارنة بمعاملة العزيق (20 و 40 يوم بعد الزراعة) و الكنترول(غير المعامل). و لقد بينت النتائج أن الحشائش السائده فى حقول الفول البلدى خلال موسمى الدراسه كانت الخبيزة ، الجعضيض ، السلق ، الحميض و الزربيح كعريضة الأوراق و الفلارس و الصامه كرفيعة الأوراق خلال موسمى الدراسة و كان وجود الحشائش عريضة الأوراق أكثر من رفيعة الأوراق. و لقد أعطت معاملة العزيق أعلى نسبة مئوية فى خفض تعداد الحشائش السائده فى حقول الفول البلدى كما اعطت أعلى نسبة زيادة فى إرتفاع النباتات و وزن ال-100 حبة و كمية محصول الحبوب فى الفول البلدى يليها مبيد فلوأزيفوب بى بيوتيل و جليفوزات بمعدلهما الموصى بة خلال فترة الدراسه.و لقد أظهرت النتائج أيضا أن إضافة سماد اليوريا أو سلفات الأمونيوم بمعدل 2% مع نصف المعدل الموصى به لكلا المبيدين فى محلول الرش أعطت نتائج مرضية و معنوية ضد الحشائش السائده و كذلك زيادة مكونات المحصول و محصول الحبوب فى حقول الفول البلدى مقارنة بغير المعامل خلال موسمى الدراسة و لقد سجلت إضافة سلفات الأمونيوم لمحلول رش كلا المبيدين فاعلية إبادية على الحشائش و زيادة أعلى للمحصول من إضافة اليوريا.

كلمات مساعده:

الفول البلدى، مبيدات حشائش، عزيق ، أسمده، حشائش، مكونات و كمية المحصول.