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Efficacy of Certain Herbicides in Controlling Weeds and their Side Effects on Field Pea (*Pisum sativum* L.)

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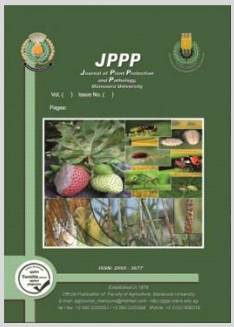

ABSTRACT

Two-field experiments were conducted at EL-Serw-Agricultural-Research Station, Damietta-Governorate-Egypt during 2018/19 and 2019/20 winter-seasons to study seeding-rate effect and treatments control on weeds and pea-crop. Experimental-design was a split-plot design, which were combination of ten-treatments, each experimented included two seeding-rates were determined in main-plots and five weed control treatments, weed control treatments were arrived to sub-plots. It is found dry-weight of total weeds reached 764 and 668kg with seeding-rate at 60kg/faddan, but, gave 370 and 325kg/faddan with seeding-rate at 80kg, during two-seasons, respectively. Weight of plant/gm and green-pod-yield/kg/faddan) increased to, 22.8 and 1510, compared with other seeding-rate 80kg/faddan gave, 17.2 and 1480 during 2018/19. Stomp-extra, Amex, Basagran and hand-hoeing-twice were decrease dry-weight of broad-leaved up to, 75.1, 34.3, 72.6 and 20.0%, in 1st-season, and 78.9, 72.8, 72.1 and 96.3%, compared with untreated, respectively, in 2nd-season, on-other-hand, herbicides treatments effect (Stomp-extra, Amex, Basagran and hand-hoeing-twice) decrease in dry-weight of total weeds up to, 77.8, 43.8, 66.9, 43.5, 78.5, 75.8, 73.3 and 43.9%, compared with untreated through two-seasons, respectively. Green-pods-yield/kg/faddan), also, increased with, Stomp-extra, Amex, Basagran and hand-hoeing-twice by 31.0, 57.9, 54.8, 52.2, 34.5, 72.2, 31.9 and 21.6%, compared with untreated during two-seasons, respectively. Dry-seed-yield was increased with, Stomp-extra, Amex, Basagran and hand-hoeing-twice by, 54.11, 80.5, 52.7 and 38.7%, compared with untreated in 2nd-season, respectively. From these results we can concluded, pea's productivity is greatly-affected by competition with weeds. Farmers can enhance weed-management-strategies by using weed control and seeding-rate at 60kg/feddan, as a weed-control-method for sustainable production toward increasing yield and income.

Keywords: Herbicides, Controlling Weeds, Field Pea, *Pisum sativum* L.

INTRODUCTION

Fields of the peas is infested heavily with annual grasses, broad-leaved weeds and sedges. Weeds compete with field pea for various production resources such as, nutrients, moisture, sunlight and space and consequently reduce the yield. This is a sustainable, cost-effective, long-term weed management approach. It uses several weed management techniques such as; cultural, mechanical/ physical, biological, and chemical methods. The approach seeks to optimize field pea yield and profits whiles protecting the natural resources and reducing environmental effects. Currently, the herbicide is a powerful tool for weeds control. However, there is the issue of its sustainability.

Crop management factors, such as optimum sowing time and method, plant population, weed competition, water and nutrients affect the yield of field pea. Among these, competition due to weeds is important as uncontrolled weed growth has been reported to cause yield reduction 77.2 per cent (Tripathi et al. 2001). Slow initial growth of field pea and wide spacing provide congenial environment for weeds to grow and compete with crop. Blackshaw (1998) indicated that the hand-weeding method was good enough to control the weed growth in pea. Dimitrova (1998) noted that weed competition reduces the green pod yield by 44.6–55.6% in pea field. William (1994) mentioned that dinitroaniline compounds as pendimethalin and butralin can be used as pre emergence herbicide to control most annual grassy and some annual broadleaf weeds this herbicide classified as cell growth disrupters and inhibit root and or shoot growth of emerging seedling. Jukka et al. (2005) and Salonen et al. (2005) were showed that herbicides decreased number of weed species per field (Chenopodium album, Stellaria media, Viola arvensis and Elymus repens).

Weed control decreased dry weight of weeds by 38.7% and 37.6% in both seasons, respectively. Green pods yield (ton/fed) and dry seed yield (kg/fed) were significantly negatively correlated with number and weight of grassy, broad-leaved and total weeds (Fakkar and El-Dakkak, 2015). Khan et al. (2003) proved that pod length, No. of seeds pod-1 and pod yield of pea was the highest in hand-weeded, followed by post emergently Metribuzin treated. Wagner (2006) double rates of Stomp 330 AS and Sencor 70 WG significantly declined height of shoots and roots of a green pea. Examined pre-emergence herbicides could affect growth characteristics to a varied extent. Gbor and Erzsbet (2009) proved that Bazagran declined the pea plant shoot dry weight and the yield. Imazethapyr and pendimethalin have been reported to be the effective chemical treatments for weed control in pea (Rana et al. 2013). Khan et al. (2003) stated that pod length (9.6 cm), No. of seeds pod1 (6.14) and pod yield (4673 kg ha1) were the maximum in hand weeding followed by post-emergence of application Metribuzin treated plots.

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Seed yield of field pea was decreased by 50% when weeds were allowed to compete for the entire season. It is therefore concluded that, to minimize yield loss due to weed competition in field pea, weed control measures should be targeted to avoid weed competition between 20-70 days after sowing (Mainpal Singh et al., 2016).

Hence, the study is under taken to elucidate the effect of seeding rate and weed control management practices on weed, and yield of fields' pea crop.

MATERIALS AND METHODS

Two field experiments were conducted during 2018/19 and 2019/20 winter seasons at EL-Serw Agricultural Research Station, Damietta Governorate, Agric. Res. Center, Egypt. The main soil characteristic in heavy clay, soil mechanical composition is shown in Table 1, and chemical analysis according to Piper (1950).

Table 1.Physical and chemical properties of the soil samples during 2018/19 and 2019/20 seasons.

Season	Soil Depth cm.	Particle size distribution				Texture Class	O.M. %	Caco3 %	PH (1:2.5) Suspension
		Coarse sand%	Fine Sand%	Silt %	Clay %				
2018/19	0-30	1.73	14.43	21.73	62.11	Clayey	1.22	2.30	7.6
2019/20	0-30	1.79	14.75	21.75	61.71	Clayey	1.23	2.33	7.7

The experimental fields were prepared through two plowings and harrowing and leveling. Calcium superphosphate (15.5% P_2O_5) was added at the rate of 100 kg/faddan before soil plowing. Each experiment was set in a split -plot design, with four replicates. The size of sub plot was 21m^2(3m width x7m long), peas seeds were planted at the two rates of 60 and 80 kg/faddan in the 25th and 20th October in 2018/19 and 2019/20 winter seasons, respectively. Two seeding rates of 60 and 80 kg, were allocated in the main plots and weed control treatments in the sub- plots.

The herbicides applied in peas experiments during 2018/19 and 2019/20 winter seasons

which were as follow:

1- Stomp-extra 45.5 CS% EC (pendimethalin) at the rate of 1.5 L /faddan applied pre peas sowing
2- Amex 48% EC (butralin) at the rate of 1.5 L /faddan applied pre peas sowing.
3- Basagran 48% AS (bentazon) at the rate of 1.0 L /faddan applied after 21 days from sowing.
4-Hand hoeing twice at 30 and 45 days from sowing.
5-Untreated check.

Knapsack sprayer CP3 was used with water volume 200 L/faddan.

Data in Table (2), illustrated the common name, chemical family, chemical class, trade name and site of action of used herbicides

Table 2. Common name, chemical family, chemical class, trade name and site of action of used herbicides.

No	Common Name	Chemical Family	Chemical Class*	Trade Name	Site of action
1	pendimethalin	Dinitroaniline	3	Stomp	Inhibitor of microtubule assembly
2	Butralin	Dinitroaniline	3	Amex	Inhibitor of microtubule assembly
3	Bentazon	Benzothiadiazinone	6	Basagran	Inhibitor of photosynthesis at photosystem II site B

*** Chemical class description: Numbers represent the WSSA approved MOA classes, while letters indicate the MOA designations in the system of the industry Herbicide Resistance Action Committee (www.hracglobal.com)**

Data recorded:

For determining survey weeds associated with field pea analysis; the sample was using one squire meter quadrate and weeds were separated and identified by species. Weeds were identified according to TackhŐlm, 1974.

Weeds were air dried for 3 days and then dried in an oven at 70ºC and data recorded as:

1 - Dry weight of annual broad - leaved weeds (g/m^2).
2 - Dry weight of annual grassy weeds (g/m^2).
3 - Dry weight of total annual weeds (g/m^2).

Peas growth characters and yield components:

At green-maturity: samples were taken from one square meter chosen in center plot and use ten peas plants were collected randomly too and the following characters were determined; plant height (cm) measured from the cotyledonary node to the top of the main stem., number of branches, number of leaves, number of pods, weight of plant(gm), weight of pods(gm), weight of green pods/ faddan(kg), while dry seed yield (kg/fed) was recorded at dry harvest date.

Statistical analysis:

All the obtained data were subjected to the proper statistical analysis as randomized a split-plot design according to Steel and Tosrrie (1980).

RESULTS AND DISCUSSION

The existed weed species in this study during both seasons were *(Melilotus indica* L.) All. (sour clover), *Chenopodium album*, L. (white goosefoot, Lambsquarter), *Rumex dentatus*, L, (dentated dock) as annual broad-leaved weeds, meanwhile, *Polypogon monspelienses*, L. Desf. (Annual bard grass) and *phalaris minor*, Retz (littleseed canarygrass, canarygrass) as the annual grassy weeds.

1- The effects of seeding rate:

On dry weight of weeds:

Results in Table (3) showed that the dray weight of broad-leaved, grassy weeds and total weeds were increased by decreasing seeding rate from 80 to 60 kg / faddan and dry weight of total weeds was reached to 764 and 668 kg with seeding rate at 60 kg / faddan, but, gave 370 and 325 kg/ faddan with seeding rate at 80 kg, during two seasons, respectively. This may be due to poor seed weed germination under seeding rate at 80 kg / faddan and in 60 kg / faddan due to aeration between plants owing's the good in this case.

Table 3. The effect of seeding rate on dry weight of, broad-leaved, grassy weeds and total weeds (gm/m^2) during 2018/19 and 2019/20 seasons.

Seeding rate kg/faddan	Broad-leaved	Grassy weeds	Total weeds
	2018/19		
60	149.0	33.4	182.4
80	88.3	00.0	88.3
F test	*	*	**
LSD at 0.05	81.56	38.2	46.10
	2019/20		
60	139.3	19.5	158.9
80	77.0	00.0	77.0
F test	***	NS	***
LSD at 0.05	26.56	-----	9.69

The dry matters of weeds under seeding rate at 60 kg / faddan were significantly higher as compared to

seeding rate at 80 kg / faddan. This might be ascribed to adequate moisture availability, better root proliferation and nutrients supply to weeds. The heavy weed growth did not seem to be high enough to compensate the overall advantages accrued due to proliferated crop growth and developmet under seeding rate.

The findings are also in accordance with those shown by (Tripathi *et al.* 2001) and (Fakkar and El-Dakkak, 2015).

On pea growth characters and yield components:

Data presented in Tables (4 and 5) revealed that all studied characters; namely, number of pods and dry seeds in first season and number of branches, green pods and seed index in second season did not significantly differ under both 60 and 80 kg seeding. Concerning plant height (cm), seeding rate at 80 kg increased it up to 11 and 7%, compared with the other rate through two seasons, respectively. The number of branches / plant was increased with seeding rate at 60 kg / faddan than other rate during 2018/19 season, but, the number of leaves / plant was increased with first seeding rate up to 12.8 and 10.6, compared with 80 kg / faddan was gave 9.5 and 10.4, during two seasons, respectively. Number of pods / plant was decreased with seeding rate at 80 kg / faddan up to 4.5 than the another seeding rate during 2019/20 season.

Table 4. The effect of seeding rate on, plant height (cm), number of branches, number of leaves and number of pods during 2018/19 and 2019/20 seasons.

Seeding rate kg/faddan	Plant height(cm)	Number of branches	Number of leaves	Number of pods
		2018/19		
60	53.2	1.5	12.8	5.5
80	59.1	1.0	9.5	4.5
F test	***	*	*	NS
LSD at 0.05	2.07	0.304	2.718	-----
		2019-20		
60	54.5	1.2	10.6	4.6
80	58.7	1.1	10.4	4.5
F test	*	NS	*	*
LSD at 0.05	5.09	----	4.01	1.58

Table 5. The effect of seeding rate on, weight of plant (gm), green pods /faddan (ton), seed index and dry seed yield/faddan (ton) during 2018/19 and 2019/20 seasons.

Seeding rate kg/faddan	Weight of plant(gm)	Green pods (kg)	Seed index	Dry seed yield (kg)
		2018/19		
60	22.8	1510	69.7	658.8
80	17.2	1480	68.3	601.3
F test	***	*	*	NS
LSD at 0.05	2.75	536.7	14.63	---------
		2019-20		
60	21.1	1380	70.5	588.4
80	21.4	1417	68.6	586.9
F test	*	NS	NS	***
LSD at 0.05	9.15	----------	----------	116.3

Seeding rate at 60 kg/ faddan increased weight of plant (gm), green yield (kg), seed index and dry seed yield (kg) compared with seeding rate at 80 kg/faddan. Weight of plant, green pod yield (kg/faddan) and seed index were increased to, 22.8, 1510 and 69.7, compared with other seeding rate 80 kg/ faddan was gave, 17.2, 1480 and 68.3 during 2018/19 season.

Seeding rate application favoured the cell division, cell elongation and turgidity maintenance of plants, which in turns led to better plant growth, increased photo synthetically active area and assimilation of more photosynthesis and ultimately the yield. Invariably increased availability of moisture and nutrients under seeding rate at 60 kg/ faddan led to increased growth and helped in further transfer of photosynthesis to reproductive organ thereby tended to increase the yield.

2- Effect of weed control treatments:

On dry weight of weeds:

Results obtained in Table 6 indicated that all weed control treatments caused considerably impacts on the dry weight of all studied weeds (g/m2) in 2018/19 season and on, broad-leaved with total weeds in 2019/20 season. Dry weight of grassy weeds/m2 (*Polypogon monspelienses* and *phalaris minor*) declined under weed control, Stomp-extra, Amex, Basagran and hand weeding twice and gave percent of control to, 93, 100, 33 and 46.3%, respecteviely, in the first season. Broad-leaved weeds (*Melilotus indica*, *Chenopodium album* and *Rumex dentatus*) showed the great decline under weed control treatments. Stomp-extra, Amex, Basagran and hand hoeing twice were decrease the dry weight of broad-leaved up to, 75.1, 34.3, 72.6 and 20.0%, in the first season and, 78.9, 72.8, 72.1 and 96.3%, compared with the untreated check, respectively, in the second season, on the other hand, the effect of herbicides treatments (Stomp-extra, Amex, Basagran and hand weeding twice) were decrease in dry weight of total weeds up to, 77.8, 43.8, 66.9, 43.5, 78.5, 75.8, 73.3 and 43.9%, compared with the untreated check through two seasons, respectively.

The same finding was reported by Blackshaw (1998); Dimitrova (1998); Jukka *et al.* (2005) and Salonen *et al.* (2005) (Fakkar and El-Dakkak, 2015) and (Mainpal Singh *et al.,* 2016).

Table 6. The effect of weed control on, broad-leaved, grassy weeds and total weeds (gm/m^2) during 2018/19 and 2019/20 seasons.

Treatments	Broad-leaved	Grassy weeds	Total weeds
	2018/19		
Stomp-extra	53.7	2.4	56.1
Amex	141.9	0.0	141.9
Basagran	59.0	24.6	83.6
Hand hoeing twice	122.9	19.7	1426
Untreated check	215.9	36.7	252.6
F test	***	*	***
LSD at 0.05	65.9	26.12	67.865
	2019-20		
Stomp-extra	48.4	7.0	55.4
Amex	62.5	0.0	62.5
Basagran	64.0	4.9	68.9
Hand hoeing twice	136.2	8.5	144.7
Untreated check	229.7	28.5	258.2
F test	***	NS	***
LSD at 0.05	88.36	------	93.51

On pea growth characters and yield components:

Data arranged in Tables (7 and 8) cleared that the differences between weed control treatments arrived to the level of significance on, plant height and green pods (kg/ faddan) during the two seasons, and dry seeds yield in the second season. All herbicidal and hand hoeing twice treatments increased plant height by 58.4, 62.5, 56.2 and 56.2 cm in the first season, compared with the untreated check. Green pods yield (kg/ faddan), also, were increased with, Stomp-extra, Amex, Basagran and hand hoeing twice by 31.0, 57.9, 54.8, 52.2, 34.5, 72.2, 31.9 and 21.6%, compared with the untreated check during two seasons, respectively. Dry seed yield was increased with, Stomp-extra, Amex, Basagran and hand hoeing twice by, 54.11, 80.5, 52.7 and 38.7%, compared with untreated check in the second season, respectively.

Similar results were introduced by Khan *et al.* (2003); Jukka *et al.* (2005); Salonen *et al.* (2005); Wagner (2006) and Gbor and Erzsbet (2009).

Table 7. The effect of weed control on, plant height (cm), number of branches, number of leaves and number of pods during 2018/19 and 2019/20 seasons.

Treatments	Plant height(cm)	Number of branches	Number of leaves	Number of pods
2018/19				
Stomp-extra	58.4	1.5	12.9	4.9
Amex	62.5	1.2	11.6	4.6
Basagran	56.2	1.2	11.5	5.4
Hand hoeing twice	56.2	1.2	10.6	5.2
Untreated check	47.5	1.1	9.4	4.1
F test	***	NS	NS	NS
LSD at 0.05	7.53	-----	-----	------
2019-20				
Stomp-extra	57.5	1.1	8.7	4.4
Amex	60.6	1.1	11.0	4.9
Basagran	56.9	1.6	14.1	5.6
Hand hoeing twice	50.0	1.0	8.3	4.0
Untreated check	58.1	1.0	10.3	4.0
F test	*	NS	NS	NS
LSD at 0.05	6.37	-----	----	------

Table 8. The effect of weed control on, weight of plant (gm), green pods/faddan (kg), seed index and dry seed yield/faddan (kg) during 2018/19 and 2019/20 seasons.

Treatments	Weight of plant(gm)	Green pods (kg)	Seed index	Dry seed yield (kg)
2018/19				
Stomp-extra	23.7	1407	72.6	589.0
Amex	19.6	1696	66.0	731.6
Basagran	22.2	1663	66.5	691.6
Hand hoeing twice	18.2	1635	68.5	695.7
Untreated check	16.2	1074	71.5	442.3
F test	NS	*	NS	NS
LSD at 0.05	------	467.3	----	-------
2019-20				
Stomp-extra	18.2	1424	70.7	623.7
Amex	23.0	1824	61.2	730.6
Basagran	27.5	1397	71.2	618.0
Hand hoeing twice	14.7	1288	72.0	561.2
Untreated check	22.7	1059	72.5	404.7
F test	NS	*	NS	*
LSD at 0.05	-------	469.8	--------	184.4

3- Effect of interaction between, seeding rate and weed control treatments:

On dry weight of weeds:

Data presented in Table (9) showed that the effect of interaction between seeding rate x weed control treatments were statistically significant on dry weight of, broad-leaved with total weeds in both seasons and dry weight of grassy weeds (gm/m^2) in the first season. Broad-leaved, total weeds were increased with 60 kg seeding rate and weed control treatment in both seasons, and grassy weeds in 2018/19 season in comparison with the other treatments.

The dry weight of total weeds increased with interaction between, seeding rate at 80 kg / faddan and hand hoeing twice by 23.7 and 14.7 % during two seasons, respectively, compared with untreated check.

The interaction between seeding rate x weed control treatments recorded an increased percentage at weed control to dry weight of broad-leaved up to 65.7, 40.7, 71.4,72.8,72.6, 73.9, 58.5 and 68.2%, on the other hound, the dry weight of grassy weeds were recorded, 93.6, 100.0, 33.0, 46.2, 75.4, 100.0, 83.0 and 98.2 %, during first season, respectively, compared with untreated check.

Table 9. The effect of interaction between, seeding rate and weed control treatments on, broad-leaved, grassy weeds and total weeds (gm/m^2) during 2018/19 and 2019/20 seasons.

Seeding rate kg/faddan	Treatments	Broad-leaved	Grassy weeds	Total weeds
2018/19				
60	Stomp-extra	102.5	4.7	107.2
	Amex	177.0	0.0	177.0
	Basagran	85.5	49.2	134.7
	Hand hoeing twice	81.2	39.5	120.7
	Untreated check	298.7	73.5	372.2
80	Stomp-extra	5.0	0.0	5.0
	Amex	106.7	0.0	106.7
	Basagran	32.5	0.0	32.5
	Hand hoeing twice	164.5	0.0	164.5
	Untreated check	133.0	0.0	133.0
F test		**	**	***
LSD at 0.05		93.3	36.9	95.97
2019-20				
60	Stomp-extra	84.2	14.0	98.2
	Amex	80.0	0.0	80.0
	Basagran	128.0	9.7	137.8
	Hand hoeing twice	97.5	17.0	114.5
	Untreated check	307.0	57.0	364.0
80	Stomp-extra	12.5	0.0	12.5
	Amex	45.0	0.0	45.0
	Basagran	0.0	0.0	0.0
	Hand hoeing twice	175.0	0.0	175.0
	Untreated check	152.5	0.0	152.5
F test		*	NS	**
LSD at 0.05		124.96	------	132.2

On pea growth characters and yield components:

Data presented in Tables (10 and 11) noticed that the effect of interactions between, seeding rate at 60 and 80 kg / faddan and weed control treatments plant height and number of branches were statistically significant, in 2018/19 season, where the rest of characters in 2019/20, and all studied character [weight of plant (gm), green pods/faddan (kg), seed index and dry seed yield/faddan (kg)], through two seasons, did not arrive to the level of significance, compared to the untreated check.

Table 10. The effect of interaction between, seeding rate and weed control treatments on, plant height (cm), number of branches, number of leaves and number of pods during 2018/19 season.

Seeding rate kg/faddan	Treatments	Plant height (cm)	No. of branches	No. of leaves	No. of pods
2018/19					
60	Stomp-extra	61.2	1.7	14.5	5.2
	Amex	55.0	1.5	14.5	5.2
	Basagran	53.7	1.5	14.0	6.2
	Hand hoeing twice	53.7	1.5	11.0	5.5
	Untreated check	42.5	1.2	10.2	3.7
80	Stomp-extra	55.5	1.2	11.2	4.5
	Amex	70.0	1.0	8.7	4.0
	Basagran	58.7	1.0	9.0	4.5
	Hand hoeing twice	58.7	1.0	10.2	5.0
	Untreated check	52.5	1.0	8.5	4.5
F test		**	*	NS	NS
LSD at 0.05		10.65	0.848	------	-----
2019-20					
60	Stomp-extra	56.2	1.2	9.0	4.2
	Amex	58.7	1.0	10.0	5.0
	Basagran	58.7	1.7	16.0	6.2
	Hand hoeing twice	43.7	1.0	8.0	3.7
	Untreated check	55.0	1.2	10.2	3.7
80	Stomp-extra	58.7	1.0	8.5	4.5
	Amex	62.5	1.2	12.0	4.7
	Basagran	55.0	1.5	12.2	5.0
	Hand hoeing twice	56.2	1.0	8.7	4.2
	Untreated check	61.2	1.0	10.5	4.2
F test		NS	NS	NS	NS
LSD at 0.05		-----	-----	----	------

Table 11. The effect of interaction between, seeding rate and weed control treatments on, weight of plant (gm), green pods/faddan (kg), seed index and dry seed yield/faddan (kg) during 2018/19 season.

Seeding rate kg/faddan	Treatments	Weight of plant(gm)	Green pods (kg)	Seed index	Dry seed Yield (kg)
		2018/19			
	Stomp-extra	30.0	1345	73.2	549.2
	Amex	25.7	1925	61.5	833.2
60	Basagran	24.5	1662	67.0	720.2
	Hand hoeing twice	16.0	1587	68.5	718.5
	Untreated check	18.0	1031	78.5	473.0
	Stomp-extra	17.5	1469	72.0	628.7
	Amex	13.5	1468	70.5	63.0
80	Basagran	20.0	1664	66.0	663.0
	Hand hoeing twice	20.5	1683	68.5	673.0
	Untreated check	14.5	1118	64.5	411.7
F test		NS	NS	NS	NS
LSD at 0.05		—	—	—	—
		2019-20			
	Stomp-extra	17.0	1570	68.0	734.5
	Amex	20.5	1649	65.0	662.0
60	Basagran	34.0	1334	72.5	600.0
	Hand hoeing twice	13.5	1190	75.5	503.5
	Untreated check	20.5	1157	71.5	442.2
	Stomp-extra	19.5	1278	73.5	513.0
	Amex	25.5	1999	57.5	799.2
80	Basagran	21.0	1461	70.0	636.0
	Hand hoeing twice	16.0	1386	68.5	619.0
	Untreated check	25.0	961	73.5	367.2
F test		NS	NS	NS	NS
LSD at 0.05		—	—	—	—

Plant height was increased according to the interaction between seeding rate x weed control treatments up to 45.0, 29.4, 26.3, 26.3, 05.0, 33.3, 11.8 and 11.8 %, during two seasons, respectively. The interaction between seeding rate at 60 kg/ faddan and weed control treatments, recorded larger value of number of branches than untreated check up to, 41.6, 25.0, 25.0 and 25.0 %, in first season, respectively.

From these results we can be concluded that pea's productivity is greatly affected by competition with weeds. Farmers can enhance weed management strategies by using weed control treatments and seeding rate at 60 kg / faddan with hand hoeing at twice as a weed control method for sustainable production toward increasing yield and income.

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فاعلية بعض مبيدات الحشائش في مكافحة الحشائش وآثارها الجانبية على البازلاء الحقلية *Pisum sativum* L.

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أجريت تجربتان حقليتان في محطة البحوث الزراعية بالسرو – مركز البحوث الزراعية – دمياط- مصر خلال الموسمين الشتويين 2018- 2019 و 2019-2020 – وذلك لدراسة تأثير معدلات التقاوي للبسلة و بعض مبيدات الحشائش على محصول البسلة و الحشائش المصاحبة له. في هذه الدراسة تم استخدام تصميم القطع المنشقة مرة واحدة مع خمس مكررات كمية التقاوي كانت 60و 80 كجم بسلة للفدان في القطع الرئيسية و كذلك استعمال خمسة معاملات مقاومة حشائش في محصول البسلة في القطع المنشقة وكانت النتائج التي تم الوصول اليها: ازدياد الوزن الجاف للحشائش الكلية حتى وصل الى 764 و 668 كجم / ف مع معدل التقاوي 60 كجم / ف بينما أعطى 370 و 325 كجم وزن جاف للحشائش بالترتيب مع المعدل 80 كجم بسلة للفدان خلال موسمي الدراسة. على جانب اخر أدى استعمال معدل التقاوي 60 كجم للفدان الى زيادة الوزن الطازج للنبات(جم) و وزن القرون الخضراء الى 22.8 و 1510بالمقارنة مع استعمال المعدل 80 كجم للتقاوي و الذي بدورة سجل 17.2 و 1480 خلال الموسم 2019/2018. من ناحية أخرى أدى استعمال معاملات مكافحة الحشائش ستومب اكسترا, أميكس, بازجران و نقاوة يدوية مرتين الي الوزن الجاف للحشائش عريضة الأوراق الى 75.1, 34.3, 72.6, و 20% خلال الموسم الأول و 78.9, 72.8, 72.1 و 96.3% خلال الموسم الثاني تحت الدراسة بالمقارنة بمعاملة الكنترول و علي جنب اخر أدى استعمال هذة المعاملات الى انخفاض الوزن الكلي للحشائش ل 77.8, 43.8, 66.9, 43.5, 78.5, 73.3 و 43.9% خلال موسمي الدراسة بالمقارنة بمعاملة الكنترول. ازداد وزن القرون الخضراء مع استعمال معاملات مكافحة الحشائش ستومب اكسترا, أميكس, بازجران و نقاوة يدوية مرتين ل 31.0, 57.9, 54.8, 52.2, 34.5, 72.2, 31.9 و 38.7% بالمقارنة بمعاملة الكنترول خلال موسمي الدراسة كما ازداد الوزن الجاف للحبوب الى 54.11, 80.5, 52.7 و 38.7% خلال الموسم الثاني من الدراسة. من هذه الدراسة نستطيع القول بأن تعظيم انتاجية البسلة قد تأثر بمنافسة الحشائش. ويستطيع المزارعين بأن يضعوا خطة استراتيجية لاستعمال احدى معاملات مكافحة الحشائش مع كمية تقاوي 60 كجم للفدان وذلك لزيادة الانتاجية و الدخل من زراعة البسلة.