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EFFECT OF WEED CONTROL TREATMENTS AND FOLIAR FERTILIZATION ON GROWTH, YIELD, CHEMICAL COMPOSITION AND ASSOCIATED WEEDS OF SOYBEAN PLANTS AT NOBARYA

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ABSTRACT

Two field experiments were conducted at the experimental Farm of National Research Centre at Nobarya during 1995 and 1996 seasons to study the effects of weed control treatments and foliar fertilization (stimufol) on the associated weeds, plant growth, yield and its components of soybean plants, in addition to chemical composition of soybean seeds. All herbicidal treatments, as well as, hand hoeing showed significant improvements in yield and its components. Superiority of hand hoeing treatment significantly surpassed as yield of soybean and its components was concerned. Hand hoeing and pendimethalin were significantly decreased the total weeds grown in soybean field followed by fluazifop-butyl, oxyflurfen and bentazone than that of unweeded control.

Hand hoeing and pendimethalin treatments were recorded the highest values of chlorophyll (a), carotenoids, total carbohydrate and slight increase in crude protein.

Hand hoeing and pendimethalin treatments gave highest N,P,K and Zn, Cu and Mn in seeds with significant differences between them.

Foliar application of stimufol (400 g/fed) decreased significantly the total weeds grown in soybean field, and increased significantly photosynthetic pigments in leaves at 75 days old, total carbohydrate and protein content in seeds of soybean treated plants. Whereas oil content of seeds decreased due to foliar fertilization.

INTRODUCTION

Soybean is considered as an important leguminous summer crop which has shown extensive success along different provinces in Egypt and all over the world. It consists about 20 % oil and 40 % protein. Therefore, it is an excellent source for human and animal consumption. Soybean yield is significantly decreased by weed competition for nutrient, water, light than any other factors. Therefore, weed control is essential especially during their early development of soybean (Muniyabba *et al.*, 1982). At present time there is a great shortage in hand labour and rise in wage scale, this makes the uses of chemical weed control very necessary to decrease the cost and to increase the production of soybean. On the other hand, Lakres *et al.*, (1987) reported that hand hoeing gave more effective weed control than any other herbicides which resulted in greatest yield.

Also, Pendimethalin gave good control of grasses in soybean fields (Jain and Acharya, 1985), the same authers mentioned that fusilade, Linuron and stomp gave effective control of grassy weeds in soybean. Shams El-Din and Salwau (1994) demonstrated that all the herbicides treatments gave a satisfactory level of weeds, control.

El-Quesni and Radwan (1993) reported that N-content was increased by the vital role of micronutrients, as a result of the activity of microorganisms, which caused by the influences of micronutrients on biomass.

Sharma (1995) mentioned that application of nitrogen, as foliar spray, at the end of flowering increased number of pods and grain yield per plant. Rodrigues and Queires (1995) reported that foliar fertilizer solution significantly increased total chlorophyll content of leaves and dry weight, total protein and ash contents of leaves.

The objective of the present investigation was to study the efficiency of some chemical and mechanical weed control treatments and foliar fertilization on the growth and yield of soybean plant, as well as, its components and chemical composition of seeds during its growth and harvest stage.

MATERIALS AND METHODS

Two field experiments were carried out at the Agricultural Experimental Station at Nubariya. The texture of the experimental site was sandy. The physical and chemical characteristics of the soil described by Jackson (1958), Richard (1954) and Piper (1950) are recorded in Table 1. Soybean seeds of Crawford IV treated with *Rhizobium japonicum* before sowing. Seeds were sown in hill spaced 20 cm. a part on 14 and 21 May 1995, 1996 respectively. Factorial experiments in complete randomized block design were used for the two successive seasons with four replications. Plot area was 14 m^2 (4 X 3.5 m) each plot consist of 5 rows (70 cm apart and 4 meters length), treatments were as follows :

A. Weed control :

1. Bentazon (basagran) : 3-(1-methylethyl)-(1H)-2,1-3 Benzo-thiadiazin-4(3H)-one 2,2-(dioxide) at a rate of 1 l/fed applied as post-emergence.
2. Oxyfluorfen (Goal) :,2-Chloro-1-(Zethoxy-4-nthophenoxy)-4-triflouromethyl benzene (23.6 % EC) at a rate of 0.75 l/fed was applied as pre-emergence at the day of sowing before the planting irrigation.
3. Flauzifop-butyl (Fusilade) : (±)-2-[4-[5-(trifluoromethyl)-2-Pyridinyl]oxy] Phenoxy Propanoic acid at a rate of 2 l/fed, was applied as a post-emergence herbicide.
4. Pendimethalin (stomp, Penoxalin), N-(1-ethylpropyl)3,4-dimethyl-2,6-dinitrobenzamine (50 % EC) at the rate of 1.7 l/fed was applied as pre-emergence.
5. Hand hoeing (twice), After 30 and 60 days from sowing.
6. Unweeded control.

Table 1 : Mechanical and chemical analysis of Nubarya soil before executing the experiment.

Components	Value
Mechanical analysis :	
Soil fraction	
Sand %	75.6
Silt %	17.4
Clay %	5.5
Texture class	Sandy
Chemical analysis :	
pH	7.99
E.C.	0.730 mmhos/cm
HCO_3	2.5*meq/100 g. soil
Cl^-	1.0 meq/100 g. soil
Ca^{+2}	2.5 meq/100 g. soil
Mg^{+2}	1.0 meq/100 g. soil
Na^+	1.3 meq/100 g. soil
K^+	0.05 meq/100 g. soil
Total nitrogen	350 ppm

*m.equivalent/100 g soil.

B. Foliar fertilizer :

Foliar fertilizer (stimufol), used in three doses (Zero, 200 and 400 g/fed). All herbicides and foliar fertilizer were sprayed uniformily with knapsack sprayer with spray volume of 200 l/fed. The dry seeds were ground, total nitrogen was determined by conventional micro-kjeldahl method Piper, (1950), Phosphorus content was determined according to Chapman and Pratt (1978). Zn, Mn, Fe and Cu were determined using a zeis PMO Atomic Absorption Spectrometry according to the method adopted by Chapman and Pratt (1978). Potassium and calcium were determined photometrically by using flame photometer (B700-E).

The method used for extraction of oil was essentially similar to that described by Meara (1955).

The method of estimation of carbohydrate and photosynthetic pigments were described by Snell and Snell (1954), Dubios, *et al.* (1956) and Metzner, *et al.* (1965) respectively.

All data obtained were statistically analyzed according to Snedecor and Cochran (1980). The combined analysis was done over seasons according to Waller and Duncan (1969).

RESULTS AND DISCUSSION

1. Effect of weed control treatments and foliar spray Stimufol on associated weeds:

The infestation of soybean with different species of weeds has created a hard competition between them. This, in turn, reflects unfavourable effect on the obtained yield. The dominant weeds species encountered in the experimental plots of soybean fields at Nubariya were:

1. Annual broad leaved weeds were, i.e., *Portulaca olerceae* L., *Chenopodium* spp. L. and *Gynandrapsis gynandra* (L.).

B. Annual grasses weeds were, i.e., *Dactyloctenium aegyptium* L. and *Echinochloa colonum* L.

2. Perennial weeds were, i.e., *Cynodon dactylon* L., *Cyprus notondus* L. and Convolvulus arvensis L.

Data in Table 2 indicated that efficiency of herbicides, as well as, hand hoeing was extended to exert a depressing effect on dry weight of soybean weeds at 75 days after sowing. Hand hoeing and pendimethalin treatments gave he highest depression in dry weight of perennial weeds, the efficiency of the two superior mentioned treatments exceeded significantly than unweeded control by 65.20 % and 47.76 %, respectively.

Hand hoeing and fluazifop-butyl significantly affected depression of annual grasses with soybean fields by 86.83 % and 70.61 %, respectively than that of control plants. It could be concluded that generally both hand hoeing and pendimethalin were significantly decreased the total weeds grown in soybean field followed by fluazifop-butyl, oxyfluorfen and bentazone than that of unweeded control by 76.81 % and 57.78 %, respectively, for dry weight of weeds. Superiority of hand hoeing in controlling soybean. Weeds could be attributed to the destroying effect of hoeing on annual weeds since these weeds are not capable to regrowth from the underground parts. Muzik (1970) reported that in the majority of cases, tillage in the most practical method of controlling annual and perennial weeds. Similar results were obtained by Patil *et al.* (1999).

Concerning the effect of foliar fertilization of stimufol at Zero, 200 and 400 g/fed treatments on perennial weeds, annual broad leaved weeds and grasses, it could be concluded that foliar application of stimufol on soybean field and associated weeds decreased significantly. The dry weight of the above mentioned weed classes grown in soybean fields, this might be due to increasing the vegetative growth of soybean plants treated by stimufol subsequently inhibited the weeds growth.

2. Effect on growth parameters of soybean plants after 75 days from sowing:

Data presented in Table 3 indicate that the significantly higher and heaviest fresh and dry weights of shoots of soybean plants were obtained due to hand hoeing treatment, followed by pendimethalin, flouzifop-butyl, oxyflourfen and bentazone. These results agreed with those obtained by Sangkkara *et al.* (1995).

Weed control treatments increased significantly number of leaves, branches, internodes and number of green pods/plant of soybean plants 75 days old over unweeded control. Results indicate that the highest value obtained from hand hoeing followed by pendimethalin and fluazifop-butyl with nonsignificant differences.

The aforementioned results indicated that weed control treatments favours the growth of soybean plants. Superiority of these treatments is correlated with their markedly efficiency on soybean associated weeds. This finding could be due the limiting weeds infestation and minimizing weed

Table 2: Effect of weed control treatments and foliar fertilization on dry weight of weeds after 75 days from sowing (g/m²) (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		Penrenial weeds			Annual broad leaved			Annual grass weeds		Total P.W.[1]	Total A.B.W.[2]	Total A.G.[3]	Total Weeds
		Cyndon dactylon	*Cyperus rotundus*	*Convol-vuls arvensis*	*Portulaca oleraceae*	*Chenopo dium-spp.*	*Gyndro-psis gynandria*	*Dactylo-tenium aegyptium*	*Echino-chola colonum*				
Weed control treatments	Unweeded control	122.49	81.62	57.16	153.34	109.88	65.03	223.16	168.40	261.27	328.25	391.56	981.09
	Fluazifop-butyl (2 l/fed)	61.44	51.68	37.78	67.29	72.19	39.94	65.89	49.16	150.90	179.42	115.05	445.38
	Oxyfluorfen (0.75 l/fed)	73.68	62.73	38.79	52.94	64.08	31.67	84.24	59.81	175.20	148.69	144.05	467.94
	Pendimethalin(1.75 l/fed)	56.36	49.55	30.57	59.98	64.48	36.22	61.10	55.94	136.48	160.68	117.04	414.18
	Bentazone (1 l/fed)	83.21	68.42	43.83	51.02	59.08	32.37	107.37	76.89	195.46	142.47	184.26	522.18
	Hand hoeing (twice)	43.14	35.88	16.82	28.40	31.55	20.22	31.52	20.01	95.84	80.17	51.53	227.52
L.S.D. at 5 %		2.41	2.34	2.36	2.45	1.88	1.91	4.49	1.33	9.61	5.52	7.63	21.08
Foliar fertilizer	Zero	87.15	65.53	43.19	73.78	72.30	43.18	104.27	78.68	195.87	189.26	182.95	568.07
	200 (g/fed)	75.61	61.24	37.50	70.01	68.05	38.12	96.02	73.83	174.35	176.18	169.85	520.37
	400 (g/fed)	57.40	48.16	31.78	62.70	60.28	31.42	86.35	62.60	137.34	154.40	148.95	440.70
L.S.D. at 5 %		1.70	3.65	2.67	1.73	1.33	1.35	3.17	1.89	5.14	8.37	11.16	29.76

1. Perennial weeds, 2. Annual broad leaved, 3. Annual grass weeds.

Table 3: Effect of weed control treatments and foliar fertilization on growth parameters of soybean plants after 75 days from sowing (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		Plant height (cm)	Fresh wt. of root (g)	Dry wt. of root (g)	Fresh wt. of shoot (g)	Dry wt. of shoot (g)	No. of branches	No. of leaves	No. of internodes	No. of green pods (g)	F. wt. of green pods	Dry wt. of green pods
Weed control treatments	Unweeded control	53.46	8.05	3.05	64.11	17.21	4.25	31.83	32.83	50.58	24.97	7.88
	Fluazifop-butyl (2 l/fed)	66.01	9.67	3.93	77.85	22.46	5.33	39.67	40.67	62.75	35.55	12.90
	Oxyfluorfen (0.75 l/fed)	62.31	9.24	3.63	74.12	21.20	4.92	37.42	38.42	60.58	31.53	10.88
	Pendimethalin (1.75 l/fed)	67.96	10.30	4.13	82.06	23.45	5.50	41.42	42.42	66.33	40.33	14.29
	Bentazone (1 l/fed)	58.15	8.63	3.29	69.11	19.30	4.58	34.67	35.67	55.50	28.83	9.01
	Hand hoeing (twice)	70.47	10.86	4.46	86.28	24.88	6.08	43.08	44.08	70.92	43.99	15.45
L.S.D. at 5 %		1.37	N.S	N.S	1.59	0.75	0.86	5.83	2.82	2.90	1.24	0.78
Foliar fertilizer	Zero	48.23	8.15	2.98	64.30	17.89	3.25	27.92	28.92	46.38	24.75	7.95
	200 (g/fed)	63.75	9.16	3.67	76.28	21.62	5.63	40.50	41.50	65.88	35.80	11.35
	400 (g/fed)	76.45	11.07	4.60	86.18	24.74	6.46	45.63	46.63	71.08	42.05	15.90
L.S.D. at 5 %		5.97	0.38	0.21	4.12	0.53	N.S	2.59	2.53	3.64	4.88	0.55

competition. This in turn favoured growth of soybean plants and consequently the height and weight of pods/plant. Similar conclusions were obtained by Sangakkara *et al.* (1995), who found that the adverse effect of weeds was greatest on vegetative growth. Soybean treated with stimufol had a significant response to plant vegetative growth, number of branches, leaves, internodes and increased fresh and dry weight of green pods to 200 and 400 g/fed. The great increase value was obtained by applying 400 and 200 g/fed, respectively, with significant differences.

3. Effect on photosynthetic pigments and chemical composition of soybean seeds :

The results in Table 4 showed that weed control treatments generally increased photosynthetic pigments of soybean plant at 75 days old. Chemical and mechanical weed control treatments increased chlorophyll (a), chlorophyll (b) and carotenoids content. Hand hoeing and pendimethalin gave the highest value of chlorophyll (a) and carotenoids than that of other treatments. The increases value of chlorophyll (a) ranged from 108 % and 86 % and for carotenoids reached 103 % and 70% for hand hoeing and pendimethalin, respectively, whereas the increases value of chlorophyll (b) content reached 90 % and 59 % for pendimethalin and hand hoeing treatments, respectively. Dodge (1983) stated that the action of many herbicides is due to the promotion of chloroplast electron flow which generates free radicals as shown by some diphenyl ethers, El-Quesni and Radwan (1993) gave the same results.

Concerning the effect of foliar fertilization on chlorophyll (a), (b) and carotenoids. The results in Table 4 revealed that foliar fertilization markedly increased chlorophyll (a), chlorophyll (b) and carotenoids, the most effective treatments 400 and 200 g/fed, the increases value ranged by 33 % and 13 % for chlorophyll (a), 35 % and 16 % for chlorophyll (b) and 32 % and 14 % for carotenoids due to 400 and 200 g/fed of stimufol respectively. The results in Table 5 indicated that the mechanical and chemical weed control treatments, hand hoeing, pendimethalin, flauzifop-butyl, oxyfluorfen and bentazone resulted in 24.63, 23.53, 22.60, 22.03 and 21.23% total carbohydrate in seeds of soybean more than unweeded control plants (20.37 %) the increase in total carbohydrate content is not great enough to reach 5 % level of significance. Slight increase in crude protein was noticed as affected by the formentioned weed control treatments as follow (38.22, 37.77, 37.46, 37.13 and 36.74 %). The increases in crude protein content was accompanied with significant decrease in oil content. Data presented in Table 5 revealed that foliar fertilization increased total carbohydrate, protein content in seeds of soybean treated plants with 400 and 200 g/fed Whereas oil content in seeds of soybean treated plants were decreased due to foliar fertilization treatment.

Results presented in Table 6 indicate significant differences between chemical and mechanical weed control treatments in N, P, K and Zn, Cu and Mn of the harvested soybean seeds. Hand hoeing and pendimethalin treatments gave the highest N, P, K and Zn, Cu and Mn in seeds with significant differences between them and each of other herbicides.

Table 4 : Effect of weed control treatments and foliar fertilization on photosynthetic pigments of soybean plants after (75) days from sowing (mg/g. Fresh weight) (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		After 75 days from sowing			
		Chlorophyll (a)	Chlorophyll (b)	Chlorophyll (a + b)	Carotenoid
Weed control treatments	Unweeded control	0.97	0.32	1.29	0.27
	Fluazifop-butyl (2 l/fed)	1.52	0.43	1.95	0.39
	Oxyfluorfen (0.75 l/fed)	1.35	0.39	1.74	0.35
	Pendimethalin (1.75 l/fed)	1.81	0.61	2.42	0.46
	Bentazone (1 l/fed)	1.17	0.35	1.51	0.31
	Hand hoeing (twice)	2.02	0.51	2.53	0.55
L.S.D. at 5 %		0.13	0.02	0.04	0.03
Foliar fertilizer	Zero	1.27	0.37	1.64	0.34
	200 (g/fed)	1.44	0.43	1.88	0.39
	400 (g/fed)	1.70	0.50	2.2	0.45
L.S.D. at 5 %		0.02	0.01	0.03	0.01

Table 5 : Effect of weed control treatments and foliar fertilization on chemical composition of soybean seeds at harvest stage (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		Carbohydrate %	Crude protein %	Oil content %
Weed control treatments	Unweeded control	20.73	36.61	17.62
	Fluazifop-butyl (2 l/fed)	22.60	37.46	18.51
	Oxyfluorfen (0.75 l/fed)	22.03	37.13	18.68
	Pendimethalin (1.75 l/fed)	23.53	37.77	18.27
	Bentazone (1 l/fed)	21.38	36.74	18.91
	Hand hoeing (twice)	24.63	38.22	18.09
L.S.D. at 5 %		N.S	N.S	0.18
Foliar fertilizer	Zero	21.10	36.63	19.00
	200 (g/fed)	22.52	37.38	18.52
	400 (g/fed)	23.83	37.94	18.29
L.S.D. at 5 %		N.S	0.13	0.13

The effect of foliar fertilization with stimufol Table 6 clearly indicated that seeds of soybean plants are markedly affected by foliar spray of fertilization and increased seed nutrient (N, P and K) and (Zn, Cu and Mn) at 400 g/fed.

Whereas, Fe contents were increased by using foliar fertilization of stimufol by the same arrangement. The finding indicates the vital role of micronutrients in increasing N content as a result of activity of soil microorganisms. It, also, indicates a marked positive of micronutrients of biomass. The present results are in accordance with those obtained by El-Quesni and Radwan (1993) Jet and Nepalia (1994).

Yield and its components:

All herbicidal treatments Table 7 under investigation, as well as, hand hoeing treatment showed significant improvements in yield and its components (number and weight of pods, pod length, number and weight of seeds and weight of 100 seeds). Superiority of hand hoeing treatment in growth and yield components of soybean plant, hoeing treatment gave highest reduction in soybean weeds after 75 days from sowing, this in turn, accelerated the vegetative growth, this enhances the photosynthetic activity which eventually from the carbohydrate pools, yield and yield components were increased. The results are also in good agreement with those obtained by Patil *et al.* (1999).

From the same table the highest value of yield and its components was recorded by 400 g/fed followed by 200 g/fed Due to foliar fertilization. It can be concluded that chemical and mechanical weed control (i.e.) hand hoeing (twice) and pendimethalin (1.75 l/fed) can be effectively control weed in soybean field to produce higher seed and straw yield (biological yield), as well as, chemical composition of seeds.

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Table 6 : Effect of weed control treatments and foliar fertilization on macro and microelements soybean seeds at harvest (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		N (mg/g)	P (mg/g)	K (mg/g)	Fe (ppm)	Zn (ppm)	Cu (ppm)	Mn (ppm)
Weed control treatments	Unweeded control	5.86	6.93	23.84	343	87	0.51	64.1
	Fluazifop-butyl (2 l/fed)	5.96	7.05	24.79	217	112	0.93	86.2
	Oxyfluorfen (0.75 l/fed)	5.90	7.00	24.64	203	104	0.89	76.8
	Pendimethalin (1.75 l/fed)	6.03	7.13	25.03	260	124	1.02	96.1
	Bentazone (1 l/fed)	6.88	6.96	24.42	162	94	0.73	70.0
	Hand hoeing (twice)	6.15	7.14	25.18	310	134	1.15	105.9
L.S.D. at 5 %		0.04	0.03	0.04	6.8	3.5	0.03	0.43
Foliar fertilizer	Zero	5.85	6.83	24.46	240	101.3	0.75	74.1
	200 (g/fed)	5.98	7.03	24.67	250	108.8	0.88	84.3
	400 (g/fed)	6.07	7.25	24.82	258	117.2	0.98	91.3
L.S.D. at 5 %		0.03	0.02	0.03	4.2	2.4	0.06	0.63

Table 7 : Effect of weed control treatments and foliar fertilization on yield and yield components of soybean plants (combined analysis of the two growing seasons of 1995 and 1996).

Treatments		No. of pods/plant	Wt. of pods/plant (cm)	Pod length (cm)	No. of seeds/ plant	Wt. of seed/ plant (g)	Wt. of 100 seeds (g)	Seed yield (ton/ fed)	Straw yield (ton/ fed)	Biolo-gical yield (ton/ fed)
Weed control treatments	Unweeded control	40.08	23.07	4.05	107.42	18.33	16.82	1.27	1.22	2.49
	Fluazifop-butyl (2 l/fed)	48.50	32.93	4.96	128.83	24.60	18.90	1.65	1.51	3.16
	Oxyfluorfen (0.75 l/fed)	46.50	29.14	4.68	123.58	22.73	18.18	1.57	1.43	3.00
	Pendimethalin(1.75 l/fed)	51.17	35.24	5.28	134.08	27.08	20.00	1.74	1.62	3.36
	Bentazone (1 l/fed)	43.58	26.15	4.32	118.00	20.68	17.48	1.44	1.32	2.76
	Hand hoeing (twice)	54.42	38.63	5.79	140.25	30.57	21.52	1.91	1.75	3.66
L.S.D. at 5 %		0.98	1.06	0.36	0.87	0.89	1.05	0.06	0.06	0.13
Foliar fertilizer	Zero	41.58	22.23	4.61	114.38	18.41	15.93	1.25	1.20	2.45
	200 (g/fed)	48.38	32.27	4.92	127.00	23.62	18.49	1.72	1.55	3.27
	400 (g/fed)	52.17	38.09	5.01	134.71	29.97	22.05	1.81	1.68	3.49
L.S.D. at 5 %		0.69	0.75	0.25	0.62	0.63	0.74	0.04	0.04	0.20

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تأثير معاملات مقاومة الحشائش والسماد الورقى على النمو والمحصول والمحتوى الكيماوى والحشائش المصاحبة لفول الصويا بالنوبارية

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اجريت تجربتان حقليتان خلال موسمين متتاليين (١٩٩٥ ، ١٩٩٦) بمزرعة المركز القومى للبحوث بمنطقة النوبارية وذلك لدراسة تأثير بعض معاملات مقاومة الحشائش الكيماوية والميكانيكية (العزيق اليدوى) والسماد الورقى (ستيموفول) على نمو ومحصول والمحتوى الكيماوى لنبات فول الصويا وكذلك الحشائش المصاحبة له وكانت اهم النتائج كالاتى :

- ادت معاملتى العزيق والمعاملة بالستومب (١,٧٥ لتر/فدان) هى الاكثر فاعلية فى مقاومة اوزان الحشائش بانواعها مقارنة بالكنترول .
- كما ادت معاملة الحشائش بالسماد الورقى فى تقليل الحشائش المصاحبة لنبات فول الصويا وذلك بتركيز ٤٠٠ جم/فدان .
- جميع المعاملات عدا معاملة المقارنة كان لها تاثيرا معنويا فى زيادة جميع قياسات النمو لنباتات فول الصويا فى عمر ٧٥ يوما .
- اعطت معاملات العزيق والستومب زيادة معنوية فى كلوروفيل (أ) ، (ب) والكاروتينات عن جميع المعاملات الاخرى – وادت معاملة السماد الورقى الى زيادة نسبة كلوروفيل (أ) ، (ب) والكاروتين عند تركز ٤٠٠ جم/فدان فى عمر ٧٥ يوما .
- زادت نسبة الكربوهيدرات زيادة معنوية باستعمال معاملات مقاومة الحشائش
- ادت معاملات مقاومة الحشائش الى زيادة فى محتوى البروتين ورفع معدلات العناصر الكبرى والصغرى فى بذور فول الصويا – وسجلت اعلى نسبة زيادة مع العزيق فيماعدا الحديد فقد اختزلت نسبتة باستخدام معاملات مقاومة الحشائش .
- زادت معدلات العناصر الكبرى والصغرى فى محصول البذور باستخدام السماد الورقى (ستيموفول) وكانت اعلىنسبة زيادة مع ٤٠٠ جم/فدان .
- أعطت معاملات المقاومة بالعزيق والستومب اعلى معدلات النقص للوزن الغض والجاف وعدد الحشائش المصاحبة لنباتات فول الصويا مما ادى الى تحسن نمو النباتات وبالتالى تحسن المحصول وصفاته وأيضا المكونات الكيميائية للبذرة .