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EFFECT OF SOWING METHODS AND SOME WEED CONTROL TREATMENTS ON YIELD AND YIELD COMPONENTS OF WHEAT

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ABSTRACT

Two field experiments were carried out during winter seasons 2004/2005 and 2005/2006 in Experimental Station of National Research Centre, Shalakan District , Kalubia Governorate , Egypt . The aim of the study was to examine the response of wheat cultivar Sakha-93 to 3 weed control treatments and two sowing methods.The experiment included 6 treatments which were the combinations of two sowing methods 1- in ridges 2- rows and response of wheat cultivar Sakha-93 to 3 weed control treatments 1-Unweeded (control) ; 2-Hand weeding twice at 30 and 60 DAS 3-Chemical weed control by Panther 55% Sc at post emergence . The treatments were arranged in split plot design in four replicates, sowing methods in main plots and weed control treatments in subplots. Combined analysis used for the two seasons.

Data indicated that sowing wheat c.v Sakha-93 in ridges surpassed in rows for no. of tillers ; spikes/m^2 ; spike length ; spike weight ; grains weight/spike ; grain; straw; biological yields as kg/fed.; harvest index % ; protein ; phosphorus and K yields as kg/fed. On the other hand, sowing in rows produced taller plants, heavier 1000 grains weight . . Results showed that chemical weeded had superiority in total, broad leaved ,grassy weeds either fresh or dry/m^2 at both samples 75 and 105 DAS ,also, in no. of tillers/m^2 ; no. of spikes/m^2 ; spike length ; spike weight ; grains weight/spike ; 1000-grains weight ; grain yield/fed. ; harvest index% ; protein ,P,K yields (kg/fed.) whereas hand weeding produced tallest plants , highest protein ,P,K% in grains. Interaction of sowing method in ridges and chemical weeded significantly surpassed other treatments in no. of tillers/m^2; no. of spikes/m^2 ; spike weight ; straw and biological yield as kg/fed. Interaction of sowing method in ridges and hand weeding gave the highest content of protein ; phosphorus and potassium in wheat grains as kg/fed.

Keywords: Wheat, sowing methods, weed control treatments

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INTRODUCTION

Wheat is the worlds most important and most widely grown cereal crop through many properties and uses of its grains and straw. Increasing grain yield of wheat is an important national goal to face the continious increasing food needs of Egyptian population. Wheat production in Egypt increased from 2.08 in 1983 to 7.37 million ton in 2007. This increase was achived by increasing wheat area from 1.83 to 2.71 million fed./ year and grain yield from 1.50 to 2.71 ton/fed. in the same period (AERMAE 2007).

Plant density; sowing methods; and weed control are among the limited factors of wheat production. To obtain high yield of wheat, sowing method is one of the important factors which compensates the low tillering in

wheat, to give the best plant distribution in the field and to save the labor in controlling weeds within ridges or rows (Martin *et al*., 1975; Samra and Dhillon 2000; Tripathi *et al.*, 2002; Jat *et al.,* 2003; Pandey and Kumar, 2005; and Amjad and Anderson, 2006).

Weeds reduce crop yield through competition for moisture , nutrients , sunlight and space also, during harvest, drying and dockage which reflected on reducing quantity and/or quality reducing the economic return. El Naggar (1996) stated that chemical weeding by bromoxynil gave the largest reduction in total no. of weeds/m2 at 50 and 80 DAS. Nisha *et al*. (1999) pointed reduction in wheat yield due to weed infestation reached to 30.7% ; Ikramullah *et al*. (2002) stated that isoproturun was moderately effective in controlling grassy and broad leaved. Saad El Din and Ahmed(2004) revealed the excellence of chemical weeded in wheat production. Muhammed *et al.* (2007) revealed that panther herbicide gave the best results in decreased weed population in wheat field at Pakistan during 2003-2005 and increased wheat grain yield by about 60% over control treatments. On the other hand ,many researchers reported that hand weeded had superiority in weed control compared to other weed control methods (Mishra and Kewat 2002; Radwan *et al.*,2002; and Kironmay *et al.*,2006). The reported that hand weeding gave about 50% higher over herbicides treatments. Rajvir and Sharma(2003) resulted that hand weeding were equivalent with isoproton in efficacy in reducing weed populations. The objective of this study was to investigate the effect of two sowing methods and three weed control treatments on yield and yield components of wheat c.v Sakha 93,also, fresh and dry weights of associated weeds either broad leaved or grassy weeds.

MATERIALS AND METHODS

Two field experiments were carried out during winter season of 2004/2005 and 2005/2006 in the Experimental Station of National Research Centre, Shalakan District , Kalubia Governorate, Egypt. The experimental soil before sowing had the following mechanical and chemical characters in both seasons sand14.9-12.3% ; silt 38.8-36.4%; clay 46.3-51.3% ; texture clay loam ; Ca co_3 1.7-1.58% ; organic matter 1.96-2.24% ; EC 0.66-0.60 mmhos/cm^3 ; p ^{H}8.15-8.05 ; N 0.15-0.17% ; P 16.2-18.6 ppm; K 389-410 mg/kg soil (Jackson, 1960).

The Experimental treatments can be described as follows:-

A- Main plots (sowing methods)

1- In ridges – dry grains in hills 10cm between on both sides of ridges 60 cm apart.

2- In rows – dry grains drilled in rows 15 cm apart.

B- Sub plots (weed control treatments)

1- Unweeded (control).

2- Hand weeding – twice at 30 and 60 days after sowing (DAS).

3- Chemical weed control by using panther 55% SC herbicide – post emergence active materials were: isoproturon 500 g/l (urea group)+ deflophenikcan pyridinecarboxamide group 50 g/l) at the rate of 600 cm^3/fed.

The herbicidal treatment was applied at 2-3 leaf stage of wheat using knapsake spryer (200 litre water/fed.)+0.1% tepol as wetting agent.
Experimental field prepared through 2 ploughing and leveling then divided to experimental plots 3 x 3.5 m= 10.5 m^2 (1/400 fed.). Experimental area divided to 2 equal parts for the main plots (sowing methods), the first for ridges 60 cm apart and the second for rows 15 cm between. Each main plot divided to 3 sub-plots, then weed control treatments randomly allocated in sub-plots.
. Chemical fertilizers NPK at recommended dose (75:31:48) . The forms of NPK was (N) ammonium nitrate 33.5% N; (P) calcium superphosphate 15.5% p_2o_5 and (K) potassium sulphate 48% k_2o , P and K added during tillage operation before sowing and N added at two portions at 35 and 49 DAS.
Dry grains of wheat variety Sakha-93 obtained from Ministry of Agriculture, Egypt at rate of 45 kg/fed. Sowing dates were 29 and 27 November; harvest dates were 23 and 15 May for the two seasons, respectively.
The following data were recorded :

A- Weeds :

Two samples were taken from 1 m^2 from each plot of trial at 75 and 105 DAS to determine fresh and dry weights of broad leaved , grassy , total weeds and weed control %.

B- Yield and yield components:-

At harvest two central ridges or rows from each plot were harvested and sub samples of ten plants were taken randomly to estimate the following yield components:-
1-Plant height (cm). 2-Number of tillers/m^2. 3-Number of spikes/m^2. 4-Spike length (cm). 5-Spike weight (g). 6-Weight of grains/spike. 7-1000-grains weight (g).
All plants of each plot were harvested to determine :- 1-Grain yield (kg/fed. *). 2-Straw yield (kg/fed.). 3-Biological yield (kg/fed.). 4-Harvest index% = grain yield/biological yield x100 .

C- Chemical composition of wheat grains :-

Samples of grains were taken from the grain yield of each plot for chemical analysis. Total N, P and K contents in grains were determined according to Chapman and Pratt (1978). Crude protein calculated by N % x 5.75. Protein , phosphorus and potassium yield (kg/fed.) calculated by multiply protein % , P % and K % by grain yield (kg/fed.).

Statistical analysis:-

Data were statistically analyzed according to Snedecor and Cochran (1990). The combined analysis was conducted for the data of two seasons. The least significant differences (LSD at 5%) used to compare the treatments means.
fed. * feddan = 4200 m^2.

RESULTS AND DISCUSSION

A- Effect of sowing methods:-

A-1- Weeds

Data presented in Table (1) revealed that sowing method in ridges significantly surpassed in rows method. Sowing wheat in ridges decreased

the weight of broad leaved , grassy and total weeds either fresh or dry weight at the two ages 75 and 105 DAS. Results are in agreement with those obtained by El-Naggar (1996) and Amjad and Anderson (2006).

A-2- Yield and yield components.

Data presented in Table (2) revealed the differences between sowing methods in ridges and in rows for yield and yield components. It is clear that there were significant differences between the two studied sowing methods for all studied characters except for plant height; spike length and 1000-grains weight.

Sowing wheat in ridges produced the greater number of tillers/m^2; no. of spikes/m^2 ; taller spikes ; the heaviest spike weight (g) ; weight of grains/spike (g) ; grain yield (kg/fed.) ; straw yield (kg/fed.) ; biological yield (kg/fed.) and the higher harvest index %. Sowing wheat in rows gave the taller plants and heavier 1000-grains weight than sowing in ridges. Results are in harmony with obtained by El Nagar (1996); Samra and Dhillon (2000); Tripathi *et al.* (2003); Jat *et al.* (2003).

A-3- Chemical composition of wheat grains:-

Data in Table (3) show insignificant differences between sowing methods for N, P, K% in grains. It is clear from data presented in the same table that sowing method in ridges gave higher protein yield (kg/fed.); Phosphorus yield (kg/fed.) and potassium yield (kg/fed.) than sowing in rows. Results were in confirmed with those obtained by Pandey and Kumar (2005); Amjad and Anderson (2006).

Table (1): Effect of sowing method treatments on fresh and dry weight of weeds (g/m^2)in wheat field at 75 and 105 days after sowing.

(Combined analysis of 2004/2005 and 2005/2006 seasons)

Characters	Broad-leaved weeds		Grassy weeds		Total weeds	
Treatments	Fresh	Dry	Fresh	Dry	Fresh	Dry
	75 days after sowing					
Ridges	189.4	45.8	87.7	23.4	277.1	69.2
Rows	215.8	45.3	121.8	34.2	337.6	79.5
L.S.D. at 5%	18.1	N.S.	12.6	2.7	30.1	6.2
	105 days after sowing					
Ridges	271.1	87.5	166.2	74.7	437.3	162.2
Rows	320.7	105.2	206.6	89.9	527.3	195.1
L.S.D. at 5%	24.7	14.1	24.3	10.6	52.6	16.3

Table (2): Effect of sowing methods treatments on yield and yield components of wheat.

(Combined analysis of 2004/2005 and 2005/2006 seasons).

Characters / Treatments	Plant height (cm)	No. of Tillers/ m^2	No. of spikes/ m^2	Spike length (cm)	Spike weight (g)	Weight of grains/ spike (g)	1000-grains weight (g)	Grain yield kg/fed.	Straw yield kg/fed.	Biological yield kg/fed.	Harvest index %
Ridges	91.3	469.4	304.2	13.4	3.11	2.05	49.02	2126	4628	6754	31.50
Rows	93.5	446.4	283.2	13.2	3.06	1.98	49.24	1923	4436	6359	30.30
L.S.D 5%	N.S.	13.3	5.4	N.S	0.04	0.06	N.S.	34	80	95	0.42

Table (3): Effect of sowing methods treatments on wheat grain protein, phosphorus and potassium yield (kg/fed) . (Combined analysis of 2004/2005 and 2005/2006 seasons)

Sowing methods treatments	Protein		Phosphorus		Potassium	
	%	Yield (kg/fed.)	%	Yield (kg/fed.)	%	Yield (kg/fed.)
Ridges	11.75	249.80	0.293	6.22	0.863	18.66
Rows	11.46	220.37	0.298	5.73	0.872	16.76
L.S.D. at 5%	N.S.	3.90	N.S.	0.10	N.S.	0.30

B- Effect of weed control:-

B-1- Weeds

Table (4) show significant differences between weed control treatments due to broadleaved , grasses ,total weeds as fresh and dry weights. Chemical weeded recorded the lowest weight of weeds and weed control % at 75 and 105 DAS. Hand weeding recorded the first order in grass weeds at 105 DAS, results were in accordance with obtained by El Naggar (1996); Ikramullah *et al*. (2002); Saad El-Din and Ahmed (2004) ; Muhammed *et al*. (2007).

Table (4) : Effect of weed control treatments on fresh and dry weight of weeds (g/m^2) in wheat field at 75 and 105 days after sowing(Combined analysis of 2004/2005 and 2005/2006 seasons).

Characters	Broad-leaved weeds		Grassy weeds		Total weeds		Weed control %	
Treatments	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
	75 days after sowing							
Unweeded(Control)	366.1	69.5	170.9	46.6	537.0	116.1	0.0	0.0
Hand weeding	127.2	33.6	75.6	21.6	202.8	55.2	62.1	51.9
Chemical weeded	114.6	33.6	68.0	18.3	182.6	51.9	65.9	55.1
L.S.D. at 5%	27.5	23.1	20.9	18.2	35.8	30.7		
	105 days after sowing :							
Unweeded(Control)	507.3	149.1	327.2	136.8	834.5	285.9	0.0	0.0
Hand weeding	209.9	80.3	110.1	53.6	320.0	133.9	61.7	53.2
Chemical weeded	170.5	59.7	122.1	56.7	292.3	116.4	65.0	59.3
L.S.D. at 5%	29.8	25.7	25.6	27.7	33.4	34.9		

B-2-Yield and yield components.

Data presented in Table (5) revealed that chemical weeded produced the highest no. of tillers/m^2 ; no. of spikes/m^2 ; the tallest spike (cm) ; heaviest spike (g) ; the highest weight of grains/spike (g) ; the highest 1000-grains weight (g) ; the highest grain yield (kg/fed.) and the highest harvest index (%).The same results obtained by El-Naggar (1996) *;* Ikramullah et al., (2002) ; Saad El-Din and Ahmed (2004) ; Muhammed *et al*., (2007). On the other hand weeding treatment gave the tallest plants; the highest straw yield (kg/fed.) and the greatest biological yield (kg/fed.). The same result reported by (Mishra and Kewat 2002 ; Radwan *et al*., 2002 and Kironmay *et al*., 2006).

Table (5) :Effect of weed control treatments on wheat yield and its components.
(Combined analysis of 2004/2005 and 2005/2006 seasons).

Characters / Treatments	Plant height (cm)	No. of tillers /m^2	No. of spikes/m^2	Spike length (cm)	Spike weight (g)	Weight of grains/ spike (g)	1000-grains weight (g)	Grain yield kg/ fed.	Straw yield kg/fed.	Biological yield kg/ fed.	Harvest index %
Unweeded (Control)	93.	340	195	12.89	2.88	1.85	47.62	1541	3228	4769	32.3
Hand weeding	93	511	339	13.36	3.15	2.07	49.33	2258	5089	7347	30.7
Chemical weeded	92.	521	346	13.61	3.24	2.15	50.45	2275	4379	6654	34.2
L.S.D. at 5%	N.S.	20	4.7	0.32	0.08	0.06	2.40	47	83	107	0.53

A-3- Chemical composition of wheat grains :-

Data in Table (6) show insignificant differences between weed control treatments due to protein , P and K yield (kg/fed.) but insignificant in protein ,P and K (%) in grains. Hand weeding gave the best percentage in protein , P and K but chemical weeded gave the highest protein,P,K yield (kg/fed.). Results are in harmony with obtained by Saad El Din and Ahmed (2004).

Table (6): Effect of weed control treatments on wheat grain protein, phosphorus and potassium yield (kg/fed) .
(Combined analysis of 2004/2005 and 2005/2006 seasons)

Weed control treatments	Protein		Phosphorus		Potassium	
	%	Yield (kg/fed.)	%	Yield (kg/fed.)	%	Yield (kg/fed.)
Unweeded (control)	11.51	177.36	0.286	4.41	0.798	12.29
Hand weeding	11.68	263.73	0.301	6.79	0.903	20.39
Chemical weeded	11.62	264.4	0.299	6.8	0.903	20.54
L.S.D. at 5%	N.S.	5.5	N.S.	0.14	N.S.	0.42

C- Effect of interaction between sowing methods and weed control treatments.

C-1- Weeds

Table (7) show that interaction of chemical weeded x sowing method in ridges reduced fresh and dry weights of weeds either broad leaved or grassy in both samples except for dry weight of broad leaved at 75 DAS. Chemical weeded x in rows was the best. Interaction of hand weeding x in ridges has the best effect in controlling fresh and dry WT of grassy weeds at 105 DAS. Chemical weeded x in ridges reduced total fresh and dry WT at 105 DAS.

C-2- Yield and yield components:-

Data presented in Table (8) show that interaction between chemical weeded x sowing method in ridges produced the greatest no. of tillers/m^2 ; no. of spikes/m^2 ; tallest spikes ; heaviest spikes (g) ; heaviest grain weight of spikes (g) ; heaviest 1000 grains weight (g) ; heaviest straw yield (kg/fed.) and highest biological yield (kg/fed.) but the tallest plants produced by interaction of chemical weeded x sowing in rows. Interaction of hand weeding x sowing method in ridges gave the best grain yield (kg/fed.). Finally, the best

harvest index % recorded by unweeded x sowing method in ridges,.These results were in harmony with those obtained by (Gupta and Ganpat 1985 ; Johri *et al*., ;1991 ; Berry and Wikes 1992 ; Samra and Dhillon 2000 ; Mishra and Kewat 2002 ; Radwan *et al*., 2002 ; Tripathi *et al*., 2002 ; Jat *et al*., 2003 ; and Navneet *et al*., 2003).

Table (7): Effect of interaction between weed control treatment and sowing method treatments on fresh and dry weight of weeds (g/m^2) in wheat field at 75 and 105 days after sowing.

(Combined analysis of 2004/2005 and 2005/2006 seasons).

characters		75 days after sowing						105 days after sowing					
		Broad-leaved weeds		Grassy weeds		Total weeds		Broad-leaved weeds		Grassy weeds		Total weeds	
Treatments													
Sowing methods	weed control	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry	Fresh	Dry
Ridges	Unweeded	354	68	153	39	507	107	493	151	292	123	785	274
Rows	(Control)	378	70	188	54	566	125	521	147	362	151	884	297
Ridges	Hand	112	34	57	17	169	50	172	64	94	48	266	112
Rows	weeding	142	34	96	26	235	60	248	97	126	59	374	155
Ridges	Chemical	101	35	52	15	153	50	148	47	112	53	261	100
Rows	weeded	127	32	59	22	186	54	193	72	132	60	324	132
L.S.D. at 5%		38	13	29	12	40	16	42	13	35	14	47	20

Table (8) :Effect of interaction between sowing methods and weed control treatments on yield and yield components of wheat.

(Combined analysis of 2004/2005 and 2005/2006 seasons).

Characters / Treatments		Plant height (cm)	No. of tillers/ m^2	No. of spikes /m^2	Spike length (cm)	Spike weight (g)	Grain weight of spike (g)	1000 grains weight (g)	Grain yield kg/fed.	Straw yield kg/fed.	Biological yield (kg/fed.)	Harvest index %
Sowing methods	Weed control treatments											
Ridges	Unweeded	93.48	357.0	202.3	12.94	2.89	1.86	47.65	1595.0	3307	4902	32.55
Rows	(Control)	93.25	323.3	187.7	12.84	2.88	1.83	47.60	1488.0	3148	4636	32.10
Ridges	Hand	93.34	520.1	347.9	13.57	3.19	2.14	49.10	2395.0	5138	7533	31.75
Rows	weeding	93.24	503.2	331.1	13.16	3.10	2.00	49.56	2120.0	5041	7161	29.60
Ridges	Chemical	91.19	531.3	362.5	13.71	3.26	2.17	50.32	2387.0	5440	7827	30.70
Rows	weeded	93.51	511.4	281.0	13.52	3.21	2.12	50.57	2162.0	5119	7281	29.70
L.S.D.at 5%		N.S.	29.6	6.7	N.S.	N.S.	0.08	N.S.	67.7	117	152	0.70

C-3- Chemical composition of wheat grains :-

Data presented in Table (9) clear that interaction of hand weeding x sowing in ridges recorded the highest % and yield (kg/fed.) of N and K. The interaction of chemical weeded x in ridges came in the first order either for P % or P yield (kg/fed.). Results were in harmony with Saad El Din and Ahmed (2004) and Pandey and Kumar (2005).

Table (9) :Effect of interaction between sowing methods and weed control treatments on wheat grain protein, phosphorus and potassium yield (kg/fed) .
(Combined analysis of 2004/2005 and 2005/2006seasons)

Treatments		Protein		Phosphorus		Potassium	
Sowing methods	Weed control	%	Yield (kg/fed.)	%	Yield (kg/fed.)	%	Yield (kg/fed.)
Ridges	Unweeded	11.450	182.62	0.278	4.43	0.763	12.16
	Hand weeding	11.980	286.92	0.300	7.18	0.917	21.96
	Chemical weeded	11.834	282.47	0.301	7.18	0.911	21.74
Rows	Unweeded	11.580	172.31	0.294	4.37	0.834	12.41
	Hand weeding	11.380	241.25	0.302	6.4	0.889	18.85
	Chemical weeded	11.420	246.90	0.298	6.44	0.895	19.35
L.S.D. at 5%		N.S.	7.70	N.S.	0.20	N.S.	0.59

Conclusion

It is clear from results that sowing wheat Sakha-93 in ridges method produced the higher grain yield/fed. and for most of yield attributes. It can be concluded that these superiority may be due to the excellent plant distribution in the field which reflected on best conditions of space, light, air and high response to fertilization in turn on yield and most yield attributes. Due to weed control treatments it is clear that Panther (Isoproturon) herbicide is an effective method for increasing grain , straw and biological yields of wheat c.v Sakha-93 under trial condition. Finally, it can be concluded that sowing wheat grains c.v Sakha-93 in ridges and treated by Panther (Isoproturon) herbicide is the effective tool to increase wheat yield , its components and chemical composition of grains under trial condition.

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تـأثير طـرق الزراعـة وبعـض معـاملات مقاومـة الحشـائش علـي محصـول القمـح ومكونـاتة

محمد عمر كـابش * ، محمـد فـاروق القرمـاني*، جـابر عبـداللطيف سـاري، هـارون محمد النجار** و جيهان شاكر حنا باخوم***

*** قسم بحوث المحاصيل الحقلية – المركز القومي للبحوث**

**** قسم المحاصيل – كلية الزراعة – جامعة بنـها**

أقيمـت تجربتـان حقليتـان خـلال الموسـمين الشـتويين لسـنة ٢٠٠٤/٢٠٠٥ و ٢٠٠٥/٢٠٠٦ بمحطة تجارب البحوث الزراعية للمركز القومي للبحوث بشلقان – محافظة القليوبية لدراسة استجابة محصول القمح صنف سخا ٩٣ لثلاثة معاملات مقاومة حشائش وطريقتان للزراعة.

تحتوي التجربة علي ستة معاملات لتفاعل طرق الزراعة : ١- الزراعة في خطوط ٢- الزراعة في سطور ومعاملات مقاومة الحشائش ١- مقارنة بدون معاملة ٢- نقاوة يدوية مرتين (بعد ٣٠ و ٦٠ يوم من الزراعة) ٣- مقاومة كيماوية باستخدام مبيد بانتر ٥٥ % بعد الانبات.

صممت التجربة في قطع منشقة في أربعة مكررات حيث وزعت طرق الزراعة في القطع الرئيسية ووزعت معاملات مقاومة الحشائش في القطع المنشقة عشوائيا.

أوضحت النتائج تفوق معاملة زراعة القمح صنف سخا ٩٣ في خطوط عن الزراعة في سطور في معظم الصفات المدروسة خاصة محصول الحبوب والقش والبيولوجي كجم/فدان ودليل الحصاد % وكذا محتوي الحبوب من البروتين والفوسفور والبوتاسيوم كجم/فدان هذا وقد أظهرت معاملة المقاومة الكيماوية للحشائش معنوية في تقليل الوزن الطازج والجاف للحشائش عريضة وضيقة الأوراق وأيضا الوزن الطازج والجاف والكلي للحشائش/م٢ عند عمري ٧٥ و ١٠٥ يوم من الزراعة وبالتالي أدت الي زيادة معظم الصفات المدروسة للقمح بينما أظهرت معاملة النقاوة اليدوية للحشائش زيادة في طول النباتات والنسبة المئوية للعناصر الغذائية (البروتين والفوسفور والبوتاسيوم) في حبوب القمح.

أدي التفاعل بين طريقة الزراعة في خطوط مع المقاومة الكيماوية للحشائش المصاحبة لنمو القمح الي زيادة في معظم الخواص المدروسة لمحصول القمح خاصة محصول القش والبيولوجي (كجم/فدان) بينما أدي التفاعل بين طريقة الزراعة في خطوط مع معاملة النقاوة اليدوية للحشائش الي زيادة في محتوي حبوب القمح من البروتين والفوسفور والبوتناسيوم (كجم/فدان).