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Evaluation of Some Bread Wheat Cultivars under Different Seeding Rates and Weed Control Treatments

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ABSTRACT

An experiment was conducted during 2014/2015 and 2015/2016 growing seasons at Shandaweel Agriculture Research Station, Sohag Governorate, Egypt to study the effect of two seeding rates (50 and 60 kg/fed), three bread wheat cultivars (Shandaweel-1, Sids-12 and Giza-168) and six weed control treatments (Atlantis (T_1), Garnstar + Tpik (T_2), Garnstar + Axial (T_3), Garnstar + Traxos (T_4), hand weeding twice (T_5) and unweeeded control (T_6))on weeds growth, yield and yield components of wheat. Split-split plot design with four replications was used. Results indicated that seeding rates were significantly on annual weeds (g/m^2) and yield and yield components in both seasons. Increased seeding rate to 60 (kg/fed) significantly decreased the dry weight of total weeds (g/m^2) by 23.48 and 36.81% in first and second seasons, respectively compared to seeding rate of 50 (kg/fed).Seeding rate at 60 (kg/fed)give highest values of spike/length,No. of spikes/$m^2$and grains yield (arad/fed) in both seasons.Wheat cultivars were significantly effect on dry weight of weeds in both seasons.Giza-168 cultivar decreased the dry weight of broad, grassy and total weeds by 19.98, 23.22 and 21.7% in the first season and by 25.02, 30.58 and 35.67% in the second season, respectively as compared to Sids-12cultivar.Wheat cultivarswere significantly effect of spike/length, No.of spikes/m^2, grains weight/spike,weight of spike and grains yield (arad/fed) in both seasons.Weed control treatments were significantly reduced dry weight of grassy, broad-leaved and total weeds (g/m^2) in both seasonscompared to(T_6). Using of (T_2), (T_4)and (T_5) twice gave the highestreduction the dry weight of grass, broad-leaved weed and total weeds in both seasons.Weed control treatments were significanteffect of spike length,No. of spikelets/spike,No. of spikes/m^2,No. of grains/spike,spikeweight,seed index and grains yield (arad/fed) in both seasons.The interactions among highest seeding rate of 60 kg/fed, wheat Cultivar Giza 168 and (T_5) reduced dry weight of the grassy weeds by 94.9 and 97.3% in 2014/2015 and 2015/2016 seasons, respectively, and the dry weight of total weeds by 97.5% in 2015/2016 season as compared to sowing Sids-12 cultivar by seeding rate at 50 kg/fed and unweededtreatment.Correlation analyses weresignificantly negative correlation with weight of grassy, broad-leaved and total weeds and yield in the first and second seasons, andsignificantly positive correlation between yield and its components in both seasons.Economic evaluation of the results indicated that seeding rates 60kg/fed with wheat cultivars Giza 168 and using of (T_2), (T_4)and (T_5) gave the highest economic values, gross income, net income and profitability in the average of two seasons. Generally, cultivation Giza-168 at a rate 60kg/fed seed and application of (T2), (T4) and (T5)obtained by better crop of wheat under the experiment conditions.

INTRODUCTION

Wheatis considered to be the first strategic food crop in Egypt andsupplies about 20 percent of the food calories for the consumers. Also, wheat straw is an important fodder (Gomma, 1999). In Egypt, the total cultivated area of wheat reached 1.425 million hectares and the final production exceeded 9.0 million tons with an average of 6.0 t/ha (FAO, 2016). The gap between wheat production and consumption is about 40% of the national demand, it's imported from foreign markets. For these reasons,efforts should be done toward increasing and enhancing the wheat yield, in order to fill this gap.

Seeding rate strongly affects the capacity of wheat to utilize environmental resources because it affects the relative importance of intra-plant competition for light, water and nutrients during crop development (Tompkins *et al*, 1991, a and b). The occurrence of lodging and diseases may increase at higher densities and leads to grain yield reduction. Low seed rate reduced competition, especially during vegetative growth, but increase intra-plant competition during filling because plants tend to produce more spike-bearing tillers (Marshall and Ohm, 1987). Tomar (2004) found that wheat grain yield was at the maximum with the highest seeding rate of 150 kg/ha.Ibrahim *et al* (2008) indicated that the interaction between sowing dates and wheatcultivars had a significant effect on grain yield and other characters as in plant height, days to heading and maturity, weight of grains/ spike and 1000-grain weight. The highest grain yield was obtained when wheat was grown during Nov. Seed rate also affects the plant densities, No. of tillers/m^2, 1000-grain weight and biological yield Amanullah *et al*(2008).

Increasing wheat yield per unit area can be achieved by breeding high yielding cultivars and applying the optimum cultural practices such as seed rates and weed control treatment (Abd-Alla and Bassiouny, 1994). Wheat cultivars differed in yield and its components, superiority of Giza-168 cultivar with regard to grain yield and its components was investigated by many authors (Omar(2007), El-Ganayni and Mahmoud (2008), Hassan(2008), El-Nady (2009), Abd El-Ghany *et al*(2013), Mehasen *et al*(2014), Seadh (2014) and Abdrabbo *et al* (2016).Similarly,Kandil *et al* (2016) found that Giza-168 cultivar exceed (Shandweel-1 and Sides-12) cultivars in spik length, No. of grains/spik, grains weight/spik 1000-grain weight and grain yield in the first and second seasons, respectively.

Weeds are one of the major constraints in wheat production as they reduce production due to competition Abbas *et al*(2009) indicated that crop losses due to weed competition allover the world as a whole, are greater than those resulting from combined effect of diseasesandinsects. It causes yield reduction in wheat from 10 to 65 %,Genene and Habtamu (2001). Application of herbicides significantly decreased dry weight of weeds as compared to dry weight in non-applied plots and increased wheat yield and yieldcomponents, Ashrafi *et al*(2009) and Bibi *et al*(2008) indicated that herbicidal control of weed must be considered in combination with other improved agronomic such as seed rates. Fakkar (2005) reported that the application of Topik at 100 cc fed^{-1}. and hand weeding at

30, 45 days after growing significantly increased plant height, spike length, weight of grains plant^{-1}, weight of grains spike^{-1} and grain yield fed^{-1}.Yasin *et al* (2010) found that clodinafop (Topic-15 WG) at rate of 37 g.a.i. ha^{-1} produced relatively less weed biomass, more plant height, wheat yield components and grain yield. Salahuddin *et al* (2016) showed that using of herbicidesimproved of wheat yield components and grain yield comparing with unweeded treatment.

The objective of this study aimed to study the effect of seeding rate, wheat cultivars and some weed control treatments on weeds growth, yield and yield components of wheat.

MATERIALS AND METHODS

The experiment was carried out at Shandaweel Agricultural Research Station, Agricultural Research Center, Sohag Governorate (Upper Egypt) in both winter growing seasons of 2014/2015 and 2015/2016. The preceding summer crop was maize in both seasons. Physical and chemical analysis of the soil of the experimental sites indicated that the soil was clay loam and containing of 35.0, 910 and 307 ppm for N, P and K, respectively with 8.52 pH and total 1.26of N.

The sowing dates were 28th and 25th of November and harvested were 15th and 18th May in the 1st and 2nd seasons, respectively. The plot area was 10.5 m^2. Phosphorus fertilizer was applied as mono-calcium super phosphate (15.5 % P_2O_5) during preparation at the rate of 150 kg fed^{-1}. N-fertilizer was added in the form of urea (46.5% N) at the rate of 75 kg N fed^{-1} in two equal portions before the first and second irrigation. The other recommended agricultural practices of growing wheat in the region were done. A split-split plot with RCBD design was used.Seeding rates were allocated in the main plots, the cultivars in the sup-plots and weed control treatments in the sub-sub plots as follows:

A-Main-plots: two seeding rates of 50 and 60kg/fed.

B- Sub-plots: three broad wheat cultivars, Shandaweel-1, Sids-12 and Giza-168.

C- Sub-Sub plots: Six weed control treatments were used as follows:

1 - Atlantis 42 % OD (Iodosulfuron +Mesosulfuron) at 400 cm/fed at 30 days after sowing (T_1).

2- Granstar 75 % DF (Tribenuron-methyl) at 8.0 g/fed at 20 days after sowing+ +Topik 24% (Clodinafop-propargyl) at 140g / fed at 30 days after sowing (T_2).

3- Granstar + Axial 10% EC (Pinoxaden) at 1.0 L/fed at 30 days after sowing(T_3).

4- Granstar + Traxos 45% EC at 500 cm^3/fed at 30 days after sowing (T_4).

5 - Hand weeding twice at 30-45 days after sowing (T_5).

6 - Unweeded (Control) (T_6).

Table 1. Trade, common and chemical names of the herbicides used in the study.

Trade name	Common name	Chemical name
Atlantis 42%OD	Mesosulfuran methyl+indosulfuran methyl-sodium.	(Mesosulfuron 10g/L. + iodsulfuron 2g/L. +mefenpyr-diethyl 30g/L.).
Topik 15% WP	Clodinafop- propargyl	{2-propnil (®-2-[4-(5-chloro-3-fluoro-2- pyridnyloxy) phenoxy]-propionate}.
Axial 10%EC	Pinoxaden	8-(2,6-diethyl-4-methylphenyl)-1,2,4,5-tetrahydro-7-oxo-7H-pyrazolo [1,2-d][1,4,5]oxadiazepin-9-yl 2,2-dimethylpropanoate.
Granstar 75 % DF	Tribenuron-methyl	[Methyl 2-(N- (4-methoxy - 6 - methyl - 1, 3, 5 triazin 2 -cultivars [13, 14]. Y) methylamine) caronyl)amino)sulful) benzoate.
Traxos 45% EC	Pinoxaden + Clodinafop propargyl	8-(2,6-diethyl-p-tolyl)-1,2,4,5-tetrahydro-7-oxo-7H-pyrazolo[1,2-d][1,4,5]oxadiazepin-9-yl 2,2-dimethylpropionate.

The following data were recorded:

1-Weed data:

The dominant weed species in the present study were recorded: Avena spp. (wild oats) and Phalaris sp. (canary grass) as annual grassy weeds; Brassicasp. (Kabar, black mustard), Emexspinosus(spiny emex), Chenopodiumsp. (Lambsquarters), Ammi majus (common bishop) and Rumex dentatus (curly dock) as annual broadleaved weeds. The other weed species in rare infestation rates were Lolium sp. (ryegrass) as annual grassy weed and Anagallisarvensis (preinpernel), Beta vulgaris (wild beet, sea beet), Medicago polymorpha(medic, toothed medik), Melilotus indica (sweet clover) and Sonchus oleraceus (annual sowthistle) as annual broadleaved Weeds were hand pulled from one square meter randomly of each plot after 60 DAS (days after sowing), then identified into species and classified into the following two groups:

1- Dry weight ofgrassy weeds.

2- Dry weight of broad-leaved weeds.

3- Dry weight oftotal weeds: combined of grassy weeds and broad-leaved weeds.

Weeds were air dried for 3 days and dried onoven at 70 C$^{\circ}$ for 24 hours. Therefore, the dry weight of total weeds was recorded in gram m^{-2}. Herbicides were sprayed by Cp3 knapsack sprayer with 200 litter of water fed^{-1}.

2-Yield and yield components of wheat:

At harvest time, ten fertile stems were chosenrandomly from each sub-subplot for measuring, plant height (cm), weight of spike (g),No. of spikelets/spike, No. of grains/spike, weight of grain/spike, No. of spikes/m^2, counted in randomly chosen m^2 in each plot, 100-seed weight (g) and grain yield (ardab fed^{-1})determined by threshing the harvested area in each plot (10.5m^2) and weighing the resulting grain.

3- Correlation analysis:

Asimple correlation matrix was carried out for the two seasons to investigate the relationships between dry weight different weed categories and wheat yield as well as between yield and its components to Steel and Torrie (1980).

4-Economic evaluation:

The economic evaluation of the experimental grain yield data was done using the methods described by CIMMYT (1988).

The economic evaluation included four estimates follows as:

1-Total cost = cost of all operations in the production of wheat crop.
2-Gross income = Price (L.E. /ard) x Yield (ard /fed).
3-Net income = Gross income – Total income.
4-Benefit: cost ratio (B/C) = Gross income / Total cost.

Price of the yield and the cost of agriculture practices were considered according to the Agriculture Research Center, Administration center of the Agriculture Extension in 2014/2015 and 2015/2016 seasons.

5-Statistical analysis:

The data were statistically analyzed according to techniqueanalysisof variance (ANOVA) for the split-split plot design as mentioned by Gomez and Gomez (1984) by mean of "MSTAT-C" computer software package and Least Significant Differences (LSD) at 5% level of probability was calculated for compare between treatments means.

RESULTS AND DISCUSSION

A-Effect of seeding rates,cultivarsand weed control treatments on dry weight of weeds:

I-Effect of seeding rates

Data in Table 2 reported that seeding rates had significantly effect on dry weight of weeds (g) in both seasons.Increasing seeding rateto60 kg/fed reduceddry weight of broad, grassy and total weeds by 23.98, 23.03 and 23.48% and 35.55, 38.40 and 36.81% in the first and second seasons, respectivelyas combated to the rate of50 kg/fed in 2014/2015 and 2015/2016 seasons. These results might be due to increase the No. of plants with using rate of 60 kg/fed which could decrease the numbers of weeds. Marwat *et al*(2002), Khan *et al*(2002), Zoheir *et al*(2009) and Meysam and Saeed (2015) supported these results.

II- Effect ofwheat cultivars

Table 2 showed that wheat cultivarshad significantly effect on dry weight of weeds in two seasons.Giza-168 cultivar decreased the dry weight of broad, grassy and total weeds by 19.98, 23.22 and 21.7% in the first season and by 25.02, 30.58 and 35.67%in the second season, respectivelyas compared to Sids-12 variety. Giza-168 variety of low dry weight of broad, grassy and total weeds followed by Shandaweel-1 cultivar due to vigor growth of these cultivarsand increase number of tillers and leaf area index than Sids-12cultivar.Sids-12cultivar has the highest dry weight of broad, narrow and total weeds. These results are in good agreement with those obtained byAbouziena *et al* (2008).

III- Effect of weed control treatments:

Data in Table 2 show that the use ofweed control treatments were significantly reduced dry weight of total annual weeds in both seasons, as compared to(T_6).Atlantis at 400 cm/fed at 30 days after sowing, Granstar at 8.0 g/fed at 20 days after sowing+ Topik at 140g / fed at 30 days after sowing , Granstar + Axial at 1.0 L/fed at 30 days after sowing, Granstar + Traxos at 500 cm^3/fed at 30 days after sowing and hand weeding twice at 30-45 days after sowing decreased the dry weight of broad-leaved weeds by88.45, 93.23, 88.33, 92.32 and 94.25%, grassy weeds by 86.31, 88.8, 85.60, 90.99 and 91.22% and total weeds by 87.71, 91.39, 87.22, 92.23 and 93.55%in 2014/2015 season, respectively as compared to (T_6). In 2015/ 2016 seasons, (T_1), (T_2), (T_3), (T_4) and (T_5) decreased the dry weight of broad-leaved weeds by 90.28, 92.87, 91.56, 93.70 and 94.52% , grassy weeds by 84.68, 88.06, 86.09, 88.01 and 88.05%) and total weeds by 87.66, 90.69, 89.06, 91.17 and 91.69%,respectively as compared to (T_6). These results may be due to that the application of(T_1), (T_4) and (T_2)is a good measure for eradiating weeds during early growth period or during seedling. These treatments were efficiency in control of weeds because the weeds escape a weeding to likeness the weeds with wheat plants especially in early stages.These results are in harmony with those obtained byseveral researchers, such as El-Metwally and Saudy (2009), El-Metwally *et al*(2010),Tagour *et al*(2011),Shehzad *et al* (2012) and Ibrahim *et al* (2015).

Table 2. Effect of seeding rates, cultivarsand weed control treatments on dry weight of broad, grassy and total weeds (g/m^2) in 2014/2015 and 2015/2016 seasons.

Treatments	2014/2015 season			2015/2016 season		
	Broad weeds	Grassy weeds	Total weeds	Broad weeds	Grassy weeds	Total weeds
A-Seeding rates						
50 kg / fed.	86.54	95.07	181.61	83.13	66.01	149.14
60 kg / fed.	65.79	73.18	138.97	53.58	40.66	94.24
F. test	**	**	**	**	**	**
B- Cultivars						
Shandaweel1	74.23	84.06	158.29	66.28	51.81	118.09
Sids12	85.70	95.21	180.91	79.32	60.92	140.24
Giza168	68.58	73.09	141.67	59.47	42.29	101.76
L.S.D $_{0.05}$	6.80	4.71	7.32	4.88	4.82	3.34
C- Weed control treatments						
(T_1) Atlantis	37.34	43.97	81.31	29.09	29.69	58.78
(T_2)Garanstar +Topik	21.89	35.99	57.88	21.33	23.14	44.47
(T_3)Garanstar + Axial	37.73	46.26	83.99	25.25	26.96	52.21
(T_4)Garanstar + Traxos	24.84	28.95	53.79	18.86	23.24	42.10
(T_5)Hand weeding twice	18.60	28.16	46.76	16.40	23.15	39.55
(T_6)Unweeded (Control).	323.24	321.26	644.50	299.31	193.79	493.10
L.S.D $_{0.05}$	5.57	5.33	7.88	3.54	3.70	4.22
Interaction						
A x B	NS	**	NS	NS	**	NS
A x C	**	**	**	NS	**	NS
B x C	**	**	**	NS	**	**
A x B x C	NS	**	NS	NS	**	**

B-Effect of seeding rates, wheat cultivarsand weed control treatments on wheat yield and its components:

1-Effect of seeding rates:

Tables 3and 4 reveals that seeding rates have significantly influence onyield and its component in both seasons except with plant height and No. of grains/spike in both seasons, No. of spikelets /spike in 2014/2015 season and spike length and seed index in 2015/2016 season. In 2015/2016 season the highest value of spike length 11.76 cm was obtained from sowing rate of 60 kg/fed compared to 10.07cm with the sowing by 50 kg/fed. The highest value of No. of spikes/m^2 in both season and No. of spikelets/spike in the second season was obtained from theseeding rate at of 60 kg/fedas compared to sowing by seeding rate of 50 kg/fed due to increased number of wheat plants/unite area and decrease in weeds plant. Sowing by seeding

rate 50 kg/fed give the highest value of spike weight in the first season , grains weight/spike and seed index in both seasons than sowing by seeding rate at60 kg/fed, due to decreased the competition between wheat plant on nutrient and waterof soil. The highest valuesof grain yield 21.02 and 21.58 were obtained from seeding rate at 60 kg/fed as compared with 19.10 and 19.68 at seeding rate of50 kg/fed in 2014/2015 and 2015/2016 seasons, respectively, due to increased No. of spike/m^2 and seed index. Higher yield with higher seed rate was also indicated by Ali *et al*(2010),Ahmed *et al*(2012) and Essam(2014). Similarly, Geleta *et al* (2002) found that 33% more grain yield from seeded wheat at 65 and 130 Kg/ha as compared with the 16 Kg/ha seeding rate.

2 - Effect of wheat cultivarson yield and its component:

Tables 3 and 4 show that wheat cultivarswere significantly effect on yield and its components in both seasons except plant height in both seasons,No. of spikelets/spike in the secondseason ,No. of grains/spike and seed index in the first season. Giza-168 have the greatest spike length, No. of spikelets/spike, No. of spikes/m^2, grains weight/spike, No. of grains/spike .spike weight, seed indexand grain yield followed by Shandaweel-1, but, Sids-12havethe lowest value of these traits. This true found in the two seasons of these experiments. The greatest grain yield (20.78 and 21.4 ardab/fed.) resulted from Giza-168 and the least grain yield (19.37 and 19.78 ardab/fed.) was obtained by Sids-12 in 2014/2015 and 2015/2016 seasons, respectively. This increase in economic yield may be due to increase of spike length, No. of spike/m^2, No. of spikelet/spike, spike weight and seed index. These results are in line with those of Essam (2014) and Abdrabbo *et al* (2016).

3 - Effect of weed control treatments on wheatyield and yield component:

Data in Tables 3 and 4 shows that all weed control treatments were significantly effect on grain yield and its componentof wheatinboth seasons except plant height and grainsweight/ spike in the first season. (T_5)give the greatest values of spike length (cm), No. of spikelets/spike, No. of spikes/m^2, grains weight of spike, No. of grains/spike,spike weight and seed index followed by (T_4), (T_2) and (T_3), but, the value of these traits were resulted from (T_1) and (T_6), in both seasons. The maximum wheat grain yield (ard/fed) was obtained by applying (T_5) and (T_4) they gave 21.62 and 21.11 (ard/fed) in 2014/15 season and 22.61 and 22.14 (ard/fed)in 2015/16 season compared with (T_6)(17.53 and 18.52 ard/fed) respectively, in 2014/2015 and 2015/2016 seasons. It is argued that by (T_4), (T_2), (T_3) and (T_5) of weed control effectively reduced the weed population which led to better utilization of available resources and resulted in of maximum grain yield thus giving maximum 1000-grain weight. These results are in agreement with those found by Pandey *et al*(2001), Amit *et al*(2008) and Salahuddin *et al* (2016).

4- Effect of the interaction between seeding rates and wheat cultivarson dry weight of weeds and wheat grain yield and itscomponent:

The interaction among seeding rates and wheatcultivars under study hadinsignificant effect on broad-leaved, total weeds, grain yield and yield components in both seasons, except weight of grains/spike (g) in the first season and grassy weeds in two seasons. Data in Table 5reported that the interaction between wheatcultivars and seeding rates had a significant effect on weight of grassy weeds in both season and weight of grains/spike (g) in the first season. The lowest dry weight of grassy weeds (62.05 and 33.37 g/m^2) was resulted from the interaction between seeding rate of 60 kg/fed and Giza168 variety, but, the highest dry weight of grassy weed (106.57 and 81.37 g/m^2) was obtained from the interaction amongseeding rate of 50 kg/fed and Sids-12 cultivar in 2014/2015 and 2015/2016 seasons, respectively.Essam (2014) supported these trends.

Table 3. Effect of seeding rates, wheatcultivarsand weed control treatments on yield and yield component in 2014/2015 seasons

Treatments	No of spikes /m^2	spike length (cm)	No. of spikelets /spike	Plant height (cm)	grains weight /spike(g)	spike weight (g)	No. of grains/ spike	Seed index	grain yield (ard/fed)
A- seeding rates									
50 kg / fed.	398.66	10.07	20.02	110.41	2.38	3.63	44.30	46.02	19.10
60 kg / fed.	431.89	11.76	19.64	112.34	2.11	3.28	43.30	43.51	21.02
F. test	*	*	NS	NS	*	*	NS	*	*
B- Cultivars									
1- Shandaweel-1	413.18	10.69	20.46	110.49	2.27	43.61	3.44	45.02	20.02
2- Sids-12	405.58	9.94	18.44	109.38	2.17	42.40	3.32	43.05	19.37
3- Giza-168	427.07	12.05	20.59	114.26	2.30	46.02	3.60	46.23	20.78
L.S.D $_{0.05}$	15.05	0.18	0.42	NS	0.05	NS	0.14	NS	0.60
C- Weed control treatments									
(T_1) Atlantis	397.12	10.63	18.69	110.04	2.18	42.63	3.49	43.07	19.20
(T_2) Garanstar +Topik	422.18	10.78	20.07	111.63	2.32	45.07	3.60	46.28	20.71
(T_3) Garanstar + Axial	414.21	10.81	19.83	112.24	2.32	44.12	3.58	44.29	20.17
(T_4) Garanstar + Traxos	426.93	11.56	20.46	112.63	2.41	47.61	3.71	46.39	21.11
(T_5)Hand weeding twice	427.79	11.64	21.11	112.37	2.42	47.79	3.69	48.28	21.62
(T_6) Unweeded (Control).	403.42	9.94	18.84	109.36	1.80	36.86	2.65	40.31	17.53
L.S.D $_{0.05}$	14.38	0.73	0.19	NS	NS	1.71	0.07	1.69	0.97
Interaction									
A x B	NS	NS	NS	NS	**	NS	NS	NS	NS
A x C	NS	NS	NS	NS	NS	**	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	NS	NS	NS
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 4. Effect of seeding rates, wheatcultivarsand weed control treatments on yield and yield component in 2015/2016 seasons

Treatments	No of spikes /m^2	spike length (cm)	No. of spikelets /spike	Plant height (cm)	grains weight /spike(g)	spike weight (g)	No. of grains/ spike	Seed index	grain yield (ard/fed)
A- seeding rates									
50 kg / fed.	459.84	9.82	19.81	112.22	2.50	3.15	44.26	46.64	19.68
60 kg / fed.	557.73	10.84	21.15	111.20	2.31	3.54	44.78	44.86	21.58
F. test	*	NS	*	NS	*	*	NS	NS	*
B- Cultivars									
Shandaweel-1	500.18	10.31	20.45	109.85	2.43	42.84	3.36	45.58	20.70
Sids-12	478.28	9.66	20.09	112.52	2.30	40.78	3.20	43.53	19.78
Giza-168	547.89	11.02	20.89	112.76	2.47	46.92	3.48	48.14	21.41
L.S.D $_{0.05}$	8.20	0.76	NS	NS	0.05	2.72	0.08	3.18	0.56
C- Weed control treatments									
(T_1) Atlantis	499.33	9.38	19.57	110.01	2.40	41.32	3.37	44.05	19.82
(T_2) Garanstar +Topik	524.65	10.74	21.01	112.10	2.47	45.59	3.48	47.94	21.84
(T_3) Garanstar + Axial	514.57	10.25	20.71	114.20	2.43	43.06	3.41	45.19	21.10
(T_4) Garanstar + Traxos	528.18	11.14	21.17	115.19	2.50	45.79	3.54	47.89	22.14
(T_5)Hand weeding twice	536.08	11.37	21.24	114.58	2.56	46.47	3.56	48.62	22.61
(T_6) Unweeded (Control).	449.87	9.09	19.17	104.17	2.06	36.87	2.70	40.82	18.52
L.S.D $_{0.05}$	9.06	0.58	1.03	1.33	0.09	2.85	0.09	2.23	0.81
Interaction									
A x B	NS	NS	NS	NS	NS	NS	NS	NS	NS
A x C	NS	NS	NS	NS	NS	NS	NS	NS	NS
B x C	NS	NS	NS	NS	NS	NS	NS	NS	NS
A x B x C	NS	NS	NS	NS	NS	NS	NS	NS	NS

Table 5. Effect of the interaction between seeding rates and wheatcultivars on dry weight of grassy weeds (g/m^2), weight of grain/spike (g) in 2014/2015 and 2015/2016seasons.

Treatments		2014/2015 season		2015/2016 season
		Weight of grassy weeds (g)	grains Weight /spike (g)	Weight of grassy weeds (g)
50 Kg/fed	Shandaweel-1	94.51	2.36	65.46
	Sids-12	106.57	2.25	81.37
	Giza-168	84.13	2.52	51.20
60 Kg/fed	Shandaweel-1	73.61	2.17	38.15
	Sids-12	83.88	2.08	50.47
	Giza-168	62.05	2.09	33.37
L.S.D $_{0.05}$		6.66	0.08	6.82

5- Effect of the interaction between seeding rates and weed control treatments on dry weight of weeds and wheat grain yield and its components:

The interaction among seeding rates and weed control treatments had no significant effect on yield and its components in both seasons, except spike weight in the first season, but, it significantly affectedbroad and total weeds in the first season and grassy weeds in both seasons.Table 6show that the interaction between seeding rate of 60 kg/fed and weed control by (T_5)resulted the best reduction in dry weight of broad-leaved, grassy and total weeds in the first season. In the second season the interaction between seeding rate at 60 kg/fed and weeds control by (T_4) or (T_5)significantly reduced grassy weeds than all interactions between seeding rates and weed control treatments. The lowest dry weight of grassy and total weeds resulted from the interaction effect between seeding rate at 50 kg/fed and weed control by (T_3) in the 1st season. The maximum of weight spike was resulted from seeding rate at 50 kg/fed and weed control by (T_5), but the lowest value was obtained with seeding rate at 60 kg/fed and (T_6).

Table 6. Effect of the interaction between seeding rates and weed control treatments on dry weight of weeds (g/m^2), yield and yield component in 2014/2015 and 2015/2016seasons.

Treatments		2014/2015 season				2015/2016 season
		Grassy weeds	Broad leaved weeds	Total weeds	Spike weight (g)	Grassy weeds
50 Kg/fed	Atlantis	46.23	41.02	87.26	3.64	36.22
	Granstar +Topik	35.30	21.98	57.28	3.81	27.57
	Granstar + Axial	49.47	40.14	89.61	3.75	32.91
	Granstar + Traxos	28.69	27.28	55.97	3.90	29.02
	Hand weeding twice	29.98	15.58	45.56	3.92	28.37
	Unweeded (Control).	380.68	373.30	753.98	2.74	241.86
60 Kg/fed	Atlantis	41.70	30.96	72.56	3.33	23.15
	Granstar +Topik	37.74	16.90	54.64	3.39	18.70
	Granstar + Axial	43.05	33.55	76.60	3.42	21.00
	Granstar + Traxos	29.20	15.86	45.06	3.51	17.45
	Hand weeding twice	25.58	12.80	38.38	3.46	17.93
	Unweeded (Control).	261.88	284.71	546.59	2.56	145.72
L.S.D $_{0.05}$		7.99	7.88	11.15	0.07	5.23

6- Effect of the interaction among wheat cultivars and weed control treatments on dry weight of weeds and yield and its components:

The interaction between wheat cultivars and weed control treatments was significantly effectondry weight of broad-leaved weeds, grassy, total weeds (g/m^2)in the first seasons and grassy, total weeds in the second season, but, not had significant effect on yield and yield components in both seasons. Table 7 show that the interaction between Giza-168 cultivar and weed control by(T_5)resulted the best reduction in dry weight of broad, grassy and total weeds in the first season, which did not significant than the interaction Giza-168 cultivar and weed control by (T_4) or Sandaweel-1 cultivar and weed control by (T_5). In the second season the interaction between Giza-168and weeds control by (T_5) reduced significantly grassy weeds than all interactions between cultivarsand weed control treatments. The least effect on grassy and total weeds in both seasons was resulted from the interactions between Sids-12 or Shandweel-1 cultivar and weed control by(T_3).

Table 7. Effect of the interaction between wheatcultivars and weed control treatments on dry weight of weeds (g/m^2) in 2014/2015 and 2015/2016 seasons

Treatments		2014 / 2015 season			2015 / 2016 season	
		Grassy weeds	Broad leaved weeds	Total weeds	Grassy weeds	Total weeds
Shandaweel1	Atlantis	43.05	32.82	75.87	28.44	59.65
	Granstar +Topik	39.27	18.79	58.06	22.13	42.00
	Granstar + Axial	48.52	34.77	83.29	25,55	50.94
	Granstar + Traxos	28.69	20.68	49.37	20.22	38.07
	Hand weeding twice	23.65	12.34	35.99	22.23	38.03
	Unweeded (Control).	321.20	325.99	647.19	192.09	479.82
Sids12	Atlantis	49.52	40.70	90.22	36.82	71.60
	Granstar +Topik	39.82	21.50	61.32	29.44	55.86
	Granstar + Axial	51.22	39.82	91.03	33.85	63.7
	Granstar + Traxos	33.67	24.19	57.86	30.90	53.48
	Hand weeding twice	37.53	16.74	54.27	34.05	53.97
	Unweeded (Control).	359.58	371.22	730.80	230.45	572.58
Giza168	Atlantis	39.33	34.30	73.64	23.80	44.85
	Granstar +Topik	30.39	18.13	48.52	17.84	35.54
	Granstar + Axial	39.05	35.80	74.85	21.47	41.72
	Granstar + Traxos	24.57	19.75	44.32	18.60	34.74
	Hand weeding twice	22.15	13.50	35.65	13.17	26.78
	Unweeded (Control).	283.05	289.82	572.86	158.84	376.89
L.S.D $_{0.05}$		7.99	7.88	19.31	6.41	7.31

7- Effect of the interaction among seeding rates, wheatcultivars and weed control treatments on dry weight ofweeds and wheat grain yield and itscomponent:

The interaction among seeding rates, wheat cultivars and weed control treatments hada significant effect on dry weight of grassy weeds in the 1st season, grassy and total weeds in the 2nd season, but, did not significantly affected yield and yield components in both seasons. Table 8show that the interaction among seeding rate at 60 kg/fed, Giza-168 cultivar and weed control by (T_5) gives the best reduction in dry weight of grassy weeds in the first season, grassy and total weeds in the second season, which did not significant than the interaction effect among seeding rate at 60 kg/fed, Giza-168cultivar and weed control by (T_4) or seeding rate of 60 kg/fed, Shandaweel-1 cultivar and weed control by (T_5), seeding rate at 60 kg/fed, Sandaweel-1 cultivar and weed control by (T_4). The lowest effect on grassy weeds in the first season, grassy and total weeds in the second season wasobtained from the interactions among seeding rate at 50 kg/fed, Sids-12 cultivar and weed control by(T_1) or (T_3) (Table 8).

C- Correlation coefficients

Results in Table 9 indicated that grain yield was positively and significantly correlated with spike length (0.992 and 0.914), No. of spikelets/spike (0.529 and 0.588), No of spikes/m^2 (0.651 and 0.872), weight of grains/spike (0.339 and 0.557), spike weight (0.465 and 0.855), No. of grains/spike (0.746 and 0.684) and seed index (0.489 and 0.391), in 2014/2015 and 2015/2016, respectively. This indicated that increased attributes, invariability resulted in increasing grain yield. These findings in most cases were in accordance with those obtained by Mondal and khadjura (2001), El.Ganayni and Mahmoud (2008), Hassan (2008) and Essam (2014). Meanwhile, grain yield was not significantly correlated with plant height 0.201 and 0.175 in 2014/15 and 2015/2016 seasons, respectively. Conversely, grain yield was negatively and significantly correlated with grassy -0.598 and -0.654) broad-leaved (-0.495 and -0.587) and total weeds (-0.565 and -0.607) in 2014/2015 and 2015/2016 seasons.

Table 8. Effect of interaction among seeding rates,wheatcultivarsand weed control treatments on dry weight of weeds (g/m^2) in 2014/2015 and 2015/2016seasons.

Treatments			2014/2015 season	2015/2016 season	
			Grassy weeds	Grassy weeds	Total weeds
50 Kg/fed	Shandaweel-1	Atlantis	43.87	35.10	69.77
		Granstar +Topik	35.50	26.03	48.63
		Granstar + Axial	52.10	32.00	59.57
		Granstar + Traxos	27.13	28.10	51.23
		Hand weeding twice	24.57	29.23	50.13
		Unweeded	383.87	241.97	591.77
	Sids-12	Atlantis	53.40	45.67	88.67
		Granstar +Topik	38.30	36.10	65.07
		Granstar + Axial	54.63	42.07	77.20
		Granstar + Traxos	34.40	36.87	65.33
		Hand weeding twice	42.13	37.27	62.87
		Unweeded	416.53	290.23	717.13
	Giza-168	Atlantis	41.43	27.90	53.77
		Granstar +Topik	32.10	20.57	44.07
		Granstar + Axial	41.67	24.67	48.60
		Granstar + Traxos	24.70	22.10	42.60
		Hand weeding twice	23.23	18.60	35.73
		Unweeded	341.63	193.37	512.37
60 Kg/fed	Shandaweel-1	Atlantis	42.23	21.77	49.53
		Granstar +Topik	43.03	18.23	35.37
		Granstar + Axial	44.93	19.10	42.30
		Granstar + Traxos	30.23	12.33	24.90
		Hand weeding twice	22.73	15.23	25.93
		Unweeded	258.53	142.20	367.87
	Sids-12	Atlantis	45.63	27.97	54.90
		Granstar +Topik	41.33	22.77	46.67
		Granstar + Axial	47.80	25.63	50.20
		Granstar + Traxos	32.93	24.93	41.63
		Hand weeding twice	32.93	30.83	45.07
		Unweeded	302,63	170.67	428.03
	Giza-168	Atlantis	37.23	19.70	35.93
		Granstar +Topik	28.67	15.10	27.00
		Granstar + Axial	36.43	18.27	34.83
		Granstar + Traxos	24.43	15.10	26.87
		Hand weeding twice	21.07	7.73	17.83
		Unweeded	224.47	124.30	241.40
L.S.D $_{0.05}$			13.05	9.06	10.34

Table 9. Correlation coefficients of grain yield(ard./fed) as influenced by yield components and dry weight of weeds in 2014/15 and 2015/16 seasons.

Characters	2014/2105	2015/2016
Grain yield (ardab/fed)		
1-Plant height (cm)	0.201^{ns}	0.175^{ns}
2-Spike length (cm)	0.922**	0.914**
3-No. spikelets/spike	0.529**	0.588**
4-No. of spikes/m^2	0.651**	0.872**
5- Weight of grains /spike (g)	0.339*	0.557**
6-Spike weight (g)	0.465**	0.855**
7-No. of grains/spike	0.746**	0.684**
8-1000-seed weight (g)	0.489**	0.391**
9-Grassy weeds	-0.598**	-0.654**
10-Broad -leaved weeds	-0.495**	-0.587**
11-Total leaved weeds	-0.565**	-0.607**

***and**: Significant at 0.05 and 0.01 probability levels, respectively. ns: not significant**

D- Economics of crop production:

Table 10 showed that the cost of all operation included in the production of wheat crop was calculated/fed (4169.00 L. E/fed)*i.e.* land preparation, seeding and planting, fertilizers, water rates, insect control, harvesting and land rent/fed and average random cost was about 300, 305, 580, 360 and 400 L.E. /fedfor using (T_1), (T_2), (T_3, (T_4)and (T_5).Thegreatest gross, net income and B/C ratio was recorded withcultivar Giza.168, (8649.52 L. E/fed, 4131.35 L.E/fed and 1.91)followed by Shandaweel-1 (8336.16 L.E/fed 3817.99 L.E/fed and 1.85), while the lowest was in sids-12, (8025.07 L.E./fed, 3506.90 L.E/fed and 1.78), respectively might by due to higher grain yields observed in the seed rate of at 60 Kg seed/fed was recorded the highest gross, net income and B:C ratio, it might be due to higher grain yield recorded than in 50 Kg seed/fed.Data inTable 10 indicated that the highest gross income (8988.57 and 8796.21 L.E/fed), net income (4394.57 and 4242.21 L.E. /fed) and B: Cratios (1.96 and 1.93) were recorded from (T_5) which was closely followed by with application of Granstar and Traxos treatment. The lowest gross income 7296.47 L.E/fed, net income 3102.47 L. E/fed and 1.74 B: C ratio were recorded from unweeded treatment. The average of gross income/fed of wheat yield ranged from about 7037.65 L.E. to about 9704.70 L.E. with interaction among a2xb3xc5 and with interaction among a1xb1xc6 as minimum and maximum values. The average of net income of wheat yield/fed recorded about 5085.70 L. E/fed with interactionamong a2xb3xc5. While, thelowest values with interactionamong a1xb2xc6 about 2548.85 L.E. /fed Also, the trend of B: C ratio is the same interaction.

Table 10. Total costs, gross income, net income (L.E/fed.) and Benefit: cost ratio as affected by seeding rates, wheatcultivars and weed control treatments (average of two seasons).

Treatments			Total costs	Gross income	Net income	Benefit/cost
(A)	(B)	(C)	L.E/fed	L.E/fed	L.E./fed	Ratio (B/C)
50 Kg/fed (a1)	Shandaweel1 (b1)	Atlantis (c1)	4469.00	7550.15	3081.15	1.69
		Granstar +Topik (c2)	4474.00	8124.15	3650.15	1.82
		Granstar + Axial (c3)	4749.00	7878.15	3129.15	1.66
		Granstar + Traxos (c4)	4529.00	8536.20	4007.20	1.88
		Hand weeding twice (c5)	4569.00	8665.35	4096.35	1.90
		Unweeded (Control). (c6)	4169.00	7037.65	2868.65	1.69
	Sids12 (b2)	Atlantis (c1)	4469.00	7195.50	2726.50	1.61
		Granstar +Topik (c2)	4474.00	7708.00	3234.00	1.72
		Granstar + Axial (c3)	4749.00	7535.80	2786.80	1.61
		Granstar + Traxos (c4)	4529.00	8214.35	3685.35	1.81
		Hand weeding twice (c5)	4569.00	8413.20	3844.20	1.84
		Unweeded (Control). (c6)	4169.00	6717.85	2548.85	1.61
	Giza168 (b3)	Atlantis (c1)	4469.00	7796.15	3327.15	1.74
		Granstar +Topik (c2)	4474.00	8562.85	4088.85	1.91
		Granstar + Axial (c3)	4749.00	8212.23	3463.23	1.73
		Granstar + Traxos (c4)	4529.00	8706.35	4177.35	1.92
		Hand weeding twice (c5)	4569.00	8767.85	4198.85	1.92
		Unweeded (Control). (c6)	4169.00	7455.85	3286.85	1.79
Mean of A1			4493.17	7948.76	3455.59	1.77
60 Kg/fed (a2)	Shandaweel1 (b1)	Atlantis (c1)	4519.00	8472.65	3953.65	1.87
		Granstar +Topik (c2)	4524.00	9020.00	4496.00	1.99
		Granstar + Axial (c3)	4799.00	8767.85	3968.85	1.83
		Granstar + Traxos (c4)	4579.00	8993.35	4414.35	1.96
		Hand weeding twice (c5)	4619.00	9471.00	4852.00	2.05
		Unweeded (Control). (c6)	4219.00	7517.35	3298.35	1.78
	Sids12 (b2)	Atlantis (c1)	4519.00	8138.50	3619.50	1.80
		Granstar +Topik (c2)	4524.00	8718.65	4194.65	1.93
		Granstar + Axial (c3)	4799.00	8507.50	3708.50	1.77
		Granstar + Traxos (c4)	4579.00	8849.85	4270.85	1.93
		Hand weeding twice (c5)	4619.00	8909.30	4290.30	1.93
		Unweeded (Control). (c6)	4219.00	7392.30	3173.30	1.75
	Giza168 (b3)	Atlantis (c1)	4519.00	8829.35	4310.35	1.95
		Granstar +Topik (c2)	4524.00	9585.80	5061.80	2.09
		Granstar + Axial (c3)	4799.00	9143.00	4344.00	1.91
		Granstar + Traxos (c4)	4579.00	9477.15	4898.15	2.07
		Hand weeding twice (c5)	4619.00	9704.70	5085.70	2.10
		Unweeded (Control). (c6)	4219.00	7658.80	3439.80	1.82
Mean of A2			4543.17	8725.07	4427.73	1.92
Mean of B		Shandweel-1 (b1)	4518.17	8336.16	3817.99	1.85
		Sids-12 (b2)	4518.17	8025.07	3506.90	1.78
		Giza-168 (b3)	4518.17	8649.52	4131.35	1.91
Mean of C		Atlantis (c1)	4494.00	7997.05	3503.05	1.78
		Granstar +Topik (c2)	4499.00	8602.28	4103.28	1.91
		Granstar + Axial (c3)	4774.00	8340.76	3566.76	1.75
		Granstar + Traxos (c4)	4554.00	8796.21	4242.21	1.93
		Hand weeding twice (c5)	4594.00	8988.57	4394.57	1.96
		Unweeded (Control). (c6)	4194.00	7296.47	3102.47	1.74

Note: A- Average prevailing market prices of herbicides during 2014/2015 to 2015/2016
1- Atlintis 500 L.E/lit., 2- Axial 370 L.E/lit., 3- Traxos 300 L.E/lit., 4- Topik 70 L.E/100g
5- Granstar 10 L.E/8g B- Price of wheat grain=410 L.E/ard.(during season 2014-15)
C- Labor for herbicide application = 2 workers.50 L.E/worker/day. D-The price of seeds150 L.E/30 kg seed.

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"تقييم بعض أصناف قمح الخبز تحت معدلات مختلفة من التقاوى ومعاملات مكافحة الحشائش"

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أجريت تجربتان حقليتان بمحطة البحوث الزراعية بشندويل محافظة سوهاج خلال موسمى الزراعة ٢٠١٤/٢٠١٥ و ٢٠١٥/٢٠١٦ لدراسة تأثير معدلين من التقاوى (٥٠ و٦٠ كجم للفدان) وثلاث أصناف قمح الخبز(شندويل١وسدس١٢ و جيزة١٦٨) وست معاملات لمقاومة الحشائش (مبيد أطلانتس، جرنستار+توبيك، جرنستار+أكسيال، جرنستار+تراكسوس، نقاوة يدوية مرتين وبدون معاملة)علي الحشائش والمحصول ومكوناته في القمح الخبز.تم إستخدام تصميم القطع منشقه مرتين مع أربعة مكررات وأوضحت النتائج. ان معدلات التقاوي أثرت معنوياً علي الوزن الجاف للحشائش (جم/م٢) والمحصول ومكوناته في الموسمين مقارنة بمعاملة الكنترول. وجد أن زيادة معدل التقاوي الي٦٠كجم/ف أدت إلي إنخفاض الوزن الجاف للحشائش الكلية بنسبة (٢٣,٤٨٪) و(٣٦,٨١٪) في الموسم الاول والثاني علي التوالي مقارنة بمعدل التقاوي ٥٠كجم/ف.أعطى معدل تقاوى ٦٠ كجم/فدان أعلى القيم في وزن السنبلة وعدد الحبوب/سنبلة ووزن الحبوب/سنبلة وعدد السنابل/م٢ ووزن الـ١٠٠٠ حبة ومحصول الحبوب (اردب/ف) في الموسمين . اوضحت النتائج ان زراعة الصنف جيزة ١٦٨ قد قلل معنويا الوزن الجاف للحشائش الضيقة والعريضة بنسبة (١٩,٩٨- ٢٣,٢٢ - ٢١,٧٠٪) في الموسم الاول وبنسبة (٢٥,٠٢- ٣٠,٥٨- ٣٥,٥٧٪) في الموسم الثاني مقارنة بالصنف سدس١٢ويرجع ذلك الي زيادة التفريع وطول النبات في الصنف جيزة ١٦٨.سجل الصنف جيزة ١٦٨ أعلى متوسطات لكل من عدد السنابل/م٢، طول السنبلة، عدد حبوب السنبلة، وزن السنبلة، عدد السنيبلات بالسنبلة، عدد السنابل/م٢، وزن الـ١٠٠٠ ومحصول الحبوب(أردب/ف)في الموسمين.أثرت معاملات مكافحة الحشائش معنويا علي الوزن الجاف للحشائش العريضة والضيقة والكلية في الموسمين بالمقارنه بمعاملة الكنترول.وجد أن معاملات جرنستار+توبيك، جرنستار+تراكسوس، نقاوة يدوية مرتين أعطت أعلي إنخفاض في الوزن الجاف للحشائش العريضة والضيقة والكلية في الموسمين بالمقارنه بمعاملة الكنترول.أثرت جميع معاملات الحشائش تأثيراً معنوياً على المحصول ومكوناته بموسمى الزراعة. معاملات جرنستار+توبيك، جرنستار+تراكسوس و نقاوة يدوية مرتين أعطت أعلي القيم في وزن السنبلة وعدد الحبوب/سنبلة ووزن الحبوب/سنبلة وعدد السنابل/م٢ ووزن الـ١٠٠٠ حبة ومحصول الحبوب (أردب/فدان) في الموسمين.كان التفاعل بين معدلات التقاوى ومعاملات مكافحة الحشائش معنوياً لصفات الوزن الجاف للحشائش الضيقة والعريضة والكلية بالموسم الأول من الزراعة ، وكذلك لصفة الوزن الجاف للحشائش الضيقة للموسم الثانى . وكان التفاعل معنوى بين الأصناف ومعاملات مقاومة الحشائش لصفة الوزن الجاف للحشائش الضيقة والكلية خلال الموسمين، والوزن الجاف للحشائش العريضة بالموسم الأول فقط وبعض مكونات المحصول ومحصول الحبوب(اردب/فدان) في الموسمين. وجد ان هناك ارتباط معنوي سالب بين الحشائش الضيقة والعريضة والكلية والمحصول ومكوناتهفي حين وجد ارتباط معنويا موجبا بين المحصول ومكوناته في الموسمين.أشار التقييم الاقتصادي إلي أن معدل التقاوي ٦٠ كجم/ف وزراعة الصنف جيزة ١٦٨ واستخدام معاملة جرنستار+توبيك، جرنستار+تراكسوس، نقاوة يدوية مرتيناعطي اعلي زيادة معنوية في الدخل الإجمالي والعائد الصافي وهامش الربح والفائدة/معدل التكلفة والأربحية الاقتصادية في متوسط الموسمين. وعلى ضوء نتائج هذه الدراسة فإن زراعة الصنف جيزة١٦٨ بمعدل ٦٠ كجم للفدان تقاوى وتطبيق مبيد الجرنستارمع التوبيك أو تراكسوس وكذلك النقاوة اليدوية حقق أفضل محصول من القمح خلال الموسمين تحت منطقة الدراسة.