

COMPARATIVE STUDIES BETWEEN NATURAL AND CHEMICAL FERTILIZERS UNDER INTENSIVE CULTURE FOR SOME FILD CROPS.

Rizk, M.A.;* Abd El-Hay, G.H.* Ali, S.A.** and Ahmed, M.A.**

* Department of Agron., Fac. of Agric., Al-Azhar Univ., Cairo, Egypt.

** Cotton Research Institute, Agric. Research Center.

ABSTRACT: This investigation was conducted to study the effects of different doses of biological, organic and inorganic fertilizers on cotton when it intercropped with wheat. Two field experiments were carried out at Sids agricultural research station using cotton and wheat plants during (1999-2000) and (2000-2001) seasons. The bio-fertilizers were nitrobeen, microbeen and phosphoreen. Results indicated that seed index of cotton, lint percentage and seed cotton yield per feddan were affected significantly by both intercropping and fertilizaer treatments. While the final number of plants per feddan of cotton was not affected significantly by both inter cropping and fertilizaer treatments in both seasons. As for wheat, the obtained results from this study indicated that 1000 kernel weight was not affected significantly by all studied treatments in both seasons. However the spike weight and grain yield as well as straw yield were significantly affected by intercropping and fertilizaer treatments. The highest values for intercropping system of grain yield was obtained for plants received 100% chemical fertilization, while, the highest value of straw yield was obtained from plants received a combined application of bio, organic and chemical fertilizers at 33% of their field recommended rate.

It can be concluded that intercropping of cotton with wheat using the following system, at beed width of 90 Cm. with 4 wheat rows and cotton was sown on both Sids of this beed and fertilizing with bio, organic and chemical fertilizers at 33% of their field recommended rates would improve the total net income per feddan as compared to the purestand of both control wheat and cotton.

INTRODUCTION

The use of non-rational rates of chemical fertilizers increase the cost of agricultural production and environmental pollution, especially the pollution due to chemical used in crops and its harmful effects on human health. There are some problems in many cotton fields, in some

Governorats at Egypt, due to late sowing of cotton after some winter crops such as, Egyptian clover, faba been and wheat or intercropping some summer crops such as cucumber, sweet melon and tomato with cotton in the same area to get the highest economic return from unit area. The aim of the present investigation is to evaluate some sources of bio, organic and chemical fertilizers effects on intercropping pattern (cotton and wheat) in order to get some information on the significance of such intensifying procedure under efficiency of safe fertilization and optimum combination doses of bio, organic and inorganic fertilizers in cotton plants when intercropped with wheat to achieve high productivity of cotton and wheat in the same area.

MATERIALS AND METHODS

Comparative studies were carried out at Sids Agricultural research station, Bani-Swef Governorate, during 1999/2000 and 2000/2001 seasons, to study the effect of bio, organic and inorganic fertilizers on intercropping cotton with wheat, (45 days before its harvest) using the Egyptian cotton cultivar Giza 80 (*Gossypium barbadens* L.) and the wheat cultivar Sids 4 (*Triticum aestivum* L.).physical and chemical analysis of the experimental soils and organic fertilizer were presented for the two seasons in Tables 1,2 and 3.

The experimental design was completely randomized block design with four replications, all treatments were random distributed. The plot area was 36m² (5x7.2)contains 12 ridges in control treatment but contains 8 ridges in intercropping each of 60 or 90 cm wide and 5m long in the first season. While in the second season plot area was 21.6m² (4x5.4) with 9 ridges (control) and 6 ridges in intercropping with 60 or 90 cm width and 4 m length.

Table (1): Physical and chemical analysis of upper 50cm of soil in 1999/2000 and 2000/2001 seasons.

Chemical Analysis	Season		Physical analysis	Season	
	1999/2000	2000/2001		1999/2000	2000/2001
Available N (ppm)	30	30	Sand%	15.75	16.25
Available P (ppm)	3	9	Silt%	31.55	33.55
Available K (ppm)	440	328	Clay%	50.36	47.36
PH	7.39	7.32	Organic matter	1.92	1.94
EC mohs/Cm/25C	7.5	6.88	Texture	Clay Loam	

Table (2): Chemical analysis of organic manure in season 1999/2000 for wheat and cotton.

The wheat		The cotton	
Chemical analysis	Season 1999/2000	Chemical analysis	Season 1999/2000
Nitrogen (ppm)	1.95	Nitrogen (ppm)	1.72
Phosphorus (ppm)	0.60	Phosphorus (ppm)	0.65
Potassium (ppm)	1.25	Potassium (ppm)	1.35
Iron (ppm)	2290	Iron (ppm)	3808
Manganese (ppm)	336	Manganese (ppm)	328
Zinc (ppm)	70	Zinc (ppm)	36
Copper (ppm)	62	Copper (ppm)	12

Table (3): Chemical analysis of organic manure in season 2000/2001 for wheat and cotton.

The wheat		The cotton	
Chemical analysis	Season 2000/2001	Chemical analysis	Season 2000/2001
Nitrogen (ppm)	0.42	Nitrogen (ppm)	0.42
Phosphorus (ppm)	0.24	Phosphorus (ppm)	0.24
Potassium (ppm)	1.4	Potassium (ppm)	1.4
Iron (ppm)	6200	Iron (ppm)	6200
Manganese (ppm)	739	Manganese (ppm)	739
Zinc (ppm)	180	Zinc (ppm)	180
Copper (ppm)	1474	Copper (ppm)	1474

Experimental treatments:

The experiment included; 100% Bio-fertilization only, 100% organic fertilization only, 100% inorganic fertilization only, Bio-fertilization + organic fertilization at 50% each, Bio-fertilization + inorganic fertilization at 50% each, organic fertilization + inorganic fertilization at 50% each, Bio+ organic + chemical fertilization at 33% each. All treatments for intercropped are component cotton and wheat. Inorganic fertilization (100%) for solid planting of cotton after Egyptian clover (one cut), and finally, 100% inorganic fertilization for solid planting of wheat followed by cotton after wheat harvest.

Wheat was sown on 9th and 8th December, Cotton pure stand was sown on 14th and 19th March, while cotton intercropped on 22nd and 25th March, while cotton after harvest wheat on 9th and 13th May, in the first and second seasons, respectively. Solid planting of wheat was drilled in

flat land in rows 10cm. apart. Solid planting of cotton was planted on ridges 60cm. wide on one side in hills spaced at 20cm. with 2 plants per hill (70000 plants/fed.).

Intercropping cotton with wheat in apart of beds 90cm. in width. Wheat grain were drilled in 4 rows 10cm. apart on the top of the beds. Cotton was planted 45 days before wheat harvest, on both sides of the beds in hills 30 cm. apart with 2 plants per hill (62222 plants/fed.).

Nitrogen fertilizer (Ammonium nitrate 33.5%N.) was added at the recommended rate (100%) of 75kg N/fed. for wheat and 60 kg N/fed. for cotton. Nitrogen fertilizers was splitted into two equal portions applied before 1st and 2nd irrigation of wheat and before 2nd and 3rd irrigation for cotton.

Calcium superphosphate (15.5% P₂O₅) was applied with the land preparation for wheat and before the preceding sowing irrigation of cotton (the fourth irrigation for wheat), at the rate of 22.5 kg P₂O₅/fed. as 100% recommended rate for both cotton and wheat.

Potassium fertilizer was added in one dose, at rate of 24kg K₂O/fed. as (48% K₂O) before the first irrigation for wheat, while before the second irrigation for cotton.

Bio-fertilizaers used was nitrobeen (1000gm./fed) for wheat. and microbeen (400 gm./fed) for cotton as well as phosphoreen was applied at the rate of 600 gm. fed. for wheat and cotton. The previous rates were considered as 100% rate of the recommended rate. Nitrobeen, Microben and phosphoreen were splitted into two equal portions, the first was by inoculation the seed before sowing and the second one was added after mixture it with few organic matter before the first irrigation directly after sowing.

Organic fertilizer as animal manure was applied at rate of 20 m₃/fed. (the recommended rate 100%) at land preparation for wheat and cotton.

Characters studied:

1- Cotton: Ten plants of each plot were chosen at random to study the following characters:-

Seed index (gm), final number of plants feddan, lint percentage as weight of lint cotton/weight of seed cotton X 100 and seed cotton yield was estimated from the yield/plot.

2- Wheat: Spike weight (gm.), 1000 kernels weight (gm.), grain yield in ardabs per feddan and straw yield in ton per feddan.

Statistical analysis:

The data obtained were subjected to statistical analysis to procedure outlined by Steel and Torrie (1984). A significance of difference among variable in experiment was done according to least significant differences test (L.S.D.) at 0.05 level of significance

RESULTS AND DISCUSSION

A) Effect of bio, organic and inorganic fertilization under intercropping system of cotton and wheat on cotton characters:-

1- Seed index (gm.):

The data in Tables (4) show that seed index was insignificantly affected in the first season. Seed index of sole cotton + chemical fertilizer 100% (control) give the highest value (11.0 gm), while the lowest value was obtained by treatment of organic fertilizer 100% + intercropping (9.9 gm). On the other hand, seed index was significantly affected in the second season. Seed index of cotton plant growing after wheat harvesting appeared to be high value (11.9 gm). As for fertilization treatments combined with intercropping system, the highest value of seed index was observed by the treatment of recommended rate of inorganic fertilizer 100% + intercropping (11.6gm), followed by the application of organic + inorganic fertilizers at 50% of their recommended rates or bio + organic + inorganic fertilizers at 33% of their recommended rates. This finding is in agreement with Srinivasan-Ca and sivasamy-B, (2000) and Hamissa. et al (2000).

2- Final number of plants per feddan:

Results in Tables (4) show that final number of plants per feddan was not significantly effected by bio, organic and chemical fertilization and intercropping system in both seasons. The data show that there were no increase of intercropping treatments as compared with pure stand cotton (control), in the first season, treatment received single application of bio-fertilizer. This maybe due to relative increase of soil temperature due to root activity of wheat plants, while the germination of cotton seeds of pure stand exposed to relatively low soil temperature. These results are in harmony with those obtained by Makram et al (1995) and Abd El-Hady

and Fawkia, K. El-Khatib (2000) showed that percentage of plant stand at harvest was increased significantly in favour of intercropping treatments as compared with pure stand cotton.

Table (4): Effect of bio, organic and inorganic fertilization for intercropping cotton and wheat on seed index (gm) and final number of plants per feddan (thousand)

Treatments	Seed index (gm.)		Final No. of plants/fed (thousand)	
	1999-2000	2000-2001	1999-2000	2000-2001
Bio. Fert. 100% + intercrop.	10.3	10.3	54.5	55.9
Org. fert. 100% + intercrop.	9.9	10.4	59.0	55.4
Chem..fert.100% + intercrop.	10.3	11.6	57.3	59.4
Bio.fert.50% + org.fert.50%+ intercrop.	10.2	10.8	59.4	58.3
Bio.fert.50%+ chem..fert.50%+intercrop	10.6	10.6	58.7	58.1
Org.fert.50%+chem..fert.50%+intercrop	10.3	11.1	57.5	60.7
Bio.fert.33%+org.fert.33%+chem..fert.33%+intecrop	10.4	11.1	59.1	63.8
Chem..fert.100%+sole cotton after harvest sole wheat (control)	10.7	11.9	57.0	57.8
Chem.fert.100%+sole cotton (control)	11.0	11.6	55.5	62.2
L.S.D	NS	1.0	NS	NS

Intercrop = Intercropping cotton with wheat
 Bio.fert. = Bio-fertilization
 Org.fert. = Organic fertilization
 Chem.fert. = Chemical fertilization

3- Lint percentage %:

Data in Tables (5) observe that lint percentage was significantly affected by all treatments in the second season only, lint percentage of cotton for pure stand was superior to any other treatments except, bio and chemical fertilization at 50% of their recommended rate in the second season. The lowest mean value of this character was observed when cotton sown after wheat harvest, in the two seasons, the decrease percent was 4.7 and 16.3%, compared with sole cotton (control), in both seasons, respectively.

Lint percentage was significantly affected in one season by intercropping cotton with wheat and fertilization treatments. The slightly decrease in lint percentage in case of intercropping cotton with wheat my

be due to the effect of intercropping operation on fiber development, resulting from the negative effect of intercropping on cotton growth, such results were obtained by Mohamed et al., (1997), and Abd El-Hady and Fawkia, K. El-Khatib, (2002).

Table(5): Effect of bio, organic and inorganic fertilization for intercropping cotton and wheat on lint percentage and seed cotton yield per feddan (Kn.fed).

Treatments	Lint percentage (gm.)		Seed cotton yield per fed. (Kn. Fed.)	
	1999-2000	2000-2001	1999-2000	2000-2001
Bio. Fert. 100% + intercrop.	40.8	40.2	7.6	6.2
Org. fert. 100% + intercrop.	42.5	40.8	7.4	6.2
Chem..fert.100% + intercrop.	41.0	40.2	9.7	7.6
Bio.fert.50%+ org.fert.50%+ intercrop.	42.3	39.9	8.9	6.0
Bio.fert.50%+ chem..fert.50%+intercrop	42.1	41.5	9.8	6.4
Org.fert.50%+chem..fert.50%+intercrop	41.5	40.5	9.4	6.6
Bio.fert.33%+org.fert.33%+chem..fert.33%+intecrop	42.3	40.6	10.0	7.7
Chem..fert.100%+sole cotton after harvest sole wheat (control)	40.6	34.3	5.5	3.4
Chem.fert.100%+sole cotton (control)	42.6	41.0	12.4	7.8
L.S.D	NS	1.7	1.1	2.0

Concerning the effect of fertilization treatments on lint percentage, data in the same Tables reveal that highest mean value was observed when intercropping cotton with wheat fertilized by bio, organic and chemical fertilizers at 33% of their recommended rates or bio plus organic fertilizers at 50% of their recommended rates and the treatment receiving bio plus inorganic fertilizers at 50% of their recommended rates, in a decreasing order, in the first and second seasons, respectively. Hamissa et al., (2000) pointed out that the highest mean values of lint percentage were obtained from combination between the full chemical dose and insulation of seed cotton with the commercial bio-fertilizer.

4- Seed cotton yield per feddan (Kentar/fed.)

The interaction effect of intercropping cotton with wheat, growing cotton in pure stand or after wheat and fertilization treatments on seed cotton per feddan are presented in Tables 6 and 7.

Table (6): Effect of bio, organic and inorganic fertilization for intercropped cotton and wheat on yield components characters of wheat 1999/2000 seasons.

Treatments	Spike weight (gm)	1000 kernel weight (gm.)
Bio. Fert. 100% + intercrop.	5.2	54.1
Org. fert. 100% + intercrop.	5.3	54.4
Chem..fert.100% + intercrop.	6.5	55.1
Bio.fert.50%+ org.fert.50%+ intercrop.	5.6	54.4
Bio.fert.50%+ chem..fert.50%+intercrop	5.8	54.8
Org.fert.50%+chem..fert.50%+intercrop	5.7	54.6
Bio.fert.33%+org.fert.33%+chem..fert.33%+intecrop	6.0	55.2
Chem..fert.100%+sole cotton after harvest sole wheat (control)	6.6	55.4
Chem.fert.100%+sole cotton (control)	-	-
L.S.D at 0.05	NS	NS

Intercrop = intercropping cotton with wheat
 Bio.fert. = Bio-fertilization
 Org.fert. = Organic fertilization
 Chem.fert. = Chemical fertilization

Table (7): Effect of bio, organic and inorganic fertilization for intercropped cotton and wheat on yield components characters of wheat 2000/2001 seasons.

Treatments	Spike weight (gm)	1000 kernel weight (gm.)
Bio. Fert. 100% + intercrop.	4.1	54.5
Org. fert. 100% + intercrop.	4.2	55.0
Chem..fert.100% + intercrop.	5.1	55.3
Bio.fert.50% + org.fert.50%+ intercrop.	4.4	54.9
Bio.fert.50%+ chem..fert.50%+intercrop	4.7	54.2
Org.fert.50%+chem..fert.50%+intercrop	4.5	55.1
Bio.fert.33%+org.fert.33%+chem..fert.33%+intecrop	5.4	55.4
Chem..fert.100%+sole cotton after harvest sole wheat (control)	5.7	56.0
Chem.fert.100%+sole cotton (control)	-	-
L.S.D at 0.05	0.7	NS

Intercrop = Intercropping cotton with wheat
 Bio.fert. = Bio-fertilization
 Org.fert. = Organic fertilization
 Chem.fert. = Chemical fertilization

Data show that seed cotton yield per feddan was significantly

affected by intercropping cotton with wheat and fertilization treatments, compared with cotton in pure stand, in both season. Growing cotton in pure stand showed or increase in seed cotton yield per feddan by 55.6% and 56.4%, compared with growing cotton after wheat harvest, in the first and second seasons, respectively. Concerning means of all intercropping treatments, seed cotton yield per feddan was decreased by 27.4 and 14.1%, compared with cotton in pure stand, in the first and second seasons, respectively. The high seed cotton yield per feddan in pure stand over all growing cotton under intercropping cotton with wheat or cotton after wheat harvest may be due to that sole cotton had the chance to better growth and consequently produced the largest number of open bolls, heaviest boll weight, seed index, seed cotton yield per plant and seed cotton yield per feddan. On the other hand, the lower yield of growing cotton after wheat harvest could be due to the delay in sowing and consequently, short vegetative and fruiting periods which were reflected in lower number of open bolls per plant, inferior boll weight, lower seed index, seed cotton yield per plant and seed cotton yield per feddan. These results are in line with that obtained by Lin, et al., (1990).

Concerning the application of bio, organic and inorganic fertilizers in single or combined does at 100, 50 and 33% of their field recommended rates to the cotton plant intercropped with wheat, the data in Tables 7 and 8. clearly show that seed cotton yield per feddan appeared to be high and superior when cotton plant received bio, organic and inorganic fertilizers at 33% three equal rates followed by single chemical fertilizer, for the two studied seasons at dose 100% whereas were 10 Ken. and 9.7 Ken. in first season and 7.7 Ken. and 7.6 Ken. in the second one, respectively. This treatment (bio, organic and inorganic fertilizer) increased seed cotton yield per feddan by 24, 26 and 11% in the first season and by 19.5, 19.5 and 22.1% in the second season as compared with single application of the bio-fertilizer at 100% of its recommended rate, single application of organic fertilizer at 100% of its recommended rate and combined application of bio plus organic fertilizers at 50% of their recommended rates, respectively. These increases in seed cotton yield per feddan due to combined application of bio, organic and inorganic fertilizers as compared with the other fertilizer treatments may be due to the beneficial effect of N-fixation and phosphate solubilizing micro organisms and the role of organic manure which considered a source of carbon and energy, additional of the initial dose of mineral fertilizer could be improved the

stimulative effect of organic manure on the microbial activity to release nutrients to cotton plant. With this respect, several researchers recorded that although Egyptian soils and the rhizospheres of major crops are rich in a symbiotic N₂-fixers with high potential activity, such is limited by the availability of carbon and energy sources. So, addition of organic manure to the soil increased the number and activity of asymbiotic N₂-fixers (Abd-el-Malek, 1971 and Hegazi et al, 1980). Hamissa et al, (2000) attributed this increases in seed cotton yield per feddan to the role of these micro organisms combined with organic Manure in increasing the nitrogen and potassium uptake which promote photosynthesis and plant development and consequently the productivity per unit area.

B- Effect of bio, organic and inorganic fertilization treatment and intercropping systems of cotton and wheat on yield components characters of wheat.

1- Spike weight (gm):

Results in Table (6 and 7) indicat that bio, organic and inorganic fertilization and intercropping cotton and wheat were significantly affected spike weight only in the first season.

Wheat alone and chemical fertilization 100% at the recommended rate (control) produced the spike weight 5.7 gm followed by intercropping cotton and wheat and 33% from the recommended rates of bio, organic and chemical fertilizers and 100% chemical fertilization only in both seasons. The lowest spike weight was produced under the intercropping cotton and wheat and single organic fertilization or single bio fertilization in both seasons.

2- 1000 Kernel Weight (gm):

Results in Tables (6 and 7) showed that weight of 1000 kernel was not significantly affected by both fertilization bio, organic and chemical) and intercropping system of wheat and cotton, compared with wheat grown alone using the field recommended chemical rate (control), in both seasons. The heaviest weight of 1000 kernel were produced from the recommended rate of single chemical fertilization under sole wheat (control) in both seasons.

The lightest kernels wheat was produced from (50% of their bio and inorganic fertilization) followed by that whish was produced from (100% single bio fertilization) in the first season.

While, in the second season, it was produced from 100% single bio fertilization under intercropping system, followed by 100% single organic fertilization or 50% of their bio and organic fertilization under intercropping system wheat and cotton, respectively.

It is cleared that this character is mainly dependent on the genetical constitution of the wheat cultivar and is rarely affected by environmental factors and cultural treatments. This finding is in agreement with those of several researchers among them (Wang, et al., 1997) and (Sharaan – AN. And El-Samei-FSA. 1999).

Effect of bio/organic and inorganic fertilization and intercropping system of cotton and wheat on yield of wheat.

1- Grain yield in ardab per feddan:

Data in Table (8) revealed that grain yield (ar/fed.) was significantly affected by intercropping cotton and wheat and fertilization treatments in the second season, while no significant effect was reflected at the first season. The grain yield of wheat was increased in case of pure wheat (control) as compared to intercropping treatments. These findings are in agreement with those of several researches among them Mohamed et al 1997 and Abd El-Hady and Fawkia, K. El-Khatib (2002).

Table(8): Effect of bio, organic and inorganic fertilization for intercropping cotton and wheat on grain yield (ardab/fed.) and straw yield (ton/fed).

Treatments	Grain yield (ardab/fed.)		Straw yield (ton/ fed.)	
	1999-2000	2000-2001	1999-2000	2000-2001
Bio. Fert. 100% + intercrop.	12.9	9.3	3.1	2.8
Org. fert. 100% + intercrop.	13.3	12.4	3.7	3.1
Chem..fert.100% + intercrop.	16.7	15.0	4.2	3.2
Bio.fert.50% + org.fert.50%+ intercrop.	15.5	12.5	3.9	2.7
Bio.fert.50%+ chem..fert.50%+intercrop	15.5	14.4	3.9	3.1
Org.fert.50%+chem..fert.50%+intercrop	15.6	14.1	3.9	3.0
Bio.fert.33%+org.fert.33%+chem..fert.33%+intecrop	16.9	14.9	4.2	3.5
Chem..fert.100%+sole cotton after harvest sole wheat (control)	18.6	21.9	4.6	4.4
Chem.fert.100%+sole cotton (control)	--	--	--	--
L.S.D	NS	3.0	NS	0.9

Intercrop = Intercropping cotton with wheat
 Bio.fert. = Bio-fertilization
 Org.fert. = Organic fertilization
 Chem.fert. = Chemical fertilization

In the first season, the highest value was obtained from inorganic fertilization 100% with sole wheat 18.6 ardab/feddan followed by the application of bio, organic and inorganic fertilizer at 33% of their recommended rates 16.9 ardab, while, the lowest value was 12.9 ardab which was obtained from the treatment of bio-fertilizer under intercropping system. In the second season, the highest grain yield was 21.9 ardab which received inorganic fertilizer 100% under sole wheat. Followed by the treatment of inorganic fertilizer 100% under intercropping system 15.0 ardab, while the lowest grain yield was 9.3 ardab which obtained from bio-fertilizer 100% with intercropping system.

In accordance with the above results, Ishac et al., (1986) and Neyra and Dobereiner (1977) found that organic amendment plus bio fertilizers could enhance the microbial activities in the root zone. Moreover, low levels of chemical fertilizers promote the response of wheat plants to inoculation and establishment of effective organisms association. The role of organic matter in increasing root biomass as well as organisms in increasing nutrient uptake maybe responsible for the improvement in wheat grain yield.

2- Straw yield per feddan:

Straw yield of wheat as shown in Table (8) and was significantly influenced by intercropping system and bio, organic and chemical fertilization in the second season, while, it was not significantly influenced in the first season.

In general, sole wheat (control) produced the heaviest straw yield in comparison with the combinations from intercropping system and bio, organic and chemical fertilization followed by the treatment receiving bio organic and chemical fertilizers at 33% of their recommended rates, in both seasons, Never the less, differences were not enough to reach the level of significance in first season, while, they were high enough to reach the level of significance in the second season. Whereas, the lightest straw yield of wheat was obtained when wheat grown under intercropping system cotton and recommended rate and it was decreased as compared with sole wheat (control) by 32.4% and 36.4% in both seasons, respectively. Similar results were obtained by Mohamed et al (1997) and Abd El-Hady Fawkia, K. Khatib (2002).

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دراسات مقارنة بين الزراعة بالمخصبات الطبيعية والكيميائية تحت ظروف التكثيف الزراعي لبعض المحاصيل الزراعية

أ.د/ محمد علي محمد رزق ، د/ جمال الدين حسن عبدالحى

د/ سيد عبدالهادى على ، محمد عبدالعظيم أحمد

أقيمت تجربتان حقليتان بمحطة بحوث سدس الزراعية - محافظة بنى سويف . وذلك خلال موسمى الزراعى ١٩٩٩ / ٢٠٠٠ ، ٢٠٠٠ / ٢٠٠١م لدراسة تأثير تحميل القطن على القمح مع استخدام الأسمدة العضوية والحيوية الأزوتية والفوسفاتية فى تكامل مع الأسمدة الكيماوية وذلك بنسب مئوية مختلفة . وقد تم زراعة هذه التجربة فى أربع مكررات وإجراء كل المعاملات طبقا للتوصيات.

ويمكن تلخيص النتائج المتحصل عليها فى هذا البحث كما يلى :-

أولا :- المحصول ومكوناته فى اللطن:

- ١- أظهرت النتائج عدم تأثر معاملى البذرة معنويا بمعاملات التحميل والتسميد فى الموسم الأول بينما تناقص فى الموسم الثانى وكانت أعلى قيمة لمعامل البذرة عند التسميد الكيماوى بنسبة ١٠٠% من المعدل الموصى به فى الموسم الأول . بينما كان أقل معاملى البذرة عند زراعة القطن منفردا بعد قمح.
- ٢- لم يكن لمعاملات التسميد والتحميل تأثير معنوى على معدل تصاقى الحليج فى الموسم الأول بينما تأثرت هذه اله : فى الموسم الثانى.
- ٣- لم يكن لمعاملات التسميد والتحميل تأثير معنوى على عدد النباتات فى وحدة المساحة فى كلا الموسمين.
- ٤- تأثر محصول القطن للقدان بالقتطار معنويا بمعاملات التسميد والتحميل فى كلا الموسمين وكانت أعلى قيمة بالنسبة لهذه الصفة عند زراعة القطن بدون تحميل مع التسميد بمعدل ١٠٠% من المعدل الموصى به (كترول).

ثانيا :- نتائج المحصول ومكوناته فى القمح :

- ١- أظهرت النتائج وجود تأثير معنوى لمعاملات التسميد والتحميل على وزن السنبله فى موسم الزراعة الأول بينما لم تؤثر هذه المعاملات فى موسم النمو الثانى. وكان أعلى وزن للسنبله عند زراعة القمح منفردا مع التسميد الكيماوى بمعدل ١٠٠% من الموصى به فى كلا الموسمين.
- ٢- لم يتأثر وزن الألف حبه معنويا بكل معاملات الدراسة فى كلا الموسمين .
- ٣- أظهرت النتائج أيضا تأثر عدد الحبوب بالسنبله معنويا بمعاملات التحميل والتسميد فى كلا الموسمين.
- ٤- كما أثر كل من التسميد والتحميل معنويا على صقتى محصول الحبوب والقش/ قدان فى الموسم الثانى فقط.

العلاقات التنافسية والاقتصادية:

- ١- أنخفض معدل استغلال الأرض للقمح والقطن عن الواحد الصحيح عند تحميلهما تحت كل معاملات التسميد مقارنة بزراعة القطن أو القمح منفردا فى كلا الموسمين.
- ٢- القمح كان أكثر تنافسا من القطن فى نفس المساحة فى كلا الموسمين.
- ٣- أعلى قيمة لمعدل الحشد النسبى كانت عند التسميد بالسماد الحيوى والعضوى والكيماوى بنسبة ٣٣% فى المعدل الموصى به لكل منهم. فى كلا الموسمين.
- ٤- أعطى التسميد بمعدل ٣٣% من المعدلات الموصى بها لكل من التسميد الحيوى والعضوى والكيماوى أعلى صافى دخل للقدان وذلك عند تحميل القطن على القمح فى كلا الموسمين .