

EFFECT OF PRECEDING CROPS AND RELAY INTERCROPPING COTTON WITH FABA BEAN UNDER DIFFERENT PLANT DISTRIBUTION OF FABA BEAN IN RELATION TO YIELD AND YIELD COMPONENTS.

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ABSTRACT

Two field trials were carried out at Sids Agricultural Research Station, Beni Suief

Governorate during 2001/ 2002 and 2002/ 2003 seasons to study the effect of preceding summer crops, i.e. (maize, sunflower and soybean) and relay intercropping cotton with faba bean under different faba bean plant distributions; 10, 20 and 30 cm on the side and top of ridges. Cotton was planting on the other side of ridge. The experimental design was split-split plots with three replications, preceding summer crops were put in main plot, whereas plant distributions were allocated in the sub-plots and the intercropping systems were applied in sub-sub plots.

Results could be summarized as follows:

Data indicated that preceding summer crops had significant effect on faba bean plant height, weight of pods/ plant and seed yield/ fed. On the other hand, all the cotton traits were not significantly affected.

Increasing hill spaces from 10 cm to 30 cm led to decreasing in plant height and seed yield of faba bean/ fed., but the other yield components increased by increasing hill spaces. Moreover, all studied traits of cotton were not significantly affected by hill spaces of faba bean intercropped.

Relay intercropping cotton with faba bean had significant effect on weight of pods/ plant and seed yield/ fed of faba bean. On the other hand, no significant effect on cotton characters under study was shown.

Interactions showed only in faba bean with preceding crops x hill spaces. Plant height and seed yield/ fed recorded the highest values with 10 cm space and preceded by soybean. Whereas, weight of pods/ plant showed the highest values with 30 cm space and preceded by soybean. All the interactions of cotton were not significant.

Total income was 3971.2 L.E when cotton was grown as relay intercropping with faba bean, compared with 2964.50 L.E as the net income of faba bean and cotton when grown as solid crop (equal 10076.7 L.E. as net income).

In general, it can be stated that relay intercropping cotton with faba bean could be used as an improved planting technique of cotton.

INTRODUCTION

Intercropping cotton with faba bean is a new farming system that has been founding in Egypt. Such intercropping helps in increasing the total production from the limited cultivation area.

With regard to preceding crops, Salama and El-Hawary (1994) found that faba bean preceded by cotton markedly surpassed those preceded by maize in growth, yield and yield components. Metwally (1997) indicated that preceding summer crops; sunflower and soybean had significant effects on faba bean plant height, number of branches and pods/plant, number of seeds/ plant, 100- seed weight and seed yields/ fed.

Numerous investigators have studied the effect of faba bean hill spaces on yield and yield attributes. Shalaby and Mohammed (1978) showed that seed yield/ fed of faba bean decreased with increasing spacing between hills from 10 to 15, 20 and 25 cm. On the contrary, Singh et al, (1992) and Salwau (1994) found that yield of seeds/ fed increased as plant density increased,. Hassan and Hafiz (1998) indicated that decreasing faba bean plant spacing from 25 cm to 15 cm between hills caused significant increase in the means of values of plant height and seed yield/ fed. Meanwhile, no. of branches/ plant and no. of pods/ plant were decreased with decreasing planting space between hills within the row. Selim et al, (1998) stated that intercropping cotton under different plant densities were not affected by increasing plant density of faba bean from 20 up to 30 plant/ m². El-Douby et al. (2000) reported that plant height was increased as the distances between hills became more closer. He added that, number and weight of pods and seeds/ plant and seed yield/ fed were increased when grown at 20 cm apart, compared with 15, 25 and 30 cm.

Intercropping cotton with faba bean was studied by many investigators. Kamel et al. (1992) reported that relaying cotton with faba bean had any deleterious effect on either cotton or faba bean yield and yield components. Selim et al. (1998) found that intercropping cotton with faba bean had no adverse effect on yields and yield components of both crops. Most cotton studied characters were not significantly affected by intercropping with faba bean.

The objectives of this research were (1) to study the effect of preceding summer crops to grow before faba bean. (2) Investigate the possibility of intercropping cotton before harvesting faba bean to overcome the avoid effect of delaying sowing date of cotton and (3) determine the plant distribution for growing faba bean.

MATERIALS AND METHODS

Two field experiments were conducted at Sids Agricultural Research Station, Beni Suef Governorate during 2001/2002 and 2002/2003 seasons. The objective of this research was study the effect of preceding crops; sunflower (cv. Vedoc), maize (cv. S.C. 10) and soybean (cv. Clark) and relay intercropping cotton (c.v Giza 88) with faba bean (cv. Giza 716) under different faba bean plant distributions. Faba bean plant distributions were; 10 cm (leaving one plant/ hill and 60 cm between rows), 20 cm (leaving two plants/ hill) and 30 cm (leaving three plants/ hill). Faba bean was grown on the side and top of ridges. Faba bean was sown on November 10th and 15th in 2001 and 2002 seasons, respectively.

Cotton cv. Giza 88 was relay intercropping with faba bean on March 15th and 20th in 2002 and 2003 seasons, respectively. Solid crop of faba bean was planted as recommended at 20 cm space and two plants/ hill on both sides of ridges. Faba bean was harvested on April 7th and 13th in 2002 and 2003 seasons. Cotton was relay intercropped with faba bean on March 15th and 20th in 2002 and 2003 seasons, respectively. Cotton was planted on the other side of faba bean ridges at 20 cm a part between hills and

leaving two plants/ hill. Moreover, sole crop of cotton was sown at 20 cm space and leaving two plants/ hill as recommended. Cotton was harvested on September 20th and 25th in 2002 and 2003 season, respectively.

The experimental design was split-split plot with three replications. The preceding crops were arranged in the main plots, while plant distributions of faba bean were allocated in the sub-plots and the intercropping systems were applied in sub-sub plots. Each sub-sub-plot consisted of 6 ridges 5 m long and 3.6 m width (18 m²). In addition to control treatments of both crops which conducted as recommended.

Calcium superphosphate 15 % P₂O₅ was applied at a rate of 200 kg/ fed during land preparation and prior to planting faba bean for all treatments. As well as, 20 kg N/ fed as ammonium sulfate (20.6 % N) was added after thinning faba bean plants.

Cotton plants received 45 kg N/ fed as ammonium sulfate after harvest faba bean in two equal doses after thinning cotton plants and before the 2nd irrigation. Potassium fertilizer (50-52 % K₂O) at the rate of 50 kg/ fed potassium sulfate was applied in one dose with the first dose of nitrogen fertilizer.

At harvest:

Faba bean measurements:

At harvest, guarded ten plants were chosen randomly to determine plant height (cm), number of branches/plant, number of pods/plant, weight of pods/plant (g), seed yield/plant (g), weight of 100 seeds (g) (estimated as average of 5 measurements) and seed yield of faba bean/fed (kg) was determined as a hole plot..

Cotton measurements:

Three inner ridges were used for the determination of seed cotton yield/ plant, lint yield, seed index, while seed cotton yield/ fed was determined on the whole of sub-sub plot. At the same time, 10 plants were chosen from each plot and gained to measure plant height (cm), number of open polls/ plant, number of fruiting branches/ plant, weight of poll (g), and number of seeds/ polls.

Net income for each treatment was determined by Egyptian pounds / feddan at market price of average 2001/ 2002 and 2002/2003 seasons for faba bean 3.0 L.E./ kg and cotton 500 L.E./ kantar. The production costs were 500 and 850 L.E. for faba bean and cotton in relay intercropping. Whereas, 250 and 1200 L.E. for berseem and cotton in traditional cropping of cotton.

All the data collected were subjected to statistical analysis as described by Snedecor and Cochran (1967) and mean values and combined analyses were compared L.S.D at 0.05 significant.

Table (1): Available N, P and K (PPM) and PH of soil after maize, sunflower and soybean.

Available element	After preceding crops			After cotton relayed faba bean			
	Ppm	Sunflower	Maize	Soybean	Sunflower	Maize	Soybean
N		40.1	42.4	60.3	40.1	40.6	50.9
P		8.3	9.9	10.3	8.9	9.6	9.5
K		485	510	580	500	540	578
Caco3		3.81	3.60	3.65	3.62	3.61	3.63
Na		4.76	4.75	4.80	4.73	4.72	4.75
PH		7.6	7.7	7.8	7.5	7.6	7.7

Available N, P and K were determined according to methods outlined by Black (1965)

This table shows that available elements after preceding crops were higher after soybean followed by maize, whereas the lowest values recorded by sunflower. That results reversed on faba bean as a succeeding crop where the data were higher after soybean followed by maize, while the lowest values showed by sunflower.

RESULTS AND DISCUSSION

1-Effect of preceding crops on:

1-1: *Faba bean characters:*

Data in Table (2) revealed that plant height of faba bean was significantly affected by preceding crop in both seasons and combined data. Also, weight of pods/ plant and seed yield/ fed were significantly affected in both seasons and combined analysis. Faba bean preceded by soybean was superior in all studied characters as compared to those preceded by sunflower or maize. The superiority may be attributed to the high level of soil fertility after soybean (Table 1).

Planting faba bean after soybean recorded the highest value, followed by maize, whereas the lowest value recorded by sunflower in data combined. Maize yield was superior to those preceded by sunflower, that may be due to that maize plant have many types of roots compared with sunflower which have deeping roots only.

Salama and El-Hawary (1994) reported similar results.

Table (2): Growth, yield and yield component of faba bean as affected by Preceding crops in two seasons, as well as combined analysis.

Characters Preceding crop	Plant height (cm)	No. of branche s/ plant	No. of pods/ plant	Weight of pods/ plant (g)	Weight of seeds/ plant (g)	Weight of 100 seeds (g)	Seed yield/ fed (kg)
2002 season							
Sunflower	129.87	2.71	15.70	22.42	16.01	53.24	1353.80
Maize	130.96	2.88	15.93	23.70	16.70	53.76	1437.30
Soybean	136.40	2.98	16.60	28.60	17.90	54.40	1380.00
L.S.D (at 0.05)	0.86	N.S	N.S	0.88	N.S	N.S	14.30
2003 season							
Sunflower	128.17	2.70	15.23	22.09	15.56	52.59	1146.67
Maize	131.66	2.81	16.18	24.20	16.76	52.99	1245.67
Soybean	135.38	2.90	16.40	27.56	17.30	55.20	1320.00
L.S.D (at 0.05)	1.12	N.S	N.S	1.06	N.S	N.S	8.12
Combined							
Sunflower	129.02	2.71	15.47	22.26	15.79	52.92	1250.24
Maize	131.31	2.85	16.05	23.95	16.73	53.38	1341.33
Soybean	135.84	2.94	16.50	28.08	17.60	54.80	1350.00
L.S.D (at 0.05)	1.02	N.S	N.S	0.92	N.S	N.S	10.02

1-2: Cotton characters:

Results in Table (3) stated that growth and yield components of cotton were not significantly affected by preceding crops in both seasons and combined. As well as, seed cotton yield/ plant and per fed were not significantly affected by preceded crops in both seasons and combined analysis. These results are true due to the adverse effect of preceding crops that received by faba bean only and had not reached to cotton growth.

Table (3): Growth, yield and yield component of cotton as affected by preceding crops in two seasons, as well as combined analysis.

Characters Treatmens	Plant height (cm)	No. of fruiting branches/ plant	No. of open polls/ plant	No. of total polls/ plant	Weight of polls/ plant	No. of seeds/ poll	Seed index	Lint %	Seed cotton/ plant. (g)	Seed cotton/ fed (kentar)
2001/2002 season										
Sunflower	128.37	12.77	13.53	14.87	2.80	20.26	8.67	36.85	34.02	6.749
Maize	127.63	12.30	13.73	14.97	2.76	20.84	8.83	37.34	36.79	7.075
Soybean	129.70	12.62	13.98	15.50	2.88	20.95	8.92	37.88	37.72	7.140
L.S.Dat (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
2002/2003 season										
Sunflower	130.52	12.75	13.31	15.05	2.78	20.13	8.56	36.73	34.69	6.340
Maize	130.07	12.18	13.96	15.33	2.79	20.41	8.70	37.23	37.44	6.887
Soybean	129.50	12.62	13.98	15.50	2.88	20.95	8.92	37.88	37.72	7.140
L.S.Dat (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
Combined										
Sunflower	129.44	12.76	13.42	14.96	2.78	20.20	8.62	36.79	34.36	6.545
Maize	128.85	12.24	13.85	15.15	2.78	20.63	8.76	37.28	37.12	6.981
Soybean	129.60	12.50	13.95	15.40	2.81	20.88	8.86	37.80	37.40	7.120
L.S.Dat (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

These results are in harmony with those obtained by Selim *et al.*, (1998) who mentioned that growth and yield components of cotton were not significantly affected by relay intercropping with faba bean, except seed cotton yield/ plant and per feddan.

2- Effect of plant distribution:

2-1: On faba bean characters:

Data in Table (4) showed clearly that plant height was increased by decreasing hill spaces from 30 to 10 cm apart. The tallest plants at lower hill space suffer from severe competition for light which resulted in a marked increase in plant height. Abo-Shetaia (1990) come to similar result.

Number of branches and pods/ plant, weight of pods and seeds/ plant and weight of 100 seed had the opposite trend of plant height

These results suggest that under maximum hill spaces a lower competition was occurred between plants for assimilates. These are true due to less inter competition between faba bean plant and absorb enough soil nutrient and available solar radiation (heat and light). These data are in compatible with those recorded by Selim (1998).

With regard to seed yield/ fed, it was significantly affected by hill spaces. The data obtained revealed gradual increase in the yield by decreasing hill spaces from 30 cm to 10 cm apart in both seasons and combined data. However, the differences in seed yield/ fed were significant between all spaces in two seasons and combined. The excess in seed yield/ fed estimate to 18.47 and 40.92 % for 20 and 10 cm, respectively. in the combined over the two seasons, compared with 30-cm space. These results are in harmony with those obtained by Abo- Shetia (1990) and Selim *et al.*, (1998).

Table (4): Growth, yield and yield component of faba bean as affected by faba bean hill spaces in two seasons, as well as combined analysis.

Characters Treatments	Plant height (cm)	No. of branche s/ plant	No. of pods/ plant	Weight of pods/ plant (g)	Weight of seeds/ plant (g)	Weight of 100 seeds (g)	Seed yield/ fed (kg)
2002 season							
10 cm	134.23	2.15	14.21	21.20	14.73	51.15	1668.0
20 cm	131.70	3.08	16.06	23.54	16.67	53.11	1386.7
30 cm	126.95	3.41	17.50	26.36	18.70	57.01	1192.0
L.S.D at (0.05)	1.50	0.45	0.82	1.15	1.12	1.18	22.14
2003 season							
10 cm	132.78	2.13	14.04	20.46	13.99	50.87	1404.0
20 cm	130.91	2.81	15.83	22.96	16.15	51.86	1196.0
30 cm	126.03	3.32	17.25	26.01	18.34	55.63	988.00
L.S.D at (0.05)	1.15	0.51	0.78	1.40	1.22	0.88	18.16
Combined							
10 cm	133.51	2.14	14.13	20.83	14.36	51.01	1536.00
20 cm	131.31	2.95	15.95	23.25	16.41	52.49	1291.35
30 cm	126.49	3.37	17.38	26.18	18.52	56.32	1090.00
L.S.D at (0.05)	1.66	0.55	0.83	1.51	1.18	1.08	21.11

2-2: On cotton characters:

As shown in Table (5) all the characters under study had not significantly affected by growing cotton on the other side of ridges of faba bean at different hill spaces. The residual effect of faba bean on 10, 20 cm or 30 cm had not significant effect on cotton characters. That mean the competition between faba bean and cotton hardly found. These results are in accordance with those obtained by Selim *et al.*, (1998).

Table (5): Growth, yield and yield components of cotton as affected by hill spaces in two seasons, as well as combined analysis.

Characters	Plant height (cm)	No. of fruiting branches/plant	No. of open pools/plant	No. of total polls/plant	Weight of pods/plant	No. of seeds/polls	Seed index	Lint %	Seed cotton/plant. (g)	Seed cotton/ fed (kentar)
Treatments										
2001/2002 season										
10 cm	127.80	12.50	13.55	14.80	2.75	20.02	8.60	36.22	35.83	6.577
20 cm	128.55	12.50	13.65	15.01	2.75	20.44	8.73	37.03	36.19	6.947
30 cm	127.65	12.60	13.40	14.95	2.84	21.20	8.93	38.03	34.20	7.213
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
2002/2003 season										
10 cm	129.20	12.34	13.33	14.85	2.75	19.91	8.50	36.13	36.11	6.373
20 cm	131.47	12.49	13.73	15.25	2.80	20.13	8.62	36.91	36.52	6.823
30 cm	129.42	12.57	13.81	15.45	2.80	20.78	8.78	37.91	35.59	6.643
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
Combined										
10 cm	128.50	12.42	13.44	14.83	2.75	20.78	8.55	36.18	35.97	6.485
20 cm	130.01	12.50	13.69	15.13	2.77	20.29	8.68	36.79	36.36	6.885
30 cm	128.53	12.59	13.61	15.20	2.82	20.99	8.86	37.97	34.90	6.928
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

3- Effect of intercropping:

3-1: On faba bean characters:

Data in Table (6) included the growth, yield and yield components of faba bean as affected by intercropping pattern. All the characters under study were not significantly affected by intercropping system, except weight of pods and seeds/ plant and seed yield/ fed in both seasons and combined data.

Table (6): Growth, yield and yield components of faba bean as affected by Different intercropping systems with cotton.

Characters	Plant height (cm)	No. of branches/plant	No. of pods/plant	Weight of pods/plant (g)	Weight of seeds/plant (g)	Weight of 100 seeds (g)	Seed yield/ fed (kg)
Treatments							
2001 season							
Solid crop	129.87	2.71	15.70	22.42	16.01	53.24	1416.00
Intercropping	130.96	2.88	15.93	23.70	16.70	53.76	1268.89
L.S.D at (0.05)	N.S	N.S	N.S	0.88	0.08	N.S	22.36
2003 season							
Solid crop	129.02	2.54	14.34	20.61	15.34	52.27	1196.00
Intercropping	129.91	2.75	15.71	23.14	16.16	52.79	1162.61
L.S.D at (0.05)	N.S	N.S	N.S	1.13	0.12	N.S	12.10
Combined							
Solid crop	129.45	2.63	15.02	21.52	15.68	52.76	1306.00
Intercropping	130.45	2.82	15.82	23.42	16.43	53.28	1215.75
L.S.D at (0.05)	N.S	N.S	N.S	0.92	0.11	N.S	15.16

The increase in solid crop compared to intercropping patterns estimated by 90.25 kg/ fed in the data average. The results reflect that intercropping cotton at the end of faba bean life had no adverse effect on faba bean seed yield/ fed. These results are in agreement with those obtained by Selim *et al.*, (1998) who mentioned that intercropping cotton with faba bean had no adverse effect on both crops characters.

3-2: On cotton characters:

Results in Table (7) show that all the characters under study had not significant affected by relay intercropping with faba bean. These data reflected that no significant effect was occurred due to relay intercropping, as well as faba bean did not leave residual effect as inhibitor to cotton characters. The results coincided with those obtained by Kamel *et al.*, (1992) and Sleimet *et al.*, (1998) who found that relaying cotton with faba bean had no detrimental effect on growth, yield and yield components of cotton.

Table (7): Growth, yield and yield components of cotton as affected by relay intercropping with cotton.

Characters	Plant height (cm)	No. of fruiting branches/ plant	No. of open polls/ plant	No. of total polls/ Plant	Weight of polls/ plant	No. of seeds/ polls	Seed index	Lint %	Seed cotton/ plant. (g)	Seed cotton/ fed (kentar)
Treatments										
2001/2002 season										
Solid crop	128.70	12.55	13.73	15.15	2.64	21.03	8.88	37.29	37.75	7.04
Intercropping	128.0	12.53	13.53	14.92	2.78	20.27	8.63	36.98	35.40	6.91
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
2002/2003 season										
Intercropping	130.77	12.63	13.31	15.05	2.80	20.74	8.80	37.15	36.81	6.78
Solid crop	130.29	12.47	13.63	15.19	2.78	20.40	8.75	37.10	36.06	6.61
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S
Combined										
Intercropping	129.73	12.59	13.52	15.10	2.72	20.88	8.84	37.22	37.28	6.91
Solid crop	129.15	12.50	13.58	15.06	2.78	20.34	8.69	37.04	35.73	6.72
L.S.D at (0.05)	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S	N.S

4- Interaction effects:

4-1 On faba bean:

Data in Table (8) revealed the interaction effects of preceding crop x hill spaces. Plant height and weight of pods/ plant were significantly affected by interaction effect of preceding crop x hill spaces. The maximum plant height was shown with the lowest hill spaces (10 cm) and preceded by soybean plant. Weight of pods/ plant recorded the highest value with 30 cm space and preceded by soybean, while seed yield/ fed recorded the highest values with 10-cm space and preceded by soybean.

Table (8): Interaction effects of preceding crop X hill spaces on faba bean plant height and weight of pods/ plant (combined of two seasons).

Characters Treatments		Plant height (cm)	Weight of pods/ plant (g)	Seed yield/ fed (kg)
Sunflower	10 cm	131.62	20.43	1368
	20 cm	130.01	22.37	1144
	30 cm	123.36	21.66	928
Maize	10 cm	135.78	22.81	1440
	20 cm	130.78	23.94	1248
	30 cm	130.95	26.62	1048
Soybean	10 cm	140.13	25.31	1510
	20 cm	135.16	28.42	1360
	30 cm	132.22	30.51	1180
L.S.D at (0.05)		1.01	0.94	13.12

*All the other interactions recorded insignificant observation.

4-2 On cotton:

All the interaction effects of cotton were not significant.

Economic Evaluation:

To evaluate the relay intercropping system of cotton, compared with solid crop, it must be evaluate the two seasons of winter and summer crops for the unit area (faddan), where cotton as summer crop, have to sown early and did not allow the preceding winter crops to reach its maturity, only we can get one or two cuttings from berseem. The evaluation depended upon the cost needs for production the winter and summer crops (output) and the income through the year from the two crops (input) Table (9). It can be concluded that the income from the unit area over the two years was higher when cotton was planted as relay intercropping with faba bean. While lower income was obtained by solid crop which may be due to higher cost and lower income from Tahreesh berseem which sown before the cotton. The net income as a cash money between solid crops and relay intercropping was 1006.7 L.E./ fed.

Table (9): Evaluation of relay intercropping cotton with faba bean, input, output and net income of using one feddan in Egyptian pound.

Intercropping System	Output (cost)				Input		Total income	Net income
	Winter crops		Summer crops	Total cost	Winter crops	Summer crops		
	Berseem	Faba bean	Cotton		Berseem or faba bean	Cotton		
Solid crop	250	-----	1200	1450	960	3454.5	4414.5	2964.5
Relay intercropping	-----	500	850	1350	1960.02	3361.5	5321.2	3971.2
Net income as a cash money between solid crops and relay intercropping								1006.7

Price of faba bean(kg) = 3 L.E
 Price of cotton (kentar) = 500 L.E
 Price of berseem (fed) = 960 L.E

Finally, relay intercropping of cotton with faba bean can be recommended as intensive cropping system for gaining two main yields from faba bean and cotton without significant deleterious effect on faba bean. This intercropping system enable us to increase the cultivation area of faba bean to overcome the gab between consumption and production of food yield. By the same, we can extent cotton planting area to the planting area devoted for faba bean.

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تأثير المحصول السابق والتحميل المناوب للقطن مع الفول البلدي تحت توزيعات نباتية مختلفة من الفول البلدي على المحصولين. سيد عبد العزيز صالح ، صلاح السيد عطية طعيمة و وقاء خميس محمد معهد بحوث المحاصيل الحقلية. قسم بحوث التكايف المحصولي

أجريت تجربتان حقليتان خلال موسمي ٢٠٠١/٢٠٠٢ و ٢٠٠٢/٢٠٠٣ بمحطة البحوث الزراعية بسدس محافظة بنى سويف لدراسة تأثير المحصول السابق (الذرة الشامي وعباد الشمس وفول الصويا) و التحميل المناوب للقطن مع الفول البلدي تحت ثلاث توزيعات نباتية للفول البلدي (١٠- ٢٠- و ٣٠ سم بين الجور) على جانب وقمة الخط وتم زراعة القطن على الجانب الآخر من الخط ودراسة تأثير ذلك على النمو والمحصول ومكوناته لكلا المحصولين وأستخدم تصميم القطع المنشقة مرتين. تم وضع المحاصيل السابقة في القطع الرئيسية بينما التوزيعات النباتية وضعت في القطع المنشقة بينما وضع نظام التحميل في القطع التحت منشقة في ثلاث مكررات.

وكانت النتائج المتحصل عليها كالتالي :-

- ١- أثرت المحاصيل السابقة معنوياً على طول النبات ووزن قرون النبات و محصول البذور من الفول البلدي للفدان بينما لم يلاحظ أي تأثير معنوي على محصول القطن ومكوناته.
- ٢- أدى زيادة مسافات الزراعة للفول البلدي من ١٠ سم حتى ٣٠ سم إلى زيادة في كل صفات القول البلدي تحت الدراسة فيما عدا طول النبات و محصول الفدان والذي زاد بتقليل مسافات الزراعة إلى ١٠ سم. بينما لم تتأثر كل صفات القطن بمسافات الزراعة للفول البلدي.
- ٣- أثر التحميل المناوب للقطن مع الفول البلدي معنوياً على وزن قرون النبات و محصول البذور للفول البلدي/ الفدان. وعلى العكس من ذلك لم يتأثر محصول ومكونات القطن بالتحميل المتداخل.
- ٤- أدى التفاعل بين المحاصيل السابقة x مسافات الزراعة إلى الحصول على أعلى القيم لطول النبات و وزن القرون للنبات عند الزراعة على مسافة ١٠ سم والزراعة بعد فول الصويا. أيضاً تم الحصول على أعلى إنتاجية لبذور الفول البلدي عند الزراعة على مسافة ١٠ سم بعد ذرة. بينما لم تتأثر كل صفات القطن معنوياً تحت أي تفاعل.
- ٥- تحقق أقصى دخل عند تحميل القطن تحميلاً مناوباً مع الفول البلدي المنزرع على مسافة ١٠ سم (٣٩٧١,٩٢ جنيه) بعد ذرة مقارنة بالزراعة المنفردة (٢٩٦٤,٥٠ جنيه) لمحصول القطن.
- ٦- ازداد صافي الدخل للمزارع عند تحميل القطن مناوباً مع الفول البلدي عن الزراعة التقليدية للقطن بما يعادل ١٠٠٦,٧٠ جنيه.