



NEGATIVE INTERRELATIONSHIP BETWEEN NUMBER OF BERSEEM CUTS AND COTTON YIELD AS A FOLLOWING CROP

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ABSTRACT

The present investigation was carried out at the Experimental Farm of the Faculty of Agriculture at Fayoum, Cairo University at Dalla, Fayoum Governorate during the two seasons 2000/2001 and 2001/2002. The aim of this investigation was to study the effect of organic manure and number of berseem cuts on cotton yield and its components and fiber traits. The obtained results indicate that only plant height at harvest, number of fruiting branches / plant and the height of the 1st fruiting branch were significantly affected by organic manure (O.M.) application. On the other hand, organic manure did not affect significantly the seed cotton yield, yield components and fiber quality traits. Cotton planting dates affected significantly all studied vegetative growth, seed cotton yield, yield components and fiber quality traits. Early planting date (1st week of March) showed significant superiority over the other two planting dates (1st week of April & May) in number of fruiting branches/ plant, number of days to 1st flower appearance and 1st boll opening, number and weight of open bolls/ plant in the 1st & 2nd pickings, seed cotton yield, lint percentages and studied fiber quality traits.

The decreases in the total seed cotton yield attributed to the late planting dates (1st week of April & May) amounted 26.4 and 84.8% and 30.6 and 84.1% of March planting with the treatments of 10 and 20 m³/fad organic manure, respectively.

INTRODUCTION

The crop rotation plays an important role in the system of crop husbandry for raising the crop production. In Egypt, it is well known that the most recommended cotton rotation is planting cotton after short season berseem as catch crop. Unfortunately, during the last two decades cotton planting date has been extended or delayed till May. This delay is mainly due to the shortage of forages which reflected on berseem price and make it more profitable to the farmers and encourage them to keep berseem to take more cuts and consequently delay cotton planting. The interrelationship between number of berseem cuts or other winter crops on cotton yield has been investigated by many workers. **El-Moghazy et al (1984); Makram et al (1994); El-Debaby et al (1995 a & b) and Saif El-Nasr et al (1996) and others.** They found that early planting date (March planting) showed superiority over late planting dates (April & May) in number of fruiting branches / plant, number of days to the 1st flower appearance and 1st boll opening. Meanwhile, other workers showed that late planting stimulate plant height and other vegetative traits, **Dawood (1980); Yassen (1986); Makram et al (1994) and El-Debaby et al (1995 a & b).**

Concerning the effect of planting date on seed cotton yield, many investigators found that as planting date was delayed yield were reduced, **Bilbra & Ray (1973); Yousef (1980); Nawar et al (1986) and Radwan et al (1995).**

Several investigators showed that cotton sowing dates affected significantly the yield, earliness %, lint percentages and fiber quality traits, **Bilbro & Ray (1973); Stella et al (1980); Abbas et al (1983); Abdalla et al (1989) and El-Debaby et al**

(1995 a & b). On the other hand, Abuldahb (2001) and Abuldahab et al (2000) showed that lint index and lint index and fiber properties were not affected by sowing date.

MATERIAL AND METHODS

Two field experiments were conducted during 2001 and 2002 seasons at the Experimental Farm of Faculty of Agriculture at Fayoum, Cairo University at Dalla, Fayoum Governorate.

The cotton experiments were conducted in the same field of the previous berseem trials to study the effect of preceding farm yard manure and preceding numbers of berseem cuts consequently "cotton planting dates" on growth, yield, yield components and fiber quality of cotton variety Giza 83. Each experiment was laid out in a split plot design with three replicates. The main plots were devoted for the farm yard manure treatments (FYM) (10, 20 m³/ fad.) and the sub plots were assigned to berseem cultivars (Fahl & Meskawy).

The sub plot size was 10.5 m² (3.5 x 3 m) and contained six ridges. The cotton planting dates were corresponded to the number of berseem cuts taken and were as follows:

March planting; Either after one cut of berseem c.v. Fahl or after two cuts of berseem c.v. Meskawy.

April planting; after three cuts of Meskawy

May planting; after four cuts of Meskawy

Recorded data

a. Growth and fruiting traits

Ten guarded plants were taken at random from the inner rows of each plot to measure the following traits:

1. Percentages of successful hills for every plot after month from planting.
2. Plant height at harvest was measured in (cm) from the cotyledonary node to the end of the main stem.
3. Number of vegetative branches/ plant
4. Number of fruiting branches/ plant at harvest were counted and then the average number of fruiting branches per plan was calculated.
5. Height of the first fruiting branch in (cm) and by number of nodes. It was measured in (cm) from the two cotyledonary nodes to the first fruiting branch node. Also, it was measured by counting the number of nodes on the main stem above the cotyledons to the node of the first fruiting branch.

6. Days to the first flower appearance: Number of days from sowing till the appearance of the 1st flower.
7. Days to the first boll opening: Number of days from sowing till the opening of the first boll.
8. Number of completely open bolls per plant: The averages number of mature bolls per plant was recorded at harvest for the sampled plants (10 guarded plants) at every pick.
9. Total number of non-completely open bolls per plant at every pick.
10. Weight of seed cotton per completely open bolls per plant. It was picked by hand and weighted in gm.

B- Yield of seed cotton in metric kentars/ fad

The yield of seed cotton was picked twice for each sub plot and then weighted in kilograms after picking. The yield per sub plots was then transformed to kentars per fad. (metrickentar= 157.5 kg of seed cotton).

C- Earliness index

Percentage of first pick to the total seed cotton yield of two picks: it was estimated according to the following formula:

$$\frac{\text{Average seed cotton yield of first pick}}{\text{Average seed cotton of the two pick}} \times 100$$

D- Lint percentage

Lint percentage was estimated from a sample of seed cotton taken from each sub plot.

Each sample was mixed, weighted, ginned and lint percentage was counted as follows:

Lint percentage =

$$\frac{\text{Weight of lint a sample}}{\text{Weight of seed cotton in the sample}} \times 100$$

E- Fiber traits

1. Micronair value

It was measured by the Micronaire instrument as reported by ASTM (D-1448-59). Micronaire reading indicates the resistance of passage of air through a 50 grain (3.24 gm) sample in a fixed chamber. This value expresses fiber fineness and maturity in combination.

2. Fiber strength and elongation percent

Both were determined by the Stelometer at $\frac{1}{8}$ inch gauge length, according to the procedure designated by the ASTM standards (D1445-67).

3- Fiber length (at 2.5% span length)

Estimated by using Digital Fibergraph at 2.5% S.L., according to ASTM. (D-1447-63T)

Statistical analysis

The analysis of variance for a split-plot design was carried out for all studied traits for each growing season according to **Little and Hills (1997)**.

RESULTS AND DISCUSSION

The response of cotton crop to the preceding organic manure (O.M.) and cotton planting dates as affected by berseem cultivars and numbers of berseem cuts will be discussed on growth, yield, yield components and fiber quality traits.

1. Effect of organic manure

Results in **Table (1)** reveal that plant height at harvest, number of fruiting branches/ plant and the height of the 1st fruiting branch were significantly influenced by O.M. application. On the other hand, the following growth traits, i.e. percentages of successful hills, number of vegetative branches/ plant, days to 1st flower appearance and 1st boll opening as well as seed cotton yield and yield components (**Tables 2 & 3**) and fiber quality traits (**Table 4**) were not significantly affected.

II. Effect of cotton planting dates

As previously mentioned, the planting dates of cotton are correlated directly with the number of taken cuts of berseemc.v. Meskawy. Results in **Table (1)** indicate that all studied growth traits were significantly affected by planting dates, early planting date (March) showed superiority over April and May planting in number of fruiting branches/ plant as well as days to 1st flower appearance and 1st boll opening.

Similar results were reported by **Bilbro (1975)**; **Makram et al (1994)** and **EI-Debaby et al (1995 a & b)** who reported that early sowing prolonged the period of 1st flower initiation to about 94 days from planting whereas the latest sowing date shortened the mentioned period to about 74 days. On the contrary, late planting dates stimulate the vegetative growth traits i.e. plant height, number of vege-

tative branches/ plant and height of the 1st fruiting branch. These results are in agreement with those of **Dawood (1980)**; **Yasseen (1986)**; **Makram et al (1994)** and **EI-Debaby et al (1995 a & b)**. The above results were quite expected due to environmental effects and variation in weather conditions mainly temperature. The minimum degree of temperature of April and May are relatively higher than that of March which enhanced germination (successful hills %), plant height and number of vegetative branches/ plant. Moreover, as a result of increasing air and soil temperatures the number of days from planting to first flower appearance and first boll opening were decreased by delaying the date of sowing cotton.

In respect to the effect of cotton planting dates on seed cotton yield and its components, results in **Table (2)** indicate that numbers of open and closed bolls/ plant as well as seed cotton yield were greatly affected by cotton planting dates. Delaying in cotton planting date (May planting) decreased and increased the numbers of open and closed bolls/ plant, respectively in the two cotton pickings. Similar results were reported by **Makaram et al (1982 & 1994)** and **Abuldahab (1991 & 2001)**.

Concerning the effect of cotton planting dates on seed cotton yield, results in **Tables (2 and 3)** showed significant decreases in yield of both pickings as planting date delayed (April and May planting) after taking three or four berseem cuts.

These results are in full agreement with **Saif EI-Nasr et al (1996)** who found that the cotton yield was significantly decreased by increasing the number of berseem cuts, and the highest net return of cotton was obtained when cotton was planted after two cuts of berseem.

General trends for Egyptian cotton indicate that early planting yielded significantly more than late planting ones, **Bilbro & Ray (1973)**; **Yousef (1980)**; **Makram et al (1981 & 1994)**; **Nawar et al (1986)**; **Abd El-Rahman (1989)**; **EI-Okkia et al (1989)**; **Abo El-Zahab (1994)** and **Abuldahab et al (2001)**.

The superiority of early sowing in cotton yield could be due to growing the cultivar to full season in order to obtain complete thermal units requirement (**Young et al (1980)**), and to the exposure of cotton plant at early stages of growth to lower night temperatures (not less than 15°C) which promotes flowering early and bring the crop to harvest in suitable time (**McMahon and Low, 1972**).

Table 3. Combined analysis for the effect of cotton planting date and organic manure on seed cotton yield, lint % and earliness index

Treatments	Seed cotton yield kentars/ fad.	Lint percentage age	Earliness index %
Organic manure (O)			
10 m ³ / fad	9.41	36.36	91.28
20 m ³ / fad	9.33	35.6	90.72
Mean	9.37	35.98	91.00
Planting dates (P)			
March 1 st week (after Fahl)	13.3	36.96	83.54
March, 1 st week (after 2 cuts of Meskawy)	12.79	36.62	84.26
April, 1 st week (after 3 cuts of Meskawy)	9.41	36.12	97.14
May, 1 st week (after 4 cuts of Meskawy)	1.98	34.22	99.07
Mean	9.37	71.96	91.00
L.S.D O	N.S	N.S	N.S
L.S.D P	0.4	1.76	0.98
L.S.D O x P	S	N.S	N.S

Table 4. Combined analysis for the effect of cotton planting date and organic manure on some technological traits

Treatments	Micronaire readings (units)	Fiber strength (g/tex)	Fiber elongation percentage	Fiber length at 2.5% Span length (mm)
Organic manure (O)				
10 m ³ / fad	4.47	27.07	7.21	29.15
20 m ³ / fad	4.33	27.4	7.48	28.78
Mean	4.4	27.23	7.34	28.96
Planting dates (P)				
March 1 st week (after Fahl)	4.5	28.79	7.72	28.43
March, 1 st week (after 2 cuts of Meskawy)	4.57	28.16	7.49	29.8
April, 1 st week (after 3 cuts of Meskawy)	4.6	25.46	7.24	28.73
May, 1 st week (after 4 cuts of Meskawy)	3.92	26.52	6.92	28.9
Mean	8.79	27.23	7.34	28.96
L.S.D O	N.S	N.S	N.S	N.S
L.S.D P	0.45	2.08	N.S	N.S
L.S.D O x P	S.	N.S	N.S	N.S

Concerning the effect of lint percentage and yield earliness, results in **Table (3)** reveal significant decreases in lint % by the delay in sowing date. Similar results were reported by **Stella et al (1980)**; **Abbas et al (1983)** and **El-Debaby et al (1995b)**. On the contrary, **Abuldahab (2001)** showed that lint index and fiber properties were not affected by sowing date. Regarding yield earliness% were increased in favor of earlier sowing dates. This was quite expected due to the superiority in seed cotton yield for early sowing compared with that of late sowing particularly that of the 1st cotton picking. These results are in agreement with those reported by **Makram et al (1994)** and **Abuldahab (2001)**.

The effect of planting dates on some fiber quality traits, namely; Micronaire reading, fiber strength, fiber elongation % and fiber length at 2.5% span length are presented in **Table (4)**.

The values of the micronaire reading and fiber length were significantly decreased only on May planting compared with those of early planting (March planting). Meanwhile, fiber strength and fiber elongation percentage were significantly decreased in both April and May plantings compared with March planting. These results agree with those reported by **Bilbra & Ray (1973)** and **Abdalla et al (1989)** and disagreed with **Abuldahab et al (2001)**.

The effect of the interaction between organic manure and planting dates of cotton was not significant on almost all studied traits as shown in **Tables (1 to 4)**. The significant effects of the interaction, means that the response of cotton plant to planting dates were not the same under the studied rates of organic manure. For example, the effect of this interaction on plant height at harvest was not significant under the low rate of organic manure (10 m³/ fad) for April and May planting, but was significant with the 20 m³/ fad. organic manure treatment.

REFERENCES

- Abbas, A.M., Dawla, N.F. and Rizk, M.A. 1983.** Effect of transplanting on Egyptian cotton under different seedling ages and sowing dates. *Ann. Agric. Sci., Moshtohor*, **20**: 3-14.
- Abd El-Rahman, L.M. 1989.** Effect of planting date on earliness and yield characters in cotton. *Agric. Res. Rev.*, **67**: 751-756.
- Abdalla, F.H., Shalaby, E.M., Eissa, A.M. and Abdel-Malak, K.K.I. 1989.** Effect of planting systems, planting dates, and distance between hills on seed and fiber properties and net return of cotton. *Assuit J. Agric. Sci.*, **20**: 267-278.
- Abo- El-Zahab, A.A. 1994.** Integrated short season production system for Egyptian cotton. *Final Report. NARP Research Grand No. (34) A-6-8.*
- Abuldahab, A.A. 1991.** Sowing date, as environmental modifier in four varieties of Egyptian cotton. *Bull. Fac. Agric., Cairo Univ.*, **42**: 311-328.
- Abuldahab, A.A. 2001.** Effect of certain sowing and thinning dates on growth and yield of cultivar Giza 86 of cotton. *J. Agric. Sci., Mansoura Univ.*, **26(1)**: 15-29.
- Abuldahab, A.A., Sohair, E.D. Elayan and Samia, E.S. Ali 2000.** Cotton growth parameters and production of Giza 75 cotton variety as affected by sowing date and nitrogen levels. *J. Agric. Sci., Mansoura Univ.*, **(12)**: 7367-7379.
- Bilbro, J.D. 1975.** Relation of air temperature to first bloom dates of cotton. *Texas Agric. Exp. Sta. Misc. Puld. No. 1186*, 8pp.
- Bilbro, J.D. and Ray, L.L. 1973.** Effect planting date on the yield and fiber properties of three cotton cultivars. *Agron. J.* **65**: 606-609.
- Dawood, A.M.M. 1980.** Response of some cotton varieties to nitrogen fertilization at different planting dates. *M.Sc. Thesis, Fac. Agric. Alex. Univ., Egypt.*
- El-Debaby, A.S., Hammam, G.Y. and Nagib, M.A. (1995a).** Effect of planting date, N and P application levels on growth characters of Giza 80 cotton cultivar. *Ann. Agric. Sci., Moshtohor*, **33(2)**: 441-454.
- El-Debaby, A.S., Hammam, G.Y. and Nagib, M.A. 1995b.** Effect of planting date, N and P application levels on seed index, lint percentage and technological characters of Giza 80 cotton cultivar. *Ann. Agric. Sci. Moshtohor*, **33(2)**: 455-464.
- El-Moghazy, M., Messiha, S., Ghaly, F.M., El-Banna, M. and Fathalla, S. 1984.** Effect of some winter crops preceding cotton varieties on seed cotton yield. *Agric. Res. Rev.*, **62(6)**: 203-215.
- El-Okkia, A.F.H., El-Shishtawy, M.M., Helal, L.A.L. and Abou-Tour, H.B.L. 1989.** Cotton cultivars response to shortening the growing season and removing the tips of cotton plants. *Ann. Agric. Sci. Moshtohor*, **27**: 2053-2070.
- Little, T.M. and Hills, F.J. 1977.** Agricultural Experimentation Design and Analysis. pp. 350. *John Willey and Sons, New York.*

- McMahon, J. and Low, A. 1972.** Growing degree days as a measure of temperature effects on cotton. *Cotton Grow. Rev.*, **49**: 39-49.
- Makram, Effat A., Othman, M.F. and Dawood, A.M. 1982.** Effect of planting date on growth, yield and earliness of Egyptian cotton cultivar, Giza 70. *Research Bulletin No. 2011, Faculty of Agric. Ain Shams Univ.* pp. 9.
- Makram, Effat, A., Abd El-Aal, H.A., Ziadah, K.A. and Darwish, A.A. 1994.** The interrelationship between planting date and each of hill spacing and nitrogen fertilization doses for the Egyptian cotton cultivar Giza 75. *Ann. Agric. Sci., Ain Shams Univ., Cairo*, **39(2)**: 606-622.
- Nawar, A.I., Kassem, A.A., Bishr, M.A. and Khadr, F.H. 1986.** Sowing cotton after berseem and relay cropping with onions. *Proc. Conf. Agron., Alex., Egypt.* **2**: 299-308.
- Radwan, F.E. and Abdel-Malak, K.K.I. 1995.** Effect of cotton transplanting, N & P₂O₅ on yield and its components. *Assiut J. Agric. Sci.*, **26(2)**: 93-104.
- Saif, El-Nasr, F.M., Zahira M. Attia, Khalil, H.E., Shams, S.M. and Kamel, A.S. 1996.** Growing long duration winter crop in cotton rotation. *Ann. Agric. Sci., Moshtohor*, **34(2)**: 501-512.
- Stella Galanopoulou-Sendouka, A.G., Sficas, N.A. Fotiadis, Gagianas, A.A. and Gearkis, P.A. (1980).** Effect of population density, planting date, and genotype on plant growth and development of cotton. *Agron. J.*, **72**: 347-353.
- Yassen, A.F.I.H. 1986.** The relationship between yield and agronomic treatments for some Egyptian and American cotton varieties. p. 106. *Ph.D. Thesis, Fac. of Agric. Ain Shams Univ. Egypt.*
- Young, E.F., Taylor, Jr. R.M. and Peterson, H.D. 1980.** Day-degree units and time in relation to vegetative development and fruiting for three cultivars of cotton. *Crop Sci.*, **20**: 370-374.
- Yousef, S.M. 1980.** Effect of late sowing on yield and quality properties of upland and Egyptian cotton varieties. *Agric. Res. Rev.*, **58(9)**: 23-38.