Egypt. J. Agric. Res., 78 (3), 2000.

RESPONSE OF COTTON PLANTS TO FOLIAR APPLICATION OF ASCOBINE AND ASCORBIC ACID

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(Manuscript received 3 June 1999)

Abstract

Two field experiments were carried out at Gemmiza Research Station, during 1996 and 1997 seasons to study the effect of Ascobine compound and ascorbic acid on cotton plants cv. Giza 75. Ascobine (containing 25% ascorbic acid and 13% citric acid) at two rates, 200 and 400 g per feddan, and ascorbic acid at three rates of 200, 300 and 400 ppm were sprayed on cotton plants either once at start of flowering or twice i.e., at start and at peak of flowering.

The obtained results showed that one spray of ascobine or ascorbic acid increased plant height significantly. One spray of ascobine at a rate of 400 g/fed. and two sprays of Ascorbic acid at a rate of 200 ppm tended to increase the number of fruiting branches per plant significatly. Spraying ascobine or ascorbic acid seemed to increase number of open bolls per plant, as a result of reducing boll shedding. In cotton leaves, all chlorophyll forms.i.e., chlorophyll a, b and total chlorophyll increased significantly by spraying these compounds either once or twice. The hgihest levels of reducing sugars and total soluble sugars were observed when 300 ppm ascorbic acid was sprayed at start of flowering. One or two sprays did not affect boll weight, however 200 g/fed. ascobine produced the highet value of boll weight. Number of sprays did not affect lint percentage, earliness of yield (except for ascorbic acid at 200 ppm in 1996), and seed cotton yield. Various concentration of ascobine and ascorbic acid affected fiber properties insigificantly. Oil seed conent was increased significantly.

INTRODUCTION

Among the available organic chemicals to the cotton researchers are ascobine (25% ascorbic + 13 % citric acid) and ascorbic acid as growth factors, which improve growth, flowering and productivity of fruits (Nishikimi, 1975). Their practical use in cotton plans under field conditions is possible. Ascobine as a natural and organic compound has auxinic action (Raskin, 1992) since it contains citric acid and ascorbic acid.

Observations that ascorbic acid is most hgihly concentrated in the more actively growing regions of plant tissues have led experiments to be designed to determin whether it acts as a growth factor in plants, where ascorbic acid promotes the growth of certain Plants and this may be due to the greater formation of indole acetic acid

(IAA) from some precursors. Sharma *et al.* (1984), reported that speed of germination and seedling growth of cotton were hgiher with 50-500 ppm ascorbic acid. Moreover, Chinoy *et al.* (1967), reported that ascorbic acid may stimulate the production of ATP by acting as electron donor in photosynthetic phosphorylation as well as oxidative phosphorylation, thus creating a favorable reduction-oxidation balance for the synthesis of nuucleic acids, proteins and cell wall constituents.

On the other hand, the presence of high- energy compounds in the cell such as phosphoenol pyruvate (PEP), ATP, 6 - phosphogluconic acid and citric acid means that the cell is rich in energy. In other words, when the concentration of these compounds is high, the oxidation of carbohydrates via glycolysis is switched off where glycolysis is a key metabblic component of the respiratory process which generates energy in the form of ATP in the cells where photosynthesis is not tacking place (Goodwin and Mercer,1985).

Dhopte and Lall (1987) and Dhopte (1990) showed the effect of foliar spray of 500 ppm ascorbic acid applied at the peak of flowering stage on leaf reddening and seed cotton yield. In two years with favorable weather conditions, ascorbic acid showed good response.

Thus, this, study aimed to study the response of cotton plants Giza 75 cultivar to ascobine and ascorbic acid application during flowering period.

MATERIALS AND METHODS

This investigation was carried out at Gemmiza Research Station, during two successive seasons (1996 and 1997) to study the effect of spraying ascobine and ascorbic acid to cotton plants. Seeds of Giza 75 cv. were sown on April 1 st and 27th March in 1996 and 1997 seasons respectively in hills spaced 20 cm apart. The active substances in ascobine compound are citric acid (13%), ascorbic acid (25%) plus organic materials (62%). Ascobine (a product of The General Organization of Agricultural Balance Fund) at two rates of 200 and 400 gram per feddan and ascorbic acid (authentic) at three rates of 200, 300 and 400 ppm were used as foliar spray and tap water as control. To study the effect of time of spraying of these compouunds, two main treatments were applied, either once at start of flowering (A), or twice i.e, at start of flowering and at peak of flowering (B). Each plot consisted of five rows, four meters long, 60 cm. apart. All cultural practices for cotton plants were carried out normally.

A complete randomized blocks design in a factorial arrangement, with four replications was used, with a plot area of 12 m^2. Five Plants were collected randomly, from each plot were taken after 15 days from each treatment (each spray) to study the following characters:

Vegetative and fruiting characters: Plant height, nuumber of fruiting branches per plant (symbodial branches) and number of bolls per plant.

Yield and yield components: At the end of season, average boll weight, number of bolls per plant, seed index, lint percentage, earliness of yield %, and seed cotton yield in kentar per feddan were determined.

Fiber properties: Micronaire value and Pressley index (fiber strength) were estimated at the Laboratories of the Cotton Technology Research Division, Giza, according to the method of testing, A.S.T.M. (1967).

Chemical analysis: Fresh leaves from the main stem on the fourth node from the apex were taken at random after 30 days from the first spray to determine the following chemical constituents in 1997 season: Chlorophyll a, b and total (Arnon, 1949), caroteniods (Rolbelen, 1957), Total soluble sugars (Smith et al., 1959), Reducing sugars (A.O.A.C., 1965), total phenols (Simons and Ross, 1971), polyphenols (A.O.A.C., 1965). Oil content was determined in cotton seeds by the A.O.C.S (1975) method.

The data were subjected to statistical analysis as shown by Snedecor and Cochran (1967). Comparisons between means were further tested using the L.S.D. at 5% level of probability in both seasons.

RESULTS AND DISCUSSION

Plant growth and fruiting characters:

It is clear from data presented in Table 1 that one spray of ascobine or ascorbic acid at sart of flowering increased significantly plant height when was recorded after 15 days from each spray with 200 gram ascobine / feddan being more effective. However, ascorbic acid with its three concentrations increased slightly plant height, this was true in both seasons. The difference in plant height may be attributed to the difference in number of stem internode and /or average internode lengh, which may do occur as a result of the stimulative effect of ascobine or ascorbic acid on growth and devlopment of cotton plants and their effect on hormone activity within the plant, thus

Table 1. Effect of Ascobine and Ascorbic acid on the development and growth characters of cotton plant in 1996 and 1997 seasons.

Treatments	Plant height (cm)				No. fruiting branches / plant				No. bolls/ plant			
	1996		1997		1996		1997		1996		1997	
	A	B	A	B	A	B	A	B	A	B	A	B
Control	160.3	174.7	156.1	170.2	17.0	22.2	16.1	19.9	15.6	30.2	13.0	25.7
One spray												
Ascobine 200g/fed	174.2	182.0	169.3	179.6	18.7	24.3	16.9	20.2	15.8	30.5	14.7	27.6
Ascobine 400g/fed	172.3	179.7	167.7	177.1	17.1	25.0	16.2	24.5	15.9	31.6	15.0	29.0
Ascorbic acid 200 ppm	160.0	175.1	157.7	174.2	16.0	20.1	15.7	20.0	18.1	33.6	14.2	28.1
Ascorbic acid 300 ppm	161.0	176.2	156.1	175.2	17.4	21.2	16.3	20.7	20.4	35.1	14.0	27.3
Ascorbic acid 400 ppm	162.1	175.3	157.0	174.7	16.1	19.7	16.0	19.8	18.0	34.7	14.5	28.7
Mean	**165.9**	**177.7**	**161.6**	**176.2**	**17.1**	**22.1**	**16.2**	**21.0**	**17.6**	**33.1**	**14.5**	**28.1**
Two sprays:												
Ascobine 200g/fed	162.0	176.5	159.7	174.7	16.6	21.7	16.0	22.1	17.2	33.6	16.7	31.9
Ascobine 400g/fed	158.7	172.2	155.0	170.1	15.3	21.9	15.5	23.3	16.0	31.8	14.5	29.1
Ascorbic acid 200 ppm	158.7	170.7	154.2	167.7	16.5	22.9	16.0	23.0	18.5	34.6	17.1	32.7
Ascorbic acid 300 ppm	156.0	168.2	153.5	166.9	16.7	21.9	17.2	22.5	18.2	33.0	16.6	31.7
Ascorbic acid 400 ppm	155.7	166.2	153.1	165.7	15.9	21.6	15.7	20.9	18.8	35.1	17.3	33.3
Mean	158.5	171.4	155.3	169.2	16.3	22.0	16.1	21.8	17.4	33.1	15.9	30.7
Average:												
Control	**158.2**	**170.8**	**155.1**	**169.0**	**16.2**	**22.0**	**16.1**	**22.4**	**17.7**	**33.6**	**16.4**	**31.7**
Ascobine 200g/fed	168.1	179.2	164.3	177.1	17.7	23.1	16.4	21.1	16.5	31.6	15.7	29.7
Ascobine 400g/fed	165.5	175.9	161.3	173.6	16.2	23.4	15.9	23.8	16.0	30.7	14.8	29.0
Ascorbic acid 200 ppm	159.3	172.9	155.7	170.9	16.3	21.0	15.9	21.5	19.5	35.1	15.6	30.4
Ascorbic acid 300 ppm	158.6	172.2	154.8	171.0	17.1	21.4	16.8	21.6	18.1	33.8	15.3	29.5
Ascorbic acid 400 ppm	158.9	170.7	155.0	170.2	16.0	20.7	15.8	20.4	18.4	35.6	15.9	31.0
L.S.D. (0.05)												
Sprays	1.46	1.50	0.99	1.40	N.S.	0.30	N.S.	N.S.	N.S.	N.S.	0.48	0.71
Treatmentsxc	2.95	2.01	1.50	2.05	0.54	0.50	0.54	N.S.	0.32	1.34	0.67	1.32
Interaction	3.57	2.32	1.95	2.61	0.76	0.70	0.76	N.S.	0.45	N.S.	0.95	N.S.

A : After 15 days from first spray.
B : After 30 days from first spray.

these substances may exert its effect on cell division and / or its elongation. On the other hand, two sprays of these substances (at start of flowering and at peak of flowering) showed an opposite response where reduction in plant height was observed particularly when higher rates were used.

Results also showed that one or two sprays of ascobine (400 g /feddan) tended to increase the number of fruiting branches per plant. However, two sprays only of 200 ppm ascorbic acid exhibited also higher number of such character. The interaction between number of sprays and treatments gave significant effect on the number of fruiting branches in 1996 season.

Ascobin and ascorbic acid application, in general, led to significant increase in number of bolls per plant. It is obvious that spraying these compounds increased number of bolls as a result of deceasing boll shedding and this effect was more pronounced with spraying two times. Ascorbic acid, in general tended to increase boll setting as compared with ascobine. Such results could be attributed to the effect of ascobine or ascorbic acid in enhancing flower and boll produuction per plant rather than a controlling effect on their abscission (Nehra et al., 1987).

The previous results could be interpreted that the low pH which may do occur as a result of spraying citric acid or ascorbic acid activates enzymes already in cell wall that mediate cell extension, e.g., glycosyl transferase (Johnson et al., 1974) or directly disrupts association cell well polymers. Rayle and Cleland (1972), postulated that the primary effect of IAA auxin is to cause the cell to lower the pH of the aqueous phase of the cell wall, possibly by stimulating a membrane-bound H^+ ion pump. This increase in H^+ concentration would then weaken the hybrogen bonding between cellulose microfibrils and the xyloglucans and allow them to slide past each other under the pull of turgor pressure. Moreover, it may further aid wall plasticity by activating cell bound glycosidase some of which are known to have low pH optima.

Chemical constituents of cotton leaf:

Leaf Pigments:

Results of leaf pigment analysis are shown in Table 2. It is obvious that all chlorophyll forms i.e., chlorophyll a, b and total chlorophyll were significantly increaed by spraying these compounds either once or twice. These results may be attributed to the delayed leaf senescence, thus producing more photo pigments. The increase in chlorophyll contents was more pronounced as the rates of ascobine and ascorbic acid

were increased. In general, all treated plants contained more chlorophyll a, and for this reason, a / b ratio seemed higher as compared with the control leaves. Such results may support the view that synthesis of ascorbic acid may be linked with photosynthesis.

Results also showed that ascobine and ascorbic acid seemed to stimulate the biosynthesis of carotenoides where it increased significantly after spraying these compounds twice. However, ascobine did not increase carotenoides when applied once. Such results are in good accordance with the finding of Dhopte and Lall (1987), referring that ascorbic acid showed good response, it decreased leaf reddening and increased photosythetic and respiration rates.

Carbohydrates:

Data presented in Table 2 show clearly that ascobine and ascorbic acid enhanced and increased significantly carbohydrate contents i.e., reducing sugars and total soluble sugars. The highest level of carbohydrate content was observed when 300 ppm of ascorbic acid was sprayed one time. In this respect, Dhopte and Lall (1987), reported that foliar spray of 500 ppm ascorbic acid applied at the peak of flowering stage increased leaf carbohydrate and nitrogen. It could be concluded that ascorbic acid or citric acid (mainly) play a role as activators or intermediates in the formation of carbohydrate during photosynthesis. Both may be are the transformative products of the sugar first found in photosynthesis.

Phenolic components:

Data presented in Table 2 show clearly that ascobine and ascorbic acid exerted significant effects on phenolic components as polyphenols and total phenols in cotton leaves. In addition, two sprays of such compounds increased slightly the phenolic components when compared with one spray. However, higher rates of ascobine or ascorbic acid produced more total phenols. Low values for polyphenol / total phenol percentage were recorded when ascorbic acid was sprayed one time only. Polyphenols and other derivatives from shikimate metabolism play an important role in decreasing IAA oxidation by 30% in healthy cotton tissues because these compounds contributed to the increase of IAA and decrease IAA decarboxylation (Wiese and De Vay, 1970). Also, polyphenols inhibit the action of IAA oxidase (Zink and Muller, 1963, Abdel-Al et al., 1998).

Table 2. Effect of Ascobine and Ascorbic acid on the chemical constituents of cotton leaves, as mg/ g (after 30 days from the first spray) in 1997 seasons.

Treatments	Chlorophy II				Caroten-oides	Total soluble sugars	Polyphe nols	Total phenols	Polyphenols/ Totalphenols %
	Chl. a	Chl b	Total Chl	a/b Ratio					
Control	2.88	1.75	4.63	1.65	0.66	23.51	8.22	10.19	80.61
One spray									
Ascobine 200g/fed	3.32	1.78	5.10	1.86	0.52	24.63	9.07	10.04	90.03
Ascobine 400g/fed	3.51	1.92	5.42	1.82	0.54	26.70	10.05	16.65	94.36
Ascorbic acid 200 ppm	3.05	1.77	4.82	1.72	0.70	32.39	8.37	11.85	70.63
Ascorbic acid 300 ppm	3.10	1.80	4.90	1.72	0.74	36.50	9.00	12.13	74.19
Ascorbic acid 400 ppm	3.20	1.85	5.05	1.73	0.69	33.11	9.25	13.12	70.50
Mean	**3.24**	**1.82**	**5.06**	**1.77**	**0.64**	**30.67**	**9.15**	**12.76**	**79.94**
Two sprays:									
Ascobine 200g/fed	3.52	1.82	5.35	1.92	0.71	27.15	9.10	11.86	76.72
Ascobine 400g/fed	3.62	1.90	5.52	1.90	0.68	28.70	11.42	13.35	85.54
Ascorbic acid 200 ppm	3.65	2.20	5.85	1.66	0.77	32.91	9.48	10.62	89.26
Ascorbic acid 300 ppm	3.80	2.23	6.13	1.63	0.78	35.15	10.58	11.20	94.46
Ascorbic acid 400 ppm	3.95	2.15	6.10	1.83	0.80	34.27	9.55	11.04	86.50
Mean	**3.71**	**2.06**	**5.79**	**1.79**	**0.75**	**31.64**	**10.03**	**11.61**	**86.50**
Average:									
Ascobine 200g/fed	3.42	1.80	5.22	1.89	0.62	25.39	9.08	10.95	83.37
Ascobine 400g/fed	3.56	1.91	5.47	1.86	0.61	27.70	10.73	12.00	89.95
Ascorbic acid 200 ppm	3.35	1.98	5.33	1.69	0.73	32.65	8.92	11.23	79.94
Ascorbic acid 300 ppm	3.45	2.06	5.51	1.67	0.76	36.32	9.79	11.66	84.32
Ascorbic acid 400 ppm	3.57	2.00	5.57	1.78	0.75	33.69	9.40	12.08	78.50
L.S.D. (0.05)									
Sprays	0.02	0.02	0.01		0.01	0.20	0.03	N.S	
Treatments	0.03	0.03	0.02		0.01	0.34	0.05	0.12	
Interaction	0.04	0.04	0.03		0.02	0.48	0.07	0.17	

Yield and yield components:

Table 3 shows the effect of spraying ascobine and ascorbic acid on yield components of Giza 75 cotten cultivar. Results showed that number of sprays (once or twice) did not affect significantly boll weight, since once and twice sprays of 200 g/fed ascobine produced the hgihest value of boll weight. However, one spray of ascorbic acid was more effective than two sprays.

Results given in Table 3 indicate that seed index was affected singificantly in 1996 season only as a result of foliar application of ascobine and ascorbic acid sprayed once or twice. However, these treatments increased in general seed index.

Number of sprays failed to affect significantly lint percentage, earliness of yield percentage and seed cotton yield. This means that one spray is enough to attain higher yield. Variation in ascobine and ascorbic acid concentrations seemed to affect these characters since seed cotton yield was affected significantly in the two seasons. Results showed that ascorbic acid at 200 ppm gave the highest value of lint % and earliness of yield. However, Ascobine treatment at 200 g gave the highest seed cotton yield in both seasons. Such results may be attributed to the stimulative effect of citric acid or ascorbic acid on number and weight of open or matured bolls per plant. In this respect Brar et al. (1983), reported that spraying 100 ppm ascorbic acid at the flowering stage of cotton gave hgiher seed cotton yield. Nehra *et al.* (1987), showed that ascorbic acid application increased seed cotton yield per plant as well as per hectare. They added that 0.3 mM ascorbic acid increased number of flowers and bolls, while 0.6 mM was effective at reducing boll abscission and increasing final yield.

Fiber properties:

Results in Table 3 show that number of sprays did not affect fiber propertties i.e., micronaire reading (fiber maturity and fineness) and Pressley index (fiber strength) in the two seasons. On the other hand, different concentrations of ascobine and ascorbic acid seemed to affect fiber properties insignificantly.

Seed oil:

Data in Table 3 reveal that oil seed content was significantly affected by number of sprays or treatments in 1997 season, whereas oil seed value was significantly increased by spraying ascobine up to 200 g/fed once or twice in both seasons. Such results may be due to the fact that citric acid or ascorbic acid exerted its effects on the metablism and biosynthesis of oil and its related compounds.

Table 3. Effect of Ascobine and Ascorbic acid on yield, fiber properties and seed oil content of cotton in 1996 and 1997 seasons.

Treatments	Boll weight gm		Seed index gm		Lint %		Earliness %		Seed Cotton yield (k/f)		Micronaire reading		Peressley index		Oil seed %	
	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997	1996	1997
Control	3.15	3.39	10.33	11.20	37.83	36.53	64.33	59.05	10.38	9.75	4.27	4.28	10.43	10.44	18.87	19.10
One spray																
Ascobine 200g/fed	3.40	3.46	10.34	11.60	37.63	36.10	66.50	61.10	11.80	10.75	4.40	4.30	10.32	10.31	20.10	20.51
Ascobine 400g/fed	3.33	3.41	11.33	11.50	37.47	36.20	62.23	59.00	10.76	9.96	4.40	4.35	10.45	10.39	18.53	18.85
Ascorbic acid 200 ppm	3.32	3.37	10.20	11.10	38.50	37.15	67.94	61.90	11.20	9.81	4.37	4.36	10.42	10.45	19.22	19.77
Ascorbic acid 300 ppm	3.33	3.37	10.50	11.21	36.87	37.00	64.41	59.53	11.15	9.93	4.39	4.30	10.33	10.39	19.27	19.81
Ascorbic acid 400 ppm	3.35	3.41	11.30	11.20	37.63	36.30	64.62	59.31	11.31	10.12	4.52	4.42	10.48	10.46	19.32	19.27
Mean	**3.35**	**3.40**	**10.73**	**11.32**	**37.62**	**36.55**	**65.14**	**60.17**	**11.24**	**10.11**	**4.42**	**4.35**	**10.40**	**10.40**	**19.29**	**19.64**
Two sprays:																
Ascobine 200g/fed	3.30	3.40	10.38	11.21	37.89	36.70	65.10	60.15	10.76	10.11	4.41	4.32	10.30	10.33	19.36	19.66
Ascobine 400g/fed	3.17	3.25	10.40	11.20	37.97	37.00	63.81	58.75	10.50	10.00	4.38	4.33	10.46	10.42	18.10	18.22
Ascorbic acid 200 ppm	3.20	3.32	10.52	11.30	37.67	36.50	65.43	59.21	10.52	10.10	4.36	4.37	10.38	10.41	20.70	18.91
Ascorbic acid 300 ppm	3.33	3.33	10.60	11.30	37.57	36.47	63.56	59.67	10.00	9.85	4.40	4.25	10.36	10.37	19.70	18.85
Ascorbic acid 400 ppm	3.35	3.37	10.55	11.38	37.54	36.50	62.90	58.76	10.45	10.00	4.49	4.40	10.43	10.45	18.67	18.71
Mean	**3.27**	**3.33**	**10.49**	**11.28**	**37.73**	**36.63**	**64.16**	**59.31**	**10.45**	**10.01**	**4.41**	**4.33**	**10.39**	**10.40**	**19.31**	**18.87**
Average:																
Ascobine 200g/fed	3.35	3.43	10.49	11.44	37.76	36.40	65.80	60.60	11.03	10.06	4.40	4.31	10.31	10.32	19.73	20.08
Ascobine 400g/fed	3.25	3.33	10.70	11.33	37.72	36.60	63.02	58.87	10.36	9.98	4.39	4.34	10.45	10.40	18.61	18.53
Ascorbic acid 200 ppm	3.25	3.35	10.43	11.10	38.08	36.82	66.68	60.55	10.86	9.95	4.36	4.36	10.40	10.43	19.69	19.34
Ascorbic acid 300 ppm	3.33	3.35	10.55	11.17	37.22	36.73	63.98	59.60	10.57	9.89	4.39	4.27	10.34	10.38	19.48	19.33
Ascorbic acid 400 ppm	3.35	3.39	10.88	11.25	37.58	36.40	63.76	59.03	11.12	10.43	4.50	4.41	10.45	10.45	18.99	18.99
L.S.D. (0.05)																
Sprays	N.S.	N.S/	0.10	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	N.S.	0.18
Treatments	0.10	0.17	0.17	N.S.	0.41	N.S.	1.61	N.S.	0.29	0.28	N.S.	N.S.	N.S.	N.S.	0.45	0.25
Interaction	0.14	N.S.	0.24	N.S.	0.59	N.S.	N.S.	N.S.	0.41	0.40	N.S.	N.S.	N.S.	N.S.	0.36	0.36

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إستجابة نباتات القطن للرش بالاسكوبين وحمض الاسكوربيك

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أجريت تجربتان حقليتان بمحطة بحوث الجيزة موسمى ١٩٩٦، ١٩٩٧ ، بغرض دراسة تأثير كل من المركب العضوى أسكوبين وكذا حمض الأسكوربيك على نباتات القطن صنف جيزة ٧٥ . وقد تم رش الأسكوبين (٢٥٪ حمض الأسكوربيك + ١٣٪ حمض ستريك + ٦٢٪ مواد عضوية) ، بمعدل ٢٠٠، ٤٠٠ جرام/فدان ، وحمض الأسكوربيك بمعدل ٢٠٠ ، ٣٠٠ ، ٤٠٠ جزء فى المليون مرة واحدة فى بداية التزهيز أو مرتين فى بداية التزهير وفى قمة التزهير معاً.

وقد أدى الرش بحمض الأسكوربيك أو مركب الإسكوبين مرة واحدة إلى زيادة معنوية فى طول النبات . كما أوضحت النتائج زيادة معنوية فى عدد الأفراع الثمرية / نبات باستخدام رشة واحدة بمعدل ٤٠٠ جم أسكوبين ، ورشتين بمعدل ٢٠٠ جزء فى المليون حمض الأسكوربيك كما أدى إستخدام هذين المركبين إلى زيادة فى عدد اللوز على النبات نتيجة نقص معدل تساقط اللوز على النبات .

وأظهرت نتائج التحليل الكيميائى لأوراق القطن زيادة معنوية فى المكونات الكلية للصبغات النباتية مثل كلورفيل أ، ب بعد رش هذه المركبات مرة واحدة أو مرتين . كما أعطى إستخدام حمض الأسكوربيك بمعدل ٣٠٠ جزء فى المليون أعلى مستوى من السكريات المختزلة والسكريات الذائبة الكلية عند الرش مرة واحدة. كما لوحظت زيادة بسيطة للمركبات الفينولية مثل الفينولات العديدة والفينولات الكلية.

وأظهرت نتائج المحصول أن وزن اللوزة لم يتأثر معنويا بعدد مرات الرش ، ولكن رش الأسكوبين بمعدل ٢٠٠ جرام /فدان اعطى أعلى قيمة لوزن اللوزة . كما أدت جميع المعاملات الى زيادة معنوية فى معدل وزن ١٠٠ بذرة بالجرام، والنسبة المئوية للشعر وكذا نسبة التبكير للمحصول فى موسم واحد فقط.

كما أظهر رش هذين المركبين تأثيرا معنوياً على محصول القطن الزهر بالقنطار / فدان فى كلا الموسمين مع عدم وجود تأثير لعدد الرشات على المحصول. وعموماً فإن إستخدام حمض الأسكوربيك بتركيز ٢٠٠ جزء فى المليون أعطى أعلى قيمة لتصافى الحليج ، والتبكير فى المحصول. بينما الأسكوبين بمعدل ٢٠٠ جرام أ عطى أعلى محصول فى السنتين . وكان للتركيزات المختلفة لهذه المركبات تأثيراً غير معنويا على صفات الشعر التكنولوجية . وعلى العكس من ذلك أثرت هذه المركبات على زيادة نسبة الزيت ببذرة القطن تأثيراً معنويا فى كلا الموسمين .