



## Effect of plant growth regulators on the lint quality of cotton parameters

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### Abstract

Laboratory studies were carried out to analyze the effects of application of plant growth regulators Pix (mepiquat chloride), salicylic acid and Planofix (naphthaleneacetic acid). Cotton was harvested two times and lint of every picking was analyzed separately. The experiment conditions were on seed index, micronaire, fibre maturity, staple length, fibre strength, ginning out turn and seed germination. Results showed that there was no significant effect of plant growth regulators on all above lint quality characters. There was significant harvesting on staple length, whereas the highest staple length was recorded for second harvesting which was 31.00 mm compared with first which was 29.00 mm. The lowest seed germination was recorded in control plots, while the highest seed germination was recorded in plots receiving plant growth regulators. The highest values of lint quality characters were recorded on first harvest of crop.

**Keywords:** cotton, lint quality, PGR, Got

### Introduction

Cotton, *Gossypium hirsutum* L, is the most important fiber crop of Pakistan and the world. It provides raw material not only to our ginning factories and rapidly expanding textiles industries but also to oil mills for manufacturing edible oil and Cotton is regarded as the mother of civilization <sup>[1]</sup> The area under cotton cultivation in Pakistan during 2002 to 2003 stands 2793.6 thousand hectares with production of 10210.6 thousand bales. The contribution of Sindh province is 542.6 thousand hectares with production of 2411.8 thousand bales. Furthermore, the yield per hectares of Pakistan and Sindh province is 622 and 756 kgs respectively (GOP, 2003). Taxonomically, cotton is known as *Gossypium* spp. According to the latest classification, this genus has been divided into 28 species out of these only four species i.e., *G. hirsutum* L., *G. herbaceum* L. *G. arborium* L. and *G. barbadense* L. are cultivated for fiber supply in the world. Timely sowing of cotton varieties and the proper application of selected pesticides against insect pests would ensure the increase in production and yield of cotton to largest extent <sup>[2]</sup>. Among other measures to be taken in order to boost up the yield and production of cotton, the application of hormones and micronutrients is step of great importance. Productivity was significantly influenced by a top dressing of nitrogen at 100 kg N/ha. There was no significant difference between productivity without PIX and treatment with PIX at 50 g a.i. /ha. PIX at 100 g a.i./ha significantly reduced productivity. The major benefit from using the growth regulator was uniformity of maturation and advancement of harvest <sup>[3]</sup>.

Hormones and plant growth regulator not only stimulate cell division and cell enlargement but also play specific role in seed germination, plant growth, darkness is also prevented by hormones <sup>[4]</sup>. Plants need essential and non-essential elements for growth and development from germination to maturity these elements are grouped as micro and macro nutrients on basis of amount required by plants <sup>[5]</sup>. In present study plant growth regulators, are used on cotton to axes their effect on lint quality characters. Such studies will help

in the understanding the effect of use of plant growth regulators, in increasing cotton yield and its quality characters.

### Materials and Methods

The field experiment on effect of use of plant growth regulators, on cotton plant damage compensation and cotton lint quality characteristics was conducted in the field of Cotton Section, Agricultural Research Institute (ARI), Tandojam. Cotton plant damage was simulated by artificially removing cotton leaves and fruiting bodies. Different treatments were arranged as:

T1 = Natural control.

T2 = 12 percent leaves + fruiting bodies removed.

T3 = 24 percent leaves + fruiting bodies removed.

T4 = 36 percent leaves + fruiting bodies removed.

T5 = 48 percent leaves + fruiting bodies removed.

T6 = 60 percent leaves + fruiting bodies removed.

T7 = treated control, in which plant growth regulators were applied.

Three plant growth regulators were tested: Pix (mepiquat chloride) (P1), (salicylic acid) (P2) and Planofix (naphthalene acetic acid) (P3). The present study on lint quality characteristics were conducted under laboratory conditions at Fiber Technology Laboratory, ARI, Tandojam from October 2015 to January 2016.

### Collection of Samples

Plant growth regulators, experiment lint samples for different treatments were collected separately. Samples were properly labeled and stored before carrying out lint quality tests. Cotton was harvested (picked) two times and lint of every picking was analyzed separately. Before analysis samples were cleaned and trash was separated out. The following tests were carried out. After weighing the samples, ginning was carried out for separation of the lint and seeds from seed cotton on ginning machine. For determination of seed index, 100 cotton seeds were

collected at random and weighed on an electrical balance (Sartorius 200s model). The tests conducted under laboratory conditions were: Seed Index, Micronaire, Fibre maturity, Staple Length, Fibre Strength, Ginning out Turn and Seed Germination.

**Results**

**Ginning Out Turn**

The results of ginning out turn are shown in Table-1 which indicated that the application of plant growth regulators had no effect on ginning out turn. However, time of harvesting a significantly ( $F=275.30$ ,  $DF=1, 82$ ;  $P<0.0001$ ) affected the ginning out turn.

**Staple length**

There was no significant effect of plant growth regulators on staple length. Staple length varied between 29.00 and 31.00 mm. There was significant harvesting on staple length, whereas the highest staple length was recorded for second harvesting which was 31.00 mm compared with first which was 29.00 mm.

**Micronaire value**

There was no significant effect of damage simulation, application of plant growth regulators and time of harvesting of cotton on

**Table 1:** Effect of artificial damage simulation, plant growth regulators time of picking on Ginning out turn, Staple length and Micronaire value % of cotton.

Picking	Plant Growth Regulators	T1	T2	T3	T4	T5	T6	T7
1	Pix	32.84	32.21	32.61	32.48	31.83	32.76	32.19
	Salicylic acid	32.96	33.55	32.15	32.22	31.57	31.96	32.93
	Planofix	32.11	31.11	32.33	33.69	34.05	32.32	33.25
2	Pix	34.94	36.98	37.41	37.5	36.76	34.94	37.56
	Salicylic acid	37.56	36.73	37.16	36.26	36.30	36.24	35.78
	Planofix	37.49	36.73	37.77	37.79	37.67	36.36	37.29
1	Pix	29.66	30.33	30.33	29.66	29.5	30.33	29.66
	Salicylic acid	29.5	29.33	30.33	30.16	29.5	30.16	30.16
	Planofix	30.00	29.66	30.83	30.5	30.83	29.66	30.33
2	Pix	30.16	29.33	30.16	29.66	29.83	30.33	29.66
	Salicylic acid	29.66	30.33	30.16	29.5	29.66	29.33	30.00
	Planofix	29.83	29.83	30.66	30.00	31.00	29.66	30.66
1	Pix	4.08	3.96	4.08	3.82	4.18	4.16	3.88
	Salicylic acid	3.82	3.97	3.93	4.00	3.41	3.54	3.93
	Planofix	3.81	3.88	4.06	4.11	4.01	4.06	3.88
2	Pix	4.50	4.32	4.44	4.21	4.51	4.26	4.21
	Salicylic acid	3.89	3.81	3.8	3.71	3.75	3.95	3.88
	Planofix	4.43	4.30	4.40	4.21	4.29	4.15	3.64

**Fibre maturity**

Fiber maturity in the present study varied between 82.51 to 87.86% (Fig 1). There was no significant effect of application of plant growth regulators on fiber maturity. However, fiber maturity was significantly ( $F=56.46$ ;  $DF=1, 82$ ,  $P=0.001$ ) greater for first harvesting compared with second.

**Seed index**

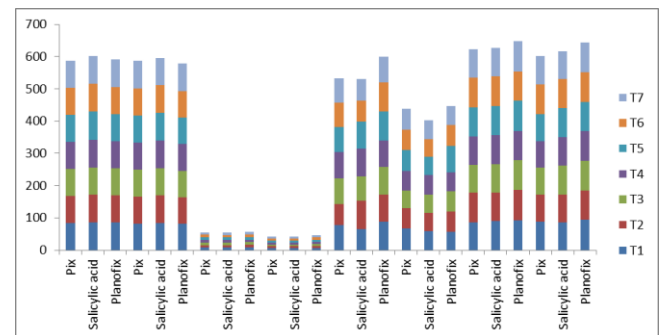
There was no significant effect of removal of fruiting bodies and leaves on the seed index. Similarly application of plant growth regulators also did not affect the seed index. Seed index of cotton was significantly ( $F=266.29$ ;  $DF=1, 82$   $P<0.001$ ) greater for second harvesting compared with first harvest (Table-5).

**Seed germination**

The lowest seed germination was recorded in control plots, while the highest seed germination was recorded in plots receiving plant growth regulators. The time of harvest also significantly ( $F=1017.61$ ;  $DF=1, 82$ ,  $P<0.0001$ ) affected the seed germination.

**Fiber Strength**

There was no significant effect of application of plant growth regulators and time of harvesting on the fiber strength in present study. The fiber strength remained between 80.72 and 94.41.



**Fig 1:** Effect of artificial damage simulation, plant growth regulators time of picking on Fiber maturity, Seed index, Seed germination and Fiber strength of cotton.

**Discussion**

In present study use of plant growth regulators had no significant effect on seed index, fiber maturity, staple length, ginning out turn and seed germination. Whereas, the time of harvesting significantly affected all the lint quality characters under present study. An investigation recorded by [6] whom found that Excessive growth reduces seed cotton yields and encourages insect-pests attack. Various growth retardants such as Pix (mepiquat chloride [mepiquat]), cycocel (chlorocholine chloride [chlormequat]), Alar (daminozide), Ethrel (ethephon) have been found to reduce vegetative growth such as plant height, leaf area, root weight, internodal distance and increase number of

sympodia/plant, ginning percentage, lint index and seed cotton yield. Whereas the, There was no significant effect of removal of fruiting bodies and leaves on the seed index. Similarly application of plant growth regulators also did not affect the seed index. Some other researcher<sup>[7-9]</sup> studied the yield of treated plots increased by an average of 35% in comparison with the control Cycocel 75 improved fibre strength significantly, although other parameters of fibre quality, such as length, uniformity, elongation, and micronaire index were not affected respectively<sup>[10]</sup>. Carried out application of plant growth regulator and micronutrients significantly delayed the maturity of cotton. There was no significant effect of damage simulation, application of plant growth regulators and time of harvesting of cotton on in present study recorded.

### Conclusions

There was no significant effect of damage simulation (removal of fruiting bodies and leaves) whereas plant growth regulators have no effect on micronaire and fibre strength. Moreover, the time of harvesting (picking) significantly affected lint quality characters.

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