Standardization of Agricultural Practices for High Density Cotton Planting in the Dry Zone

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Abstract

As precious as refined white gold Cotton, being a leading natural fibre commodity and a major cash crop in India, is very important to the country's economy. About 5% of GDP, 14% of industrial output, and 11% of total export revenues come from the textile sector. Cotton manufacturing came next, after farming. In order to learn more about the impact of planting pattern, intercrops, and nutrient management practises on the growth and yield of cotton under a high density planting system, field experiments were carried out at KVK, Lucknow farm, Kanpur during kharif 2020 and kharif 2021. Three replicates of a split plot design were used in the experiment to test the effect of different planting radii on different cotton genotypes. The findings showed that the seed cotton yield, net returns, and B:C ratio were all considerably better in plots with a planting geometry of 45 x 10 cm compared to other plot geometries.

Keywords: *Cotton, Kharif, Crop, Economy, Field Experiments.*

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Introduction

India is the only place in the world where all four types of cotton can be grown successfully in a variety of agricultural environments. Although cotton is cultivated in 81 different nations, India has the most cotton fields and is second in cotton output worldwide. China, India, the United States, Brazil, and Pakistan are the five major cotton-producing nations in the world. [1-2]

Shorter sympodial branches and shorter internodal length provide compact genotypes the morphological traits of a compressed habit and clustered bolls, and they require minimal area owing to their low vertical and horizontal development. Therefore, they provide a lot of leeway for decreasing both the interrow width and the interplant spacing. Because the plants are shorter, they are simpler to reach and preserve. Growing more plants in a given space is easier with compact genotypes since their smaller stature allows for double-cropping, mechanised harvesting, and the benefit of fewer harvests overall.[3-4]

Countries including the United States, Australia, Brazil, Uzbekistan, and China that are major producers of cotton have produced compact genotypes that allow for denser planting densities of 1-2,500,000 plants per hectare. Compact cultivars, improved pest control techniques, the advantages of defoliants, and the use of automated pickers have all contributed to the success of the high density planting system (HDPS) in the aforementioned nations. To this end, adapting HDPS in cotton to the conditions in India may provide a viable alternative technique for boosting cotton's production and economic viability.[5-6]

Risk in cotton production is reduced by the use of cotton-based intercropping systems, which are common in cotton-growing countries due to issues with pests, extended gestation periods for revenue realisation, price volatility, market uncertainty, and increasing input costs out of proportion to income. Inter or mixed cropping with pulses is a typical method of growing cotton. The economic benefit of intercropping pulses, however, is minimal. Therefore, intercropping high-value vegetable crops is a practical method for maximising profits per acre.[7-8]

Soil productivity and environmental quality suffered as a result of decades of uneven dietary practises. The steady decrease in soil organic content and low crop production is mostly attributable to the sub-optimal use of NPK fertilisers by poor and marginal farmers.Cotton yields were negatively impacted by negative nitrogen and potassium balances, according to the nutrient budgeting analysis study. Cotton thrives on soils that have been supplemented with nitrogen, phosphorus, and potassium. Over-fertilization with nitrogen results in abundant vegetative growth, which attracts pests like bollworms and sucking bugs. However, there is no data on how cotton coupled with intercropping systems respond to paired row planting and nutrient management practises for vegetables and legumes.[9-10]

2. Material And Methods

Experiment location

Experiments in the field were carried out in the Southern Dry Zone of Uttar Pradesh at the Lucknow farm near Kanpur during the kharif seasons of 2020 and 2021. Located at 11 degrees 55 minutes north of the equator and 76 degrees 56 seconds east of the longitude, the station is 787.6 metres above sea level (MSL).

Location of the experiment's soil

The soil used in the studies was a medium black clay loam. Before conducting the trials, the experimental plot was levelled. Composite soil samples were taken at random from the experimental plot between 0 and 30 centimetres deep for analysis of physical and chemical parameters. Table simply summarises the results and the approaches used to their assessment.

Table 1: Environmental factors at the experimental location

Properties	Values obtained
Physical properties	
1. Particle size analysis	
Sand (%)	20.20
Silt (%)	38.35
Clay (%)	41.45
Texture	Clayloam
2. Bulk density (mg m^{-3})	1.27
B. Chemical properties	
Soil reaction (pH)	7.58
Electrical conductivity (dS m^{-1})	0.45
Organic carbon (%)	0.23
Available nitrogen (kg ha^{-1})	214.6
Available phosphorus (kg ha^{-1})	22.3
Available potassium (kg ha^{-1})	293.8

The soil in the test plot was worked to a fine tilth by ploughing it twice with a tractor-drawn plough and then being harrowed twice. 20 cm wide and 15 cm high bunds were used to divide each allotment.

Sowing

The tests were carried out as intended. Within each experimental plot, furrows were dug at 45-, 60-, and 90-centimeter intervals, and two seeds per hill were dibbled at a depth of 2.5-5.0 centimetres, with 10, 20, and 30-centimeters of separation between them. Both plantings took place on July 28th, 2020 and July 30th, 2021. DSC-99, ARBC-64, and SURAJ were employed as compact genotypes for this research.

On July 30, 2020, and July 31, 2021, planting took place for a second experiment examining the effects of intercropping on yield and nutrient management. Markings were made at the prescribed intervals between rows. Normal sowing required 60 cm between rows, with each dibbled seed being spaced 10 cm apart. The paired row technique used a spacing of 45/90 10 cm for sowing. The treatment consisted of planting two rows of intercrops between every two rows of cotton. The bundle of cultural practises that was suggested was implemented. Listed below are the specifics.

Statistical analysis of data

According to the Gomez and Gomez (1984) ANOVA technique. The 'F' and 't' tests were performed at the P=0.05 level of significance.Results have been analysed and discussed based on the combined data from the two seasons, and ciritical difference values have been produced whenever the F test was significant. While, appendices have information for each specific year.

3. Results

The response of several cotton genotypes to HDPS-implemented changes in planting geometry

The optimal planting density for cotton varies greatly depending on cropping system, climatic circumstances, and cultivars, yet it is a key factor in reaching optimum production. Many physiological mechanisms, governed by both the plant's genetics and its environment, distinguish one cultivar from another in terms of production potential. There has been some thought given to the possibility of reducing production costs by shortening the growing season through the use of newly developed cotton genotypes that feature short stature, earliness, compactness, sympodial growth habit, and synchronous boll opening. Because of their smaller height, compact genotypes also provide the possibility of boosting plant population per unit space. It opens the door to opportunities like double cropping and mechanised harvesting. The small size of these varieties means they may be harvested with little effort. As a result, farmers may save money on labour and seed by using varietal seeds in the next planting season. In light of the above, the current investigation was undertaken to assess the yield potential of several cotton genotypes in response to variations in planting geometry. These are the results of the experiment.

Growth parameter changes as a result of planting orientation and cotton genotypeCotton

- **Plant height**

Tables detail how planting geometry and cotton genotypes at various development stages affect the final height of cotton plants. According to the data collected, there was no correlation between planting geometry and plant height at 30 DAS. At 60 DAS, plants were found to be tallest in the 45 10 cm (45.47 cm) planting geometry, next in the 60 10 cm (40.07 cm) planting geometry, and finally in the broader 90 60 cm (25.12 cm) planting geometry. Because of greater plants per unit area, competition for sunlight, water, and nutrients may contribute to taller plants in closely spaced plantings.

Table 2: Cotton plant height (in centimetres) at 30, 60, and 90 days after sowing

Treatments	30 DAS				60 DAS				90 DAS			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	16.15	15.97	16.11	16.07	48.97	47.42	40.03	45.47	67.57	63.02	56.73	62.44
P2	15.37	15.53	15.05	15.32	36.18	35.18	32.15	34.51	48.45	46.45	42.40	45.77
P3	15.30	15.75	15.19	15.41	42.75	41.50	35.97	40.07	61.13	57.48	52.07	56.89
P4	15.25	14.65	14.00	14.63	32.70	31.55	29.40	31.22	44.83	42.88	39.73	42.48
P5	15.10	14.42	14.43	14.65	27.67	25.97	21.72	25.12	42.00	39.90	36.75	39.55
Mean	15.43	15.26	14.96	15.22	37.65	36.32	31.85	35.28	52.80	49.95	45.54	49.43
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.36		NS		1.40		4.57		1.59		5.18	
V	0.41		NS		1.33		3.91		1.67		4.93	
P × V	0.91		NS		2.97		NS		3.74		NS	

However, apical dominance inhibition may account for the shorter stature seen with broader planting geometries. All of these findings agree with those of previous studies by Narayana et al. (2007), Sisodia and Khamparia (2007), and Bharathi et al. (2018).

Maximum plant height was measured as follows for the cotton genotype DSC-99: 15.43 cm at 30 days after sowing (DAS), 45.47 cm at 60 DAS, 52.80 cm at 90 DAS. At 30 days after sowing, however, there was no discernible variation in plant height across genotypes. Plant height was consistently lower across the board for the SURAJ cotton genotype. Plants' responses to environmental circumstances and their own unique genetic composition account for much of the variation in their mature height.

- **Cotton's overall buildup of dry matter (g plant-1)**

Table presents the effects of planting geometry and cotton genotypes at various phases of crop development on dry matter accumulation per plant (g) at harvest.

Both planting orientation and genotype had significant effects on the amount of dry matter each plant produced. Early on, up to 30 DAS, dry matter accumulation per plant was modest and there were no significant differences between planting geometries and genotypes. Dry matter accumulation plant-1 ranged from 5.40 g to 168.48 g from 30 DAS onwards to harvest. The highest amount of dry matter accumulation was

Table 3: Cotton's dry matter accumulation in reproductive parts (g plant-1) at 90 DAS, 120 DAS, and harvest (Pooled data of two years) as affected by planting geometry and genotype.

Treatments	120 DAS				At harvest			
	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	35.69	35.98	37.19	36.29	48.03	45.76	44.66	46.15
P2	38.30	39.16	41.49	39.65	57.17	54.23	51.55	54.31
P3	37.85	39.04	40.89	39.26	55.44	52.61	49.63	52.56
P4	41.63	42.60	43.49	42.57	63.82	61.48	58.43	61.24
P5	43.08	43.31	44.10	43.49	69.24	66.33	64.86	66.81
Mean	39.31	40.02	41.43	40.25	58.74	56.08	53.83	56.22
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.54		1.78		0.68		2.21	
V	0.38		1.13		0.51		1.49	
P × V	0.86		NS		1.13		NS	

At 120 days after sowing (DAS), as well as at harvest, the cotton genotype DSC-99 recorded significantly higher total dry matter production than either ARBC-64 (18.40 g plant-1) or

SURAJ (16.93 g plant-1) in terms of dry matter yield. This variation in dry matter accumulation between genotypes may result from a complex interplay between the genotypes' individual genetic make-up and the environment in which they are grown. Adarsha et al. (2004), Vinayak (2006), and Pendharkaret al.(2010) all found results consistent with these ones.

In terms of total dry matter accumulation per plant, we discovered no statistically significant interaction impact between planting geometry and cotton genotypes. However, at a planting geometry of 90 60 cm, the cotton genotype DSC-99 produced the highest total dry matter accumulation: 5.84 g, 22.14 g, 98.69 g, 130.46 g, and 168.48 g plant-1 after 30, 60, 90, and 120 days after sowing. There was no statistically significant difference in the amount of dry matter produced per square metre by planting geometry vs cotton genotypes.

- **Leaf area index (LAI) of cotton**

Data pertaining to leaf area index of cotton as influenced by planting geometry and genotypes at different crop growth stages is presented in Table.

Table 4: Cotton's total dry matter accumulation (g plant-1) at 120 DAS and harvest (Pooled data of two years) as affected by planting geometry and genotype.

Treatments	120 DAS				At harvest			
	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	106.64	103.03	99.62	103.10	126.07	121.52	119.32	122.30
P2	113.40	111.90	110.76	112.02	144.33	138.45	133.10	138.63
P3	107.63	106.77	105.74	106.71	140.88	135.22	128.33	134.81
P4	122.48	119.53	117.37	119.79	157.63	152.97	146.87	152.49
P5	130.46	126.97	123.68	127.04	168.48	162.67	159.72	163.62
Mean	116.12	113.64	111.44	113.73	147.48	142.16	137.47	142.37
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	2.38		7.76		1.52		4.96	
V	0.65		1.92		1.03		3.04	
P × V	1.45		NS		2.30		NS	

Variations in planting geometry and genotype had a major impact on leaf area index. After increasing steadily up to 120 DAS, the cotton leaf area index began to drop as a result of leaf senescence. At 120 days after planting, the leaf area index was highest for a planting geometry of 45 10 cm (3.98), followed by 60 10 cm (3.79), and 45 20 cm (3.49). The widest planting geometry, 90 60 cm (2.75), resulted in the lowest leaf area index. All the remaining phases of the crop's development followed the same pattern. Because of increased light interception at greater population densities, tighter planting geometries result in a larger leaf area index. According to Darawsheh et al. (2009), the early leaf area index and dry matter accumulation were both greater in the ultra-narrow line cotton system than in the normally spaced cotton.

The results show that the mean leaf area index did not differ significantly amongst cotton genotypes at 30, 60, or harvest days after sowing. Mean leaf area index was highest for the DSC-99 cotton genotype (3.00 and 3.67 at 90 and 120 DAS, respectively), followed by ARBC-64 (2.83 and 3.48) and SURAJ (2.65 and 3.27). Varietal differences in cotton genotypes may account for the correlation between leaf area index and photosynthate production rate. Leena et al. (2018) and Shukla et al. (2013) found comparable patterns to these ones.

In terms of leaf area index, there was no statistically significant interaction between planting geometry and cotton genotypes.

- **Sympodial branches per cotton plant**

Table displays information on how planting geometry and cotton genotypes affect the average number of sympodial branches in cotton plants.

It was found that the number of sympodial branches per plant rose from early in the crop's life to its peak at harvest. Sympodial branches plant-1 were significantly affected by planting geometry throughout all developmental phases of the crop. At 60 DAS, the greatest number of sympodial branches was reported for a planting geometry of 90 60 cm (9.23), followed by 60 20 cm (8.78), 45 20 cm (7.99), and 60 10 cm (6.31). 45 10 cm (5.40) was found to have the fewest sympodial branches. At 90 and 120 DAS, as well as at harvest, the same pattern was seen. More room, light, nutrients, and less competition between plants might explain why sympodial branches multiply in response to increasing separation. The current result corroborate the findings of Jagtap and Bhale (2010) and Ganvir et al. (2013).

The number of sympodial branches per plant was highest in the DSC-99 cotton genotype (7.67 at 60 DAS, 9.54 at 90 DAS, 11.72 at 120 DAS, and 13.55 at harvest), followed by the ARBC-64 genotype. At every development stage, the cotton SURAJ genotype showed a decreased number of sympodial branches. The factors of morphological distinctiveness, apical dominance, plant height, and resource utilisation account for the vast inter-genotypic variation in the number of sympodial branches per cotton plant.

Table 5: The effect of planting geometry and genotype at various phases of cotton development on the number of sympodial branches per plant

Treatments	120 DAS				At harvest			
	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	8.48	8.13	7.38	**7.99**	9.83	8.77	8.20	**8.93**
P2	10.81	10.04	9.33	**10.06**	12.98	11.80	10.64	**11.81**
P3	8.95	8.41	8.02	**8.46**	10.69	9.83	9.22	**9.91**
P4	13.00	11.72	10.65	**11.79**	14.32	12.49	11.30	**12.70**
P5	17.34	16.10	14.35	**15.93**	19.95	17.85	16.77	**18.19**
Mean	**11.72**	**10.88**	**9.94**	**10.85**	**13.55**	**12.15**	**11.22**	**12.31**
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.26		0.84		0.48		1.55	
V	0.38		1.13		0.33		0.97	
P × V	0.86		NS		0.74		NS	

variant cotton strains. The results observed by Giri et al. (2008) and Nalwade et al. (2013) corroborate these results.Number of sympodial branches did not vary substantially as a function of the interaction effect between planting geometry and cotton genotypes.$^{-1}$.

Cotton yield and yield metrics as affected by planting orientation and genetics

Cotton flower cluster count (per plant)

Table displays information on how planting geometry and cotton genotypes affect the average number of bolls per plant. The number of bolls produced per plant was highest for a plant geometry of 90 by 60 centimetres (20.20), followed by 60 by 20 centimetres (16.53), and finally 45 by 20 centimetres (15.05). However, there was no significant difference in the mean number of bolls produced per plant between a 60 20 cm planting geometry and a 45 20 cm planting geometry. The 45 10 cm (9.62) planting geometry produced the fewest bolls per plant. Increasing the distance between rows and within individual rows allowed for less competition for water and nutrients, which led to a considerable increase in boll production per plant. Sisodia and Khamparia (2007), Basavaneppaet al. (2000), and Maitra et al. (2000) all found similar things, therefore our results are consistent with theirs. There was a very substantial correlation between cotton genotypes and the mean number of bolls produced per plant. DSC-99 had the highest mean number of bolls per plant (16.65), followed by ARBC-64 (14.60%), and SURAJ (13.47%). Consistent with the results of Thokale et al. (2004) and Raut et al.

There was no statistically significant difference in boll yield across planting configurations and cotton varieties.

- **Seed cotton yield (g plant^{-1})**

The effects of planting geometry and cotton genotypes on seed cotton production per plant are summarised in Table.

The 90 x 60 cm planting geometry resulted in the highest seed cotton output per plant (64.93 g plant-1), followed by the 60 x 20 cm geometry (49.47 g plant-1) and the 45 20 cm geometry (41.76 g plant-1). Planting on a 45 x 10 cm grid produced the lowest yield per plant (20.50 g). Increased photosynthates available to each plant under wider spacing contributed to overall improvements in growth qualities and their favourable influence on the number of bolls produced by each plant. The above findings agree with those of Pathrikar (2021) and Chavan et al. (2011).

Seed cotton yields were highest for DSC-99 (50.47 g plant-1), followed by ARBC-64 (40.29 g plant-1) and SURAJ (34.92 g plant-1), which were both comparable to one another. DSC-99 may have a greater seed cotton yield plant-1 owing to a combination of increased boll count and boll weight. Results like this are consistent with those found by researchers like Halemani et al. (2004) and Thokale et al. (2004). There was no statistically significant difference in seed cotton production between planting geometry and cotton genotypes.

Table 6: Cotton yield characteristics in relation to planting geometry and genotype (two-year pooled data).

Treatments	Bolls plant^{-1}				Seed cotton yield (g plant^{-1})			
	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	11.25	9.60	8.00	**9.62**	26.92	19.62	14.95	**20.50**
P2	16.10	15.25	13.80	**15.05**	47.45	42.58	35.25	**41.76**
P3	15.05	12.70	11.65	**13.13**	40.15	31.50	26.79	**32.81**
P4	18.80	15.95	14.85	**16.53**	59.43	47.11	41.87	**49.47**
P5	22.05	19.50	19.05	**20.20**	78.41	60.65	55.73	**64.93**
Mean	**16.65**	**14.60**	**13.47**	**14.91**	**50.47**	**40.29**	**34.92**	**41.89**
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.75		2.43		4.37		14.25	
V	0.65		1.92		3.44		10.16	
P × V	1.46		NS		7.70		NS	

- **Stalk yield (kg ha^{-1})**

Table displays the average yield of cotton stalks (kg ha-1) as a function of planting geometry and cotton genotypes. The cotton stalk output varied noticeably amongst the different planting arrangements. The highest cotton stalk output (5,191 kg ha-1) was achieved by planting cotton at a geometry of 45 10 cm, which was also shown to be considerably superior to any other planting geometry tested. The 90 60 cm planting geometry produced the lowest yield of cotton stalks (2,827 kg ha-1).

- **Harvest Index**

Table compiles information on cotton harvest indices for various planting geometrical arrangements and genotypes.

The harvest index was not statistically different between the two planting patterns. The harvest index was highest (0.38), however, with a planting geometry of 90 60 cm, and it was lowest (0.32), with a planting geometry of 45 10 cm. Anand alur (2020) and Kerby et al. (1990) both came to similar conclusions. The harvest index does not vary much between cotton genotypes. Harvest index values ranged from 0.34 for the SURAJ cotton genotype to 0.35 for the DSC-99 variety. Consistent with what was discovered by Kote et al. (2007), these outcomes make sense. The results of a statistical analysis of the influence of the interaction between planting geometry and cotton genotypes on harvest index were inconclusive.

Table 7: Cotton harvest index, seed cotton yield, and stalk cotton yield in relation to planting geometry and genotype (pooled data from two years).

Treatments	Stalk yield (kg ha^{-1})				Harvest index			
	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	5273	5173	5125	**5191**	0.33	0.32	0.31	**0.32**
P2	4088	4023	3964	**4025**	0.37	0.35	0.35	**0.35**
P3	4754	4663	4553	**4657**	0.32	0.32	0.32	**0.32**
P4	3761	3724	3675	**3720**	0.36	0.35	0.34	**0.35**
P5	2837	2825	2819	**2827**	0.39	0.37	0.36	**0.38**
Mean	**4143**	**4082**	**4027**	**4084**	**0.35**	**0.34**	**0.34**	**0.34**
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	22.27		72.63		0.01		NS	
V	10.87		32.06		0.01		NS	
P × V	24.30		NS		0.01		NS	

Changes in quality metrics as a result of changes in planting orientation and cotton genotypes

Tables compile information on quality metrics and how planting geometry and cotton genotypes affect them.

There was no discernible variation in quality indicators across planting configurations and cotton varieties. When comparing different planting geometries, we discovered that 90 60 cm yielded the highest ginning percentage (33.53%), seed index (8.14), lint index(4.02), mean fibre length (31.41 mm), micronaire value (4.52), uniformity ratio (47.88%), and fibre strength (23.18 g/tex). However, values were found to be at their lowest when planted 45 10 cm apart. The data are in

Table 8: Cotton ginning yield, seed index, and lint index in relation to planting geometry and genotype (two-year pooled data).

Treatments	Ginning percentage				Seed index				Lint index			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	32.20	31.80	29.30	31.10	7.99	7.90	7.72	7.87	3.83	3.75	3.65	3.74
P2	32.77	32.42	31.52	32.24	8.08	7.95	7.80	7.94	3.96	3.89	3.84	3.90
P3	32.97	32.54	31.35	32.29	7.91	7.84	7.80	7.85	3.81	3.76	3.72	3.76
P4	33.02	32.71	32.27	32.67	8.18	8.09	8.08	8.11	4.03	3.97	3.95	3.98
P5	33.76	33.45	33.38	33.53	8.24	8.11	8.07	8.14	4.07	4.00	3.98	4.02
Mean	32.94	32.58	31.56	32.36	8.08	7.98	7.89	7.98	3.94	3.87	3.83	3.88
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.63		NS		0.08		NS		0.07		NS	
V	0.31		0.92		0.06		NS		0.06		NS	
P × V	0.70		NS		0.12		NS		0.13		NS	

Table 9: The effects of planting geometry and genotypes on cotton fibre characteristics such as length, strength, micronaire value, and uniformity ratio (averaged over two growing seasons' worth of data).

Treatments	Mean fibre length (mm)				Fibre strength (g/tex)				Micronaire value (µ/inch)				Uniformity ratio (%)			
	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean	V1	V2	V3	Mean
P1	31.17	25.73	30.00	28.97	19.89	20.01	21.33	20.41	4.44	4.41	4.09	4.31	47.24	46.60	45.52	46.45
P2	30.90	25.95	30.75	29.20	22.39	21.45	22.85	22.23	4.39	4.33	4.51	4.41	47.03	47.45	47.17	47.22
P3	31.70	27.12	30.95	29.92	22.65	21.46	23.11	22.41	4.48	4.26	4.42	4.38	46.67	47.33	46.67	46.89
P4	32.25	27.73	31.90	30.63	23.68	21.68	23.67	23.01	4.52	4.47	4.46	4.48	47.78	47.12	47.33	47.41
P5	33.00	28.78	32.45	31.41	23.94	22.13	23.46	23.18	4.61	4.50	4.44	4.52	47.83	47.83	47.97	47.88
Mean	31.80	27.06	31.21	30.03	22.51	21.35	22.88	22.25	4.49	4.39	4.38	4.42	47.31	47.27	46.93	47.17
Comparing of means	S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%		S.Em.±		C.D @ 5%	
P	0.80		NS		0.70		NS		0.08		NS		1.22		NS	
V	0.74		2.18		0.43		NS		0.04		NS		1.24		NS	
P × V	1.65		NS		0.96		NS		0.08		NS		2.77		NS	

There may be a correlation between the genotype and the variance in quality measures. There was no statistically significant interaction impact seen between planting geometry and cotton genotypes in terms of quality metrics.

4. Conclusion

Over 51 million people are employed directly in the cotton sector, making it the second biggest employer after agriculture. Another 68 million people are employed indirectly in the industry, many of them low-skilled women. It is projected that the textile sector would generate 233 billion US dollars in revenue. Growth, yield, and yield characteristics, fibre quality metrics, and economics of cotton were analysed to see whether there would be any significant interactions between Geometry of planting and cotton genotypes.

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