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Effect of plant spacing's and fertilizer levels on growth and productivity of *desi* cotton *(Gossypium arboreum* L.)

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Abstract
The field experiment entitled "Effect of plant spacing's and fertilizer levels on growth and productivity of *desi* cotton (*Gossypium arboreum* L.)" was conducted at Research Farm of University College of Agriculture, Guru Kashi University, Talwandi Sabo, Bathinda during *kharif* season in 2019. The trail was laid out in split plot design with three levels of spacing (67.5 x 30 cm, 67.5 x 45 cm and 67.5 x 60 cm) in main plots and four fertilizer levels (50, 100, 150 and 200% of recommended dose of fertilizer) in sub plots, replicated thrice. The plant spacing of 67.5 x 30 cm recorded higher plant height (241.2 cm), dry matter accumulation/ plant (382.4 g), leaf area index (9.4), seed cotton yield (16.2 q/ha), stick yield (50.5 q/ha) and biological yield (66.7 q/ha) but the plant spacing of 67.5 x 60 cm recorded maximum number of sympodial branches/plant (62.2), number of monopodial branches/plant (3.6), boll weight (2.7l), leaf area (224.4), number of harvested bolls/plant (24.7). Application of 150% RDF recorded maximum plant height (237.7 cm), dry matter accumulation/plant (393.0 g), number of sympodial branches/plant (60.5), number of monopodial branches/plant (3.7), leaf area (281.0), leaf area index (9.6), boll weight (2.8),number of harvested bolls/plant (24.4), stick yield (40.7 q/ha), seed cotton yield (13.4 q/ha) and biological yield (54.0 q/ha). The maximum seed cotton yield was observed at plant spacing of 67.5 x 30 cm with application of 150% RDF (16.9 q/ha) which was statistically at par with plant spacing of 67.5 x 30 cm with application of 100% RDF (l6.8 q/ha).

Keywords: *Desi* cotton, fertilizer levels, RDF, spacing levels, seed cotton yield and stick yield

Introduction

Cotton (*Gossypium arboreum* L.) the king of fibers, since time immemorial has played a vital role in the history and civilization of mankind. Commercially cotton is the best-earning commodity in the country. Due to its importance in agricultural as well as the industrial sector, it is also called "white gold". It provides fiber, a raw material for the textile industry along with cotton seeds and quality animal feed and biomass in the form of cotton stalks and plays a vital role in the economy of the country. India has the largest area under cotton production followed by China and the United States. China is the largest producer of cotton followed by India and the United States. The area under cotton in India is 122 lakh ha with a production of 377 lakh bales of 170 kgs each, 568 yield kg/ha and productivity 524 kg lint/ha (Anonymous 2019a) [1].

India ranks first in the world in respect of area but low in productivity. India is the only country in the world growing all the four cultivated species of cotton, *G. hirustum*, *G. arboreum*, *G. herbaceaum*, and *G. barbadense* are cultivated on commercial scale besides hybrids. India is unique among the major cotton-growing countries because of the broad range of agro-climatic and soil conditions that permit the cultivation of all varieties and staple lengths of cotton. Gujarat is the largest producer of cotton in India. Punjab ranks at number 8 in the production of cotton. Punjab covers an area of 291 thousand hectares with an average yield of 450 kg/ha and amounting to an overall production of 1283 thousand bales. The Bathinda region cotton covers an area of 99 thousand ha with an average yield of 843 kg/ha and an overall production of 491 thousand bales. In Punjab, *desi* Cotton covers an area of 4000 ha with 532 kg/ha average yield and overall production of up to 12000 bales. The Bathinda region *Desi* cotton covers an area of 1000 ha with an average yield of 407 kg/ha and an overall production of 2000 bales (Anonymous 2019b) [2].

Gossypium arboreum, species of cotton is most widely distributed in the country. The present *arboreum* species are mostly indeterminate inhabit, their plant phenology makes it difficult for management including cotton picking.

Recently some private companies have 2 developed *arboreum* hybrids but its phonological requirement and nutrient particularly nitrogen is the present need to increase productivity and sustainability of cotton. Earlier, the Indian cotton scenario was too much dominated by arboreum genotypes and more than 90% area was under diploid cotton. *Arboreum* cotton, on the other hand, is endowed developed *arboreum* hybrids but its phonological requirement and nutrient particularly nitrogen is the present need to increase productivity and sustainability of cotton. *Arboreum* cotton, on the other hand, is endowed to build resistance against sucking pests and can sustain drought conditions. Due to the increasing cost of cultivation of hirsutum cotton and competition at the international level now the cultivation of Indian cotton is gaining popularity. Reason for low productivity are various among them fluctuation in rainfall pattern use of improper planting techniques and inadequate quantities of fertilizer use are some of them. The most appropriate planting pattern enables the plant to take the best advantage of growth conditions, as it is ultimately connected with root development, shoot growth and fructifications. The plant spacing is associated with growth factors. Cotton cultivars grown in narrow row had fewer bolls per plant and also boll weight is less, but the lint yield were found similar due to higher plant population in both ultra-narrow row and narrow row planting system (Jahedi *et al.* 2013) [16].

Among practices, planting pattern is one of the most important factors in determining the efficiency of utilization of natural resources to increase the production of cotton. It was reported that various row planting arrangements have been utilized to provide additional moisture for plant development and maximum utilization of climatic elements *viz*. sunshine, temperature, rainfall, humidity, etc. and other resources. Butter *et al.* (2010) [9] reported that the close spacing 90 x 67.5 cm obtain higher seed yield of cotton than 90 x 90 cm and 105 x 90 cm. Various techniques like maintaining suitable plant density, use of an optimum dose of fertilizer, growth regulators, etc. are being used in *desi* cotton production. Among various cultural practices, the spacing (plant density) is a crucial factor that influences the growth, fruiting, and yield of seed cotton. Hussain *et al.* (2017) [15] found that closer spacing of cotton crop produce 17% more seed cotton yield than wider spaced crop.

The ability of the plants to produce more yields is dependent on the availability of adequate plant fertilizer. Because of continuous cultivation over centuries and intensification of agriculture in recent years, there has been progressive and sustained depletion of the soil nutrient reserves. Since the nutrients in the soil are not present in adequate quantities and proportion as required for plants to produce maximum yields on a sustainable basis. Further, an increase in yield has been reported with NPK fertilization (Giri *et al.* 2008).

Singh *et al.* (2003) reported that significant increase in plant height with the application of 100% recommended dose of fertilizer (RDF) over 75% RDF and it was at a par with 125% RDF in cotton. Improved growth attributes and yield of cotton was reported by Narayana *et al.* (2008) [18] at Guntur with higher fertilizer levels over two years of investigation. Application of 180:140:140 kg NPK/ha recorded significantly higher bolls/plant, boll weight and kapas yield over 120:60:100 kg and 150:100:100 kg NPK/ha. Keeping above experimental findings in mind present experiment was conducted to study the effect of plant spacing's and fertilizer levels on growth and productivity of *desi* cotton.

Material and Methods

The field experiment study entitled "Effect of plant spacing's and fertilizer levels on growth and productivity of *desi* cotton" was conducted during *Kharif* season 2019 at Research Farm of Guru Kashi University, Talwandi Sabo (Bathinda) which is situated between 29059' N latitude and 7505' E longitude with an altitude of 208.42 meters above the mean sea level. This tract is characterized by semi climate, where both summers and winters are extreme. The mean maximum and mean minimum temperature ranged 41.30C and 6.10.0 C, respectively recorded during June, 2019 to December, 2019. The experimental soil was loamy sand in texture with normal reaction. The experiment was laid out in split plot design with three replications. The treatments comprised of three plant spacing's *viz*. 67.5 x 30 cm, 67.5 x 45 cm and 67.5 x 60 cm and four fertilizer levels *viz*.50%, 100%, 150% and 200% RDF (recommended dosage of fertilizers).

Plant height from the ground level to the top of the plant from five tagged plants was recorded and expressed in cm. The monopodial (vegetative) branches were counted on five tagged plants and the average value was recorded as the number of monopodial branches per plant. The sympodial (reproductive) branches arising on the main stem were counted on five tagged plants. The average value was recorded as the number of sympodial branches per plant. From each plot, one plant was selected at random from a row (adjacent to each net plot) earmarked for destructive sampling were uprooted and different plant parts *viz*., stem, leaf and reproductive parts were separated. These samples were first air-dried and then oven-dried to constant weight at 650 C in a hot air oven and their by weight was recorded. Dry matter accumulation was expressed in g. The leaf area was measured by the graphical method. The leaf area per plant was expressed in dm2/ plant. The leaf area index was worked out by dividing the leaf area per plant by the land area occupied by that plant. The leaf area index was expressed in centimeter square.

LAI = Leaf area per plant/Spacing

The total seed cotton picked from the net plot of each treatment in different pickings was used for working out seed cotton yield and expressed in q/ha. The bolls picked from five randomly plants of each treatment were counted at 2nd picking. To obtain the number of bolls picked per plant, the total numbers of bolls picked were divided by the number of plants. The resultant was expressed as the number of bolls harvested per plant. Twenty-five bolls at random in each net plot were picked and weighed. The average boll weight was calculated and expressed as boll weight in gram. Sticks from each net plot were cut at the soil surface after final picking and dried in the sun and after thorough drying the weights were recorded plot-wise and expressed as stick weight in q ha-1. The biological yield obtained from the addition of seed cotton yield and stick yield.

Biological yield = Seed cotton yield + Stick yield

Results and Discussion

Growth parameters

The plant height was significantly influenced by with plant spacing's 67.5 x 30 cm as per data presented in Table 1. The highest plant height (241.2 cm) was observed with 67.5 X 30 cm and the lowest plant height was observed at 67.5 x 60 cm

(232.5). The more number of plants per unit area produced more height per plant which may be due to the increased competition for sunlight and CO2 and might be the closer spacing induced vertical growth due to congestion of plant per unit area. Similar results were reported by Ram and Giri (2006) [12], Narayana *et al.* (2007) [18] and Sisodia and Khamparia (2007) [23]. The effect of fertilizer levels on plant height was recorded non-significant, however the highest plant height was observed with application of 150% RDF (237.7 cm). The lowest plant height was observed with application of 50% RDF 234.3 cm. The maximum plant height at all the stages was recorded due to 150% RDF than others. This might be due to optimum nutrient supply through 150 per cent RDF which has promoted effect on most of the physiological process of plant. These findings corroborate the results reported by Singh and Brar (2000) [7], Patil (2007), Basavanneppa (2012) [3] and Hosamani *et al.* (2013) [14] reported increased plant height with increased fertilizer levels. The interaction effect of plant spacing's and fertilizer levels on plant height was recorded non-significant.

The data presented in Table 1 showed that effect of plant spacing on dry matter accumulation was significant. The highest dry matter accumulation was obtained at plant spacing of 67.5 X 30 was 356.4 g. The lowest dry matter accumulation was obtained at plant spacing of
67.5 X 60 cm was 295.0 g. The better source to sink capacity was developed due to better dry matter accumulation in assimilatory surface area and reproductive parts. The maximum dry matter production accumulation with closer spacing might be due to more number of plants accommodated per unit area. The highest dry matter accumulation was obtained with application of 150% RDF was 393.6 g and the dry matter accumulation was lowest with application of 200% RDF (293.6 g). Application of 150% RDF significantly increased the dry matter accumulation in different parts *viz*., leaves, stem and reproductive parts as compared to other levels. This might be due to favorable synthesis of fertilizer increased the rate of photosynthetic accumulation which finally resulted into increased dry matter production by the plant at each stage of growth. The reasons for increase in total dry matter accumulation in different parts of plant are dependent on total photosynthetic area (leaf area, leaf area index and leaf area duration) and rate of photosynthesis. In the present investigation leaf area and leaf area index increased with application of 150% RDF level at all the growth stages. These results are in conformity with the findings of Patil (2007), Basavanneppa (2012) [3], Hosamani *et al.* (2013) [14] and Brar *et al.* (2000) [7]. The interaction of plant spacings and fertilizer levels was significant. The maximum dry matter accumulation was recorded at spacing 67.5 x 30 cm with application of 150% RDF (484.7 g). The minimum dry matter accumulation was recorded at spacing 67.5 X 60 cm with application of 50% RDF (228.7 g).

Data on leaf area index (Table.1) differed significantly due to spacing and RDF levels at different growth stages of cotton. The maximum leaf area index was obtained at plant spacing of 67.5 X 30 cm (9.4) and minimum leaf area index was observed with plant spacing of 67.5 X 60 cm (5.5). This might be due to higher plant density that might have utilized all natural resources like solar radiation, moisture, nutrients and space efficiently leading to higher LAI. This is in conformity with the earlier results that were obtained by Sisodia and Khamparia (2007) [23] and Shukla *et al.* (2013) [25]. The fertilizer effect on leaf area index was observed significant with maximum leaf area index with application of 150% RDF (9.6). The minimum leaf area index was observed with application of 200% RDF (5.7) Application of higher levels of fertilizers increases photosynthetic rate, leaf area and at same time leaf area index. Similar results were also reported by Bhalerao *et al.* (2012) [6], Patil (2007), Basavanneppa (2012) [3] and Brar *et al.* (2000) [7].

The interaction effect of plant spacing and fertilizer levels was significant with maximum leaf area index at plant spacing of 67.5 X 30 cm with application of 150% RDF (12.0). The effect of plant spacing levels on number of monopodial branches per plant was observed non-significant. The highest number of monopodial branches per plant was obtained at plant spacing of 67.5 X 60 cm (3.6). The lowest number of monopodial branches per plant was observed at spacing of 67.5 X 30 cm (3.2). The effect of fertilizer levels was observed non- significant at 120 DAS. The highest number of monopodial branches per plant was obtained with application of 150% RDF (3.7) at 120 DAS and the lowest number of monopodial branches per plant was observed with application of 50%, 100% and 200% RDF (3.3 each) at 120 DAS. The effect of fertilizer levels on number of monopodial branches per plant was non-significant. The highest number of monopodial branches per plant was obtained with application of 150% RDF. The growth parameter that influences directly or indirectly the seed cotton yield is the monopodial branches per plant. Increased monopodial numbers per plant with application of 150% fertilizer level was justified and the findings are in line with the results obtained by Patil (2007), Basavanneppa (2012) [3] and Brar *et al.* (2000) [7].

The interaction effect between plant spacings and RDF levels on number of monopodial branches per plant was non-significant.

Table 1: Effect of different plant spacing's and fertilizer levels on growth parameters of desi cotton

Treatment	Plant height (cm)	Dry matter accumulation(g/Pl ant)	Leaf area index	No. of monopodial branches/plant
Plant spacing (cm)				
67.5 x 30	241.2	356.4	9.4	3.2
67.5 x 45	235.0	327.2	7.1	3.4
67.5 x 60	232.5	295.0	5.5	3.6
LSD (p=5%)	3.9	14.6	0.5	NS
RDF level (%)				
50	234.3	294.2	6.0	3.3
100	236.8	324.0	8.1	3.3
150	237.7	393.0	9.6	3.7
200	235.9	293.6	5.7	3.3
LSD (p=5%)	NS	10	0.5	NS
Interaction	NS	17.3	0.9	NS

Yield parameters

The effect of plant spacing levels on number of sympodial branches per plant was significant as per data in Table 2. The highest number of sympodial branches per plant was obtained at plant spacing of 67.5 X 60 cm (62.2) and the lowest number of sympodial branches per plant was observed at spacing of 67.5 X 30 cm (54.1) This might be due to better aeration and adequate interception of light and lesser competition for nutrients at wider spacing resulted in higher photosynthesis which in turn helped to produce more number of sympodial branches per plant. This is in confirmation of results represented by Butter and Singh (2007) [22], Sisodia and Khamparia (2007) [23] and Bhalerao *et al.* (2008) [6].

The effect of fertilizer levels on number of sympodial branches per plant was significant. The highest number of monopodial branches per plant was obtained with application of 150% RDF (60.5). The lowest number of sympodial branches per plant was observed with application of 200% RDF (54.9). Significant variations in the number of sympodial branches per plant and there, role to produce reproductive structures have played a greater role in the differences observed in yield and yield components. Increased sympodial numbers with increased fertilizer levels was justified and the findings are in line with the results obtained by Basavanneppa (2012) [3], Brar *et al.* (2000) [7] and Manjunath (2014).

The interaction of plant spacings and fertilizer levels was observed significant. The maximum number of sympodial branches per plant was recorded at spacing 67.5 X 60 cm with application of 150% RDF.

The effect of plant spacing on number of harvested bolls per plant was recorded as significant. The maximum number of harvested bolls per plant was obtained with plant spacing of 67.5 X 60 cm (24.7) which was significantly higher than other spacing's. The minimum number of harvested bolls per plant was obtained with plant spacing of 67.5 X 30 cm (20.7). The number of harvested bolls per plant was maximum under wider spacing as compared to closer spacing which may be due to availability of more space for growth and development and more interception of solar radiation. Similar results were observed by Bhalerao *et al.* (2012) [6] and Brar *et al.* (2000) [7].

The effect of fertilizer levels on number of harvested bolls per plant was recorded as significant. The maximum number of harvested bolls per plant was obtained with application of 150% RDF (24.4) which was significantly higher than other fertilizer levels. The minimum number of harvested bolls per plant was obtained with application of 50% RDF (21.7). This might be due to the favorable synthesis of growth favoring constituents in plant system due to better supply of fertilizer. The high fertilizer availability might cause increase in protein, which consequently increases no. of harvested bolls per plant. The results are also in line with the findings of Bhalerao *et al.* (2012) [6], Basavanneppa (2012) [3] and Hosamani *et al.* (2013) [14]. The interaction of plant spacings and fertilizer levels was significant with maximum number of harvested bolls per plant at plant spacing of 67.5 X 60 cm with application of 150% RDF (27.6) which was statistically at par at plant spacing of 67.5 X 60 cm with application of 100% RDF (26.6).

The effect of plant spacing on boll weight was recorded as significant. The maximum boll weight was obtained with plant spacing of 67.5 X 60 cm (2.69 g) which was significantly higher than other spacing's. The minimum boll weight was obtained with plant spacing of 67.5 X 30 cm (2.44 g). This might be due to the reason that bolls tend to be larger at wider plant spacing due to the availability of more ample space which lead to more weight in the bolls. Similar results were observed by Jat *et al.* (2014) and Singh (2015). The effect of fertilizer levels on boll weight was recorded as significant with the maximum boll weight obtained with application of 150% RDF (2.81 g) which was significantly higher than other fertilizer levels. The minimum boll weight was obtained with application of 200% RDF (2.38 g). Bhalerao *et al.* (2012) [6] reported that application of 150% RDF (200:100:100 kg NPK ha-1) resulted in significantly higher boll weight and yield attributing characters in cotton due to combined effect of N, P2O5 and K2O. Increased boll weight may be associated with more dry matter accumulation in the higher fertilization plot. These results are also in conformity with Hallikeri (2008), Patil *et al.* (2009) and Nehra and Yadav (2011) [19].

The interaction of plant spacings and fertilizer levels on boll weight was significant with maximum boll weight at plant spacing of 67.5 X 60 cm with application of 150% RDF (2.93 g) which was statistically at par at plant spacing of 67.5 X 30 cm with application of 150% RDF (2.78 g) and at par with 67.5 X 60 cm with application of 100% RDF (2.84 g). The minimum boll weight was recorded at spacing of 67.5 X 30 cm with application of 100% and 200% RDF (2.20 g).

Table 2: Effect of different plant spacing's and fertilizer levels on sympodial branches, no. of harvested bolls/plant and boll weight of Desi cotton

Treatment	Sympodial branches	No. of harvested bolls/plant	Boll weight (g)
Plant spacing (cm)			
67.5 x 30	54.1	20.7	2.44
67.5 x 45	55.9	22.6	2.50
67.5 x 60	62.2	24.7	2.69
LSD (p=5%)	2.6	1.0	0.11
RDF level (%)			
50	55.6	21.7	2.49
100	58.7	23.0	2.50
150	60.5	24.4	2.81
200	54.9	21.5	2.38
LSD (p=5%)	1.7	0.6	0.08
Interaction	2.9	1.1	0.13

The data pertaining to seed cotton yield have been presented in Table 3. The effect of plant spacing on seed cotton yield was recorded as significant. The maximum seed cotton yield was obtained with plant spacing of 67.5 X 30 cm (16.2 q/ha) which was significantly higher than other spacing's. The minimum seed cotton yield was obtained with plant spacing of 67.5 X 60 cm (10.7 q/ha). The seed cotton yield was highest in closer plant spacing compared to wider spacing's due to more number of plants per unit area. These results were in accordance with those obtained by Ram (2004), Giri and Gore (2006) [12], Pawar *et al.* (2010) [20], Devraj *et al.* (2011) [11] and Shukla *et al.* (2013) [25]. The effect of fertilizer levels on seed cotton yield was recorded as significant with the maximum seed cotton yield obtained with application of 150% RDF (13.4 q/ha) which was statistically at par with application of 100% RDF (13.0 q/ha.). The minimum seed cotton yield was obtained with application of 200% RDF (12.4 q/ha). Bhalerao *et al.* (2012) [6] and Brar *et al.* (2000) [7] reported that application of 150% RDF (200:100:100 kg NPK ha-1) resulted in significantly higher seed cotton yield and yield attributing characters in cotton due to combined effect of N, P2O5 and K2O. This may be due to sufficient fertilizer supply which helped into better translocation of assimilates from source to sink which ultimately reflected into higher values of yield in cotton. These results are also in conformity with Basavanneppa (2012) [3] and Hosamani *et al.* (2013) [14].

The interaction of plant spacings and fertilizer levels on seed cotton yield was significant with maximum seed cotton yield at plant spacing of 67.5 X 30 cm with application of 150% RDF (16.9 q/ha) which was statistically at par at plant spacing of 67.5 X 30 cm with application of 50% RDF (l6.2 q/ha) and at par with 67.5 X 30 cm with application of 100% RDF (16.8 q/ha). The minimum seed cotton yield was recorded at spacing of 67.5 X 60 cm with application of 50% RDF (10.3 q/ha). The data pertaining to stick yield which was obtained after harvest of cotton have been presented in Table 3. The effect of plant spacing on stick yield was recorded as significant. The maximum stick yield was obtained with plant spacing of 67.5 X 30 cm (50.5 q/ha) which was significantly higher than other spacing's. The minimum stick yield was obtained with plant spacing of 67.5 X 60 cm (26.6 q/ha). Stalk yield was significantly higher at the closer plant spacing as compared to wider spacing. It was obtained due to more number of plants available in closer spacing than the wider spacing. Similar results were observed by Chavan *et al.* (2011) [10] and Shukla *et al.* (2013) [25]. The effect of fertilizer levels on stick yield was recorded as significant with the maximum stick yield obtained with application of 150% RDF (40.7 q/ha). The minimum stick yield was obtained with application of 200% RDF (22.6 q/ha). This might be due to supply of fertilizer causes proliferous root system developed under balanced nutrient application resulting in better absorption of water and nutrient along with improved physical environment which resulted into better plant growth which ultimately reflected into higher stick yield. These results are also in conformity with Bhalerao *et al.* (2012) [6], Basavanneppa (2012) [3], Hosamani *et al.* (2013) [14] and Brar *et al.* (2000) [7]. The interaction of plant spacings and fertilizer levels on stick yield was significant with maximum stick yield at plant spacing of 67.5 X 30 cm with application of 150% RDF (53.9 q/ha). The minimum stick yield was recorded at spacing of 67.5 X 60 cm with application of 200% RDF (22.6 q/ha).

The effect of plant spacing on biological yield was significant. The maximum biological yield was obtained with plant spacing of 67.5 X 30 cm (66.7 q/ha) which was significantly higher than other spacing's. The minimum biological yield was obtained with plant spacing of 67.5 X 60 cm (37.3 q/ha). The effect of fertilizer levels on biological yield was recorded as significant with the maximum biological yield obtained with application of 150% RDF (54.0 q/ha) which was significantly higher than other fertilizer levels. The minimum biological yield was obtained with application of 200% RDF (47.9 q/ha). The interaction of plant spacings and fertilizer levels on biological yield was significant with maximum biological yield was recorded at plant spacing of 67.5 X 30 cm with application of 150% RDF (70.8 q/ha) which was significantly higher than other treatments comprising of plant spacing's and fertilizer levels. The minimum biological yield was recorded at spacing of 67.5 X 60 cm with application of 200% RDF (33.1 q/ha).

Table 3: Effect of different plant spacing's and fertilizer levels on yield parameters of Desi cotton

Treatment	Seed cotton yield (q/ha)	Stick yield (q/ha)	Biological yield (q/ha)
Plant spacing (cm)			
67.5 x 30	16.2	50.5	66.7
67.5 x 45	11.6	37.7	49.3
67.5 x 60	10.7	26.6	37.3
LSD (p=5%)	0.6	1.7	2.3
RDF level (%)			
50	12.7	38.0	50.7
100	13.0	38.8	51.7
150	13.4	40.7	54.0
200	12.4	35.5	47.9
LSD (p=5%)	0.4	1.2	1.6
Interaction	0.7	2.2	2.8

Conclusion

Sowing of *desi* cotton at spacing of 67.5 X 30 cm increased growth parameters *viz*. plant height, dry matter accumulation plant-1, leaf area index and yield attributes *viz.* stick yield, seed cotton yield and biological yield. Significant increase in number of sympodial branches plant-1, leaf area, number of bolls plant-1 and boll weight was observed with spacing of 67.5 X 60 cm. Application of 150% RDF significantly increased growth parameters *viz.* plant height, dry matter accumulation plant-1, leaf area, leaf area index, number of sympodial branches plant-1 and yield attributes *viz.* number of bolls plant-1, boll weight, stick yield, seed cotton yield and biological yield.

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