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STANDARDIZATION OF PLANT GEOMETRY AND NUTRIENT REQUIREMENT OF PROMISING ARBOREUM GENOTYPES OF COTTON

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ABSTRACT

Despite the significance of arboreum cotton in rainfed regions, limited research exists on optimizing its plant geometry and nutrient management specific to newer genotypes. Most studies focus on hirsutum varieties, creating a gap in genotype-specific agronomic recommendations for arboreum cotton under varied plant densities and fertilizer regimes. The present investigation was conducted to optimize the planting density and fertilizer dose for enhancing the growth and yield of arboreum cotton under a split plot design with three replications. The study comprised three arboreum genotypes NDLA-3116-3 (V_1), AKA-2013-8 (V_2) and PA-873 (V_3) tested under three plant spacings: 60 × 10 cm (S_1), 60 × 15 cm (S_2), and 60 × 30 cm (S_3). In sub-plots, three fertilizer levels i.e (N_1) 75% RDF (30:20:20 NPK kg ha^{-1}), (N_2) 100% RDF (40:20:20 NPK kg ha^{-1}) and (N_3) 125% RDF (50:20:20 NPK kg ha^{-1}) were applied to assess nutrient responses. The results indicated that, among genotypes, AKA 2013-8 (V_2) performed superiorly in terms of growth, yield and yield attributes, also significantly superior in term of economics. Among spacing (S_3) 90×30 cm observed significantly superior in term of growth, yield attributes and yield $plant^{-1}$, but Seed Cotton Yield, lint yield, stalk yield and economics which is significantly superior in spacing (S_1) 60×10 cm. Fertilizer level N_3 (125% RDF) was found to be most effective in term of better plant growth, boll development, and seed cotton yield and economics. Overall, the genotype (AKA 2013-8), spacing of 60 × 30 cm (S_3) and 125% RDF (N_3) emerged as the most promising treatment for maximizing productivity in arboreum cotton under the given agro-climatic conditions. These findings offer practical guidance for refining agronomic practices in cotton cultivation, particularly for arboreum genotypes, thereby supporting sustainable intensification and improved nutrient use efficiency.

Key words : Arboreum, Cotton, Nitrogen, Nutrient management, Plant geometry, Spacing.

Introduction

Cotton (*Gossypium* spp.) is a globally significant fibre crop that plays a crucial role in the agricultural and textile industrial economy, particularly in countries like India, which is the largest cotton-producing nation in the world (ICAC, 2022). Among the cultivated cotton species, *Gossypium arboreum* L., commonly known as desi cotton, is valued for its resilience to biotic and abiotic stresses, tolerance to drought and suitability for low-input rainfed farming systems (Kranthi, 2020). Despite these advantages, the productivity of arboreum cotton remains considerably lower than that of *G. hirsutum*, largely due to inadequate research attention on agronomic optimization tailored for this species. One of the major factors influencing cotton productivity is plant geometry (spacing) the spatial arrangement of plants in the field which directly affects light interception, air circulation, and nutrient utilization (Kumar *et al*., 2023). In addition, balanced and genotype-specific nutrient management is essential to unlock the yield potential of improved arboreum genotypes. With the development of promising desi cotton genotypes like NDLA 3116-3, AKA 2013-8, and PA 873, there is a pressing need to standardize plant spacing and fertilizer requirements for maximizing their performance under diverse agro-ecological conditions of Maharashtra. However, a critical gap exists in terms of location-specific recommendations on plant population density and nutrient levels for these newer genotypes. Most past studies have generalized agronomic practices across species or have been focused primarily on *Bt hirsutum* cotton (Patil *et al*., 2021). There is limited data on how improved arboreum genotypes respond to different planting geometries and graded nutrient levels, which are key to enhancing seed cotton yield and resource-use efficiency under rainfed and low-input systems. Therefore, the present study is undertaken with the hypothesis that optimized plant geometry and fertilizer application specific to each arboreum genotype will significantly enhance growth, yield attributes, and seed cotton yield. The objectives of the study include evaluating the interaction effects of plant spacing and nutrient levels on the growth performance and productivity of selected arboreum genotypes.The results are expected to generate critical insights into genotype-specific agronomic packages, leading to more sustainable and productive cultivation of arboreum cotton.

Materials and Methods

The experiment was conducted at the Cotton Research Unit Field, Dr. Panjabrao Deshmukh Krishi Vidyapeeth, Akola during the season *kharif* 2022-2023. The topography of the field was fairly uniform and levelled. The soil was medium black cotton belonging to vertisols with a pH of 7.9, organic carbon (3.87 g kg^{-1}), bulk density (1.21 g cm^3), electric conductivity (0.38 ds m^{-1}), available N (232 kg ha^{-1}), P (17.40 kg ha^{-1}) and K (372 kg ha^{-1}). The experiment was laid out in split plot design with three replications. The treatment comprises of 27 combinations having three genotypes *viz*. NDLA 3116-3 (V_1), AKA 2013- 8 (V_2) and PA 873 (V_3) as a main plot and in factor b three spacing is used *viz*. 60 × 10 (S_1), 60 × 15 (S_2) and 60 ×30 (S_3) in sub plot three recommended dose of fertilizer (RDF) is used viz. 75% RDF (N_1) (30:20:20 NPK kg ha^{-1}), 100% RDF (N_2) (40:20:20 NPK kg ha^{-1}) and 125% RDF (N_3) (50:20:20 NPK kg ha^{-1}).

Statistical analysis

The experimental data collected during the course of investigation were statistically analyzed with split plot design programme on computer by adopting standard statistical techniques of analysis of variance (Gomez and Gomez, 1984). Wherever, the results were significant, critical differences at P = 0.05 levels were calculated for comparison of treatment means. Data on interaction effects are presented wherever found significant. The data on treatment effects are presented suitably in appropriate tables and graphically depicted in figures.

Results and Discussion

Plant height

Genotypes AKA 2013-8 recorded significantly highest plant height (156.30 cm) over genotypes NDLA 3116-3 (139.14 cm) and PA 873 (144.87 cm), which is presented in Fig. 1. It might be due to height is genetically controlled character. Similar results were reported by Moola and Giri (2006). Plant spacing of 60×10 cm produced significantly more plant height (151.67 cm) to that of 60×30 cm (142.38 cm) and it was found to be at par with 60×15 cm (146.26 cm) plant spacing. Maximum plant height was recorded at closer planting geometry might be due the reduction in plant height under wider planting geometry due to suppression of apical dominance as against closer planting geometry which induced more vertical growth due to congestion of plant per unit area. Similar result reported by Parlawar *et al*. (2017). Application of 125% N recorded significantly more plant height (150.06 cm) over 75% N (142.62 cm) and it was found at par with 100% N (147.64 cm). It might be due to greater availability of nutrients with increase in application rate, which might have increased all the vital physiological processes, which in turn facilitated translocation of photosynthates to the growing meristematic tissues. Similar results were reported by Rawal *et al.* (2015) and Kakade *et al.* (2023).

No. of leaves

As illustrated in Fig. 2, significantly highest number of leaves was produced by genotype AKA 2013-8 (72.03) than NDLA 3116-3 (66.67) and PA 873 (68.91) which was at par with each other. It might be due to inherent genetic potential for vigorous vegetative growth, which influences internodal elongation and stem development. Wider spacing of 60×30 cm (71.02) recorded significantly higher number of functional leaves $plant^{-1}$ as compared to the closer spacings of 60×10 cm (67.36) whereas it was on par with 60 ×15 cm (69.23). It might be due to increasing plant density due to reduced intra row spacing number of functional leaves $plant^{-1}$ tended to decrease. Similar result was found by Sisodia and Khamparia (2007). Number of functional leaves $plant^{-1}$ were significantly affected due to different levels of N. Application of 125% N significantly enhanced leaf production $plant^{-1}$ (71.48) as compared to the application of 75% N (67.74) and but it was found to be on par with 100% N (68.39). Similar result was observed by Kakade *et al*. (2023).

Leaf area $plant^{-1}$ (dm^{-2})

As displayed in Fig. 3, Genotype AKA 2013-8 (57.13) recorded significantly highest leaf area $plant^{-1}$ over PA

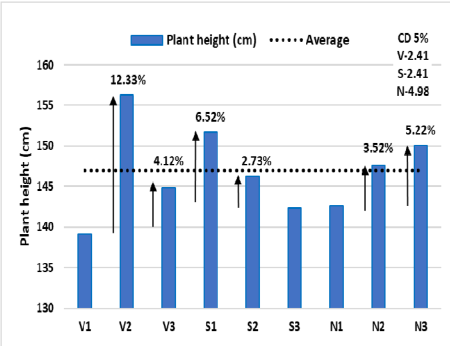

Fig. 1 : Effect on Plant height.

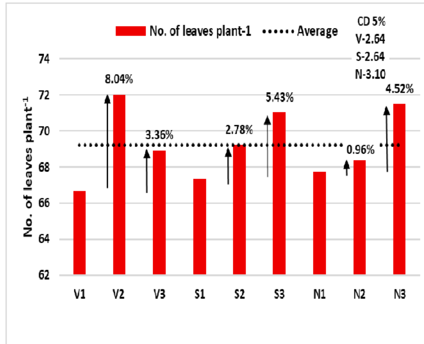

Fig. 2 : Effect on no. of leaves/ plant.

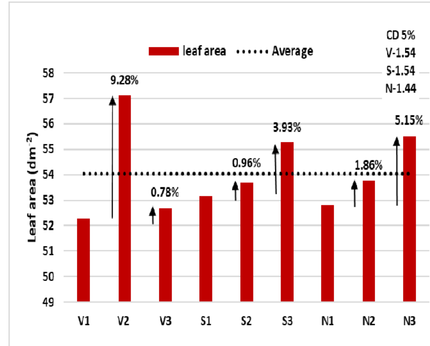

Fig. 3 : Effect on Leaf area.

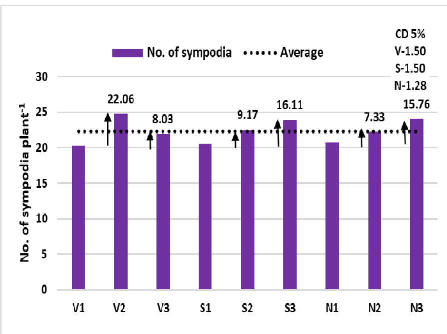

Fig. 4 : Effect on no. of sympodia.

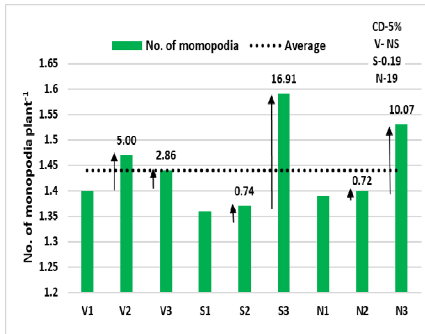

Fig. 5 : Effect on no. of monopodia.

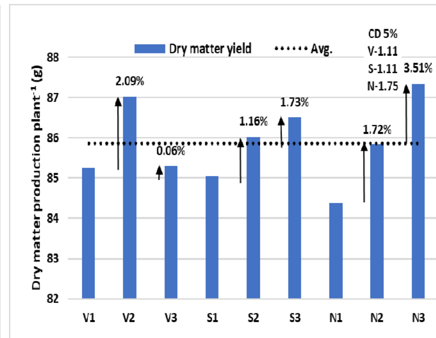

Fig. 6 : Effect on Dry matter Yield.

873 (52.69) and NDLA 3116-3 (52.28), which was at par to each other's. The value of leaf area is depends on No. of leaves. Leaf area per plant was higher in wider spacing of 60 ×30 cm (55.26) due to adequate space, light, moisture and nutrient availability, solar radiation penetration and utilization of nutrients in better way to produce higher effective leaf area per plant as compared to closer spacing of 60 ×10 cm (53.17) and 60×15 cm (53.68) with higher plant density per unit area which produced higher degree of competition for natural resources and caused reduction in leaf area similar result observed by Sisodia and Khamparia (2007), Parlawar *et al*. (2017) and Kumar and Ramchandra (2019). Application of 125% N produced significantly higher leaf area plant^{-1} (55.52) than that of 100% N (53.78) and 75% N (52.80) later two were found to be at par with each other. It might be due to N play important role production of Auxin, cell division, cell elongation and metabolic process i.e. photosynthesis. These results were similar to earlier findings of Manjula *et al.* (2017).

Monopodial branches plant^{-1}

There was no significant effect of genotype and nutrient doses on monodial branches of cotton, which is represented in Fig. 4. Similar results were reported by Manjula *et al.* (2017). The planting geometry 60x30 cm recorded significantly higher monopodial branches plant^{-1} (1.59) over 60 ×10 cm (1.36) and 60×15 cm (1.37) represented in Fig. 4. It might be due to a wider spacing plant enjoyed more space, light, moisture, and nutrient efficiently. These results are in line with finding of Parlawar *et al.* (2017), Kumar and Ramchandra (2019).

Sympodial branches plant^{-1}

As represented in Fig. 5 genotype AKA 2013-8 (24.79) produced significantly higher number of sympodial branches as compared to the rest of the two genotypes. Whereas the PA 873 (21.94) and NDLA 3116-3 (20.31) were found to be on par with each other. The present results are in conformity with the findings of Giri *et al.* (2008), Asghar *et al.* (2009). Plants under wider spacing of 60×30 cm (23.93) produced significantly highest number of sympodial branches plant^{-1} than those recorded under closer plant spacing of 60×15 cm (22.50) and 60×10 cm (20.61). It might be due to wider spacing reduces interplant competition, allowing the cotton plant to utilize highest light and nutrients, which directly promotes the initiation and growth of more sympodial branches. Such significant increase in number of sympodia per plant under wider row spacing was also reported by Parlawar *et al.* (2017), Kumar and Ramchandra (2019). Application of 125% N (24.04) recorded significantly highest number of sympodial branches plant^{-1} than that of 100% N (22.27) and 75% N (20.75). It might be due to a high fertilizer dose supplies more essential nutrients especially nitrogen, which enhances vegetative and reproductive growth resulting in the development of more sympodial branches. Above results are in agreement with

Table 1 : Effect of different Arboreum genotype, plant geometry and nitrogen management on yield, yield attributes of Arboreum cotton.

Treatments	No. of picked bolls plant $^{-1}$	Seed cotton yield plant^{-1} (g)	Seed cotton yield (kg ha^{-1})	Lint yield (kg ha^{-1})	Cotton stalk yield (kg ha^{-1})	Biological yield (kg ha^{-1})	Harvest index (%)
Main treatments							
Arboreum genotypes							
V_1 - NDLA 3116-3	21.41	59.74	1528	532	2711	4239	35.24
V_2 – AKA 2013- 8	23.44	70.05	1772	636	3139	4911	35.38
V_3 – PA 873	22.03	65.10	1677	589	2988	4664	35.25
SE(m)±	0.35	0.60	36	13	62	98	-
CD at 5%	1.05	1.80	109	39	186	295	-
Plant geometry							
S_1 – 60 × 10 cm	21.54	62.98	1854	648	3288	5141	34.98
S_2 – 60 × 15 cm	22.14	64.38	1669	596	2960	4629	35.41
S_3 – 60 × 30 cm	23.21	67.53	1453	513	2591	4044	35.47
SE(m)±	0.35	0.60	36	13	62	98	-
CD at 5%	1.05	1.80	109	39	186	295	-
Sub plot treatments							
C) N Levels							
N_1 – 75% N	21.67	63.74	1524	539	2721	4244	34.96
N_2 – 100 % N	22.20	64.15	1617	571	2873	4490	35.28
N_3 – 125 % N	23.01	67.00	1835	647	3245	5080	35.62
SE(m)±	0.34	0.69	36	13	60	97	-
CD at 5 %	0.96	1.98	105	37	173	277	-
Interaction (V×S×N)							
SE (m)±	1.01	2.07	109.23	38.36	180.84	289.90	-
CD	NS	NS	313.56	110.11	519.10	832.19	-
GM	**22.30**	**64.96**	**1659**	**586**	**2946**	**4605**	**35.29**

Manjula *et al.* (2017).

Dry Matter Accumulation Plant^{-1} (g)

Genotype AKA 2013-8 (87.03 g) recorded significantly more dry matter plant^{-1} than NDLA 3116-3 (85.25 g) and PA 873 (85.30 g) and the latter two genotypes were found on par with each other, displayed in Fig. 6. Dry matter accumulation is the reflection of better plant growth in terms of plant height, number of branches and higher leaf area per plant. Significant differences in dry matter accumulation among the varieties were mainly attributed to their genetic potential and their higher photosynthetic ability due to more leaf area for longer duration. Similar result in the dry matter production recorded by Moola and Giri (2006). Plant spacing of 60×30 cm (86.51 g) recorded significantly more dry matter plant^{-1} as compared to that of 60×10 cm (85.04 g) and 60×15 cm (86.03 g). It might be due to more availability of light, moisture and nutrient per plant per unit area than that of closer spacing. These results were supported by the findings of Shukla *et al.* (2014). Fertilizer level 125% N (87.35 g) recorded significantly highest dry matter accumulation than the 100% N (85.84 g) and 75% N (85.39 g), the latter two treatments were found to be on par with each other. It might be due to a high fertilizer dose supplies more essential nutrients (especially nitrogen, phosphorus, and potassium), which enhances vegetative and reproductive growth resulting in the development of more sympodial branches. Similar result was found by Manjula *et al.* (2017), Rakesh *et al.* (2022).

Number of picked bolls plant^{-1}

Number of picked bolls plant^{-1} were found significantly higher in AKA 2013-8 (23.44) over PA 873 (22.03) and NDLA 3116-3 (21.41), displayed in Table 1. The difference in number of bolls plant^{-1} among varieties was directed consequence of difference in sympodial branches plant^{-1}. The significant differences among varieties for number of bolls plant^{-1} had also been reported by Singh *et al.* (2012). Plant spacing of 60×30 cm recorded significantly higher number of bolls picked plant^{-1} (23.21) than 60×10 cm (21.54) and 60×15 cm (22.14) spacing, however later two were found to be on par with each other. It might be due to sufficient space available which creates better aeration, less competition and higher photosynthesis, Similar result reported by Panhwar *et al.* (2018). Fertilizer level 125% N (23.01) recorded more number of boll picked plant^{-1} over 100% N (22.20) and 75% N (21.67), but was failed to reach the level of significance with 100% N(N_2). These results were supported by the findings of Rawal *et al.* (2015) and Panhwar *et al.* (2018).

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

Genotype AKA 2013-8 (70.05 g) over PA 873 (65.10 g) and NDLA 3116-3 (59.74 g). It might be due to maximum number of bolls and boll weight in genotype AKA 2013-8. Similar results reported by Singh *et al.* (2012). Wider plant spacing of 60×30 cm (67.53 g) recorded significantly higher weight of seed cotton plant^{-1} as compared to the spacings of 60×10 cm (62.98 g) and 60×15 cm (64.38 g). Later two were found to be on par with each other. This may be due to overall improvement in growth attributes and its positive effect on number of bolls per plant under wider row spacing. The above result are in conformity with the findings of Kumar and Ramchandra (2019). Application of 125% N (67.00 g) recorded significantly higher weight of seed cotton per plant as compared to 100% N (64.15 g) and 75% N (63.74 g). It might be due to with high fertilizer, the plant gets all it needs to grow stronger, make more bolls and fill them better so the seed cotton yield increases significantly. Similar results reported by Panhwar *et al.* (2018).

Seed cotton yield (kg ha^{-1})

Significantly highest seed cotton yield was registered with the genotype AKA 2013-8 (1772 kg ha^{-1}) over NDLA 3116-3 (1528) and at par with PA 873 (1677 kg ha^{-1}). It might be due highest number of bolls palnt^{-1}. Similar result was found by Singh *et al.* (2012). Closer plant spacing of 60×10 cm recorded significantly highest seed cotton yield (1854 kg ha^{-1}) than that of the seed cotton yield register with the spacings of 60×15 cm (1669 kg ha^{-1}) and 60×30 cm (1453 kg ha^{-1}). It was observed that number of bolls plant^{-1} were highest under the wider spacing but the seed cotton yield was highest in closer spacing due to the higher plant population than the wider spacing. Similar results were reported by Shukla *et al.* (2014) and Panhwar *et al.* (2018). Fertilizer level of 125% N recorded significantly higher seed cotton yield (1835 kg ha^{-1}), which was significantly superior fertilizer levels of 100% N (1617 kg ha^{-1}) and 75% N (1524 kg ha^{-1}), whereas, later two was on par with each other. The increased yield due to application of 125% N was reflected in improvement of yield contributing characters *viz*. Number of bolls plant^{-1}, boll weight and seed cotton yield plant^{-1}. Similar results were reported by Pandagale *et al.* (2018) were in conformity with the present investigation.

Lint yield (kg ha^{-1})

Significantly highest lint yield was found in cotton genotype AKA 2013-8 (636 kg ha^{-1}) over NDLA 3116-3 (532 kg ha^{-1}) and PA 873 (589 kg ha^{-1}). This might be due to overall improvement in growth attributes and its positive effect on number bolls plant^{-1} as well as higher seed cotton yield leading to significantly higher lint yield. The above results are in conformity with the findings of Kaur *et al.* (2006). Closer plant spacing of 60×10 cm recorded significantly higher lint yield (648 kg ha^{-1}) than the wider spacing of 60×15 cm (596 kg ha^{-1}) and 60×30 cm (513 kg ha^{-1}). It was mainly due to high plant population under closer spacing than wider spacing. Similar findings were reported by Panhwar *et al.* (2018) and Ibrahim *et al.* (2022). Fertilizer level of 125% N recorded significantly higher lint yield (647 kg ha^{-1}) as compared to the lint yields (571 kg ha^{-1}) 100%N and (539 kg ha^{-1}) 75% N, however N_1 and N_2 were found to be at par to each other. Similar results were reported by Shukla *et al.* (2014), Ibrahim *et al.* (2022).

Cotton stalk yield (kg ha^{-1})

The cotton genotype AKA 2013-8 recorded significantly higher cotton stalk yield of (3139 kg ha$^{-1)}$ over NDLA 3116-3 (2711 kg ha^{-1}) and PA 873 (2988 kg ha^{-1}) which was found to be at par to each other. A closer spacing of 60×10 cm produced significantly highest cotton stalk yield (3288 kg ha^{-1}) than 60×15 cm (2960 kg ha^{-1}) and 60×30 cm (2591 kg ha^{-1}) spacings. It was obtained due to more number of plants available in closer spacing than the wider spacing. Similar results were observed by Shukla *et al.* (2014). Fertilizer level of 125% N recorded higher stalk yield (3245 kg ha^{-1}) than that of Fertilizer levels of 100% N (2873 kg ha^{-1}) and 75% N (2721 kg ha^{-1}), the later were on par with each other. 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 stalk yield. These results are also in conformity with Modhvadia *et al.* (2012).

Biological yield (kg ha^{-1})

Significantly highest biological yield was registered with genotype AKA 2013-8 (4911 kg ha^{-1}) over genotype NDLA 3116-3 (4239 kg ha^{-1}) and PA 873 (4664 kg ha^{-1}) which was found to be at par to each other. It might be due highest yield and yield attributing character. Crop geometry of 60×10 cm recorded significantly higher biological yield (5141 kg ha^{-1}) than 60×15 cm (4629 kg ha^{-1}) and 60×30 (4044 kg ha^{-1}). It might be due to higher seed cotton yield and stalk yield by accumulating more plant population than that of wider spacings. These findings are similar to the result of Katore *et al.* (2006), Bhalerao (2007). Application of 125% N produced significantly superior yield (5080 kg ha^{-1}) as compared to the fertilizer level of 100% N (4490 kg ha^{-1}) and 75% N (4244 kg ha^{-1}), however the latter two were on par with each other. It might be due to highest seed cotton yield and ultimately increased biological yield (kg ha^{-1}) of cotton. These findings are similar to the Shukla *et al.* (2014).

Harvest Index (%)

Arboreum genotype AKA 2013-8 registered highest harvest index (35.38%) which was followed by PA 873 (35.25%), and NDLA 3116-3 (35.24%), represented in table 1. Highest harvest index was recorded with wider spacing of 60×30 cm (35.47%) followed by 60×15 cm (35.41%) and 60×10 cm (34.98%). Similar results were reported by Mandeep *et al*. (2011). Application of 125 % N recorded higher harvest index (35.62%) compared to 100 % N (35.28%) and 75% N (34. 96%). Similar results were reported by Mandeep *et al.* (2011).

Gross Monetary returns (` ha^{-1})

Highest GMR was resisted with the genotype AKA 2013-8 (1,13,054 ` ha$^{-1}$) and was significantly superior over PA 873 (1,06,967 ` ha^{-1}) and NDLA 3116-3 (97,456 ` ha$^{-1}$), as represented in Fig. 7. Higher gross monetary returns were obtained with the plant spacing 60×10 cm (1,18,254 ` ha^{-1}), which was significantly superior to spacings of 60×15 cm (106506 ` ha$^{-1}$) and 60 × 30 cm (92,716 ` ha^{-1}). Higher GMR under closer spacing was due to higher seed cotton yield and cotton stalk yield (kg ha^{-1}). Similar result was reported by Asewar *et al.* (2013). Application of 125% N recorded significantly highest gross monetary returns (1,17,094 ` ha$^{-1}$) over the fertilizer level of 100 % N (1,03,155 ` ha^{-1}) and 75% N (97,227 ` ha^{-1}). The present results are in conformity with the findings of Bharathi *et al*. (2012) Malik *et al*. (2021).

Net Monetary returns (` ha^{-1})

Numerically highest NMR was resisted with the genotype AKA 2013-8 (65,213 ` ha$^{-1}$) followed by PA 873 (59,259 ` ha^{-1}) however these two were recorded significantly higher NMR over NDLA 3116-3 (50,414 ` ha^{-1}). A closer spacing 60×10 cm registered significantly

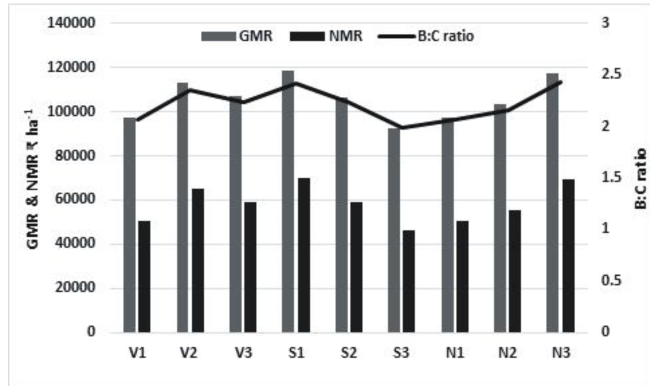

Fig. 7 : Effect on B:C ratio.

higher net monetary returns of 69,712 ` ha$^{-1}$ as compared to wider spacings 60×15cm, which gave net monetary returns of 59,140 ` ha^{-1} and 60×30 cm net monetary returns of 46,034 ` ha^{-1}. The higher net returns were achieved with closer spacing. Spacings of S_1 and S_2 were observed on par with each other. Similar results were reported by Malik *et al.* (2021). Net monetary returns were significantly influenced due to levels of fertilizer. Application of 125% N recorded significantly higher net monetary returns (69,071 ` ha$^{-1}$) over the fertilizer 100% N (55,515 ` ha^{-1}) and 75% N (50,300 ` ha^{-1}), however the later two were on par with each other. The increase in net return with higher N application rates was due to beneficial effect of nitrogen on seed cotton yield. These finding are in line with those supported by Kote *et al*. (2005), Malik *et al*. (2021).

Benefit: Cost Ratio

Arboreum genotype AKA 2013-8 registered maximum B: C ratio of 2.35 followed by PA 873 (2.24) and NDLA 3116-3 (2.06). Higher B:C ratio (2.42) was recorded under the spacing of 60 × 10 cm than the spacings of 60 × 15 cm (2.24) and 60 × 30 cm (1.99). Higher benefit cost ratio was achieved with closer spacing were reported by Asewar *et al*. (2013), Malik *et al*. (2021). Application of 125% N recorded higher BC ratio (2.43) than the fertilizer level of 100% N (2.16) and 75% N (2.07). Increased level of nitrogen significantly increased the benefit cost ratio were reported by Srinivasulu *et al.* (2006) Malik *et al*. (2021).

Interaction effect

Interaction of cotton genotype, different spacing and nutrient management is found to be non-significant with respect to all growth, yield and yield attributing character

Conclusion

Arboreum genotype AKA 2013-8 recorded the significantly higher values of growth parameters, such as plant height, sympodial branches, functional leaves, leaf area, dry matter production and yield attributes, seed cotton yield, cotton stalk yield, biological yield and net monetary returns than that of other genotypes *viz*. PA 873 and NDLA 3116-3. Plant spacing of 60×30 cm recorded significantly higher growth (functional leaves, sympodial branches, Leaf area and dry matter accumulation per plant) and yield attributes (picked bolls and seed cotton yield per plan), but Closer plant spacing of 60×10 cm registered significantly higher lint yield, seed cotton yield, stalk yield, biological yield, gross monetary returns, net monetary returns and B:C ratio. Fertilizer level of 125% RDF (50:20:20 kg NPK ha^{-1}) significantly improved the growth attributes, yield attributes, lint yield, SCY, GMR and NMR and B:C ratio than 75% RDF and 100% RDF.

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