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# Standardization of Nutrient Management for Cotton (*Gossypium arboreum* L.) Genotypes under High Density Planting System (HDPS)

**S. Jaffar Basha[1*], E. Aruna[2], A. Sitharama Sarma[3] and Y. Rama Reddy[4]**

[1]Seed Technology Research & Production Centre, Acharya N. G. Ranga Agricultural University, Jupadu Bunglow-518401, Kurnool Dist, A. P. India

[2]Agricultural Research Station, ANGRAU, Utukur-516001, YSR Kadapa District, A. P. India

[3,4]Regional Agricultural Research Station, ANGRAU, Nandyal-518502, Kurnool District, A. P. India

*Corresponding Author E-mail: shaik.jaffarbasha@gmail.com

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**ABSTRACT**

*A field experiment was undertaken at Regional Agriculture Research Station, Nandyal, Andhra Pradesh during kharif 2011-12 on vertisols to standardize nutrient management in arboretum cotton under High Density Planting System (HDPS). The experiment was laid out in split plot design having twelve treatments of arboreum cotton varieties and fertilizer levels and replicated thrice. Significantly higher seed cotton yield (1792 kg ha$^{-1}$) and number of bolls per plant (16.6) were recorded due to Yaganti. Higher seed cotton yield (1670 kg ha$^{-1}$) was recorded with 150%RDF (30-30 NP kg /ha) and was at par with 125%RDF (1612 kg ha$^{-1}$) and 100%RDF (1576 kg ha$^{-1}$).*

***Key words:*** *Cotton, HDPS, Nutrient management, Seed cotton yield*

## INTRODUCTION

Cotton is a very important commercial crop of India; it sustains the cotton textile industry which is perhaps the largest segment of organized industries in the country. India has the largest area in the world under cotton at 12.18 M ha and is the second largest producer in the world with 35.32 M bales. However, India's average cotton productivity is 493 kg lint ha$^{-1}$ combining both irrigated and rainfed areas and is low when compared to other countries (*cotcrop.gov.in*). High Density Planting System (HDPS) leads to favorable canopy structure with decreased soil water evaporation. The concept on high density cotton plantation was initiated by Briggs *et al*[2]., by adopting narrow row plantation. It has been reported that narrow row planting increase productivity of cotton[1]. Earliness is the advantage of narrow planting[4] (Rossi *et al.*, 2004). Due to narrow planting, though there is reduction in number of bolls per plant, it results into higher percentage of the total bolls in first sympodial position, while lower in second position[9]. The other advantages of narrow cropping include better light interception, sufficient leaf area and early canopy closure, resulting in weed control[8].

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Hence, present investigation was undertaken to find out optimum fertilizer management for the cultivation of cotton genotypes.

## MATERIAL AND METHODS

Field experiment was undertaken during *kharif* 2011-12 at Regional Agriculture Research Station, Nandyal to standardize nutrient management in cotton under High Density Planting System (HDPS). The experiment was laid out in split plot randomized block design with three main treatments of arboreum cotton varieties, four fertilizer levels and replicated thrice. The main plot treatments comprised of arboreum cotton varieties Arvinda, Srinandi and Yaganti where as fertilizer levels employed were 75% RDF (15-15 NP kg /ha), 100% RDF (20-20 NP kg /ha) 125% RDF (25-25 NP kg /ha) and 150% RDF (30-30 NP kg /ha). The sowing was done at planting geometry of 45 x 15 cm by dibbling the seeds. Fertilizers were applied as per the protocol. The observations on Plant height, number of monopods and sympods plant$^{-1}$, number of bolls plant$^{-1}$, boll weight and seed cotton yield were recorded. The data were subjected to statistical analysis as outlined by Gomez and Gomez[3].

## RESULTS AND DISCUSSION

Plant height differs significantly among different varieties (Table 1). Significantly higher plant height was observed in Arvinda (160.3 cm) and was at par with Srinandi (152.0 cm). Plant height did not differ significantly among fertilizer levels. However, application of 150% RDF recorded higher plant height (152.2 cm). There was no significant effect of varieties and fertilizer levels on number of monopodia and sympodia plant$^{-1}$. All the growth parameters did not differ significantly due to interaction effect of varieties and fertilizer levels. Number of bolls plant$^{-1}$ differs significantly among varieties and fertilizer levels. Higher number of bolls plant$^{-1}$ (16.6) was observed in Yaganti and was at par with Srinandi (15.7). Significantly lower number of bolls plant$^{-1}$ (12.8) was observed in Arvinda. There was significant effect of fertilizer levels on number of bolls per plant$^{-1}$. Higher number of bolls plant$^{-1}$ (16.6) was observed in 150% RDF was at par with 125%RDF (16.4) and 100%RDF (14.8). Boll weight did not differ significantly due to different varieties and fertilizer levels. Significantly higher seed cotton yield (1792 kg ha$^{-1}$) was recorded with Yaganti and was at par with Srinandi (1599 kg ha$^{-1}$). 150% RDF recorded significantly higher seed cotton yield (1670 kg ha$^{-1}$) and was at par with 125% RDF (1612 kg ha$^{-1}$) and100%RDF (1576 kg ha$^{-1}$). Higher seed cotton yield might be due more number of bolls[5,6]. Yaganti was found most suitable for HDPS based on yield, morphological features and boll number. Bolls plant$^{-1}$ and seed cotton yield differ significantly due to interaction effect of different varieties and fertilizer levels. Pooled mean (2010-11 and 2011-12) of seed cotton yield for two years indicated significantly higher seed cotton yield (1801 kg ha$^{-1}$) was recorded with Yaganti. 150% RDF recorded significantly higher seed cotton yield (1700 kg ha$^{-1}$) was at par with 125% RDF (1646 kg ha$^{-1}$) and 100% RDF (1600 kg ha$^{-1}$).

**Table 1: Growth and yield of arboretum varieties as influenced by different fertility levels under high density planting system**

| Treatments | Plant height (cm ) | No. of monopodia /plant | No. of sympodia/ plant | No. of bolls /plant | Boll weight (g) | Seed cotton yield (kg ha$^{-1}$) 2011-12 | Seed cotton yield (kg ha$^{-1}$) 2010-11 | Pooled Mean (kg ha$^{-1}$) |
|---|---|---|---|---|---|---|---|---|
| **Varieties** | | | | | | | | |
| Arvinda | 160.3 | 1.65 | 19.0 | 12.8 | 2.85 | 1331 | 1453 | 1392 |
| Srinandi | 152.0 | 1.58 | 18.2 | 15.7 | 2.83 | 1599 | 1695 | 1647 |
| Yaganti | 133.0 | 1.55 | 16.2 | 16.6 | 2.75 | 1792 | 1809 | 1801 |
| SEm± | 5.7 | 0.09 | 0.96 | 0.84 | 0.03 | 80 | 61 | 36 |
| CD(P=0.05) | 22.5 | NS | NS | 3.3 | NS | 316 | 239 | 103 |
| **Fertilizer levels** | | | | | | | | |
| 75% RDF (15-15 NP kg /ha) | 146.1 | 1.44 | 18.3 | 12.2 | 2.71 | 1439 | 1574 | 1506 |
| 100%RDF (20-20 NP kg /ha) | 146.1 | 1.88 | 18.6 | 14.8 | 2.73 | 1576 | 1624 | 1600 |
| 125% RDF ( 25-25 NP kg /ha) | 148.2 | 1.66 | 17.5 | 16.4 | 2.77 | 1612 | 1679 | 1646 |
| 150% RDF (30-30 NP kg /ha) | 152.2 | 1.42 | 16.6 | 16.6 | 3.02 | 1670 | 1731 | 1700 |
| SEm± | 3.91 | 0.16 | 0.75 | 0.89 | 0.20 | 63 | 38 | 42 |
| CD(P=0.05) | NS | NS | NS | 2.6 | NS | 188 | 113 | 119 |
| Interaction | NS | NS | NS | 4.6 | NS | 326 | 196 | 206 |
| CV (%) | 7.9 | 26.3 | 12.8 | 18.19 | 21.8 | 12.1 | 6.9 | 10.9 |

## CONCLUSION

Arboreum cotton variety Yaganti can be cultivated under high density planting system (45× 15cm) with the application of 150% RDF (30-30 NP kg/ha) for realizing higher seed cotton yield under rainfed conditions in vertisols of Andhra Pradesh.

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