EFFECT OF SOWING OF TIME AND GRANED N LEVELS ON MORPHOLOGICAL CHARACTERS AND SEED COTTON YIELD

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ABSTRACT

A field experiment was undertaken to quantify the effect of date of sowing and N levels on the morphological traits and yield in cotton cv. LRA 5166 under protective irrigated conditions of Coimbatore. The study revealed that sowing of cotton during first fortnight of September had beneficial effect on the morphological traits viz. plant height, number of nodes, leaves per plant, leaf area index and dry matter accumulation and seed cotton yield. The increase in N level also had a synergist effect with time of sowing and thereby a positive effect on seed cotton yield. Nitrogen mediated integration of growth and development led to higher productivity. The yield response was noticed upto 90 kg N/ha. There was no improvement in productivity for the further increase in N level.

Nitrogen is one of the major essential nutrient and its availability in the rhizosphere regulates crop growth and development. It is an established fact that application of N in poor deficit soils always has a pronounced effect on growth and yield of a crop (Nagwarkar et al., 1987; Tomar et al., 1989). Judicious application of N fertilizer enhanced seed cotton yield by augmenting better source and sink development during ontogeny (Kumara Perumal, 1999). Among various package of practices, sowing time and nitrogen levels are the inter related factors to step up the cotton yield. A field study was undertaken to optimize the dose of N fertilizer in relation to time of sowing for cotton cultivation under irrigated conditions of Coimbatore district.

The present investigation was carried out at the Central Institute for Cotton Research, Regional Station, Coimbatore during 2001-02 cropping season. The experimental field is situated at 11°N latitude and 77°E longitude with an elevation of 426.7 m above MSL. The soil characteristics being sandy clay loam with low in available nitrogen (196 kg/ha), and available phosphorous (9.33 kg/ha), high in available potassium (275.56 kg/ha), moderately alkaline (pH 8.1) with 0.3 dsm⁻¹ of EC.

The experiment was laid out in split-plot design with date of sowing, (D₁-4th September; D₂-14th September and D₃-24th September) in main plots and N levels (N₁-60 kg/ha; N₂-90 kg/ha and N₃-120 kg/ha) as sub plots with 4 replication. Cotton cv. LRA 5166 sown at 60 x 30 cm spacing with 7.5 kg/ha of acid delinted seed. The crop was raised under irrigated condition. Entire quantity of recommended P and K were applied basally. Regarding nitrogen 50 per cent of N applied as basal and remaining dose at square formation stage. All other practices were followed as per the recommended packages of practices. Morphological traits viz., Plant height, number of nodes, leaves/plant, were taken at 30 days interval from 30 after sowing onwards.

Time of sowing and graded levels of N had a significant influences on plant height, number of nodes, leaves/plant, leaf area index, dry matter accumulation and seed cotton yield. (Table 1 and 2).

Effect of time of sowing: There was an appreciable change in the morphological traits by time of sowing treatments. At initial growth period upto 60 DAS of the crop growth, treatment D₃ (14th September) had exerted a marked influence on plant height than other sowing times (Table 1). Later on both D₁ and D₂ treatments remained at par in
Table 1. Influence of time of sowing and different N levels on growth attributes

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Plant height (cm)</th>
<th>Nodes/plant (OAS)</th>
<th>No. of leaves/plant (OAS)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30</td>
<td>60</td>
<td>90</td>
</tr>
<tr>
<td>D1, 4th September</td>
<td>12.60</td>
<td>20.63</td>
<td>20.63</td>
</tr>
<tr>
<td>D2, 14th September</td>
<td>15.98</td>
<td>23.05</td>
<td>23.05</td>
</tr>
<tr>
<td>S.Ed</td>
<td>1.47</td>
<td>1.58</td>
<td>1.69</td>
</tr>
<tr>
<td>C.D. (P = 0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N1 - 60 kg/ha</td>
<td>13.62</td>
<td>21.75</td>
<td>21.75</td>
</tr>
<tr>
<td>N2 - 90 kg/ha</td>
<td>14.58</td>
<td>22.70</td>
<td>22.70</td>
</tr>
<tr>
<td>S.Ed</td>
<td>0.74</td>
<td>1.32</td>
<td>1.32</td>
</tr>
<tr>
<td>C.D. (P = 0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Table 2. Influence of time of sowing and different N levels on growth attributes and seed cotton yield

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Leaf area index (OAS)</th>
<th>Ory matter accumulation (DAS)</th>
<th>Seed cotton yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>60</td>
<td>90</td>
<td>120</td>
</tr>
<tr>
<td>D1, 4th September</td>
<td>2.20</td>
<td>3.05</td>
<td>3.87</td>
</tr>
<tr>
<td>D2, 14th September</td>
<td>2.33</td>
<td>3.12</td>
<td>3.94</td>
</tr>
<tr>
<td>S.Ed</td>
<td>0.13</td>
<td>0.21</td>
<td>0.29</td>
</tr>
<tr>
<td>C.D. (P = 0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>N1 - 60 kg/ha</td>
<td>2.07</td>
<td>2.89</td>
<td>3.69</td>
</tr>
<tr>
<td>N2 - 90 kg/ha</td>
<td>2.12</td>
<td>2.98</td>
<td>3.79</td>
</tr>
<tr>
<td>N3 - 120 kg/ha</td>
<td>2.12</td>
<td>2.98</td>
<td>3.79</td>
</tr>
<tr>
<td>S.Ed</td>
<td>0.11</td>
<td>0.19</td>
<td>0.27</td>
</tr>
<tr>
<td>C.D. (P = 0.05)</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
respect of plant height and it ranked as a superior treatments when compared to the
 treatment D_3. A progressive increase in number of nodes/plant was noticed under 14th
 September sowing (D_2). Regarding number of leaves/plant, the treatments D_2 and D_4
 produced significant effect than D_3. Leaf area index had shown a significant differences
 among them through the growth period, except during 90th and 120th DAS. During that
 stage (90 and 120 DAS) the treatments D_2 and D_3 behaved statistically on par. Mostly D_1
 and D_3 treatments remained equally effective and inferior to the treatments D_2 (14th
 September) in respect of dry matter accumulation. This improved growth parameters under D_3
 sowing (14th September) might be due to a congenial environment, at the time of sowing that paved way for better
 establishment and resulted in a positive influence on growth parameters. Sowing of cotton during 14th
 September (D_4) had results 7.7, 13.6 per gent higher yield over 4th
 September (D_1) and 24th September sowing (D_3) (Table 2). Delayed sowing by 10 days from
 14th September decreased the value of growth influence on seed cotton yield. The higher
 seed cotton yield was realized under 14th
 September sowing was because of better growth and development of the plant as evinced by increased plant height, more
 number of leaves, higher dry matter accumulation. The reduction in seed cotton yield under late sown crop (D_3) might be due
to the unfavorable climatic conditions at the time of sowing and boll development along with
 heavy intensity of boll shedding under delayed sown crop as opined by Ishwar Singh and

**Effect of nitrogen levels:** Enhanced
 level of nitrogen application (120 kg/ha) had a significant improvement in plant height, number of nodes/plant compared to 60 kg N/
ha, but was on par with the level of 90 kg/ha through out the crop growth period. The number of leaves produced/plant was significantly higher than other treatments. Leaf area index and dry matter accumulation also was greatly influenced by graded N levels. Both N_2 and N_3 (90 and 120 kg N/ha) remained on par in respect of LAI and dry matter accumulation and found to be superior than the recommended dose of N (60 kg N/ha), through out the phenophase of the cotton crop. The increase in the dry matter accumulation with N application was owing to the improved photosynthesis, resulting in the higher vegetative growth (Bison et al., 1994).

Favourable response of cotton to nitrogen with regard to growth and development and yield has also been reported by Boquet et al. (1993), Chhabra and Bishnoi (1993).

Application of N application at 90 kg/ ha (N_2) registered higher seed cotton yield than the recommended level of N (60 kg/ha). These results corroborate the findings of Tomar et al. (1989). Further increase in N level from 90 to 120 kg/ha did not exert any significant influence on seed cotton yield. Manney (1979) opined that there was a tendency for yield reduction at 120 kg N level in most of the cultivars. This may be attributed to excessive vegetative growth at the expense of boll development and shedding effect due to excess leaf area. It seems that integration of effective leaf area and biomass production by increase in N levels may be one of the contributing factors for achieving higher seed cotton yield from the treatment N_2 (90 kg/ha).

From the above finding, it is concluded that sowing of cotton during 14th September with 90 kg N/ha will improve the productivity in cotton by 1.3 to 1.7 q/ha under irrigated conditions of Coimbatore region, Tamil Nadu.
REFERENCES