INFLUENCE OF SEED SIZE ON SEED AND SEEDLING QUALITY CHARACTERISTICS OF CLUSTER BEAN [CYAMOPSIS TETRAGONOLOBA (L.) TAUB.]

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ABSTRACT

Studies on seed size on clusterbean cv. Pusa Navbhagar with different BSS sieve sizes revealed that size grading of seeds with BSS 6 X 6 recorded maximum recovery of quality seeds. Seed size and seed quality exerted a positive association in cluster bean.

Key words : Seed size, Seed quality, Size grading, Cluster bean.

Successful seed production depends on the rapid establishment and uniform field stand. To ensure that, high vigour seeds are normally recommended for sowing. Physical grading of seed based on morphological characters, primarily the seed size is widely used character for selection of vigorous seed from the lot (Agrawal, 1996). Cluster bean seeds exhibit variation in their size which is inevitable in crops having continuous flowering habit. Hence studies were made to categorize the seed based on size using different sieves and assess the seed quality.

Genetically pure and freshly harvested seeds of cluster bean (Cyamopsis tetragonoloba (L.) Taub.) cv. Pusa Navbhagar obtained in bulk from Agricultural Research Station, Bhavanisagar, Erode district, Tamil Nadu, formed the base material for the study. The seeds were graded based on size, using hand operated wire mesh sieves of size (British Standard Sieve) BSS 6 x 6 and 7 x 7 and the seeds retained on each of the sieve and that passed through BSS 7 x 7 were weighed separately. The recovery each grade from the total weight was expressed in percentage. From each of the grade along with control (Ungraded) seeds, 100 seeds in eight replicates were counted as per ISTA, (1999) for obtaining the test weight. The graded seeds were subjected to germination test as per ISTA, (1999) in a seed germinator maintained at 25 ºC and 95±2 per cent RH. After the recommended test period of 10 days, based on the normal seedlings observations were made on germination (%) as per ISTA, (1999) and for the vigour parameters viz., root length, shoot length, dry matter production 10 seedlings−1 and vigour index (Abdul-baki and Anderson, 1973). Protein content (Alkan and Youngs, 1973) and field emergence were also recorded. The data were analysed statistically adopting the procedure described by Gomez and Gomez (1984). Wherever necessary, the percentage values were transformed to angular (arc sine) values, before carrying out the statistical analysis. The critical difference (CD) was worked out at 5 per cent (P = 0.05) level.

Seed polymorphism based on size is inevitable in crop seeds as the mother crop is grown in different ecological conditions with various crop nutrition and intercultural operations. (Copeland and McDonald, 1995). Srimathi et al. (2003) stressed that the optimization of sieve size based on the recovery of quality seeds is warranted for better economic utility of the seed with good quality. Hence size grading becomes the integral part of the post harvest seed management practice, which optimised the size of the seed for improved field stand and uniform crop growth. Productivity and storability of the crop seeds envisaged through seed size was reported by several researchers (Guberae et al., 1998; Bhattacharjee et al., 2000).

In the present study, the cluster bean seeds were graded with BSS sieves of size 6 x 6 and 7 x 7.
The results expressed that the recovery of the seeds was the maximum with BSS 6 x 6 retained seeds (70 per cent) and followed by the seeds retained in BSS 7 x 7 sieves (24 per cent). The minimum recovery was recorded with BSS 7 x 7 passed seeds (6.1 per cent) indicating the occurrence of larger size seeds in the seed lot (Table 1). Similar variations in seed recovery with different sieve sizes were also reported by Ponnuswamy (1973) in groundnut, Paul and Ramasamy (1979) in cowpea and Srimathi et al. (2003) in lucerne, highlighting that seed size variation within a lot could be minimized by size grading the seeds with specific sized sieves.

In the present study, the seed vigour evaluated through seedling characters viz., root length, shoot length and drymatter production showed a positive association with seed size, germination and 100 seed weight. However, the seed vigour index values were at par with seeds retained in BSS 6 x 6 (2296) and BSS 7 x 7 (1880) indicating little variation between these two size grades. The larger seeds retained in BSS 6 x 6 also recorded 37 per cent increased drymatter production than the smaller seeds passed through BSS 7 x 7 sieve. Positive relationship between seed size and drymatter production had also been reported by Vakeswaran, (1998) in peas. Kalavathi and Vanangamudi (1990) in cluster bean and Bhingarde and Dumbre (1993) in greengram also recorded association between seedling vigour and seed size.

The present study thus expressed a positive association between seed size and seedling quality characters. This was in confirmity with the findings of Kalavathi and Ramamoorthi (1992) in cluster bean who reported that, bolder seeds of cluster bean gave higher germination compared to medium and small seeds and increase in seed size led to increased root and shoot length and higher drymatter production. But on large scale processing, more quantity of valuable seed could not be wasted.

### Table 1. Influence of size grading on seed and seedling quality characteristics of cluster bean.

<table>
<thead>
<tr>
<th>Sieve size (BSS)</th>
<th>Seed recovery (%)</th>
<th>100 seed weight (g)</th>
<th>Germination (%)</th>
<th>Root length (cm)</th>
<th>Shoot length (cm)</th>
<th>Drymatter production 10 seeding⁻¹ (mg)</th>
<th>Vigour index (%)</th>
<th>Protein content (%)</th>
<th>Field emergence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>6 x 6 R</td>
<td>70.0 (56.79)</td>
<td>4.376</td>
<td>88</td>
<td>12.2</td>
<td>13.9</td>
<td>181</td>
<td>2296</td>
<td>17.2</td>
<td>84</td>
</tr>
<tr>
<td>7 x 7 R</td>
<td>24.0 (29.33)</td>
<td>3.216</td>
<td>80</td>
<td>10.9</td>
<td>12.6</td>
<td>163</td>
<td>1880</td>
<td>15.1</td>
<td>70</td>
</tr>
<tr>
<td>7 x 7 P</td>
<td>6.1 (14.30)</td>
<td>2.101</td>
<td>40</td>
<td>9.2</td>
<td>11.0</td>
<td>132</td>
<td>808</td>
<td>12.2</td>
<td>40</td>
</tr>
<tr>
<td>Ungraded</td>
<td></td>
<td>3.200</td>
<td>78</td>
<td>11.5</td>
<td>12.1</td>
<td>155</td>
<td>1840</td>
<td>16.5</td>
<td>70</td>
</tr>
</tbody>
</table>

(Figures in parenthesis indicate arc sine transformed values)

In Sesbania also corroborate the influence of seed size on seed germination.

The test weight observed with different size grades exhibited a reduction with reduction in size of the sieve, indicating the positive association between seed weight and seed size in cluster bean. Kalavathi and Vanangamudi (1990) reported similar association of seed size with weight in cluster bean cv. Pusa Navbhagar.

The seeds retained on BSS 6 x 6 sieve recorded the highest seed germination (88 per cent) and was followed by seeds retained in BSS 7 x 7 sieve. However, the seeds passed through BSS 7 x 7 recorded the lowest seed germination of 40 per cent, which was 38 per cent lesser than the bulk seeds. But, the seeds recovered with BSS 6 x 6 and BSS 7 x 7 sieves, recorded 13 and 3 per cent higher germination than the bulk seeds. Srimathi and Vanangamudi (1993) in cowpea and Marshal (1986)
In those specific situations both for certified and foundation seed production, seeds could be graded with BSS 7 x 7 sieve as the seed vigour characters were similar to BSS 6 x 6 sieve and on merging the seeds of BSS 6 x 6 and 7 x 7 the loss in quantity was only 6 per cent.

REFERENCES