INFLUENCE OF SEED COAT COLOUR VARIATIONS ON SEED QUALITY IN
BENGALGRAM CV. CO 4 (CICER ARIETINUM L.)

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ABSTRACT

The seeds of bengalgram cv. CO 4 were visually colour graded into light brown, brown and dark brown seeds and were evaluated for the seed and seedling quality parameters. Significant differences were observed among the colour grades for germination, seedling length, vigour index, protein content, a-amylase and dehydrogenase activity. The results indicated that the light brown seeds were superior to other colour grades for all the seed quality parameters.

Key words: Seed coat colour, Seed quality, Biochemical change, Bengal gram.

INTRODUCTION

Seed colour is a simple and excellent indicator of seed quality. Dharmalingam and Basu (1993) in greengram indicated that off coloured seeds were poorer in quality. Kozlowski (1972) also reported about the less vigorous nature of off coloured seeds in alfalfa, due to physiological or pathological disorders. Association of seed colour with seed quality and storability had already been reported by Stewart and Carlson (1940), West and Harris (1962), Nel and Burgers (1967) and Gugnani et al. (1975) in various crops. Considering the impact of seed coat colour in various crops, studies were made to trace the effect of seed coat colour on seed quality in bengalgram cv. CO 4.

MATERIAL AND METHODS

Seeds of bengalgram cv. CO 4 obtained from pulses breeding station of Tamil Nadu Agricultural University, Coimbatore was used as an experimental material. The seeds were grouped into light brown, brown and dark brown seeds based on visual observation. Ungraded bulk served as control. The following seed quality characters were recorded namely germination percentage (ISTA, 1999), seedling root and shoot length, seedling drymatter production, vigour index. (Abdul-Baki and Anderson, 1973), Speed of germination (Maguire, 1963), electrical conductivity of the seed leachate (Presley, 1958), protein content (Alikhan Youngs, 1973), dehydrogenase enzyme activity (Kittcock and Law, 1968) and a-amylase activity (Simpson and Naylor, 1962). The field emergence potential was evaluated by sowing 100 seeds in each grade in four rows of 25 seeds each in the raised seed bed. The number of seedlings emerged from the field were counted ten days after sowing in each of the grade and the results were expressed as percentage. The data were analyzed for significance as per Panse and Sukhatme (1999).

RESULTS AND DISCUSSION

The results of the study showed a significant variation due to the seed coat colour. The germination potential was high in light brown colour seeds (89%) followed by brown colour seeds (81%). Vigour parameters like seedling length, dry matter production and vigour index values also showed similar trend as that of the germination in which the light brown colour seeds were superior to other colour grades. Speed of germination was also more in light brown seeds (6.8) followed by brown (5.9), bulk (5.0) and dark brown seeds (4.8). The maximum value of 85 per cent field
Table 1: Effect of seed coat colour variations on seed quality parameters

<table>
<thead>
<tr>
<th>Colour Grades</th>
<th>Germination (%)</th>
<th>Root length (cm)</th>
<th>Shoot length (cm)</th>
<th>Dry matter production (mg seedling⁻¹)</th>
<th>Vigour index</th>
<th>Speed of germination (%)</th>
<th>Field emergence (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk</td>
<td>75 (57.61)</td>
<td>18.1</td>
<td>25.0</td>
<td>202</td>
<td>3069</td>
<td>5.0</td>
<td>73 (58.65)</td>
</tr>
<tr>
<td>Light brown</td>
<td>89 (70.92)</td>
<td>19.2</td>
<td>26.1</td>
<td>222</td>
<td>4031</td>
<td>6.8</td>
<td>85 (67.24)</td>
</tr>
<tr>
<td>Brown</td>
<td>81 (64.18)</td>
<td>18.6</td>
<td>25.3</td>
<td>207</td>
<td>3543</td>
<td>5.9</td>
<td>82 (64.93)</td>
</tr>
<tr>
<td>Dark brown</td>
<td>63 (52.67)</td>
<td>16.9</td>
<td>23.3</td>
<td>166</td>
<td>2545</td>
<td>4.8</td>
<td>60 (50.78)</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>(5.875)</td>
<td>0.903</td>
<td>0.756</td>
<td>20.106</td>
<td>286.17</td>
<td>4.566</td>
<td></td>
</tr>
</tbody>
</table>

(Figures in the parentheses indicate arcsine values)

Table 2: Effect of seed coat colour variations on biochemical changes in seed

<table>
<thead>
<tr>
<th>Colour Grades</th>
<th>Electrical conductivity (dSm⁻¹)</th>
<th>Protein content (%)</th>
<th>Dehydrogenase activity (OD value)</th>
<th>a-amylase activity (mm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bulk</td>
<td>2.46</td>
<td>21.27</td>
<td>0.427</td>
<td>15.0</td>
</tr>
<tr>
<td>Light brown</td>
<td>2.03</td>
<td>22.47</td>
<td>0.522</td>
<td>32.6</td>
</tr>
<tr>
<td>Brown</td>
<td>2.33</td>
<td>21.75</td>
<td>0.477</td>
<td>18.8</td>
</tr>
<tr>
<td>Dark brown</td>
<td>2.77</td>
<td>21.05</td>
<td>0.397</td>
<td>16.2</td>
</tr>
<tr>
<td>CD (P=0.05)</td>
<td>0.102</td>
<td>0.703</td>
<td>0.025</td>
<td>1.494</td>
</tr>
</tbody>
</table>

emergence was recorded by light brown seeds followed by brown colour seeds (82 per cent) which were on par with each other (Table 1.) Poorer seed quality parameters of the brown and dark brown seeds of the present study might be due to the senescence or ageing processes of seeds that might had been occurred due to accumulation of poly phenols in the seed coat which lead to the change of seed coat colour from normal to dark. The variation in the seed coat colour due to the accumulation of phenols was also reported by Pathak and Prasad (1988) in sunflower. Among the colour grades, the leachate obtained from light brown seeds recorded the lowest value of 2.03 dSm⁻¹ while dark brown seeds recorded the highest value of 2.77 dSm⁻¹ might be due to the loss of semipermeable nature of the deteriorated cell of the dark brown seed as reported by Parameswari (1999) in tamarind. The biochemical parameters like protein content, a-amylase and dehydrogenase activity were also higher in the light brown colour seeds due to their better status in seed quality characters with lesser seed deterioration rate (Table 2.) Shenbaganathan (2001) also reported about the positive association between seed viability and seed biochemical quality characters. The increase of these parameters in light brown seeds of the study might be due its direct relation with germination capacity and vigour potentiality of the seed at higher order. Thus the study revealed that the light brown colour seeds of bengalgram showed superiority in seed quality parameters than other colour grades and necessitated the importance of colour sorting of the seeds.

REFERENCES