ABSTRACT

Genetic Variability Studies for Yield Attributes in Mungbean (Vigna radiata L. Wilczek) were conducted on 15 Mung bean genotypes at Horticulture Research Farm, SGT, Gurugram, Haryana during kharif 2021. The study was set up in a Randomised Block Design with three replications and focused on variability of 16 morpho-physiological characters. The analysis of variance revealed extremely significant variations across accessions for all characteristics. There is potential for improvement in traits with high mean and high range, such as Days to 50% blooming, Days to initial flower opening, Days to cessation of flower, Relative water content, Biological Yield, Harvest Index, and Grain yield per plant. IPM205-7 demonstrated advantage in terms of early blooming as well as a number of yield-related features like height of the plant, number of secondary and primary branches per plant, number of pods, root length, and number of roots, biological yield, harvest index, and grain yield per plant.

Key words: Anti-Nutritional, High Temperature, Pulses, Variability, Yield Attribute.

Introduction

Mung beans, sometimes referred to as Vigna radiata in science, are a tiny, green legume that is widely grown across Asia and other warm-climate locations. Since ancient times, they have been utilised for both culinary and medicinal purposes and are an integral element of the traditional cuisines of nations like India, China, and Southeast Asian countries. A wholesome and adaptable legume, mung beans are utilised extensively in Asian cooking and other cultures as well. By including mung beans in your diet, whether you prefer them dry or as sprouts, you may get a number of health advantages and enhance the flavour and texture of your food. Small, oval-shaped mung beans have a delicate, creamy-colored inside and a green outer layer. They are members of the same family as other legumes like chickpeas and lentils. The most common ways to eat these beans are as dry beans or sprouted beans. In Asian cooking, the dried beans are frequently split in half to make “split mung beans” or “mung dal.” Mung beans are very nutrient-dense and a fantastic source of dietary fibre, plant-based protein, vitamins (including folate, vitamin B6, and vitamin C), and minerals (such iron, magnesium, and potassium). They are also a good source of antioxidants, which can guard the body against inflammation and oxidative damage.

Studies on genetic variability offer a foundational understanding of the population’s genetic characteristics, and it is from this knowledge that breeding techniques are developed to further enhance the crop. These researches are useful for understanding
the kind of extent variability that is due to various situations, a crop’s sensitivity to environmental factors, a character’s heritability, and genetic advancement that may be realised via practical breeding. The primary source for the utilisation of genotypes’ greater potentiality is the degree of variability and heritability of the feature among genotypes. Heritability provides information on the extent of quantitative trait inheritance, whereas genetic advancement will be useful in developing appropriate selection techniques.

Materials and Methods

The field study for the current investigation, titled “Genetic variation in Mungbean yield-related characteristics under high temperatures” was carried out during Kharif 2022 in the SGT University’s Horticulture Farm in Gurugram, Haryana, using a Randomised Block Design (RBD) with three replications and plot sizes of 5 by 2 metres. Plant to plant and row to row distances were 30 cm and 10 cm, respectively. The experimental materials were 15 genotypes of mung beans that were obtained from CCSHAU, Hisar, Haryana. The observations were recorded on plot basis for days to 50% flowering, days to physiological maturity and grain yield per plot. For rest of the characters, the data were recorded on five randomly selected plants from each genotype in each replication leaving the first two border rows from all the four sides, in order to avoid the sampling error. The observations were recorded as per the following procedure. Readings from five plants were averaged replication wise and the mean data was used for statistical analysis for 16 characters.

Results and Discussion

In the current study, fifteen Mung bean genotypes were examined to see how well they performed in terms of yield and features that are associated to yield. For all of the examined characteristics, the genotypes showed extremely significant variation, either to the analysis of variance or estimations of Mean Sum of Squares (MSS). This in turn suggested that the material under study has enough variation to be used in future breeding programmes. For all 16 characteristics, the analysis of variance showed a significant difference between all 15 genotypes of Mung beans. This showed that the genotypes of Mung beans have a significant amount of variability, which might be used in future breeding projects.

Azam et al. (2018) showed considerable variability for multiple features in Mung Bean, whereas Yosephat et al. (2022), Singh et al. (2021), and Azam

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Character</th>
<th>Replication (d.f=2)</th>
<th>Treatments (d.f. = 14)</th>
<th>Error (d.f.=28)</th>
<th>Mean</th>
<th>Range</th>
<th>CV</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>DFFO</td>
<td>3.87</td>
<td>2.49*</td>
<td>0.53</td>
<td>24.10</td>
<td>22.31-25.41</td>
<td>3.03</td>
</tr>
<tr>
<td>2</td>
<td>DFF</td>
<td>11.79</td>
<td>11.75*</td>
<td>1.90</td>
<td>49.21</td>
<td>46.06-52.02</td>
<td>2.81</td>
</tr>
<tr>
<td>3</td>
<td>DCF</td>
<td>26.44</td>
<td>30.52**</td>
<td>8.20</td>
<td>99.07</td>
<td>93.12-105.04</td>
<td>2.89</td>
</tr>
<tr>
<td>4</td>
<td>PH</td>
<td>5.23</td>
<td>659.12**</td>
<td>6.94</td>
<td>63.04</td>
<td>41.58-95.37</td>
<td>4.18</td>
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<tr>
<td>5</td>
<td>NPBPP</td>
<td>0.05</td>
<td>74.55**</td>
<td>0.11</td>
<td>12.53</td>
<td>7.41-21.34</td>
<td>2.68</td>
</tr>
<tr>
<td>6</td>
<td>NSBPP</td>
<td>2.21</td>
<td>534.99**</td>
<td>0.77</td>
<td>19.71</td>
<td>4.90 - 47.94</td>
<td>4.48</td>
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<tr>
<td>7</td>
<td>PL</td>
<td>0.33</td>
<td>0.91**</td>
<td>0.07</td>
<td>6.73</td>
<td>5.63-7.59</td>
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<tr>
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<td>4.46</td>
<td>1078.79**</td>
<td>1.46</td>
<td>32.09</td>
<td>10.13-81.60</td>
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<td>NSPP</td>
<td>0.10</td>
<td>1.94**</td>
<td>0.06</td>
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<td>6.67-9.67</td>
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<tr>
<td>10</td>
<td>RL</td>
<td>0.15</td>
<td>52.36**</td>
<td>0.32</td>
<td>15.96</td>
<td>12.04-28.16</td>
<td>3.58</td>
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<tr>
<td>11</td>
<td>RDW</td>
<td>0.003</td>
<td>28.09**</td>
<td>0.03</td>
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<td>1.51-13.44</td>
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<tr>
<td>12</td>
<td>RWC</td>
<td>7.10</td>
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<td>67.52-86.89</td>
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<td>TW</td>
<td>5.22</td>
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<td>31.60</td>
<td>15.41-42.33</td>
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<tr>
<td>14</td>
<td>BY</td>
<td>57538.33</td>
<td>1018470**</td>
<td>27840.6</td>
<td>4745.45</td>
<td>3694.42-5592.56</td>
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<tr>
<td>15</td>
<td>HI</td>
<td>1.42</td>
<td>1.73*</td>
<td>0.37</td>
<td>26.01</td>
<td>24.63-27.67</td>
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<tr>
<td>16</td>
<td>GY</td>
<td>9390.667</td>
<td>59378.73**</td>
<td>1372.37</td>
<td>1232.52</td>
<td>957.26-1446.22</td>
<td>3.01</td>
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</tbody>
</table>

** Significance at 1 % level
*significance at 5 % level
et al. (2018) reported substantial variability in Mung Bean. As a result, there was enough variation among the study materials to allow for the selection of superior genotype for future advancement. The magnitude of the Mean Sum of Squares (MSS) for several variables clearly indicated the level of population diversity. IPM205-7 outperformed check MH421 in terms of features like Days to First Flower Open (DFFO), Days to Fifty percent Flowering (DFF), Plant Height (PH), Number of Secondary Branches per Plant (NSBPP), Number of Primary Branches per Plant (NPBPP), Pod Length (PL), Root Length (RL), Root Dry Weight (RDW), Biological Yield (BY), Harvest Index (HI) and grain yield per plant based on mean performance. The genotype demonstrated advantage in terms of early blooming as well as other yield-related parameters, including grain yield per plant, DFFO, DFF, PH, NSBPP, and NPBPP.

**Conclusion**

Highly significant variations between accessions for all were discovered by analysis of variance. For all characteristics tested, the mean sum of squares owing to treatments was extremely significant, which demonstrated considerable population variability. Traits with high mean and high range, such as DFFO, DFF, Days to cessation of Flowering (DCF), Relative Water Content (RWC), BY, HI, and grain yield per plant, have a good chance of being improved by straightforward selection. IPM205-7 shown superiority over check MH421 for attributes including DFFO, DFF, PH, NSBPP, NPBPP, PL, RL, RDW, BY, HI, and grain yield per plant based on mean performance.
Table 3. Estimates of Genetic parameters for different traits in Mung Bean

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Character</th>
<th>$\sigma^2_p$</th>
<th>$\sigma^2_g$</th>
<th>PCV</th>
<th>GCV</th>
<th>$h^2(\text{BS})%$</th>
<th>GA as % of Means</th>
</tr>
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<tr>
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<td>DFFO</td>
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<td>0.655</td>
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<td>55</td>
<td>5.14</td>
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<td>2</td>
<td>DFF</td>
<td>5.19</td>
<td>3.28</td>
<td>4.63</td>
<td>3.68</td>
<td>63</td>
<td>6.03</td>
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<td>224.342</td>
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<td>23.39</td>
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<td>NPBBPP</td>
<td>24.92</td>
<td>24.81</td>
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<td>39.75</td>
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<tr>
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<td>178.85</td>
<td>178.071</td>
<td>67.84</td>
<td>67.69</td>
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<td>54.72</td>
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<td>22.45</td>
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Acknowledgement

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References


