SCREENING AND SELECTION OF MUNG CULTIVARS UNDER BARANI CONDITIONS OF KOHAT REGION

BY

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ABSTRACT
Nine cultivars of mung bean were evaluated for grain yield, drought tolerance and insect pest’s resistance against local cultivar under rainfed conditions at Barani Agri. Research Station Kohat during Kharif 1999. Results revealed that cultivar NM-54 was found relatively more resistant to white flies, jassids, and chyromellid, as compared to other tested entries. Cultivars Chakwal-94 and NM-94 were found resistant to thrips. Local variety was most late maturing (67 days), while NM-54 took 59 days to mature showing early maturity. Maximum plant height (32 cm) was recorded for NCM-206, while minimum height (20.2 cm) was recorded for Chakwal-96. Maximum grain yield (263 kg/ha) was recorded for NCM-206 followed by Chakwal-96 (236 kg/ha). Chakwal-96 and NCM-206 on the basis of resistance to insects/pest and higher yield were recommended for planting in Kohat region.

Keywords: Mung bean (Vigna radiata L. Wilzet), Thrip, jassid, whitefly, screening, Kohat

INTRODUCTION
Mung bean (Vigna radiata L. Wilzet) belongs to the family leguminoseae and sub family papilaneveeae. It is one of the important pulse crops cultivated during summer throughout Pakistan (Anonymous 1991). In Pakistan, mungbean was planted on about 1991 thousand hectares with a total production of 90.6 thousand tones and an average yield of 455 kg/ha during 1995-1996. In NWFP mungbean was grown on about 8.1 thousand hectares with a total production of 4.6 thousand tones and average yield of 516 kg/ha (Baqi.1998). In Kohat mung bean was planted on an area of 608 ha with an average yield of 479 kg/ha (Anonymous, 1997). Being a legume, it does not require high doses of nitrogenous fertilizer like cereals if inoculated properly. It also improves soil fertility by fixing atmospheric nitrogen through the process of symbiosis with proper rhizobial strain. So mungbean cultivation is very economical keeping in view the cost of commercial fertilizer and high sale price of mungbean dal or whole grain in market (Baqi.1998).

Mungbean can play a leading role in the national economy of Pakistan if given proper place in cropping pattern. Though the government of Pakistan has given a top priority to the agricultural sector, yet a shortage of pulses is still found in the country. Mungbean is susceptible to a wide range of insect pests, many of which are plain tropical in distribution, but comprehensive information on the various species, their biology and relative economic importance is limited. Economically, the most serious pests are those, which feed on flowers, fruit and seeds. The most damaging among these are the pod boring caterpillars such as Heliothis spp and Etiella spp, and pod sucking bugs such as Mezara uninula. Apart from direct feeding losses, pod feeding insects can substantially reduce the sprouting quality of remaining seeds either by exposure to weather damage as with the pod borer or through loss of viability as with seeds attacked by sucking bugs (Roberts, 1985).
Khan and Lapis (1989) conducted mass screening tests and found that 7 of 20 in General Yield Trial and 6 of 29 Advanced Yield Trial, lines of *Vigna radiate*, together with 4 of 7 *V. mungo* lines, were resistant to mung bean mosaic virus the *common mosaic potyvirus*. These lines can be utilized in a breeding programme. In a screening trial (Anonymous 1990) seeds of 500 mungbean accessions in the laboratory for resistance to *Callosobruchus chinensis* were tested of 500 accessions 10 entries were classed as highly resistant. Two entries V2802B-G and V1128B-GL were immune. Sixty-six accessions were moderately resistant. Chabra and Kooner (1994 b) studied different genotypes of *Vigna radiate* against *Bemisia tabaci*, *Empoasca sp.*, *Aphis craccivora* and mungbean yellow mosaic virus (MYMV), they included some genotypes for a second year field testing and then many were selected for a third year of testing. ML267, ML326, ML372 and Pusa 326, demonstrated consistent performance over the 3 years. These were further tested for 2 more years. All the 4 genotypes were superior in all respects to the standards ML5 and ML131 and can be used as donors in resistance breeding programmes.

Hussain et al. (1997) evaluated eight different mung strains for susceptibility to *Callosoruchus chinensis* on the basis of the number of eggs laid duration of development of the immature stages, percentage adult emergence and weight loss due to damage by the pest. The strains MB-246 and Kanti were found to be highly susceptible with 13.6 and 13.0% loss in weight of seeds, respectively; strains MB-87, MB-26 and MB-66 were susceptible and strains MB-63, MB-48 and MB-55 were moderately susceptible. The size, color and protein content of the seeds had no influence on the susceptibility of mung bean seeds to *C. Chinensis*. Despite its importance as pulse and forage crop its per hectare yield is low in our country, mainly due to the fact that no systematic research has been done on this crop particularly for finding out high yielding varieties. Insect pests control of this crop varieties play a vital role in the success of mungbean crop husbandry. The yield can be increased to a greater extent provided high yielding varieties are identified and planted at suitable time. Therefore a comparative study of promising mungbean varieties was necessary in order to sort out the most suitable varieties for different climatic zones of the NWFP. Keeping these factors in views, the present study was conducted with the objective to screen and select the high yielding varieties of mung bean with resistance to insect, pests and diseases.

**MATERIALS AND METHODS**

An experiment was conducted on “screening and selection of mung bean cultivars under barani conditions of Kohat region” at the Barani Research Station Kohat during kharif 1999. All the insects found or feeding on the mungbean crop were counted. For this purpose sowing was done in rows. The row-to-row and plant-to-plant distances were 30 cm and 10 cm respectively. Size of plot for each cultivar was 4 x 1.8 m². The experiment was replicated 3 times in Randomized Complete Block Design (RCBD).

Relative abundance of major insect species attacking different cultivars of mungbean was recorded at weekly interval. For the population density of insects, five plants from each plot were randomly selected. On each of these plants, two leaves each from top, middle, and bottom were tagged and the population of insects on the both sides of these 6 leaves was counted and recorded. The data were analyzed statistically. The test cultivars of mungbean were NCM-112, NCM-122, NCM-209, NCM-206, NCM-92, NCM-54, Chakwal – 96, NM-19-19, NM-121-25, Local Mung. Other agronomic data, days to 50% maturity, days to 50% pod formation, days to maturity, plant height (cm), number of grains/pod, number of pods/ plant and grain yield (kg ha⁻¹) were collected and analyzed according to standard procedure.

**RESULTS AND DISCUSSION**

**Days to 50% flowering**

Data in table-1 showed that, days to 50% flowering was significantly different. The maximum days (49) were taken by local variety, while the minimum (40) by NM-92.

**Days to 50% pod formation**

Data regarding to 50 % pod formation presented in table-1 indicated that maximum days (54) were taken to pod formation by local variety, while the minimum (45) in NM-92.

**Days to maturity**

Data on maturity was statistically non-significant as given in table-1. However, the maximum days to maturity were recorded in local variety (67 days). The early maturing variety was NM-54, which took 59 days to mature.
Plant height (cm)
There were significant differences between the entries regarding plant height (table-1). The maximum plant height (32 cm) was observed in NCM-206, while the minimum (20.2 cm) in Chakwal-96.

No. of grains/pod
Perusal of data in table-1 showed that maximum No. of grains/pods (9.5) was recorded in NM-54, while the minimum (5.3) was noted in NCM-209.

No. of pods/plant
Meditation of data in table-1, indicated that the maximum pods per plant of (13) were recorded in Chakwal-96, while the minimum in the local variety.

Grain yield (kg/ha)
Data on grain yield (table-1) revealed that the highest yield was obtained from NCM-206 (263.9 kg/ha) followed by Chakwal-96 (236.1 kg/ha). The minimum grain yield of 55 kg/ha was recorded in the local variety.

Insect Pests
Whitefly (*Bemisia tabaci* Gen.)
Density data on white fly indicated (table-2) that cultivar’s NM-54 attracted significantly least number of whiteflies (5.63) and was therefore, relatively more resistant. This was followed by NCM-112 and NCM-209. Local mung attracted significantly large number of whiteflies (11.27) showing its least resistance. The remaining cultivars were intermediate.

Jassid (*Amrasca biguttula* Ishida.)
Analysis of data indicated (table-2) that cultivars NM-54 and NCM-112 attracted least number of jassid and were therefore, relatively more resistant. These were followed by NCM122 and NM 92 Local mung attracted significantly large number of jassids showing its least resistance. The remaining cultivars were intermediate.

Chrysomellid Beetles (*Systane. SP.*)
Data presented in the table 2, revealed that cultivars NM-54 and NM-121-25 attracted significantly least number of Chrysomellids and were therefore, relatively more resistant, while NCM112 attracted significantly large number of Chrysomellids showing its least resistance. The remaining cultivars were intermediate.

Thrips (*Thrips flavus* Schr.)
Data presented in table 2 revealed that the average weekly density of thrips on NCM-112, NCM-122, NCM-209, NM-92, NM-54, CHAKWAL-96, NM-19-19, NM-121-25, and local cultivar was 4.60, 4.96, 4.26, 5.20, 4.33, 4.33, 5.06, 4.66, and 5.30, per leaf, respectively. Data indicated that cultivars NM-54 and Chakwal-96 attracted significantly least number of thrips (4.33 thrips/leaf) and were therefore, relatively more resistant. Local variety and NM-92 attracted significantly large number of thrips showing least resistance. The remaining cultivars were intermediate.

In case of Jassids *Amrasca Biguttula Ishida*, NM-54 and NeM-112 showed relatively more resistance than other cultivars. Local cultivar was the most susceptible. Others were intermediate. Maximum population of *Chrysomellid* beetles *Systane sp* was recorded on NM-54.

Chabra and Kooner (1991 b) screened 22 genotypes of *Vigna mungo* during Kharif 1986 against *Bemicia tabia, empoasea sp* and YMV. UL254, UL-257 4G, 302, UG 370 and UG407 gave the best results. Dongre *et al.* (1996) evaluated seventy-five cultivated accessions and two wild progenitors of black gram *Vigna mungo* and mungbean *V. radiata* for their resistance to infestation by *Callosobruchus maculatus*. None of the cultivated accessions either of black gram or mungbean was found to be resistant. The results of the previous researchers are in conformity with the finding of this study, however as varieties and lines used in this study were different therefore similar results could not even be expected.
Table-1: Performance of Mung cultivars under rainfed conditions

<table>
<thead>
<tr>
<th>Entry</th>
<th>Days to germination</th>
<th>Germination %</th>
<th>Days to 50% flowering</th>
<th>Days to 50% pod formation</th>
<th>Days to maturity</th>
<th>Plant height (cm)</th>
<th>No. of grain/pod</th>
<th>No. of pod/plant</th>
<th>Grain yield (kg/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NCM-112</td>
<td>3</td>
<td>76.6</td>
<td>45 b</td>
<td>49 b</td>
<td>63</td>
<td>20.9 fg</td>
<td>8 a-c</td>
<td>4 d</td>
<td>132 bc</td>
</tr>
<tr>
<td>NCM-122</td>
<td>3</td>
<td>66.7</td>
<td>41 de</td>
<td>46 def</td>
<td>60</td>
<td>24.9 c-e</td>
<td>8 bc</td>
<td>7 bcd</td>
<td>139 bc</td>
</tr>
<tr>
<td>NCM-209</td>
<td>3</td>
<td>63.7</td>
<td>44 bc</td>
<td>50 b</td>
<td>62</td>
<td>24.0 d-f</td>
<td>5 d</td>
<td>6 cd</td>
<td>146 b</td>
</tr>
<tr>
<td>NCM-206</td>
<td>3</td>
<td>66.7</td>
<td>40 e</td>
<td>45 fg</td>
<td>62</td>
<td>32.0 a</td>
<td>7 cd</td>
<td>10 abc</td>
<td>264 a</td>
</tr>
<tr>
<td>NM-92</td>
<td>3</td>
<td>66.7</td>
<td>40 e</td>
<td>45 g</td>
<td>61</td>
<td>28.0 bc</td>
<td>8 a-c</td>
<td>7 cd</td>
<td>208 ab</td>
</tr>
<tr>
<td>NM-54</td>
<td>3</td>
<td>66.7</td>
<td>43 c</td>
<td>48 c</td>
<td>59</td>
<td>29.3 ab</td>
<td>10 a</td>
<td>7 bcd</td>
<td>215 ab</td>
</tr>
<tr>
<td>Chakwal-96</td>
<td>3</td>
<td>73.3</td>
<td>42 d</td>
<td>47 cd</td>
<td>61</td>
<td>20.2 g</td>
<td>8 ab</td>
<td>13 a</td>
<td>236 a</td>
</tr>
<tr>
<td>NM-19-19</td>
<td>3</td>
<td>60.0</td>
<td>42 d</td>
<td>47 cde</td>
<td>62</td>
<td>25.3 c-f</td>
<td>9 a-c</td>
<td>10 ab</td>
<td>208 ab</td>
</tr>
<tr>
<td>NM-121-25</td>
<td>3</td>
<td>60.0</td>
<td>41 de</td>
<td>46 efg</td>
<td>60</td>
<td>26.9 b-d</td>
<td>8 ab</td>
<td>8 bcd</td>
<td>194 ab</td>
</tr>
<tr>
<td>Local</td>
<td>3</td>
<td>81.7</td>
<td>49 a</td>
<td>54 a</td>
<td>67</td>
<td>22.0 e-g</td>
<td>8 a-c</td>
<td>4 d</td>
<td>55 c</td>
</tr>
</tbody>
</table>

Means followed by the same letters are not statistically significant at 0.05% probability levels.

LSD at P<0.05 = 1.012 0.289 1.093 N.S 3.621 1.6543 3.3 90.17

Table-2: Population density of insect pests of mungbean on different cultivars

<table>
<thead>
<tr>
<th>Cultivars</th>
<th>Whiteflies per leaf</th>
<th>Jassids per leaf</th>
<th>Chrysomelids beetles per leaf</th>
<th>Thrips per leaf</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. NCM-112</td>
<td>5.80 a</td>
<td>3.60 d</td>
<td>2.60 a</td>
<td>4.60 bc</td>
</tr>
<tr>
<td>2. NCM-122</td>
<td>8.46 c</td>
<td>4.30 c</td>
<td>2.33 abc</td>
<td>4.96 ab</td>
</tr>
<tr>
<td>3. NCM-209</td>
<td>7.36 d</td>
<td>4.43 bc</td>
<td>2.20 bcd</td>
<td>4.16 c</td>
</tr>
<tr>
<td>4. NCM-206</td>
<td>5.3 e</td>
<td>4.3 c</td>
<td>2.6 a</td>
<td>4.6 bc</td>
</tr>
<tr>
<td>5. NM-92</td>
<td>7.86 cd</td>
<td>4.36 c</td>
<td>2.46 ab</td>
<td>5.20 a</td>
</tr>
<tr>
<td>6. NM-54</td>
<td>5.63 e</td>
<td>2.50 e</td>
<td>1.73 e</td>
<td>4.33 c</td>
</tr>
<tr>
<td>7. Chakwal-96</td>
<td>8.06 cd</td>
<td>4.70 ab</td>
<td>2.40 abc</td>
<td>4.33 c</td>
</tr>
<tr>
<td>8. NM-19-19</td>
<td>9.73 b</td>
<td>4.36 c</td>
<td>2.06 cde</td>
<td>5.06 ab</td>
</tr>
<tr>
<td>9. NM-121-25</td>
<td>9.83 b</td>
<td>4.50 bc</td>
<td>2.00 de</td>
<td>4.66 bc</td>
</tr>
<tr>
<td>10. Local mung</td>
<td>11.27 a</td>
<td>4.80 a</td>
<td>2.10 cd</td>
<td>5.30 a</td>
</tr>
</tbody>
</table>

Means followed by the same letters are not statistically significant at P<0.05 level of probability.
REFERENCES


