

## RESPONSE OF MUNGBEAN (*VIGNA RADIATA* L.) GENOTYPES TO RHIZOBIA CULTURE

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Response of three mungbean genotypes namely NM-51, NM-54 and NM-92 to seed inoculation from two different sources (NIBGE inoculant and AARI inoculant) was studied under field conditions. The growth and yield components like number of pod bearing branches per plant, number of pods per plant, number of seeds per pod and 1000-seedweight were significantly affected by inoculation. Treatment of seeds with NIBGE inoculant (Biopowar) gave significantly more seed yield as compared to that with AARI inoculant. The three genotypes, however, produced statistically similar growth and yield components except 1000-seedweight which was maximum in NM-92 genotype.

**Key words:** mungbean genotypes, Rhizobia culture

### INTRODUCTION

Mungbean (*Vigna radiata* L.) is one of the most important conventional pulses grown in Pakistan. It was cultivated on an area of 195.4 thousand hectares with a total production of 88.9 thousand tonnes giving an average yield of 455 kg ha<sup>-1</sup> (Anonymous, 1999). It plays an important role not only in human diet, but also in improving soil fertility by fixing atmospheric nitrogen into available form with the help of Rhizobia species present in the nodules of its roots. However, under our agro-ecological conditions, the nodulation of mungbean is poor which is the major cause of its low yield. It was observed that inoculation of mungbean with Rhizobium increased plant height, leaf area, photosynthetic rate and dry matter production (Thakur and Panwar, 1995). Brar and Lal (1991) found an increase in number of nodules per plant and seed yield with inoculation. They obtained seed yield of mungbean ranging from 0.76 t ha<sup>-1</sup> without seed inoculation to 0.81 t ha<sup>-1</sup> with *Rhizobium phaseoli* inoculation. Similarly, Pandher et al. (1991) reported that inoculation of mungbean with single and multiple strains of Rhizobium increased the number of root nodules and seed yield. Sarkar et al. (1993) reported that seed inoculation of mungbean with Rhizobium + *Azotobacter chroococcum* and Rhizobium + *Azospirillum brasilense* produced statistically similar seed yield. Similarly, Tripathi et al. (1994) obtained the seed yield of mungbean with Rhizobium inoculation similar to that of 20 kg N ha<sup>-1</sup>. Saimnazarov et al. (1995) inoculated the seeds of mungbean cultivars with two Rhizobium strains, 1901 and 33 and found an increase in seed yield with both strains.

Varieties of mungbean vary in yield and yield components (Sharar et al., 1999). Ayub et al. (1999) obtained significantly higher seed yield of mungbean cv. NM-92 over NM-54 due to higher number of pod bearing branches per plant, number of pods per plant and number of seeds per pod. However, Khan et al. (1999) found no statistical difference between the yield components of mungbean cultivars under observation. After having known about the effect of inoculation and variable varietal behaviour, the present study was undertaken to determine an appropriate source of Rhizobium inoculation for mungbean and also to compare the growth and yield performance of three mungbean cultivars under agro-ecological conditions of Faisalabad.

### MATERIALS AND METHODS

The experiment was carried at the Agronomic research area, University of Agriculture, Faisalabad, during the year 1996, on a sandy clay loam soil having 0.085% nitrogen, 9.2 ppm available phosphorus and 134 ppm available potassium. The experiment was laid out in a split plot design with four replications having a net plot size of 1.5 m x 6.0m. Rhizobium inoculum treatments (uninoculated, NIBGE inoculant and AARI inoculant) were randomized in main plots while mungbean genotypes were randomized in subplots. The whole quantity of nitrogen and phosphorus @ 20 and 60 kg ha<sup>-1</sup>, respectively was side-dressed at sowing time. The crop was sown in second week of August in 30 cm apart rows with a single row hand drill. It was harvested in the third week of October when about 80% of pods had attained maturity. Ten plants from each plot were selected at random to record average number of pod bearing branches

Table 1. Response of three mungbean genotypes to different sources of seed Inoculation

Genotypes	No. of pod bearing branches per plant	No. of pods per plant	No. of seeds per pod	1000-seed weight (g)	Seed yield (kg ha <sup>-1</sup> )
NM-51	5.92 <sup>NS</sup>	18.87 <sup>NS</sup>	9.97 <sup>NS</sup>	51.61b	974.69 <sup>NS</sup>
NM-54	5.96	16.98	10.78	52.04ab	987.14
NM-92	6.05	19.57	10.90	52.63a	1012.18
Seed inoculant					
Uninoculated	5.73b	16.80c	8.73c	51.58 <sup>NS</sup>	796.53b
NIBGE inoculant (Biopower)	6.18a	21.59a	12.01a	52.43	1119.73a
AARI inoculant	6.01a	19.92b	10.37b	52.28	1057.76a

Means followed by the same letters did not differ significantly at 5% probability level.

plane, average number of pods plane and average number of seeds pod<sup>-1</sup>. From each plot 1000 seeds were counted and weighed to determine the 1000-seed weight. Seed yield obtained from each plot was converted to kg ha<sup>-1</sup>. Data collected were analysed statistically using Fisher's analysis of variance technique and the least significant difference test at 0.05 probability level was employed to compare the difference among the treatment means (Steel and Torrie, 1984).

## RESULTS AND DISCUSSION

The data recorded regarding various parameters are given in Table 1.

### 1. Number of Pod Bearing Branches Plane:

There was no significant difference observed among the genotypes for number of pod bearing branches per plant. This similarity can be attributed to the similar genetic traits of crop plants. Khan et al. (1999) has also reported non-significant difference among the mungbean cultivars. Number of pod bearing branches were significantly affected by the use of inoculant over the uninoculated control. This might be due to inoculation which resulted into enhanced vegetative growth. However, the two inoculants, NIBGE and AARI, produced statistically similar number of pod bearing branches plane. Significant increase in the number of pod bearing branches by inoculation was also reported by Brar and Lal (1991).

2. Number of Pods Plant<sup>-1</sup>: Non-significant difference was observed in the number of pods plane of the three genotypes. However, inoculation

significantly increased the number of pods plane over uninoculated control. Inoculation might have enhanced the enzymatic activity which controlled pod formation. The plots which were treated with NIBGE inoculant produced statistically higher number of pods plane (21.59) than those treated with AARI inoculant (19.92). The results are in line with those of Pandher et al. (1991) who also reported an increase in number of pods plane by inoculation with different strains of Rhizobium.

3. Number of Seeds Pod<sup>-1</sup>: The three genotypes did not differ significantly with regard to number of seeds pod<sup>-1</sup>. Khan et al. (1999) has also reported similar results. However, inoculation significantly increased the number of seeds pod<sup>-1</sup> over uninoculated control. This was attributed to the fact that inoculation increased nodulation, improved the utilization of atmospheric nitrogen and enhanced the phosphorus availability to the plants. The plots which were treated with NIBGE inoculant produced statistically more number of seeds pod<sup>-1</sup> (12.01) than those treated with AARI inoculant (10.37). Thakur and Panwar (1995) also found an increase in dry matter production of mungbean with inoculation.

4. 1000-Seed Weight (g): Significant differences were observed among the three genotypes for 1000-seed weight. Maximum seed weight (52.63 g) was found in genotype NM-92, which was, however, statistically at par with that of NM-54 (52.04g), which in turn did not differ significantly from that of NM-51 (51.61g). This increase in 1000-seed weight could be because of greater genetic potential

of NM-92 to utilize the environmental sources for producing heavier seeds. The results conform to those of Ayub et al. (1999) and Sharar et al. (1999) who also reported significant differences among cultivars for 1000-seedweight. However, the effect of inoculation on 1000-seedweight was found to be non-significant. The two sources of inoculation, NIBGE and AARI inoculants, also produced statistically similar results for 1000-seedweight.

5. Seed Yield (kg ha<sup>-1</sup>): The three genotypes did not differ significantly in seed yield due to statistically similar number of pod bearing branches plane, number of pods plane and number of seeds pod<sup>-1</sup>. Seed yields of inoculated and uninoculated treatments significantly differed from each other. Maximum seed yield (1119.73 kg ha<sup>-1</sup>) was obtained in plots where NIBGE inoculant was applied. This was, however, statistically similar to the seed yield obtained by AARI inoculant (1057.76 kg ha<sup>-1</sup>). The minimum seed yield was observed in uninoculated control. Similar results were obtained by Brar and Lal (1991) and Saimnazarov et al. (1995) who also found an increase in seed yield with inoculation.

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