

1 **Screening of Soybean Genotypes Against Mungbean Yellow Mosaic Virus**
2 **Disease Under Field Conditions.**
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ABSTRACT

Glycine max (L.) is a nutritionally enrich leguminous crop, playing a pivotal part in food, feed and industrial sectors. In India it has been escalated owing to high adaptability, nitrogen fixing capability economic returns. However, production is significantly constrained by Mungbean Yellow Mosaic Virus (MYMV), a major viral disease transmitted by whitefly (*Bemisia tabaci*), leading to chlorosis, stunted growth and severe yield losses. The present investigation aimed to evaluate twelve soybean genotypes for speckled resistance to MYMV under epiphytotic field conditions during the *kharif* 2024. The experiment was laid out by using RBD, with 2 replications, Disease severity was scored based on a standardized 0-5, wherein lower scores indicated higher resistance. Sustained variability was evident in disease response, with genotypes categorized as highly resistant, resistant, moderately resistant, moderately susceptible, susceptible and highly susceptible. Genotypes such as these exhibited moderately susceptible. MAUS 81, MAUS 162 showed susceptible against the yellow mosaic virus. The identification of genotypes with moderate resistance to susceptible. These findings provide a valuable foundation for the development of MYMV-resistant soybean cultivators in future. Future efforts for integrating molecular markers and genomic tools with phenotypic selection may be instrumental in accelerating the development of resilient soybean varieties for sustainable production in MYMV-endemic areas.

17 *Keywords: Disease resistant; epiphytic screening; soybean genotypes; soybean*
18 *(Glycine max); yellow mosaic virus (MYMV); whitefly (Bemisia tabaci).*

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20 **1. INTRODUCTION**

21 *Glycine max* (L.) is a self- pollinated crop belonging to the leguminosae family and
22 subfamily Papilionaceae genus *Glycine*. Soybean is an important oil seed crop with a
23 high protein content (40-42%), high lysine content and oil (20-22%) rich in vital
24 fatty acids. It is a major oil seed crop of world growing in an area of 134.55 mha and

25 production of 370.42 million mt with average yield of 2750 kg/ha in the world.
 26 Soybean is more susceptible to several diseases, among all the diseases, Mungbean
 27 Yellow Mosaic Virus is a major one distributed in India. Mungbean Yellow Mosaic
 28 Disease in soybean is caused by Mungbean Yellow Mosaic Virus (MYMV) and
 29 exclusively transmitted by whitefly (*Bemisia tabaci* Genn.) in a persistent manner.

30 2. MATERIAL AND METHODS

32 A total of 12 genotypes of soybean were screened for the reaction against Mungbean
 33 Yellow Mosaic Virus on soybean. The field study was carried out in year 2024 at
 34 Department of Plant Pathology, College of Agriculture, Latur. The experiment was
 35 undertaken under natural epiphytic conditions. Available soybean genotypes were
 36 grown, at spacing of 45x 5 cm² by maintaining 2 replications and the entire set of
 37 recommended techniques were followed. No insecticidal spray was done in the
 38 experimental plot or in the vicinity during the crop season. Plants were exposed to
 39 natural infection. Based on ratings of the disease, the percentage of YMV disease
 40 incidence was estimated in each genotype. Later these were also categorized as
 41 highly resistant, resistant, moderately resistant, moderately susceptible, susceptible
 42 and highly susceptible, respectively.

43 **Table 1: List of genotypes of soybean used in screening against MYMV**

Sr. No	Genotypes	Sr. No.	Genotypes
1	MAUS -47	7	MAUS-81
2	KDS 726	8	MAUS-158
3	KDS-753	9	MAUS-725
4	MAUS -731	10	MAUS-71
5	KDS-992	11	MAUS-61
6	MAUS-612	12	MAUS-162

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45 **Table 2: Disease rating scale of soybean genotypes against Mungbean yellow**
 46 **mosaic virus (Mayee and Datar, 1986)**

Disease scale	Description	Category
0	No Plants showing in any symptom	Immune (I)
1	Less than 1% plants showing symptoms	Resistant (R)
3	1-10% plants showing mottling symptom	Moderately Resistant (MR)
5	11-20% plants showing mottling and yellow discoloration of leaves	Moderately Susceptible (MS)
7	21-50% plants showing mottling and yellow discoloration of leaves; stunting of plants	Susceptible (S)
9	51% of more plants are affected, stunting of plants pronounced flower and fruit set reduced. Yellow mosaic severe.	Highly Susceptible (HS)

47 **Observations**

48 The soybean Mungbean Yellow Mosaic Virus disease affected plants were
 49 monitored for every 7 days and the Per cent disease incidence was estimated by
 50 using the following formula, given by Wheeler in (1969).

$$51 \text{Percent disease incidence} = \frac{\text{Number of infected plants in the plot}}{\text{Total number of plants in plot}} \times 100$$

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 53
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 55 The observations on plant growth and yield contributing characters, such as
 56 plant height, number of pods/plant and Pods lengths were recorded for all the
 57 genotypes at 45 days after sowing. Mature and dried Soybean pods were harvested.
 58 Grain yield data was calculated on a hectare basis after the pods were harvested
 59 separately according to their genotypes.

60 **3. RESULTS AND DISCUSSION**

61 **Table 3: Screening of soybean genotypes against Mungbean Yellow Mosaic**
 62 **Virus**

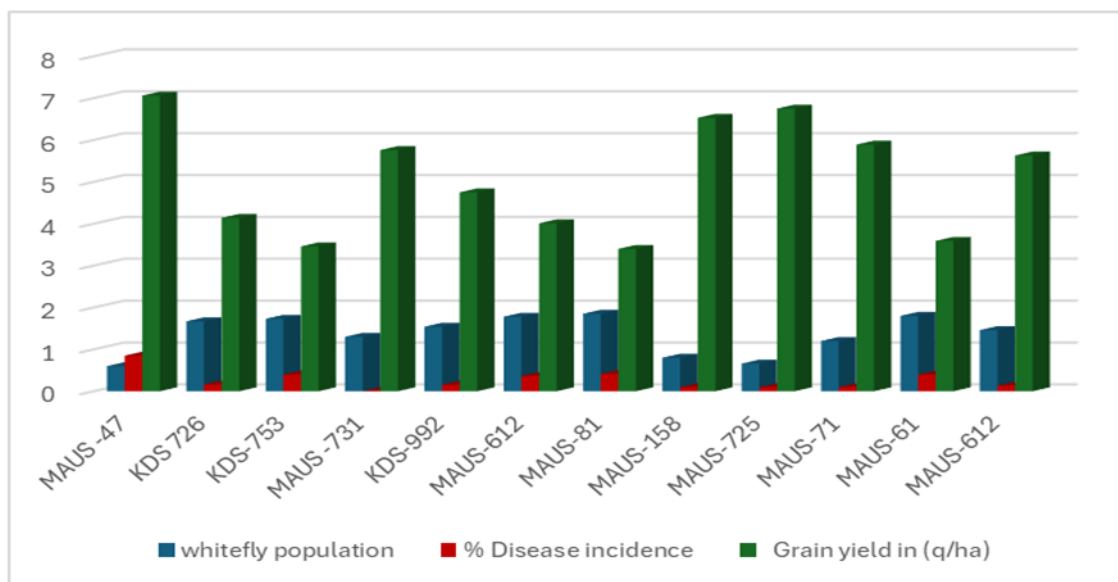
Sr. No.	Name of Genotypes	No. of Whiteflies/ leaf*	Disease Incidence (%)	First appearance of disease on plants (Days after Sowing)	Reaction
1	MAUS 47	0.60	8.5 %	36	MR
2	KDS 726	1.67	16.17%	26	MS
3	KDS753	1.73	39.86 %	24	S
4	MAUS 731	1.30	9.86%	29	MR
5	KDS992	1.54	15.45 %	28	MS
6	MAUS612	1.78	36.60 %	21	S
7	MAUS81	1.85	41.4 %	19	S
8	MAUS158	0.80	9.5 %	32	MR
9	MAUS725	0.66	9.32 %	34	MR
10	MAUS71	1.20	9.8 %	30	MR
11	MAUS61	1.80	39.7 %	20	S
12	MAUS162	1.46	13.3 %	27	MS

63 *= Average of five plants

64
 65 Results (Table 3, Fig. 1) showed that all the soybean genotypes, revealed
 66 that, minimum whitefly population (0.60 % whitefly/ leaf) was recorded in MAUS
 67 47 and maximum whitefly population in (1.85% whitefly / leaf) was recorded in

68 MAUS 81. MAUS 47 showed less disease incidence (8.5%) and MAUS 81 showed
 69 high disease incidence (41.4%). The maximum yield was recorded in MAUS 47
 70 (7.06 q/ ha) and least grain yield was found in MAUS 81 (3.68 q/ha), respectively.

71 Typically, the infected genotypes exhibited the symptoms as yellow spots
 72 along the veins, areas of yellowish green on the leaves, a bright yellow leaf surface,
 73 deformed leaves and stunted plants.



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75 **Fig. 1: Evaluation of whitefly, % disease incidence and grain yield**

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77 **Table 4: Categorization of soybean genotype varieties on the basis of their**
 78 **reaction to Mungbean Yellow Mosaic Virus disease**

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Sr. No.	Scale	Reaction	Genotypes
1	0	Highly Resistant (HR)	----
2	1	Resistant (R)	----
3	2	Moderately Resistant (MR)	MAUS47, MAUS 731, MAUS 158. MAUS 725, MAUS 71
4	3	Moderately Susceptible (MS)	KDS 726, KDS 992, MAUS 162
5	4	Susceptible (S)	KDS 753, MAUS 61, MAUS 612, MAUS 81
6	5	Highly Susceptible (HS)	----

80 Based on the per cent disease incidence on soybean genotypes, they were
 81 classified as Highly resistant (HR), Resistant (R), Moderately Resistant (MR),
 82 Moderately Susceptible (MS), Susceptible (S) and Highly Susceptible (HS) and they
 83 were presented in Table 4. MAUS 47, MAUS 731, MAUS 158, MAUS 725 and
 84 MAUS 71 are shown Moderately Resistant. KDS 726, KDS 992, MAUS 162 are
 85 Moderately Susceptible. KDS 753, MAUS 61, MAUS 612, MAUS 81 are
 86 Susceptible. There are no genotypes showing Highly Resistant, Resistant and Highly
 87 Susceptible.

88 Several researchers had recorded earlier mungbean yellow mosaic disease
 89 reactions in soybean such as Ramesh *et al.* (2019); Yadav and Dahiya (2000); in
 90 mungbean, Mandhare and Suryawanshi (2008); Salamet *et al.* (2009); Suman *et al.*
 91 (2015); Bhanu *et al.* (2017); Deepa *et al.* (2017); Khaliq *et al.* (2017); Dharajiyat *et al.*
 92 (2018); Mahalingam *et al.* (2018) and Yadav *et al.* (2021), respectively.

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94 **Table 5. Yield and yield parameters of different genotypes of soybean**

Sr. No.	Name of the Genotypes	Plant height (30 days)*	Plant height (90 days)*	Germination (%)*	No. of pods/plant*	Pod length (cm)*	Yield (q/ha)
1	MAUS -47	33.53	47.78	55.98	28.99	4.1	7.06
2	KDS 726	35.6	42.8	36.21	16.59	3.0	4.14
3	KDS-753	26.4	30.01	20.56	14.87	2.4	3.46
4	MAUS -731	31.23	39.45	44.51	19.67	3.4	5.76
5	KDS- 992	31.5	37.85	38.98	19.10	3.0	4.75
6	MAUS-612	28.06	35.26	33.69	15.11	2.9	4.01
7	MAUS-81	21.26	29.88	19.89	11.10	2.0	3.40
8	MAUS-158	35.39	42.36	51.21	21.98	3.8	6.53
9	MAUS-725	31.54	44.56	52.98	24.24	3.9	6.75
10	MAUS-71	32.76	40.22	46.69	20.29	3.7	5.89
11	MAUS-61	29.46	32.26	24.21	13.23	2.7	3.59
12	MAUS-162	29.65	38.98	40.45	19.79	3.2	5.63

95 *Average no. of plants =5

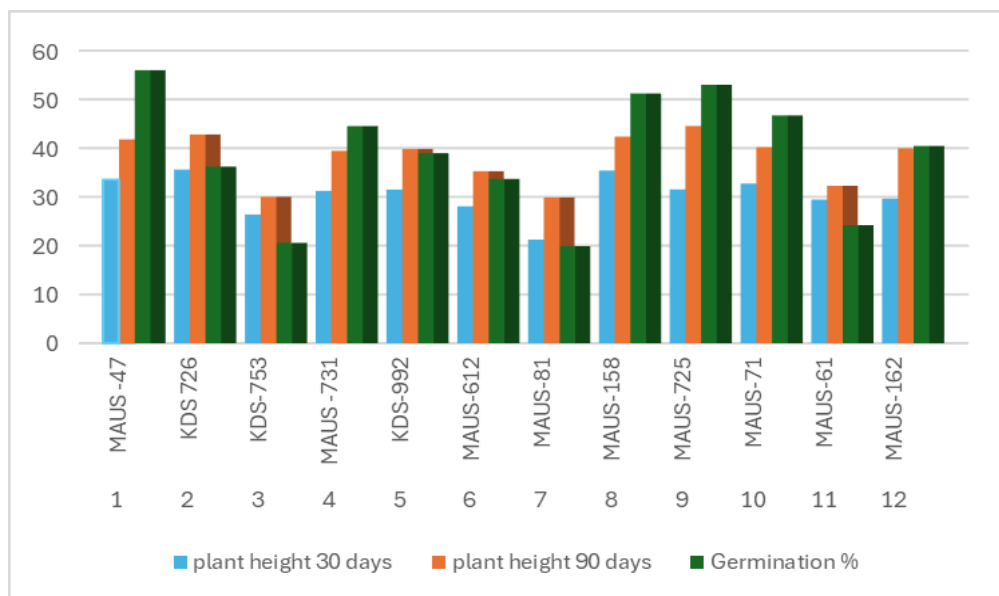
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97 The results in (Table 5) on the effect of MYMV on plant growth and yield
 98 contributing parameters revealed that MYMD incidence had a profound influence on
 99 the number of pods/plant, number of seeds/pod and seed yield in twelve soybean

100 genotypes. Soybean plant height was found to be influenced by MYMD and was
 101 ranged from MAUS 47 (47.78cm) to MAUS 81 (29.88 cm). The number of pods
 102 /plant ranged from 29 (MAUS 47) to 11 (MAUS 81). The pod length of soybean
 103 genotypes that were screened ranged from 4.1cm (MAUS 47) and 2.0 cm in MAUS
 104 81. The grain yield (q/ha) was distinctly influenced due to per cent MYMD
 105 incidence. The grain yield was highly influenced due to MYMD incidence and was
 106 ranged from 7.06 q/ha (MAUS 47) to 3.40 q/ha (MAUS 81), respectively.

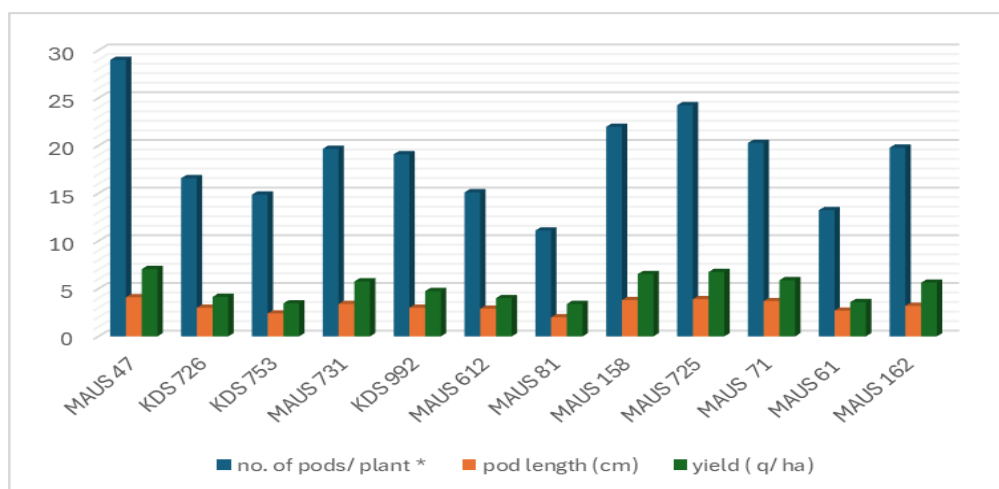
107 Several researchers had reported earlier the effect of MYMV disease on plant
 108 growth and yield contributing parameters of soybean, such as Khattak *et al.* (2000)
 109 and Alamet *et al.* (2014), respectively.

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Fig. 2: Plant height and Germination % are shown in this graph



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Fig 3: No. of pods, pod length and yield per plants are shown in this graph

114 **Conclusion**

115 A total of twelve genotype varieties of soybean were screened against
 116 MYMV, among which, none of them were found to be immune and results revealed
 117 that some of the genotypes were susceptible. Among all of them, five genotype
 118 varieties, viz., MAUS 47, MAUS 725, MAUS 158, MAUS 731 and MAUS 71 with a
 119 mean whitefly population of 0.60, 0.66, 0.80, 1.20 and mean disease incidence of
 120 8.5%, 9.32%, 9.5% and 9.8% were found to be moderately resistant genotype
 121 varieties. Three genotypes viz., MAUS 162, KDS 992 and KDS 726 with mean
 122 whitefly population of 1.46, 1.67, 1.54 and whiteflies/leaf and mean disease incidence
 123 of 13.3%, 15.45% and 16.17%, respectively, were found to be moderately
 124 susceptible genotypes and remaining genotypes viz., KDS 753, MAUS 612, MAUS
 125 61, MAUS 81 with mean whitefly population of 1.73, 1.78, 1.80 and 1.85
 126 whiteflies/leaf and mean disease incidence of 39.86%, 36.60%, 39.8% and 41.4%
 127 respectively, were found to be susceptible. The susceptible genotypes i.e., KDS 753,
 128 MAUS 612, MAUS 61, MAUS 81 were less in height, less number of pods/plant and
 129 less number of seeds/pod, when compared to moderately resistant genotypes viz.,
 130 MAUS 47, MAUS 725, MAUS 158, MAUS 731 and MAUS 71.

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