



## IDENTIFICATION OF RESISTANT SOURCES AGAINST YELLOW MOSAIC VIRUS IN VIGNA SPECIES

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### Abstract:

Thirteen *Vigna* species comprised of 126 accessions were raised at field condition continuously for three years during Kharif seasons for assessing the field resistant genotypes of various *Vigna* species and used as resistant sources for Mungbean Yellow Mosaic Virus. Most of the accessions in all species have been shown seasonal variation in MYMV susceptibility except *V. umbellata* for Yellow Mosaic Virus. None of the entries of each species showed hundred per cent MYMV resistance except *Vigna umbellata* for all the three consecutive years during Kharif seasons. Based on the infection of MYMV of field resistance, the accession of different species were selected for agro inoculation, the only species *Vigna umbellata* showed hundred percent resistance so 24 accessions were alone imposed to agro inoculation test. All 24 genotypes of *Vigna umbellata* showed resistance reaction against MYMV along with Susceptible *Vigna radiata*.

**Key Words:** *Vigna* species, field study, agro inoculation, resistance sources for MYMV

### Introduction:

The genus *Vigna* is a widely spread over the world taking part in the human consumption. In this genus with eighty two described species distributed among seven subgenera (Marechal et al., 1978). Subgenus *Ceratotropis* has its center of species diversity in Asia. The Asian *Vigna* consist of 21 species and remarkably eight of these are used for human or animal food. This contrast with the African *Vigna* ( the subgenus *Vigna* ) in which only two species have been domesticated out of 36 species (Marechal et al., 1978), and the closely related genus *Phaseolus* of the New World that consists of about 50 species and of them only five are cultivated (debouck, 2000). The importance of *Vigna* species are high nutritional value and high harvest index (*V. umbellata*) herklots, 1972), Grain legume and cover crop adapted to very dry regions (*V. aconitifolia*) Duke, 1981), Forage legume adapted to dry regions (*V. trilobata*) Duke, 1981), Grain legume for sweet paste production (*V. angularis*) (Lumpkin and McClary, 1994) and it is very good combiner with other crops. Most of the *Vigna* species contribute highest protein for human, animal and again plants growth through manures supplied and nitrogen cycle biologically. Most of the genotypes affected by MYMV especially cultivated *Vigna* species. Some of the resistance sources are naturally available in the wild species of *Vigna*. The aim of this study is to identify the durable and complete resistance source available at natural in wild species and to develop the resistant donor for greengram and blackgram for utilizing the resistant donor in the crop improvement programme *Vigna* species to bring complete durable resistance in greengram and blackgram variety against MYMV and bruchids.

### Materials and Methods:

For this study the following fourteen species as given in the table 1 were taken for study purpose. A total of 125 genotypes comprised of 13 species (Table.1) were raised in Kharif 2022, Kharif 2023 and Kharif 2024 at Dr. M. S. Swaminathan Agricultural College and Research Institute, TNAU, Eachangkottai, Thanjavur. The augmented design adopted for this study. Every ten rows after one infector row was sown with Co5 blackgram variety (Highly susceptible to MYMV disease) in two meters length of single row contains each genotypes with 10 cm plant to plant spacing and 50 cm for row to row spacing. The crop growth periods completely monitored and managed by plant breeder, pathologist and entomologist available at Dr. M. S. Swaminathan Agricultural College and Research Institute, TNAU, Eachangkottai, Thanjavur in all the accessions was recorded.

### MYMV Disease Score:

The MYMV disease scores were recorded as per the standard procedure. The disease intensity was recorded by observing the percentage of infected plants to the total number of plants and assigned a rating scale. The rating was done as followed by Singh *et al.* (1988).

Rating	Per Cent Plant Affected	Reaction
1	0.0-5.0	Resistant
3	5.1-10.0	Moderately resistant
5	10.1-25.0	Moderately susceptible
7	25.1-50.0	Susceptible
9	50.0-100.0	Highly susceptible

### Agro inoculation study only for rice bean (TNAU red umbellate) and greengram (VRM(Gg)1:

Surface sterilize *V. mungo* seeds. Soak the seeds in distilled water in a petri plate containing germination paper and leave it over night in dark. Take *Agro bacterium tumefaciens* harboring partial tandem repeats grown at AB minimal media at pH 7 at 28°C (10.D. at 600 nm). Spin the culture at 3000 rpm for 10 min at 25°C. Re-suspend the cells in an equal volume of AB minimal medium pH 5.6 with 100 µM acetosyringone. Remove seed coat of the soaked seeds using forceps and prick 3 to 5 times around the hypocotyl region using 30G needle and immerse the seed in AB culture. Leave it over night. Wash the seeds in sterile single distilled water and sow in pots containing 1:1 ratio of autoclaved vermiculite and sand ( *Sudha et al 2015* )

### Results:

Among all the *Vigna* species, three species are being cultivated widely in India namely Mungbean, Urdbean and cowpea in *Vigna* group. Two species are largely grown by the Indian farmers. The resistant reaction of MYMV of different *Vigna* species are presented in Table 2. To assess the MYMV resistant source available in mungbean, 12 mungbean genotypes were raised to

identify resistance genotypes for over three years. The first year 12 entries recorded free from Virus (Table 3) and second year all the same 12 entries were susceptible. There is no constant durable complete resistant in mungbean and urdbean. In *Vigna radiata* var. *sublobata* all the 15 entries showed susceptible reaction to MYMV. *Vigna mungo* var. *silvestris* 40 genotypes studied only two genotypes showed resistant in first year and subsequent year same entries has showed susceptible, In *Vigna umbellata* 24 entries studied, all the 24 entries showed resistant to Yellow Mosaic Virus for all the three years (Table 4). *Vigna hainiana*, two accessions shows susceptible. All the genotypes of these species namely *Vigna acconitifolia*, *Vigna trilobata*, *Vigna trinervia* var. *bourneae*, *Vigna dalzelliana*, *Vigna pilosa*, *Vigna vexillata* and *Vigna glaberescens* were showed susceptible and *Vigna capensis* one entry also having susceptible against yellow mosaic virus. The agro infection test was carried out in greengram cultivated mungbean and rice bean which was showed resistance for all the three seasons. All the field resistant entries of greengram were become susceptible and rice bean became resistant against MYMV were imposed in agro inoculation for conformed durable MYMV resistance. In PCR greengram showed positive in early stage to later stage where as rice bean showed positive upto 20 days not after but there is no symptom expressed in plants. This species has confirmed MYMV resistance genes which will be useful for crop improvement programme in *Vigna* species.

All the species raised in the different Kharif seasons to assess the biotic potential like MYMV and bruchids resistance. The MYMV resistant behaviour was not stable in all the entries of different species for different season's evaluation. Out of 14 species studies only one species namely *Vigna umbellata* is having stable hundred per cent resistant to Yellow Mosaic Virus and Bruchids for each and every accession and every season. The Bruchids resistance picture is presented in plate 1

#### Discussion

Among thirteen *Vigna* species studied, the *Vigna umbellata* recorded the durable field resistance of MYMV. The results are in agreement with the various species findings in different interspecific crosses in four *Vigna* species by Ahn and Hartmann.1978, Ahuja and Singh. 1977 in mungbean, Bisht et al. 2004 in wild *Vigna* species, Chen et al. 1989 in mungbean, Dana 1967 in mungbean crosses, Egawa in Asian *Vigna* species 1990, Ganeshram 1993 in mungbean and urdbean and Pandiyan et al. 2007 in different *Vigna* interspecific crosses in *Vigna* species.

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Table 1: Name of the *Vigna* species and number of accessions used for this study

S.No	Name of the Species	No. of Genotypes
1	<i>Vigna radiata</i> var. <i>sublobata</i>	15
2	<i>Vigna mungo</i> var. <i>mungo silvestris</i>	40
3	<i>Vigna hainiana</i>	2
4	<i>Vigna umbellata</i>	24
5	<i>Vigna acconitifolia</i>	5
6	<i>Vigna trilobata</i>	15
7	<i>Vigna trinervia</i> var. <i>bourneae</i>	2
8	<i>Vigna dalzelliana</i>	2
9	<i>Vigna pilosa</i>	2
10	<i>Vigna vexillata</i>	5
11	<i>Vigna glabrescens</i>	2
12	<i>Vigna capensis</i>	1
13	<i>Vigna radiata</i>	12
14	<i>Vigna mungo</i>	1
	<b>Total</b>	<b>126</b>

Table 2: Resistant reaction of YMV in *Vigna* species

S.No	Name of the species	No. of genotypes	No. of MYMV complete resistant genotypes for three years
1	<i>Vigna radiata</i> var. <i>sublobata</i>	15	Nil
2	<i>Vigna mungo</i> var. <i>mungo silvestris</i>	40	Nil
3	<i>Vigna hainiana</i>	2	Nil
4	<i>Vigna umbellata</i>	24	24
5	<i>Vigna acconitifolia</i>	5	Nil
6	<i>Vigna trilobata</i>	15	Nil
7	<i>Vigna trinervia</i> var. <i>bourneae</i>	2	Nil
8	<i>Vigna dalzelliana</i>	2	Nil
9	<i>Vigna pilosa</i>	2	Nil
10	<i>Vigna vexillata</i>	5	Nil
11	<i>Vigna glabrescens</i>	2	Nil
12	<i>Vigna capensis</i>	1	Nil
13	<i>Vigna radiata</i>	12	Nil
14	<i>Vigna mungo</i> (Co.5)	1	Nil
	<b>Total</b>	<b>125</b>	

Table 3: MYMV field resistant entries in mungbean

S.No	Name of the greengram entries	Disease score (Rating) Kharif 2023	Disease score (Rating) Summer 2024	Disease score (Rating) Kharif 2024
1	KMG 149	1	5	5
2	PUSA 9071	3	5	5
3	ML 818	3	5	7
4	SEL 2	3	5	3
5	PLS 3087	3	5	5
6	PDM 12-1	1	5	5
7	PLS 303-B	1	5	5

8	VBM-92-3-B	1	5	5
9	ML 1165	3	5	3
10	EL 27087	3	5	5
11	KMG 189	3	5	5
12	VGG 24	3	5	5

Table 4: YMV field resistant accessions in ricebean

S.No	Ricebean accessions	Disease score (Rating) Kharif 2022	Disease score (Rating) Kharif 2023	Disease score (Rating) Kharif 2024
1.	<i>V. umbellata</i> TNAU red	1	1	1
2.	LRB 41	1	1	1
3.	LRB 297	1	1	1
4.	LRB 110 yellow	1	1	1
5.	LRB 113 original	1	1	1
6.	LRB 23	1	1	1
7.	<i>V. umbellata</i> TNAU green	1	1	1
8.	LRB 113 & black	1	1	1
9.	LRB mottled green	1	1	1
10.	<i>V. umbellata</i> dark green	1	1	1
11.	LRB tendrils	1	1	1
12.	LRB 15 green	1	1	1
13.	LRB 89 green	1	1	1
14.	LRB 11	1	1	1
15.	LRB 29 l green mottled	1	1	1
16.	LRB 35	1	1	1
17.	TNAU yellow	1	1	1
18.	LRB 111	1	1	1
19.	LRB 104	1	1	1
20.	LRB 282	1	1	1
21.	LRB 5 mottled	1	1	1
22.	LRB 55	1	1	1
23.	LRB 109 green	1	1	1
24.	LRB 108	1	1	1