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## Incidence of yellow vein mosaic virus of okra (*Abelmoschus esculentus* (L) Moench) under field conditions

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Incidence of yellow vein mosaic virus (YVMV) on some improved and hybrid varieties of okra was recorded under field conditions. Weekly incidence of the disease was compared with severity index and a minimum variation on the severity index was observed among the varieties. Pusa sawani was the most susceptible and recorded 100 percent infection while varieties like HRB-9-2, DOV-91-4 and Pashupati showed tolerance reaction at least under field conditions.

**Key words :** Yellow vein mosaic virus, okra, disease incidence, disease severity

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### INTRODUCTION

Vegetable is one of the most important components in our daily diet and due to the presence of diverse agro-climatic zones several vegetable crops are grown in India. Liberalization of import policy of vegetable seeds in India has increased the production of many vegetable by importing hybrid seeds and adopting improved agronomic technologies. There is an acute shortage of vegetables in the plains of gangetic West Bengal specially in summer months.

Okra or Bhendi (*Abelmoschus esculentus* (L) Moench) and various types of cucurbitaceous crops are mostly grown during summer season in West Bengal and all these crops are severely infected by a number of virus diseases of which bhendi yellow vein mosaic virus (BYVMV) is the most common. The disease may cause loss in yield as high as 93.80% depending upon the age of the plant and time of planting (Sastry and Singh, 1974). BYVMV is transmitted by whitefly (*Bemisia tabaci* Genn) and intensity of spread of the disease primarily depends on the population of whitefly. Dry hot weather with little rainfall is the most favourable condition for the development of BYVMV. Cooler weather with high relative humidity and rainfall was found to be detrimental for whitefly multiplication and spread of the disease (Singh, 1990).

Several attempt had been made to breed resistant varieties and Pusa sawani a new variety evolved (Singh *et al.*, 1962) which had tolerance to this virus. But unfortunately due to intensive cultivation of this promising variety over a long period the variety has lost its resistance.

Breeding for disease resistance of YVMV of bhendi is still continuing and few varieties including some of hybrid types have already been released for commercial cultivation. Apparently on field observation they appeared to be free from any visible symptoms of vein yellowing but the chances remain for breakdown of such resistance as it happened in case with Pusa sawani. Considering the importance of okra as one of the major vegetable crops in this region, incidence and severity of the disease on some improved varieties are assessed under field conditions with an objective to find out the existence of any relationship between infection rate and severity index at different stages of plant growth.

#### MATERIALS AND METHODS

The seeds of eight improved and hybrid varieties of okra (*Abelmoschus esculentus*) were collected and sown in the field of District seed farm of Bidhan Chandra Krishi Viswavidyalaya, Kalyani, WB in the first April 1994. The varieties were LORM-1, Pusa-sawani, D-1-87-5, HRB-9-2, HRB-55, Hy No.8, Pashupati and DOV-91-4. Seeds were obtained from the coordinated project of vegetables, stationed at Bidhan Chandra Krishi Viswavidyalaya, West Bengal and some of the genotypes used were from advanced line. Seeds were sown in replicated plots of 5 × 3 meters which received 100:80:80 kg of NPK/ha and each plots had 55 number of plants. Experimental layout was randomized complete block design with 3 replications. Variety Pusa sawani was considered as check for its susceptibility to BYVMV.

Plants were exposed to natural incidence of the disease by its vector whitefly (*B. tabaci*). No insecticides were sprayed to check the vector during the period of study. Incidence of YVMV and its severity in different varieties were determined at weekly interval by visual observation of characteristics vein yellowing or vein clearing symptoms. Progress of the disease in each week of observation was used to obtain the percentage of infection in respect to each of the varieties.

Severity of YVMV infection at different stage of plant growth in each varieties was determined using a evaluation scale of 0-5 where 0-indicate no infection, 1-mild infection, 3- moderate infection and 5- severe infection. Severity index of the disease was calculated using following formula.

Severity index =  $\frac{\text{sum of numerical ratings}}{\text{highest degree of ratings}} \times \text{total no. of plants} \times 100$ .

Data obtained on the percentage of infection and severity were statistically analysed to test their significance amongst the varieties in at different time interval using Duncan's multiple range test (DMRT).

#### RESULTS AND DISCUSSIONS

Incidence of YVMV under conditions varied among the tested varieties and Pusa sawani a widely grown variety showed 100% infection while HRB-9-2 had minimum of 18.11% infection (Table 1). Observations on the progress of the disease was made at weekly interval and simultaneously the severity of the incidence based on the score value was also measured. Weekly variations on these two diseases measurement characters did not show much variation, although the variation on weekly incidence on few of the varieties like D-1-87-5, HRB-9-2, HRB-55, Pashupati and DOV-91-4, with Pusa sawani, LORM-1 and

Hy. No.-8 was also noted. When the weekly severity index was taken into consideration for the comparison, no significant differences among the varieties were observed excepting Pusa sawani where it showed a highest severity index of 6.17 percent.

**Table 1.** Weekly incidence and severity index (based on the difference of mean value of two weeks) of yellow vein mosaic virus of okra under field conditions

Variety	Weekly incidence(%)	Severity index(%)	Mean infection (%)
LORM-1	5.49 bc	2.83 b	41.28
Pusa-sawani	8.20a	6.17a	100.00
D-1-87-5	4.67 c	2.72 b	30.39
HRB-9-2	3.55 c	2.13 b	18.11
HRB-55	5.14 c	2.81 b	37.42
Hy.No.8	7.61ab	3.06 b	65.19
Pashupati	3.58 c	2.11 b	23.62
DOV-91-4	3.92 c	2.62 b	21.25

In a column means followed by a common letter are not significantly different at 5% level by DMRT

Progress of YVMV at 6 weeks observational periods in eight varieties recorded a wide range of variations (Table 2). Pusa sawani had the highest incidence of disease (27.96%) at early stage of growth and declined subsequently upto fourth week of observation. Similarly in geno-type Hy.No.8 incidence of disease decreased from 18.79% to 1.22% from first to six weeks of observations. However, in some varieties like LORM-1, D-1-87-5, HRB-9-2,

**Table 2.** Weekly progress of yellow vein mosaic virus disease on different varieties of okra under field conditions\*

Variety	Week					
	1st	2nd	3rd	4th	5th	6th
LORM-1	5.09	10.99	4.05	5.39	4.76	2.67
Pusa-sawani	27.96	10.23	8.77	2.29	6.66	0.0001
D-1-87-5	4.19	8.36	4.34	3.82	4.62	2.66
HRB-9-2	0.0001	7.64	0.80	5.14	6.86	0.84
HRB-55	7.02	9.30	3.52	4.98	4.51	1.53
Hy.No.8	18.79	12.99	5.83	4.43	2.39	1.22
Pashupati	2.50	7.37	1.81	3.62	2.75	3.43
DOV-91-4	0.0001	13.26	4.17	4.15	1.93	0.0001

\* Based on the difference of mean value of two weeks; Tested by DMRT at 5% level for comparison in between weeks. LSD value = 5.35, SE  $\pm$  m = 1.907 at 5% level.

HRB-55, Pashupati and DOV-91-4 highest percentage of disease incidence was observed at second week of observation.

Incidence of BYVMV depended on the susceptibility of the host virus inoculum and population of *B. tabaci*. Khan and Mukhopadhyay (1986) observed a steep rise of the YVMV incidence in early growth stage of crop and the time of sowing had a direct relationship on the field incidence of this virus. (Bhagabati and Goswami, 1992; Nath *et al.*, 1992). Pusa sawani the most prominent okra variety was highly tolerant to YVMV disease (Singh *et al.*, 1962) in its early days of released but due to wide scale cultivation over a long period it became the most susceptible variety. Break down of resistance in Pusa sawani may be due to adaptability of *B. tabaci* on this variety for its wide scale cultivations. Similar observation on the adaptability of insect vector with continuous and large scale cultivation had also been found with few rice varieties and rice leafhoppers (*Nephotettix virescens*, *N. nigropictus* etc.) vector of rice tungro virus disease (Dahal *et al.*, 1990; Hibino *et al.*, 1987). Screening of okra varieties for resistant to this important virus has been made by different workers in different places in India and recommended some of the varieties but none of them yet assured a high level resistant (Khan and Mukhopadhyay, 1986; Singh and Gupta, 1991).

Recently hybrid varieties of okra were cultivated for good yield and many of them apparently looked healthy. Nevertheless a mild form of infection could be noted on such hybrid varieties with a close observation. This experiment revealed none of the varieties tested under field condition showed complete resistance to the disease but varieties like HRB-9-2, DOV-91-4 and Pashupati had a minimum infection in between 18.11 to 23.62%. This results also suggested that variation on the incidence of disease in different varieties at different growth stage might be due to the host preference of its whitefly vector.

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