

VARIETAL REACTION OF DIFFERENT OKRA CULTIVARS AGAINST OKRA YELLOW VEIN MOSAIC VIRUS UNDER FIELD CONDITION



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ABSTRACT

Okra (*Abelmoschus esculentus*) is a worldwide grown crop commonly known as lady finger. Okra Yellow Vein Mosaic Virus (OYVMV) is devastating pathogen of Okra, significantly lowers the yield upto 94%. 19 varieties/cultivars were screened against OYVMV during the year of 2015 and 2016. Out of 19 varieties/cultivars, no variety/cultivar showed resistant response against the virus. Only eight (sabzpari, arka, ok-152, ok-1304, kiran, sabzpari, ok-411 and kashish) varieties/lines showed tolerant reaction against OYVMV. Ok-1305, Anarkali, ok-407 and Anmol displayed moderately susceptible reaction against the virus. Five varieties/cultivars (saneum, ikra, Shakti, ok-1312 and ok-1314) depicted as susceptible reaction. Ok-1314 and ok-1314 came out as highly susceptible during the both years. Tolerant varieties/cultivars can be incorporated in breeding program to develop high yielding/ disease tolerant variety.

Keywords:

Okra,
OYVMV,
Tolerant,
Variety

I. INTRODUCTION

Okra (*Abelmoschus esculentus* (L) Moench) belongs to family Malvaceae Juss. is an important vegetable of the sub-continent. It is native to afro-Asian countries but also cultivated widely in India, Nigeria, Pakistan, Ghana and Egypt etc. (Akanbiet al 2010.) Average world production is 12.035 million tons. (FAO, 2011). In Pakistan it is cultivated on an area of 13.900 hac and a total production of about 113,200 thousand tons (MINFA, 2013). Okra is good source of vitamin A, B, C and is also rich in protein, minerals and iodine (Balochet al, 1990). Okra requires a long and warm growing season for optimum growth and development. In the plains two crops of okra (early & late) are sown. This vegetable is attacked by a number of fungi, bacteria, virus, mycoplasma, nematodes and insects. The total loss of vegetable on this account has been estimated up to 20-30% but if pathogens are allowed to develop, this may increase up to 80-90% (Hammer & Thompson, 1957). Yellow vein mosaic is the most serious viral disease of Okra. The disease is characterized by a homogenous interwoven network of yellow veins enclosing islands of green tissues within its leaf. In case of severe infection, the infected leaves become yellowish or creamy colour. Infected plants remain stunted and bear very few deformed small fruits. Plants infected 50 and 65 days after germination suffer a loss of 84 and 49% respectively (sastry & singh, 1974). The objective of this study was to evaluate different okra cultivars against OYVMV under field condition.

II. MATERIALS AND METHODS

The experiment was conducted during the year of 2015 and 2016 at Plant Virology Section, Plant Pathology Research Institute, Faisalabad, Pakistan. Nine varieties (SabzPari, ok-411, ok-407, shakti, anmol, kashish, ok13-12, ok 13-13 and ok 13-14) were sown under randomized complete block design with three replications. Row to row and plant to plant distance was maintained at 60 cm and 20 cm respectively. The conventional agronomic practices were followed to keep the crop in good condition. The okra germplasm was subjected to natural viral inoculum, invasion and buildup of white fly (*B. tabaci*) population density. The disease severity was assessed by following the disease rating scale described by alietal (2005)

Table 1: showing the disease rating scale

Rating Scale	Severity Range%	
0	Immune	0%
1	Highly Resistant	1-10%
2	Moderately Resistant	11-25%
3	Tolerant	26-50%
4	Moderately Susceptible	51-60%
5	Susceptible	61-70%
6	Highly Susceptible	71-100%

Similarly during the year, 2016 ten varieties received from Vegetable Research Institute, Faisalabad were screened at Plant Virology Research Section following the same procedure as described earlier. The varieties sown during 2016 are: sabzpari, ARKA, saneum, Ok -152, Okra. Ok -1314-Ok 1305, OK -1304, Kiran and Anarkali. Confirmation of the disease was carried out by collecting virus infected plants from the field and grafting the diseased portion on the healthy plants. A slanting cut was made on both sides of the stem of infected plant. Wedge grafting was performed as described by Pullaihet al (1998). The grafted portion was wrapped tightly with Para film and covered with polythene bags. The plants were irrigated and the polythene sheet removed after the grafting was set properly. Non-inoculated served as control. The grafted inoculated plants showing the symptoms of OYVMV which indicates the presence of Okra yellow vein mosaic virus.

III. RESULT AND DISCUSSION

Out of nine varieties sown during the year 2015, no variety showed resistant reaction. Only three varieties i.e. SabzPari, Kashish & OK-411 displayed tolerant response. Two varieties i.e. Ok-407 & anmol exhibited moderately susceptible reaction. Three varieties i.e. Shakti, Ok 13-12 and Ok 13-13 behaved as susceptible. One variety Ok 13-14 came out as highly susceptible. During the year 2016, data was collected using the disease rating scale of Ali, (2005). Different varieties showed different response under field condition. Disease data were recorded after the interval of one, two, four and three week intervals. Average disease severity was calculated and area under disease progress curve was calculated by the formula given by Madden et al. 2007. Highest disease severity i.e. 87% was calculated on Ok 13-14 and this variety graded as highly susceptible. IKRA showed susceptible response with disease severity of 72% variety Saneum fall under the category of susceptible with disease severity of 62%. Anarkali behaved as moderately susceptible with severity percentage of 54%. SabzPari, Arka, Ok-152, Ok 1304 and Kiran displayed tolerant response with disease severity of 50%, 40%, 40%, 45% and 41% respectively. Only one variety i.e. Ok 1305 depicted as moderately susceptible response against the disease. 51% disease severity was calculated on Ok 1305. It is clear that no variety/ line showed highly resistant or resistant reaction. Even non on the variety/ line exhibited moderately resistant reaction. Those varieties who behaved as tolerant can be used in breeding programme to develop resistant cultivars. Dhankar et al., (1996) performed an experiment in which he screened 51 hybrids of okra and their 20 parents for resistance against okra yellow vein mosaic virus under field condition. Observation was made at 35, 50 and 65 days after sowing. Only one parent and 11 hybrids were fall in resistance category against yellow vein mosaic virus. P-7 was moderately susceptible while the rest fall in the category of susceptible and highly susceptible. Raghpathi et al., screened 12 okra varieties against yellow vein mosaic virus. The results show that 2 varieties Bo-1 and HRB-55 were proved highly resistance cultivar. Seven cultivars were resistant and Bo-2 was susceptible. MDU-1 and PusaSawani were highly susceptible. Ahmad and Patil (2006) screened nineteen okra germplasm, susceptible control PusaSawani also included. These germplasm were screened for their resistance toward OYVMV during summer season. The variety ArkaAnamika recorded the lowest disease incidence (0.80%) and highest yield (23 t/ ha) while PusaSawani the susceptible control recorded highest disease incidence (74.99%) and lowest yield (7.90 t/ha). None of them show complete immunity against disease. ArkaAnamika, H-8 and H-10 were resistant, while Soumya F1 and Reshma were moderately resistant. Among all those 19 okra genotypes, 13 genotypes were susceptible. Srivastava et al. (1995) deliberate the reaction of 12 okra varieties against YVMV in the field at three spots. VarshaUppar and HRB 55 were free of the disease at Karnal and Hy 6 at Andhra Pradesh. ArkaAnamika revealed moderate resistance at Karnal. The virus was not detected in any variety at Nashik. Singh (1990) noted that hot weather with slight or no rainfall was encouraging for disease development of OYVMV and also for multiplication of *Bemisia tabaci*. Low temperature high relative humidity and rainfall were detrimental to whitefly population. Sangar (1997) assessed eight okra varieties for resistance to YVMV in the rainy and summer season. He observed that disease incidence was much higher during the rainy season at that relative humidity was also high. Among eight varieties ArkaAnamika was highly resistant, ArkaAbhey resistant, Parbhani Kranti and V-6 were moderately resistant towards OYVMV. All other varieties were susceptible or highly susceptible. Bhagat et al. (2007) found the rate of dissemination of okra yellow vein mosaic virus in okra cultivars. PusaSawani (highly susceptible) Vaishali, Vadhu (susceptible) and ParabhaniKranti (resistance) during rainy season.

Table 2: Reaction of different varieties against oymv sown during 2016

Variety/cultivar	Disease severity grade	Disease severity	Varietal reaction
Sabzpari	3	50	Tolerant
ARKA	3	40	Tolerant
Saneum	5	62	Susceptible
OK- 152	3	40	Tolerant
IKRA	5	70	Susceptible
OK- 1314	6	87	Highly susceptible
OK- 1305	4	51	Moderately susceptible
OK- 1304	3	45	Tolerant
Kiran	3	41	Tolerant
Anarkali	4	54	Moderately susceptible

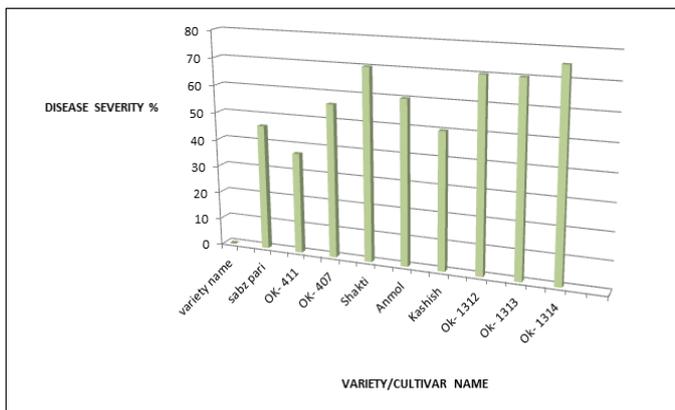


Fig 1: Different varieties of okra showing disease severity percentage during 2015

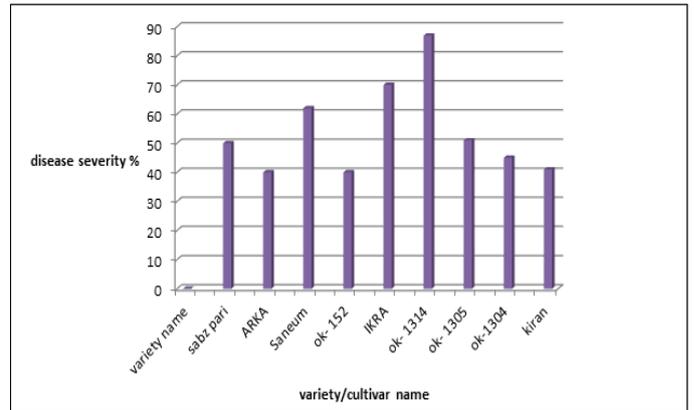


Fig 2: Different varieties of okra showing disease severity percentage during 2016

Table 3: Reaction of different varieties against oymv sown during 2015

Variety/cultivar	Disease severity grade	Disease severity	Varietal reaction
Sabzpari	3	46	Tolerant
Ok- 411	3	37	Tolerant
Ok- 407	4	56	Moderately Susceptible
shakti	5	70	Susceptible
anmol	4	60	Moderately Susceptible
kashish	3	50	Tolerant
OK- 1312	5	70	susceptible
OK- 1313	5	70	susceptible
Ok- 1314	6	75	Highly susceptible

IV. CONCLUSION

From the above study non of variety/line was resistant but only eight (sabzpari, arka, ok-152, ok-1304, kiran, sabzpari, ok-411 and kashish) varieties/lines showed tolerant reaction against OYVMV. The resistant sources can be utilized in breeding programme to develop resistant and high yielding variety.

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