Current Journal of Applied Science and Technology

39(16): 112-115, 2020; Article no.CJAST.57989
ISSN: 2457-1024
(Past name: British Journal of Applied Science & Technology, Past ISSN: 2231-0843, NLM ID: 101664541)

Assessment of Selected Yellow Vein Mosaic Virus Resistant Varieties of Okra in Rabi Season of Chatra District in Jharkhand, India

Dharma Oraon[1], Anjani Kumar[2], Ranjay Kumar Singh[1*], U. K. Singh[1] and Zunaid Alam[1]

[1]Krishi Vigyan Kendra, Chatra, BAU Ranchi, Jharkhand, India.
[2]Agricultural Technology Application Research Institute (ATARI), Zone-IV, Patna, India.

Authors' contributions

This work was carried out in collaboration among all authors. Author DO designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors AK and RKS managed the analyses of the study. Authors UKS and ZA managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/CJAST/2020/v39i1630743
Editor(s):
(1) Dr. Nhamo Nhamo, Zimbabwe Open University, Zimbabwe.
Reviewers:
(1) Majid Jafari, Higher Educational Complex of Saravan, Iran.
(2) Sandesh Bhandari, Agriculture and Forestry University, Nepal.
Complete Peer review History: http://www.sdiarticle4.com/review-history/57989

Original Research Article

Received 15 April 2020
Accepted 21 June 2020
Published 26 June 2020

ABSTRACT

An On-Farm Trial (OFT) was conducted in the year 2016-17 and 2017-18 to assess the resistance level of different okra varieties against yellow vein mosaic virus in Kharif season of Chatra district of Jharkhand. The experiment was conducted in vegetable growing village Gidhour in Gidhour block of Chatra district in Jharkhand. The trial was designed in randomized block design consisting of 20 replications with three technological option i.e. TO-I Arka Abhay ($N_{100}P_{60}K_{50}$), TO-II Arka Anamika ($N_{100}P_{60}K_{50}$) and-III Pusa Makhmali ($N_{100}P_{60}K_{50}$). For assessment related to yellow vein mosaic, percentage infestation in 5sqm and yield q/ha and economic was considered. The lowest infestation of yellow vein mosaic virus was observed in Pusa Makhmali variety i.e. (3.8%) with yield of 132.5 q/ha. It was also found superior in terms of Gross Income, Net Income and Benefit: Cost Ratio followed by Arka Anamika and Arka Abhay, respectively. Farmers' response was also positive in all respects except the availability of varieties in local market.

**Corresponding author: E-mail: kvkchatra2012@gmail.com*

Keywords: Vein mosaic virus; okra; Rabi season; genotypes.

1. INTRODUCTION

Okra or Bhindi is an annual herbaceous plant. It is one of the most popular vegetable crops cultivated throughout the world, because of high consumer demand and better price. It is widely cultivated as a summer season crop in North India and as a Kharif and summer season crop in Maharashtra, Gujarat, Andhra Pradesh, Karnataka and Tamil Nadu. It grows well in the areas where day temperatures remain between 25 to 40°C and that of the night over 22°C (Naim et al., 2013). Amongst the various constraints in the cultivation of okra, viral disease, particularly; yellow vein mosaic is a major one [1,2,3]. Farmers grow okra round the year. In India okra is grown in 498 thousand ha and production on 5784 thousand tons, Andhra Pradesh is the leading okra producing state which has produced around 1184.2 thousand tones followed by West Bengal (862.1 thousand tons) and Bihar (788.3 thousand tons). Despite its high nutritive value, well acceptability among end-users and wide range of available genetic variability, the country is still lagging behind the leading productive countries like Ghana and Egypt in the world [4].

In Jharkhand, 421.7 mt. okra was produced from over 30.0 thousand ha. area with 14.10 mt/ha. Jharkhand produced 7.3 per cent of the total okra production of the country. In Chatra district of Jharkhand okra is treated like a cash crop and covers about 13 thousand ha area. A complex of monopartite begomovirus, yellow vein mosaic virus (Family: Geminiviridae) and a small satellite DNA β component are the major factors responsible for disease development in okra [5]. The spread of the disease depends on upon the environmental conditions, crop characteristics and vector population [6, 7]. There is a Variable reaction of virus to different okra genotypes under different agro climatic conditions, so it was considered imperative to assess the different varieties and lines under different seasons to find out durable resistant genotypes against this disease [8]. This crop suffers from different disease and pest which reduce quality and yield and farmers get poor price in the market. The crop is very much susceptible to white fly (*Bemisia tabaci* Gan.), the vector of yellow vein mosaic virus. It is a serious disease which deteriorates quality and yield of the crops. Chemical control of white fly through various insecticides is not very effective. Major losses in okra fruits yield and quality is caused by this disease and its insect vector. In severe cases crop may infect up to 100% with the total yield loss of 50 to 94% which influence by growth stage and environmental conditions [9,10,11]. In the other hand, it affects human health and the environment also. Keeping this fact under consideration KVK Chatra conducted an On Farm Trial (OFT) to evaluate the performance of selected yellow vein resistant okra varieties in bio-physical and socio-economic conditions of Chatra district in Jharkhand.

2. MATERIALS AND METHODS

The field experiment was conducted during 2016-17 and 2017-18 in farmers' field of Gidhour village in Gidhour panchyat under Gidhour block of Chatra district in Jharkhand, where okra is grown round the year. The soil of the village was sandy loam to sandy clay loam analyzing low in available N(271 kg/ha), low to medium in available P (8-9 kg/ha) and medium to high in available K(175-182 kg/ha) with pH ranging from 5.3 to 6.4. The On Farm Trial was designed with three treatments-I Arka Abhay ($N_{100}P_{50}K_{50}$), TO-II Arka Anamika ($N_{100}P_{50}K_{50}$) and TO-III Pusa Makhmali ($N_{100}P_{50}K_{50}$) along with farmers' practices.

The trial was conducted under a randomized block design with 20 replications/ location in 2000 m^2 area. The row to row and plant to plant spacing was 45 cm and 15 cm, respectively. Along with 10 tonnes/ha farm yard manure, recommended dose of $N_{100}P_{50}K_{50}$ was applied.

Half dose of N and full doses of P and K were applied at the time of field preparation and the remaining half dose was top-dressed in two equal amounts, first at earthling up and second after one month. The intercultural operation and irrigation were carried out in accordance with the recommended schedule. In order to observe insect population incidence related to YVMV disease, no pesticide was sprayed. Parameters like disease severity and intensity, fruit setting and maturity were observed and estimated on 10 randomly selected plants and cumulative data was obtained. Further, to access the resistance of a given strain, disease scoring for yellow vein mosaic virus was done on a 0-9 scale [12] on the basis of virtual observation.

Economic analysis was done through calculation of gross income, net income and BC ratio of different treatments.

3. RESULTS AND DISCUSSION

As per results obtained in the present experiment (Table 1), among all three varieties tested Pusa Makhmali showed least per cent infestation of yellow vein mosaic virus i.e. 3% at flowering stage, 5% at fruiting stage and 7% at maturity stage followed by Arka Anamika (5, 6 and 8.5 per cent, respectively). Further, Arka Abhay was found moderately resistant against yellow vein mosaic disease. These findings were in agreement with observations reported by Natarajan et al. [13] that Arka Anamika was tolerant against YVMC disease.

3.1 Economics of Intervent Technologies

The data pertaining to yield and economics of intervent technologies (Table 2) shows that highest yield was observed with Pusa Makhmali (132.5 q/ha) followed by Arka Anamika (127.8 q/ha) and Arka Abhaya (118.9 q/ha). Similarly, highest gross and net income were also recorded with Pusa Makhmali (Rs. 132500.00 andRs. 99860.00) followed by Arka Anamika (Rs. 27800.00 and Rs. 95160.00), Arka Abhay (Rs. 118900.00and Rs. 86260.00).The superiority of Pusa Makhmali also reflected with highest B:C ratio (4.05) followed by Arka Anamika (3:91) and Arka abhay (3.64), respectively.

Table 1. The description of scale

Scale	Reaction category	Type of infection
0	No disease	No plants infected
1	Highly resistant (HR)	<1% plants showing symptoms
3	Resistant (R)	1-10% plants showing mottling of leaves
5	Moderately Resistant (MR)	11-20% plants showing mottling and yellow discolouration of Leaves
7	Susceptible (S)	21-50% plants showing mottling and yellow discolouration of leaves and stunting of plants
9	Highly Susceptible (HS)	> 50% plants affected, stunting of plants pronounced, flower and fruit set reduced and yellow mottling severe

Table 2. Average indices of yellow vein mosaic virus (%) disease in different selected Okra varieties (2015-16 to 2016-17)

Treatment	At seedling stage	At flowering stage	At fruit stage	At maturity state	Reacting category
Farmers Practice	-	17(4.1)	21 (5.2)	58.5 (7.6)	HS
TO I Arka Abhay	-	3.5(2.1)	9.5 (3.2)	11.5 (3.5)	MR
TO II Arka Anamika	-	7(2.8)	6 (2.6)	8.5 (3.1)	R
TO III Pusa Makhmali	-	3(2.0)	5 (2.4	7.0 (3.8)	R
	CD (5%)	0.32	0.49	0.51	

** The figures in parentheses are square root transformed*

Table 3. Average yield and economic of selected Okra varieties

Treatment	Yield (q/ha)	Cost of cultivation (Rs./ha)	Gross Income (Rs./ha)	Net Income (Rs./ha)	B:C Ratio
Farmers Practice	86.50	G	86500.00	56739.00	2.90
TO-I- Arka Abhay	118.90	32640.00	118900.00	86260.00	3.64
TO-II- Arka Anamika	127.80	32640.00	127800.00	95160.00	3.91
TO-III Pusa Makhmali	132.50	32640.00	132500.00	99860.00	4.05

Note: Family labor cost not included in cost of cultivation

4. CONCLUSION

The yellow vein mosaic virus disease cannot be controlled adequately by chemical means. The uprooting of infested plants is not practical and economical because of heavy infection rates in the field situation. So, the only practical solution of this problem is to develop tolerant varieties and conduct district level trial under different agro-ecological situations to identify best resistant varieties for a particular situation. As per the performance of varieties under the present study, Pusa Makhmali and Arka Anamika are recommended to the farmers of the district.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

REFERENCES

1. Debnath S, Nath PS. Performance of okra varieties in relation to yield and tolerance to yellow vein mosaic virus. Ann. Pl. Protec. Sci. 2003;11(2):400-401.
2. Ali MA, Islam H, Pramanik BK, Sarkar AK. Effect of soil mulching with polyethylene and hanging of its strips on the incidence of okra mosaic disease. Bangladesh J Pl. Path. 2001;17(1-2):31-34.
3. Tiwari A, Singh B, Singh TB, Sanval SK, Pandey SD. Screening of okra varieties for resistance to yellow vein mosaic virus under field condition. Hort. Flora Res. Spectrum. 2012;1(1):92-93.
4. Meenakshi Kumari SS, Solankey Manoj Kumar, Shirin Akhtarand Pallavi Neha. Assessment of okra genotypes for yellow vein mosaic virus tolerance. Int. J. Curr. Microbiol. App. Sci. 2018;(Special Issue 7):1470-1475.
5. Jose J, Usha R. Bhendi yellow vein mosaic disease in India is caused by association of a DNA β satellite with a begomovirus. Virology. 2003;305(2):310-317.
6. Singh SJ. Etiology and epidemiology of white fly transmitted virus disease of okra in India. Pl. Dis. Res. 1990;5:64-70.
7. Sharma BR, Sharma OP, Bansal RD. Influence of temperature on incidence of yellow vein mosaic virus of okra. Veg. Sci. 1987;14:65-69.
8. Magar RG, Madrap IA. Performance of okra in relation to yellow vein mosaic virus in different seasons. International Journal of Plant Sciences (Muzaffarnagar). 2010;5(1):33-35.
9. Kathal D, Gupta Om. Use of fungicides for the management of Alternariab light of Ashwagandha. Environ. & Eco. 2017;35(2B):1026-1028.
10. Mughrabi KL. Antibiosis ability of aerobic compost tea against foliar and tuber potato disease. Biotechnology. 2006;5(1):69-74.
11. Patil MK, Kulkarni S, Hedge Y. *In vitro* bioassay of fungicides against leaf spot of safflower. Current Research University of Agril. Sci. (Banglore). 1992;21.
12. Mayee CD, Datar VV. Phytopathometery: Marathwada Agricultural University, Parbhani, University Press. 1988;84.
13. Nataraja MV, Chalam MSV, Madhumathi T, Srinivas Rao V. Screening of okra genotypes against sucking pests and yellow vein mosaic virus disease under field conditions. Indian Journal of Plant Protection. 2013;41:226-230.

Peer-review history:
The peer review history for this paper can be accessed here:
http://www.sdiarticle4.com/review-history/57989