



Management of Yellow Vein Mosaic Disease of Okra Using Suitable Resistant Varieties

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ABSTRACT

Okra (*Abelmoschus esculentus* L.) crop is badly affected by yellow vein mosaic disease (YVMD) which is the most important biotic stress leading to poor production. The disease was found devastating the crop raised by farmers of Kollam district. Hence, a farmer participatory on farm evaluation was conducted for identifying the best suitable resistant hybrid variety of okra for Kollam district in Kerala during 2017-18. The hybrids evaluated were Manjima (KAU), Arka Anamika (IIHR) and CO4 (TNAU) against local variety (check) in fields of 10 farmers during the first crop season. Manjima was significantly superior in recording higher seed germination percentage (98), yield (16.44 t/ha) and benefit cost ratio (2.55). Yellow vein mosaic was absent in all plots where Manjima was cultivated, other two hybrids were on par and recorded 1.43% incidence of disease and the local variety recorded 28.4% disease incidence. Hence, Manjima was recommended as suitable yellow vein mosaic resistant, high yielding hybrid for wide spread adoption in Kollam district.

Key words: Okra, yellow vein mosaic, Manjima, on farm trial

INTRODUCTION

Okra (*Abelmoschus esculentum* L (Moench.) is an important vegetable crop mainly grown for its immature fruits throughout the world. Various biotic and abiotic stresses affect the growth, performance and yield of the crops in field. Major production constraint in case of this crop is a viral disease caused by yellow vein mosaic virus. This virus is not seed borne but transmitted by the whitefly *Bemisia tabaci*. Disease becomes severe during summer season and if the crop is in its early stages, entire crop would be lost. About 94 per cent loss is expected if the crop is affected after 25 days (Peethambaran *et al*, 2008). This viral disease was first reported from Bombay in India. Symptoms are vein clearing followed by yellowing, reduction in size of leaves and fruits, thereby causing significant reduction in yield (Dhaliwal and Sharma, 2016).

The disease became widespread during 2016-17 in Kollam district with the farmers cultivating varieties purchased from various seed shops in

expectation of huge returns without knowing the suitability of them in the area. During the monthly technology advisory meetings with the extension functionaries held at the Kendra, though remedial measures were advised, it was not sufficient to save the crop in areas where the disease had already progressed. In this scenario, Krishi Vigyan Kendra Kollam conducted an on farm trial to evaluate the suitability of yellow vein mosaic resistant varieties in Kollam district.

MATERIALS AND METHODS

The study was undertaken in the farmers' fields of Kollam district as on farm testing programme by Krishi Vigyan Kendra Kollam during the year 2017-18.

Selection of farmer partners: With the help of Department of Agriculture Kollam, Kendra has arranged a meeting with the farmers whose crops were badly affected by the YVMD during the previous season on May 2017. They were made

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Table 1. Performance of okra hybrids

Observation	T1	T2	T3	T4	CD(0.05)	CV	SEM
Per cent seed germination	98 (82.506) a	80 (63.529)b	75 (60.084)c	58 (49.623)d	3.021	5.149	1.0836
Per cent YVMD incidence	0 (0.331)a	1.43 (6.123)b	1.43 (5.775)b	28.4 (32.044)c	2.244	22.093	0.5980
Yield (t/ha)	16.206 a	14.909b	13.508c	8.690d	0.327	2.677	0.0127
BCR	2.550 a	2.370 ab	2.128 b	1.430 c	0.324	16.662	0.0125

Values in parentheses are after arc sine transformation

aware on the importance of crop health management viz. disease management practices including alternate host control by regular weed management, vector control measures and the general package of practices of KAU for okra. From this group, 10 farmer partners were selected for the on-farm evaluation of mosaic resistant varieties. In addition to the training, they were given details on laying out of experiment, practices to be followed and how to take observations as a printed instruction sheet.

Design of experiment: Experimental design followed was randomized block design with 4 treatments and 10 replications. One farmer was assigned as a replication. Individual plot size was 1 cent (40m²).

Treatments: Three high yielding mosaic resistant hybrids were evaluated in field condition against the local variety. Treatments were Manjima (released from Kerala Agril. University), Arka Anamika (from Indian Institute of Horticultural Research), CO4 (from Tamil Nadu Agricultural University) and the local variety as check.

Other practices followed: Farmers were advised to follow a spacing of 60 x 45cm. Lime application at 20g per pit was done; application of 250g crushed leaves and tender twigs of *Chromolaena odorata* and 1kg of *Trichoderma* enriched organic manure were applied as a preventive measure against plant parasitic nematodes, pathogens and as a general protectant to plant that enhance plant health 1-1.5 wk before sowing. Before sowing, seeds were soaked in

2% *Pseudomonas fluorescens* solution for 1-2 hr and a pinch of Arbescular Mycorrhizal Fungi (AMF), approximately 2-3 g was applied on the pit, seed was sown over that and covered using soil. Along with chemical fertilizers as per recommendations of KAU, top dressing with supernatant of groundnut cake @1kg/10l was applied at fortnightly intervals till flowering. Need based sprays of 1% neem oil soap was recommended against insect and mite pests and 2% *Pseudomonas fluorescens* spray was done at fortnightly intervals. These measures were followed in all the plots to ensure that the produce is safe to eat. Critical inputs for all necessary practices were provided along with seed by the Kendra. Regular field visits were conducted to the plots by the scientists of Kendra.

Observations: Germination of seeds, incidence of mosaic disease, yield, BC ratio, average fruit weight, taste and marketability.

Analysis: The data collected were analysed using 'web agri stat package 2.0'

RESULTS AND DISCUSSION

Okra hybrids performed well as indicated (Table.1). Three hybrids were good yielders but Manjima was significantly superior over others in recording yield followed by Arka Anamika and CO4. The highest BCR was also recorded by the hybrid Manjima and was significantly superior to others. Yellow vein mosaic disease was totally absent in all plots where Manjima was cultivated, mosaic disease

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appeared in both the other hybrids but it was only 1.43 per cent compared to the local check which recorded 28.4 per cent disease incidence. As per Shetty *et al* (2013), resistance to YVM virus is not stable and frequent break down of resistance have been observed in developed varieties. Chaitanya *et al* (2018) also reported 2.6-5.1 per cent occurrence of this disease in the variety Arka Anamika under two different packages of practices. Other pests and diseases were comparatively low in all the plots than the previous season. This might be due to the plant protection and crop health measures strictly adopted from the beginning of the crop. Species of *Trichoderma* were found to be managing diseases, abiotic stresses and enhancing crop health (Singh *et al*, 2020). Okon in 2014 also reported that inoculation with the AMF (*Glomus mosseae*) increased plant growth, fruit yield and nutrient uptake in okra. Apart from controlling various diseases causing pathogens, *Pseudomonas fluorescens* significantly improves growth and biomass production of crop plants (KAU, 2016).

Manjima recorded 98 per cent seed germination which was significantly superior over other and Arka Anamika (80%), CO4 (75%) and local variety (58%). Though all the hybrids were good yielder, average per plant yield and fruit weight of Manjima was 438g and 37.68g, had higher fruit weight and number with good taste and marketability. Arka Anamika individual fruit weighed 30.22g on an average, though it had good taste and marketability, number of fruits per plant were found to be less, per plant yield was 403g. Fruits of CO4 were the tastiest and the individual fruits weighed 27.06g on an average but the fruits matured very fast affecting marketability, per plant yield was 365g. Since the crop was cultivated in a safe to eat manner, the farmers got very good price and marketing had thus become easier. Present findings were in confirmation to that of Rajput *et al* (2016) who also emphasized the importance of cultivating high yielding variety of okra with recommended package of practices for increased yield and income. According to Nicaise (2014), viral diseases of crop plants pose serious

threat to global food security and the use of crop genetic resistance is a powerful tool to be applied in agriculture.

CONCLUSION

For the management of any biotic or abiotic stress, inclusion of a suitable resistant or tolerant variety would be beneficial to the farmers as well as the ecosystem, since it helps to avoid frequent application of agrochemicals and improve the yield and income of farmers. The okra hybrid Manjima was selected for popularizing through front line demonstration and also through the schemes of Department of Agriculture in Kollam district.

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