YELLOW VEIN MOSAIC VIRUS DISEASE OF OKRA UNDER THE INFLUENCE OF PESTICIDE/BIO-PESTICIDE AND SUITABLE CULTIVARS

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ABSTRACT

Four okra cultivars (GAO-2, Arka Anamika, Prabhani Kranti, and GAO-5) were cultivated in a field trial to determine the response of these to yellow vein mosaic virus and to evaluate the efficacy of pesticide/bio-pesticide (neem oil, garlic extract and imidacloprid) against insect vector Bemisia tabaci Genn. GAO-5 was found highly resistant, Arka Anamika and Prabhani Kranti were moderately resistant and GAO-2 was tolerant against yellow vein mosaic virus. Among the pesticide/ biopesticide applied, the imidacloprid significantly reduced the whitefly population. Neem oil and garlic extract were also found to be effective against Bemisia tabaci compared to water and untreated control.

Keywords : *yellow vein mosaic virus disease, okra, bio-pesticide*

INTRODUCTION

Okra (*Abelmoschous esculentus* (L.) Moench), also called bhendi or lady's finger, belongs to family malvaceae and is an important vegetable grown throughout the world mainly for its pods. Okra crop extensively cultivated in summer and *kharif* seasons in India. The cultivation of okra faces serious problems due to virus diseases *viz*., yellow vein mosaic virus (YVMV) and leaf curl which account for more losses as compared to the diseases caused by fungi, bacteria and nematodes. Among these, the former is the most serious and common disease in Panchmahal district of Gujarat. The YVMV disease was first reported by Kulkarni, 1924 from Bombay region and viral nature of the disease was established by Uppal *et al.* 1940. Yellow vein mosaic transmitted by white fly- *Bemisia tabaci* Genn. The symptoms of the disease start with yellowing of veins and clearing of veinlets followed by complete chlorosis of veins, vein swelling, slight downward curling of leaf margins, twisting of petioles, dwarfening and finally complete yellowing of leaf lamina resulting into retardation of growth (Capoor and Varma, 1950). If infection is severe, plants become stunted and pods turn yellow, deformed, fiberous and are rendered unmarketable. This disease has become major constraint in okra cultivation affecting the crop at any growth stage and it causing significant losses in yield and fruit quality. The vector of yellow vein mosaic virus is *Bemisia tabaci* Genn.

OBJECTIVE

To evaluate different pesticides/bio-pesticides on suitable okra cultivars

METHODOLOGY

Four okra varieties (GAO-2, Arka Anamika, Prabhani Kranti and GAO-5) were sown at ICAR-KVK-Panchmahal farm. Each variety was sown in three replications with 60 cm row to row and 20 cm plant to plant distance. The conventional agronomic practices were followed to keep the crop in good condition. The disease on each test entry was assessed by following self made disease rating scale (Table 1).

Table 1. Disease rating scale used in study

Rating scale	Severity range (%)
0-Immune	0 %
1-Highly resistant	1-10 %
2-Moderately resistant	11-25 %
3-Tolerant	26-50 %
4-Moderately susceptibility	51-60 %
5- Susceptibility	61-70 %
6-Highly susceptibility	71-100 %

Five treatments (T_1= Neem oil; T_2 = Garlic extract; T_3 = Imidacloprid; T_4 =Untreated control and T_5 = Water) each with three replications were sprayed against whitefly population at economic threshold level. Treatments were ap-

plied randomly on each block of a variety, thus designing the experiment according to randomized complete block design. Pesticides were used with the following doses.

T_1 = Neem oil @ 1%

T_2 = Garlic extract @ 5%

T_3 = Imidacloprid @ 0.005%

T_4 =Untreated control

T_5 = Water

RESULTS AND DISCUSSION

The response of four okra varieties against yellow vein mosaic virus was observed under natural conditions. GAO-5 had great potential of resistance against yellow vein mosaic virus, only 2.26% plant infection was found on this variety (Table 2).

Table 2. Response of okra varieties to yellow vein mosaic virus (YVMV) under natural conditions.

Sr. No.	Cultivars	Mean disease rating	Severity rating	Level of resistance/ susceptibility
1	GAO-2	28.40	3	Tolerant
2	Arka Anamika	23.20	2	Moderately resistant
3	Prabhani Kranti	14.0	2	Moderately resistant
4	GAO-5	2.26	1	Highly resistant

Arka Anamika and Prabhani Kranti showed 23.20 and 14.0% plant infection, respectively. GAO-2 showed 28.40% plant infection and graded as tolerant. Three products viz., neem oil, garlic extracts and imidacloprid were evaluated for their efficacy in the control of *Bemisia tabaci* and yellow vein mosaic virus on okra. The crop sprayed with garlic extracts suppressed the whitefly population (2.60 per leaf per plant) as compared to water (3 per leaf per plant) and untreated control (3.40 per leaf per plant). The disease incidence (16.20%) on garlic extracts treated crop was also lower in comparison to the water (22%) and untreated control (27%). The whitefly population on plants sprayed with neem oil was 2 per leaf per plant, which was low as compared to garlic extracts, water and untreated control (Table 3).

Table 3. Effect of treatments on plant infection and white-fly population on okra cultivars

Treatments	Disease incidence %	No. of white-fly/leaf/plant
Neem oil	13.70	2.00
Garlic extract	16.20	2.60
Imidacloprid	7.50	1.00
Untreated	27.00	3.40
water	22.00	3.00
Mean	17.28	2.4

Imidacloprid gave good results in controlling white-fly population and reducing disease incidence as compared to neem oil and garlic extracts. Only one whitefly per leaf per plant was noted on the crop treated with imidacloprid and 7.50% disease incidence was observed on this crop. Sarabani *et al.* (2002) has demonstrated the environment friendly management of yellow vein mosaic virus disease of okra with the help tolerant cultivars, cost effective insecticidal sprays, plant extracts to control disease and its vector (*B. tabaci*). They applied four sprays after the interval of 15, 30, 45 and 60 days of sowing which gives the highest yield. Spray application of plant products delayed the occurrence of disease up to 60 days. Adilakshmi *et al.* 2008 reported that the spraying with neem oil proved most effective in reducing the load of white-fly population on okra. Kumar *et al*. (2001) studied efficacy of imidacloprid and thiamethoxan on okra against leafhopper and whitefly. Field experiments shown that various doses of imidacloprid and thiamethoxan had no phytotoxic effect on okra but effective against insects. Sprays with leaf extracts of *Prospos chilensis* and *Bougainvillea spectabilis* has been found highly effective in reducing yellow vein mosaic virus in okra. The incubation period of the virus in plants treated with leaf extracts of *Prospos chilensis* and *Bougainvillea spectabilis* increased to 19.1 days and 19.3 days respectively, compared with 10.4 days in control plants (Pun *et al.*, 1999 and Jana *et al.*, 2015).

CONCLUSION

The easiest and cheapest method of reducing yellow vein mosaic virus disease of okra is cultivation of resistant varieties against this disease as GAO-5. Moreover four applications of different insecticides like imidacloprid, neem oil or garlic extract at 15 days interval starting two weeks after germination also reduced the spread of yellow vein mosaic virus by checking its vector *Bemisia tabaci*.

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