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Management of Yellow Vein Mosaic Disease of Okra Through Pesticide/Bio-pesticide and Suitable Cultivars

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ABSTRACT

Four okra cultivars (Pahuja, Safal, Subz Pari and Surkh Bhindi) were cultivated in a field trial to determine the response of these to okra yellow vein mosaic virus (OYVMV) and to evaluate the efficacy of pesticide/bio-pesticide (Neem extract, Effective Microbes (EM) and Imidacloprid) against insect vector *Bemisia tabaci* Genn. Surkh Bhindi was found highly resistant, Subz Pari and Safal were moderately resistant and Pahuja was tolerant against OYVMV. Among the pesticide/bio-pesticide applied, the imidaccloprid significantly reduced the whitefly population. Neem extract and Biocntrol (EM) were also found to be effective against *Bemisia tabaci* compared to distilled water and untreated control.

Key Words: Okra; Pesticides; Bio-pesticide; Disease incidence; *Bemisia tabaci*

INTRODUCTION

Okra (*Abelmoschus esculentus* L) commonly known as ladyfinger is an important vegetable crop. Several species of genus *Abelmoschus* are grown in many parts of the world. However, in Pakistan *Abelmoschus esculentus* is most common and has great commercial demand due to its nutritional value. It is good source of vitamin A, B, C and also rich in protein, carbohydrates, fats, minerals, iron and iodine (Baloch *et al*., 1990; Norman, 1992).

Okra is cultivated for its immature pods to be consumed as fresh and canned food as well as for seed purpose. Its pods contain mucilaginous substances that thicken soups and stews. A number of fungi, bacteria, viruses, mycoplasma, nematodes and insects attack this crop. The total loss of vegetable on this account has been estimated up to 20-30% but if the pathogens are allowed to develop, this loss may increase up to 80-90% (Hamer & Tthompson, 1957). The disease is characterized by a homogenous interwoven network of yellow vein enclosing islands of green tissues within its leaf. In extreme cases, infected leaves become yellowish or creamy color. If plants are infected within 20 days after germination, their growth is retarded; few leaves and fruits are formed and loss may be about 94%. The extent of damage declines with delay in infection of the plants. Plants infected 50 and 65 days after germination suffer a loss of 84 and 49%, respectively (Sastry & Singh, 1974).

The vector of okra yellow vein mosaic virus (OYVMV) is *Bemisia tabaci* Genn. Several attempts have been made to manage whitefly (Pun *et al*., 1999). The objective of this study was to evaluate different pesticides/bio-pesticides on suitable okra cultivars (commercially grown).

MATERIALS AND METHODS

Four okra varieties (Pahuja, Safal, Subz Pari and Surrkh Bhindi) were sown in the research area of Department of Plant Pathology, University of Agriculture, Faisalabad during June 2002. 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 I).

Five treatments (T_1= Neem extract; T_2 = Biocontrol; T_3 = Imidacloprid; T_4 =Untreated control and T_5 = Distilled water) each with three replications were sprayed against whitefly population at economic threshold level (4-5 whiteflies/leaf). Treatments were applied randomly on each block of a variety, thus designing the experiment according to randomized complete block design (RCBD). Pesticides were used with the following doses.

T_1 = Neem extract @ 500 mL / acre
T_2 = Biocontrol (EM) @ 1 L / acre
T_3 = Imidacloprid @ 600 g /acre
T_4 =Untreated control
T_5 = Distilled water

The crop was sprayed by above-mentioned chemicals after 15, 30, 45 and 60 days of sowing. Data regarding OYVMV and whitefly population was recoded on weekly basis and subjected to statistical analysis. All possible interactions were determined through ANOVA and treatments mean were compared by LSD or DMR test at 5% level of probability (Steel *et al*., 1997).

RESULTS AND DISCUSSION

The response of four okra varieties against OYVMV was observed under natural conditions. Surkh Bhindi had

great potential of resistance against OYVMV, only 3.3% plant infection was found on this variety (Table II). Subz Pari and Safal showed 12 and 24.40% plant infection, respectively. Pahuja showed 27.20% plant infection and graded as tolerant. Choudhary *et al.* (1992) has reported the incidence of yellow vein mosaic virus in okra. In case of hybrids disease incidence ranged from 19.26 to 69.13%; whereas, on parent plants, it ranged from 19.95 to 51.16%.

Three products, Neem (*Azadirachta indica*) extracts, Effective Microbes (EM) and Imidacloprid were evaluated for their efficacy in the control of *Bemisia tabaci* and OYVMV on okra. The crop sprayed with Neem extract suppressed the whitefly population (2 per leaf per plant) as compared to distilled water (2.60 per leaf per plant) and untreated control (3 per leaf per plant). The disease incidence (15.70%) on Neem extract treated crop was also lower in comparison to the distilled water (20%) and untreated control (25%). The whitefly population on plants sprayed with Biocontrol (EM) was I.40 per leaf per plant, which was low as compared to Neem extract, distilled water and untreated control (Table III). Imidacloprid gave good results in controlling whitefly population and reducing disease incidence as compared to Biocontrol (EM) and Neem extract. Only one whitefly per leaf per plant was noted on the crop treated with Imidacloprid and 7.20% disease incidence was observed on this crop. Sarabani *et al*. (2002) has reported environmentally safe management of yellow vein mosaic disease of okra through the use of tolerant cultivars, cost effective scheduling of efficient insecticides, plant based, vector (*Bemisia tabaci*) control measures. Four sprays after 15, 30, 45 and 60 days of sowing produced highest yield. Spray application of plant products resulted in delaying disease occurrence up to 60 days. Kulat *et al*. (1997) conducted field trials during 1994-96, to determine the efficacy of six plant extracts and two insecticides for the control of whitefly (*Bemisia taabaci*) and *Aphis gossypii* on okra. Aqueous leaf extracts of tobacco (2%) *Ipomoea cornea* (5%) and a seed extract of *Azadirachta indica* and *Pongamia bragla* (5%) gave a similar level of control compared to Endosulfan (0.06%) and Monocrotophos (0.05%). Adiroubane and Letchoumanane (1998) conducted field experiments to evaluate the efficacy of three plant extracts, sacred basil (*Ocimum sanctum*), malbar nut (*Adhutoda vesica*), Chinese chaste tree (*Vitex negudo*) and synthetic insecticides (Endosulfan & Carbaryl) and their combinations products in controlling okra jassid, whitefly and fruit borers during rainy season in 1994 by spraying them at 10, 25 and 40 days after sowing. All the treatments suppressed insect's population. Kumar *et al*. (2001) studied efficacy of imidacloprid and thiamethoxan on okra against leafhopper and whitefly. Field experiments conducted in Banglor (India) during the kharif and summer seasons of 1999 and 2000 had 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).

Table I. 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%

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

Serial No.	Cultivars	Mean of disease rating	Severity rating	Level of resistance/susceptibility.
1	Pahuja	27.20	3	Tolerant
2	Safal	24.40	2	Moderately resistant
3	Subz Pari	12	2	Moderately resistant
4	Surkh Bhindi	3.36	1	Highly resistant

Table III. Effect of treatments on plant infection and whitefly population on okra cultivars

Treatments	Disease incidence %	No. of whitefly/leaf/plant
Neem extract	15.70c	2.00b
Bio control (EM)	12.50cd	1.40bc
Imidachloprid	7.20e	1.00c
Untreated	25.00a	3.00a
Distilled water	20.00b	2.60ab
Mean	16.08±12	5.00±25

CONCLUSION

The easiest and cheapest method of reducing yellow vein mosaic disease of okra is cultivation of resistant varieties against this disease as Surkh Bhindi and Subz Pari. Moreover four applications of different insecticides like imidacloprid, effective microbes (EM) or neem extract at 15 days interval starting two weeks after germination also reduced the spread of OYVMV by checking its vector *Bemisia tabaci.*

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