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A NEW FUSARIUM WILT OF OKRA IN PAKISTAN

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Fusarium wilt of okra (*Hibiscus esculentus*) has been reported for the first time in Pakistan. Pathogenicity tests and re-isolation from inoculated plants confirmed that *Fusarium oxysporum* was the incitant. High wilt percentages among plants grown in infested soil indicate that the fungus is soilborne.

Key words: Fusarium oxysporum, Okra wilt.

INTRODUCTION

Okra (*Hibiscus esculentus* L.) is an important vegetable commonly grown in almost every part of the country for home use and for market. In July, 1987, a wilt disease of okra was observed in an experimental field of the Crop Diseases Research Institute, Karachi. Diseased okra plants showed yellowing and wilting with internal discolouration in the basal portion of the stems (Fig. 1). *Fusarium* wilt of okra caused by *Fusarium oxysporum* f. sp. *vasinfectum* had been reported to be seed transmitted and produced serious losses to the okra plant in Brazil (Kobbs *et al.* [7]), India (Ganogopadyay and Kapoor, [4] and Romania (Docea and Coroiania, [3]). The object of this study was to identify the cause of this wilting.

MATERIALS AND METHODS

During the summer of 1987, wilted plants and soil samples were collected from affected fields.

Dilution plate method. 10 gm per soil sample were placed in a sterile flask and diluted (1:10 w/w) with sterile tap water. The soil-water suspension was thoroughly mixed with a magnetic stirrer. After 10 minutes of mixing, the suspension was diluted to 1:1000 and 0.1 ml of the final dilution of each soil sample was placed in a petridish containing 10 ml of potato dextrose Agar (PDA) or pentachloronitrobenzene (PCNB) medium (Nash and Snyder, [5]). There were three replication of each plating. After 10 days of incubation at 24° (± 1°) under an alternating cycle of 12 hours of ADL (artificial day light supplied by cool white florescent tubes) and 12 hours of darkness, the number of colonies were counted and identification and microscopic observations were made.

Isolation studies. Roots and stems were thoroughly washed in tap water. Segments were surface disinfested in a 5% solution of sodium hypochlorite (NaOCl) for 2 minutes. The segments were than plated on PDA or PCNB medium and incubated as above for identification.

Pathogenicity tests. A pathogenicity test of *Fusarium oxysporum* was conducted using seed and soil inoculation. One hundred seeds, treated with 1% NaOCl for 5 minutes were used for each treatment, suitable control were maintained (Chandra *et. al.* [2]; Radhakrishan and Sen., [6]).

Surface disinfested seeds were rolled on well-sporulated cultures of the isolates and plated in sterile petri-dishes containing moist blotters (4 replicates of 25 seeds each). The petridishes were incubated at 24° (± 1°) and pre-and post-emergence mortality of the seedlings were recorded after a period of 7 and 15 days, repsectively.

Similar experiments were also conducted using pots filled with sterile field soil. After rolling the seeds on sporulated cultures, they were sown in soil and the pre-and post-emergence mortality of the seedlings were recorded.

The pathogen, grown on a sand-soil corn meal medium at 24° (± 1°) for three weeks, was used as soil inoculum. The inoculum was mixed at the rate of 8 percent (w/w) of potting soil, 24 hours prior to planting with non-infested seed.

RESULTS AND DISCUSSION

The main fungus isolated from the roots and stems of affected plants, and from soils, was identified as *Fusarium oxysporum* Schlecht, emend, Snyd. & Hans., which closely agrees with the description given by Booth, [1]. The number of *F. oxysporum* propagules was greatest (18.5 x 10^3/g) in soil with a high incidence of diseased plants, (50%), and was the lowest (0.5 x 10^3/g) in soil with a low incidence (2%). The pathogen was isolated from 90-96% of affected plant parts.

Th results of the pathogenicity test of *F. oxysporum* which was carried out by the seed or soil treatment method are given in Table-1. Seed inoculation caused 5 percent pre-emergence and 25 percent post emergence killing when sown on blotters whereas in soil, the pre-and post-emergence mortality rate decreased upto 2 and 15 percent,

Table 1. Disease development caused by inoculation of seed and soil with *Fusarium oxysporum*.

Treatment*	Percent incidence of *Fusarium oxysporum*		
	Pre-emergence	Post-emergence	Wilt/mature plant
Inoculated seed on blotters	5	25	–
Control	0	2	–
Inoculated seed in sterile soil	2	15	2
Control	0	0	0
Surface-disinfested-seed in inoculated soil	9	32	70
Control	0	0	0

* 100 seed per treatment.

respectively. The pre-and post-emergence mortality increases up to 9 and 32 percent, respectively, when surface disinfested seeds were planted in soil inoculated with *F. oxysporum*. Wilt symptoms developed 55-60 days after planting in the case of the soil treatment method. Seventy percent of the plants showed sudden but gradual wilting and death. Throughout the experiments, diseased plant parts were sectioned and plated for isolation and re-isolation of the pathogen. *Fusarium oxysporum* was isolated from both roots and stems of wilted plants. The soil treatment technique was superior to seed treatment, on the basis of total disease expression. It is suggested that *F. oxysporum* is soilborne also. The severity of the disease expression depends on the number of *F. oxysporum* propagules in the soil. Individual okra plants showed wilting symptoms in experimental field but under favourable condition the seventy percent of the plants were found wilted which produced serious losses to the okra plants. The result of these laboratory and field studies indicated that *F. oxysporum* is pathogenic to okra plants in Pakistan.

Fig. 1. *Fusarium* wilt of the okra in the field, showing yellowing and wilting among healthy plants.

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