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SUNFLOWER WILT CAUSED BY *Fusarium tabacinum* IN PAKISTAN

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SUMMARY

A wilt disease of sunflower (*Helianthus annuus* L.) was observed during summer 1992 at the National Agricultural Research Centre, Islamabad. Disease incidence ranged from 5.0 to 10.0 percent. The pathogen was isolated from the inffected sunflower plants and on the basis of its cultural characteristics it was identified ad *Fusarium tabacinum* (V. Beyma) W.Gams. This is believed to be the first report of this pathogen on sunflowers in Pakistan.

Key words: Wilt disease, *Fusarium* spp., *Heliantuhus annuus*, pathogenicity, Pakistan.

INTRODUCTION:

Sunflower (*Helianthus annuus L.*) is an important non-conventional oilseed crop which is usually grown both in spring as well as summer season and was cultivated on about 54 thousand hectares during 1992-93. So far, sixteen sunflower pathogens, *Alternaria helianthi, A. tenuissima, Botrytis cinerea, Colletotrichum sp., Epicoccum sp., Erysiphe cichoracearum, Erwinia carotovora, Macrophomina phaseolina, Puccinia helianthi, Phoma oleracea var. helianthi tuberosi, Phomopsis helianthi, Rhizopus spp., Sclerotium rolfsii, Sclerotinia sclerotiorum, Septoria helianthi, and Verticillium dahliae* have been reported for Pakistan (Mirza et al., 1988).

Sunflower wilt caused by *Fusarium spp.* has been reported from Australia, Bulgaria, Italy, Poland, Portugal and Yugoslavia (Aćimović, 1984 & 1988). *Fusarium tabacinum*, a common fungus both in arable soil and on decaying plant material, has been reported in Europe, the United States, Australia, New Zealand and other areas (Domsch et al., 1980). In few cases is was pathogenic to tobacco, pansies, tomato, basil and other hosts (Mata, 1978; Pascoe et al., 1984), but sunflower wilt caused by *F.tabacinum* has been reported only from Italy (Zazzerini and Tosi, 1987).

Sunflower wilt disease caused by *Fusarium tabacinum* (V. Beyma) W.Gams (teleomorph: *Plectosphaerella cucumerina* (Lindf.) W. Gams) was detected in sunflower hybrid "Gloriasol" for the firist time at the National Agricultural Research Centre (NARC), Islamabad, during summer (autumn) 1992 under relatively high humidity and low temperature. Stalks of the intefected plants exhibited a gray discoloration with necrotic streaks and crushed easily. Longitudinal sections of affected stalks showed diffused pith with pale to pinkish-red discoloration in the collar region, up to 20-35 cm above the soil surface. Microscopic examination also indicated the presence of hyaline

hyphae in the disorganized tissue of the pith. Disease incidence ranged from 5.0 to 10.0 percent.

The objectives of this study were i) to identify the pathogen, ii) to report its first occurrence on sunflower in Pakistan and iii) to fulfill Koch's postulates by determining pathogenicity.

MATERIALS AND METHODS

Isolation and identification

Diseased plants of the sunflower hybrid "Gloriasol" showing wilt symptoms were collected from experimental plot at NARC, Islamabad. Small stem pieces (4 mm) of infected stalk were surface sterilized in 1% solution of sodium hypochlorite (NaOCl) for 1 min, then drained on sterile filter paper and plated in 9 cm diameter petri dishes containing potato-dextrose agar (PDA) medium, added with 250 μg streptomycin sulphate per milliliter (Stevens, 1974) and incubated at 25°C. The hyphal tips from growing colonies developed on PDA were subcultured on fresh PDA to get pure culture of the pathogen.

Pathogenicity

For pathogenicity test, round toothpicks (6 cm long) were washed five times in boiling water, air dried and soaked in potato dextrose broth (potato 20 gm; dectrose 20 gm; water

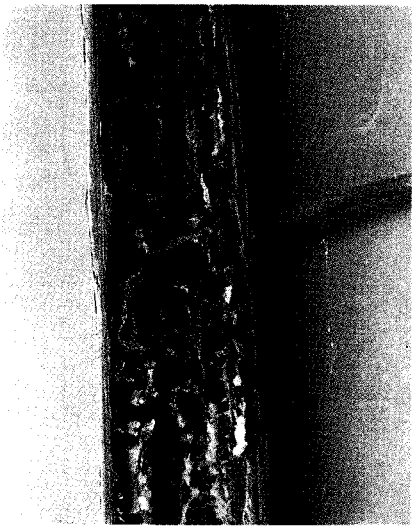

Fig.1. Longitudinal section of inoculated sunflower stalk showing pinkish-red discoloration and disintegeration of the pith.

1000 ml) contained in 300 ml glass jars and were sterilized at 120°C for 20 min. These were acidified by adding five drops of 25% lactic acid per 100 ml broth (Tuite, 1969) to inhibit bacterial growth and then inoculated with conidial suspension (10^5 /ml) made from 7 days old culture of *F. tabacinum*. After inoculation, toothpicks were incubated at 25°C for three weeks. Pathogenicity of the causal organism was determined by inoculating sunflower plants grown in the field. Stalks were inoculated with *F.tabacinum* at flowering stage, using the toothpick method of inoculation (Young, 1943).

Pathogenicity on other plants, tobacco (*Nicotiana tabacum L.*) and basil (*Ocimum basillicum*) reported as hosts of the fungus was also determined by wound inoculation (Zazzerani and Tosi, 1987).

RESULTS AND DISCUSSION

Isolation and identification

From infected sunflower stem, a fungus producing yellowish to salmon colored colonies on PDA with little or no aerial mycelium was isolated. Conidia were variable in shape, generally hyaline, cylindrical to ellipsoid or slightly curved and multiguttulate, measuring 6.5-14 μm in length and 2-2.5 μm in width, rarely one-septate in the yongest culture. On the basis of morphological charcteristics, the pathogen was identified as *Fusarium tabacinum* (Booth, 1971; Domsch et al., 1980; Gerlach and Nirenberg, 1982).

Pathogenicity

Necrotic areas developed after 15-20 days on the inoculated stem. Brown-colored lesions first appeared at inoculation point and then spread to girdle the stem. Longitudinal sections of the inoculated stalk showed pinkish to red discoloration and disintegration of the pith (Fig.1). *F.tabacinum* was successfully reisolated from the inoculated plants while no organism was isolated from untreated check (control). Wound inoculated tobacco and basil plants also exibited same disease symptoms as observed in inoculated sunflower plants. The pathogen was subsequently reisolated from the lesions developed on these inoculated plants and thus proved that it is also pathogenic to tobacco and basil.

Although this disease has also been reported on sunflower in Italy (Zazzerni and Tosi, 1987), this appears to be the first report on the occurrence of *Fusarium tabacinum* causing sunflower wilt in Pakistan as it is not included in the Fungi of Pakistan (Ahmed, 1956, 1969) Mirza and Qureshi (1978).

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