

## Twig Blight of Chilli Caused by *Choanephora cucurbitarum* in Telangana

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### ABSTRACT

In December 2014 twig blight on chilli (*Capsicum frutescens*) caused by *Choanephora cucurbitarum* was observed during survey in farmer's fields in major chilli growing areas of Telangana state. The symptoms of *Choanephora* twig blight of chilli were observed under natural field condition on leaves, stem, petioles and fruits during survey. Isolation was done from the plant parts and showed presence of *Choanephora cucurbitarum* which was identified on the basis of its morphological characters. Twig blight disease caused by the pathogen *Choanephora cucurbitarum* was identified based on morphological and cultural characters.

The disease began with water-soaking and dark-green lesions, and then the infected tissues were rapidly rotten. The drooping multispore sporangia were subglobose in shape and 90.15 - 100  $\mu$ m in size. Sporangiospores were elliptic, fusiform or ovoid in shape, light brown or dark brown in color and are characterized by longitudinal striatures on the wall surface and 12-19 x 7.23-9.5  $\mu$ m by size. The sporangiophore (conidiophore) from which the monosporous sporangiola arose was long slender, branched at the apex with primary vesicle from which secondary vesicles were produced on the stalks which bears sporangiospores (conidia). Monosporous sporangiola were elliptical, fusiform or ovoid, striate and measured 11-19 x 4-12  $\mu$ m. Zygosporangia of *C. cucurbitarum* appear not to have been observed prior to the present study. The pathogenicity of fungus was tested and Koch's postulates were confirmed. Symptoms first appeared as water soaked lesion on leaves and stems. The infected portion dries and curls up and rapidly extends downward, attacking buds and tender leaves. Prominent hairy growth of *Choanephora cucurbitarum* on the infected tissue was found in the morning hours.

**Key words:** *Choanephora cucurbitarum*, Twig blight, Chilli, Sporangiospores, Pathogenicity.

### INTRODUCTION

Chilli (*Capsicum frutescens*) is a self-pollinated crop bearing a pod like fruit (berry) and belongs to family Solanaceae. It is a tropical and subtropical crop mainly grown in India, Japan, Mexico, Turkey, United States of

America and African countries. India is the largest producer of chillies in the world, accounting for over 45% of the total area under cultivation from almost the sea level up to an altitude of 2000 meters with an annual rainfall of 60-150 cm<sup>4</sup>.

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Chilli is an annual sub-shrub constitutes one of the most important spices cultivated all over the world except in colder parts. India is the leading country in the production of chillies contributing 41.11% of the world's production. India stands first in production and consumption of chilli globally. The area under Chilli was estimated at 792.1 thousand hectare during 2010-11 with the production of 1223.4 thousand tones green chilli. During this year production of green chilli was recorded 1.5 MT per hectare<sup>5</sup>. *Choanephora cucurbitarum* is a plant pathogenic fungus causing fruit rots, flower rot and leaf blights on a variety of plants including squash, pumpkin, pepper, pea and bean. This fungus is known to attack several other crops which include cereals such as millet, rice and sorghum. The fungus also causes pod blight known as wet rot, blossom blight and whisker rot<sup>6</sup>.

#### MATERIAL AND METHODS

The naturally infected leaf of chilli crop with the typical *Choanephora* blight symptoms i.e. irregular spot, leaf area & leaf tip were collected from the field during survey. Such samples were brought to the laboratory for critical examination, isolation and the identification of causal organism under

compound microscope. The entire work of isolation and purification was done in isolation chamber and laminar air flow, which was sterilized by alcohol or formaldehyde and UV Tubes, prior to use. Chilli plants showing typical disease symptoms were collected from the farmers' fields during survey and used for isolation of the test pathogen.

The infected twigs and leaves were thoroughly washed and cut into small pieces of 1 to 2 cm long. The cut pieces were surface sterilized with 1% Sodium hypo chlorite for one minute followed by three washings with sterile distilled water before placing on PDA (Fig 1).

The plates were incubated in BOD incubator at  $25^{\circ} \pm 2^{\circ}\text{C}$ . Fungal growth emerging from diseased host tissue was directly transferred to the PDA medium under aseptic conditions and incubated at  $25^{\circ} \pm 2^{\circ}\text{C}$ .

Mycelial mats were then sub-cultured, purified by hyphal tip method and further pure culture of pathogenic fungi was maintained on PDA by periodic sub-culturing and preserved the test pathogen on PDA slant. All the growth characters were recorded and compared with the standard descriptions of pathogen for confirmation.



Fig. 1: (a) Symptoms of twig blight disease on chilli leaves, twigs and fruits  
(b) Isolation of *Choanephora cucurbitarum* on PDA medium

#### RESULT AND DISCUSSION

The test pathogen *Choanephora cucurbitarum* was isolated from chilli twigs which were collected from the farmers' field during survey  
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in Khammam district with maximum disease incidence in the field. Twig blight lesions were surface sterilised (1% Sodium hypo chlorite) for one minute, followed by the sterile water

wash and kept for incubation. After 48 hours fungal colonies developed and fresh mycelium transferred to Petri plate containing PDA medium. Pathogen was purified by single spore techniques and pathogen culture was multiplied and maintained on PDA at  $25 \pm 2^\circ\text{C}$  in BOD incubator.

#### Identification of *Choanephora cucurbitarum*

The test fungus was isolated from infected twigs and leaves on potato dextrose agar

medium and was identified as *C. cucurbitarum* with the help of descriptions given by Wolf<sup>10</sup>. The fungal colony appeared white to pale yellow on PDA plates. The white coloured mycelium on maturity produced black pin heads indicating onset of sporulation (Fig 2). The cultural characters were in accordance with the descriptions given by Saroj *et al.*<sup>8</sup>.



Fig. 2: Pure culture of *Choanephora cucurbitarum* on potato dextrose medium

The mycelia was hyaline, unbranched and without any septations. Sporangiphores were non-septate, hyaline and smooth walled. Two types of asexual structures were produced drooping sporangia and monosporous sporangiola. The drooping multispore sporangia were subglobose in shape and  $90.15 - 100 \mu\text{m}$  in size. The sporangia were non columellate and dehisce into two half releasing the spores.

Sporangiospores were elliptic, fusiform or ovoid in shape, light brown or dark brown in color and are characterized by longitudinal striatures on the wall surface and  $12-19 \times 7.23-9.5 \mu\text{m}$  by size. The sporangiophore (conidiophore) from which the monosporous sporangiola arose was long slender, branched at the apex with primary

vesicle from which secondary vesicles were produced on the stalks which bears sporangiospores.

Monosporous sporangiola were elliptical, fusiform or ovoid, striate and measured  $11-19 \times 4-12 \mu\text{m}$ . Zygospores of *C. cucurbitarum* appear not to have been observed prior to the present study. The mycelial and morphological characters were similar to that described by Wolf<sup>10</sup>. The fungus grew well between  $25^\circ\text{C}$  to  $30^\circ\text{C}$  temperatures. On the basis of microscopic examination of the fungus, the morphology was identical to that of *Choanephora cucurbitarum* (Berk and Rav.) Thaxt, Agrios,<sup>3</sup> Abel-Motaal *et al.*<sup>1</sup>, Singh *et al.*<sup>9</sup> and Kwon *et al.*<sup>7</sup>. (Fig 1.1 to Fig 1.4)

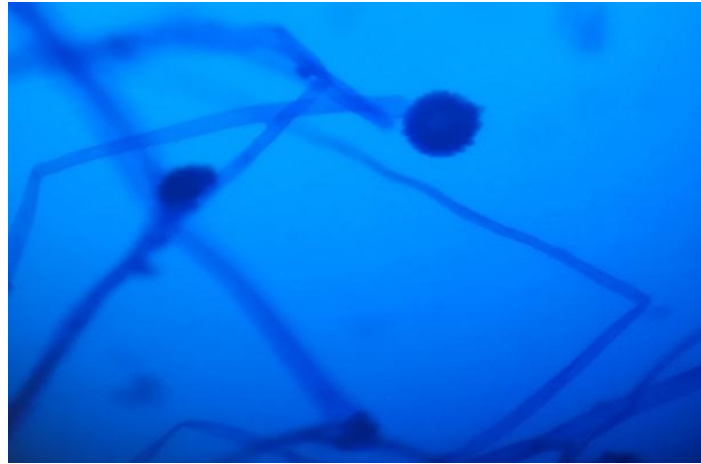


Fig. 1.1 Photomicrograph showing sporangia and sporangiophores of *Choanephora cucurbitarum* (10X)

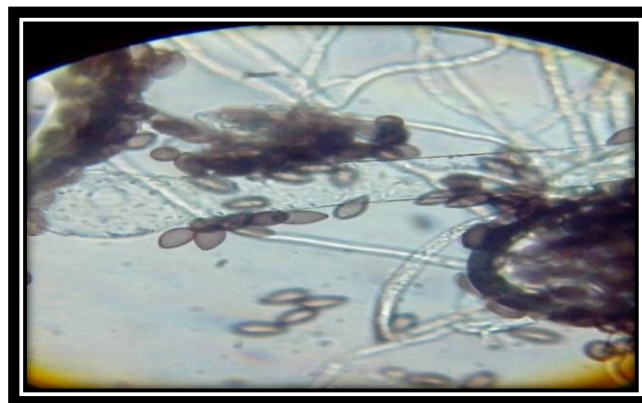
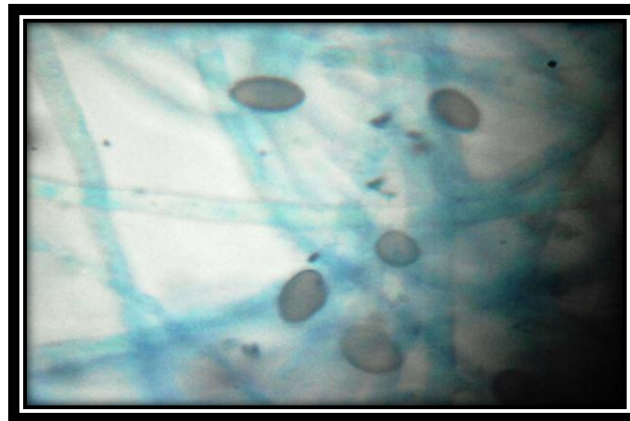


Fig. 1.2 Photomicrograph showing sporangial hyphae of *Choanephora cucurbitarum* (40X)



Fig. 1.3 Photomicrograph showing fertile heads of *Choanephora cucurbitarum* (40X)

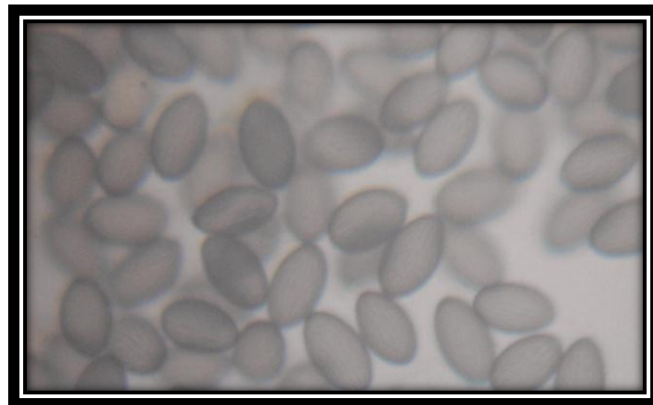


Fig. 1.4 Photomicrograph showing sporangiospores of *Choanephora cucurbitarum* (40X)

### SYMPTOMATOLOGY

The initial symptom of disease was appeared in leaves after 120 days of sowing (at flowering stage) at distal halves of infected leaves. Symptoms developed as a grayish color similar to hot water scald or chemical injury.

The infected portion become dried and curled upward. Host tissues have a hairy appearance resulting from the tall sporangiophores that produce a cluster of brown sporangia at their tips.

Water soaked lesions appear on the leaves and the margins, leaf tips gets blighted. The

appearance of a stiff silvery mass of whisker-like or hairy strands of the fungus growing out of the affected pepper tissue, topped with a black ball made of great numbers of spores.

Sporangiophores and sporangia observed on the infected portion of the leaves. Under high relative humidity (>90%) conditions cause a heavy or severe defoliation, while under low relative humidity condition infected portion dropped off without sporulations leaving the uninfected portion intact.

Similar observations were also made by Abhishek and Pooja<sup>2</sup> water soaked lesions

appear on the leaves and the margins, leaf tips get blighted. The disease causes severe destruction in rainy season in tropical climates. Initial symptoms were associated with flowers, buds or apical growing points and later fungus grows downward killing the plant. Wet rot develops on the stem which appeared as wet and green. The bark easily peels off in shreds.

### CONCLUSION

Twig blight disease caused by the pathogen *Choanephora cucurbitarum* was identified based on morphological and cultural characters. The pathogenicity of fungus was tested and Koch's postulates were confirmed. Symptoms first appeared as water soaked lesion on leaves and stems. The infected portion dries and curls up and rapidly extends downward, attacking buds and tender leaves. Prominent hairy growth of *Choanephora cucurbitarum* on the infected tissue was found in the morning hours. This is visible with a hand lens. Usually whitish mycelia and monosporous sporangial were produced on the lesions. The disease gradually spreads to more and more branches even to the stem causing severe damage under warm and humid conditions that favor the disease development.

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