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A head/curd rot disease caused by *Choanephora* spp.was constantly found to appear on cabbage and cauliflower planted in the fields of College of Agriculture, Vellayani, Thiruvananthapuram and the farmer's fields at Kasaragod district. The disease caused 30 to 60 per cent yield losses in the affected fields. Morphological characterization of the pathogen revealed the mycelia of the fungus to be hyaline and nonseptate. Sporangiophores bearing sporangiola erect, hyaline, unbranched, apically dilated to form a clavate vesicle from which arose dichotomously branched distally clavate secondary vesicles. Monosporous sporangiola, indehiscent, ellipsoid, brown to dark brown with distinct longitudinal striations, measured 12 to 20 × 6 to 12 μm. Sporangiospores ellipsoid, brown to dark brown, indistinctly striate measuring 16 to 20 × 8 to 12 μm. Further confirmation by molecular analysis on the identity of the fungus carried out by ITS sequencing revealed the pathogen to be *Choanephora* cucurbitarum.

Key words: Cabbage, cauliflower, choanephora rot, Kerala

INTRODUCTION

Cabbage (*Brassica oleracea* var. *capitata* f.*alba*) and Cauliflower (*Brassica oleracea* var. *botrytis*) has recently been brought under cultivation in the tropical climatic conditions of Kerala especially during the October-November to January-February when night temperatures are low although day temperature is high. The unprecedented rains that occur during the period predispose the plants to many fungal diseases. A head/leaf/curd rot disease is constantly found to appear on cabbage and cauliflower planted in the fields of the College of Agriculture, Vellayani and the nearby farmer's fields. It also appeared at Chullikkara area of Panathur, Kasaragod during January 2017. The disease was found to cause considerable yield and economic losses and hence was brought under detailed investigation.

MATERIALS AND METHODS

Symptomatology studies were carried out both under field and laboratory conditions. The pathogen was isolated from the diseased portions on PDA medium and was pure cultured using hyphal tip method.

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Pathogenicity of the fungus was established by artificial inoculation on healthy plants with swab of an aqueous spore suspension containing 106 spores/ml. Plants treated with sterile distilled water served as controls. Both inoculated and control plants were kept in humid conditions for 3 days at 28 ± 2°C. Pathogenicity was proved under *in vitro* conditions also, using detached leaf method.

Morphological and cultural characters of the isolated pathogen were studied and based on that, the pathogen was identified. The microscopic examinations were done with the help of a research microscope (Make: Carl Zeiss, Model: Axiolab A 1) and imaging was using ZEN software. The ITS regions of the isolated pathogen were sequenced using universal primers of ITS (ITS-1F and ITS-4R) for further confirmation on the identity of the pathogen. PCR amplification was carried out followed by sequencing using the Big-Dye Terminator v3.1 Cycle sequencing Kit. The sequence quality was checked using Sequence Scanner Software v1 (Applied Biosystems).

Symptomatology

The disease caused 30 to 60 per cent losses in the affected fields. Symptoms first appeared as

water-soaked lesions on the margins of the lower leaves of cauliflower and the topmost leaves of the head of cabbage that progressed to a wet rot. The lesions further progressed to cover more portions of the leaf lamina and later became sunken, surrounded by brownish margins and yellow halo. Mature lesions harboured pinheads with black fructifications of the suspect pathogen. In later stages, the pathogen penetrated to deeper layers converting the head or curd in to a brownish black rotting mass covered with cottony mycelia and numerous sporangiophores bearing black pinhead like sporangia.

Isolation and pathogenicity

Pathogen isolations were done by placing pieces of infected tissues on potato dextrose agar after surface sterilization. A fungus tentatively identified as a *Choanephora* sp. that produced white aerial mycelia that later turned pale yellow was consistently isolated from infected plant parts.

In artificially inoculated plants the initial symptoms developed in 2 to 3 days while typical disease symptoms appeared on all the inoculated plants after 7 days. Control plants were free from infection. The re-isolation from artificially inoculated plants again yielded *Choanephora* sp., thus fulfilling Koch's postulates.

RESULTS AND DISCUSSION

Cultural and morphological characterization and identification

The colony under PDA was initially whitish later turning to creamy white with typical aerial mycelia. The underside of the plate appeared creamy yellow in colour. The pathogen was a fast grower and completely covered a 9 cm Plate within 3-4 days. Sporulation started after 6 days of incubation and was perceptible as black pinhead like sporangia.

Mycelia were hyaline and nonseptate. Sporangiophores bearing sporangiola were erect, hyaline, unbranched, apically dilated to form a clavate vesicle from which arose dichotomously branched distally clavate secondary vesicles. Monosporous sporangiola were indehiscent, ellipsoid, brown to dark brown with distinct longitudinal striations, measured 12 to 20 × 6 to 12 μm. Sporangia were multispored, spherical, initially white to yellow and pale brown to dark brown at maturity, measuring 40 to 160 μm. Sporangiospores from sporangia were ellipsoid to broadly ellipsoid, brown to dark brown, indistinctly striate with fine hyaline polar appendages, and measured 16 to 20 × 8 to 12 μm. The mycelial and morphological characters were in accordance with the descriptions by Kirk (1984).

On the basis of the cultural as well as morphological characteristics and description, the fungus was identified as a *Choanephora cucurbitarum* which was further confirmed by BLAST analysis of the sequences obtained for the isolate. The results of BLAST analysis indicating the distribution of 100 blast hits on the query sequence of *Choanephora* showed that the isolates had 100% identity with the known isolates of *C. cucurbitarum*.

C. cucurbitarum is reported to cause Damping off and hypocotyl wilting of Cabbage plug seedlings in Japan (Kubota and Abiko, 2001). Pornsuriya *et al*. (2017) reported *Choanephora cucurbitarum* wet rot on leaves of *Brassica chinensis* in a private greenhouse in Hatyai city, Thailand and observed the pathogen to be infecting the young and expanded leaves resulting in water-soaking symptoms followed by production of dark mass of sporangiophores bearing sporangiola.

Choanephora has been reported as the causal factor in Leaf blight of Chillies, Pod rot of Cowpea and Wet rot of *Withamnia somnifera* (Sally *et al*. 1995; Kown *et al*. 2001; Saroj *et al*. 2012). Park *et al*. (2015) reported Choanephora flower rot in *Abelmoschus manihot* from Korea. Milsha and Girija (2015) reported Choanephora pod rot to be an emerging problem in vegetable cowpea growing tracts of Kerala, India.

Perusal of literature reveals that *Choanephora* has not so far been reported from cruciferous crops in Kerala, India. Hence, this appears to be the first report of the incidence of Choanephora leaf rot on cabbage and cauliflower from Kerala State. The fungal culture was deposited at National Facility for Collection of Fungi of India (NFCCI)and the accession number is NFCCI 4230.

REFERENCES

Kirk, P. M, 1984. A monograph of the Choanephoraceae. *Mycological Papers* **152**: 1-61.

Kown, J.H., Shen, S.S and Park, C.S. 2001. Pod rot of cowpea (*Vigna sinensis*) caused by *Choanephora cucurbitarum. J. Pl.*

Pathol. **17**:354-356.

Kubota, M. and Abiko, K. 2001. A new disease of cabbage plug seedlings caused by *Choanephora cucurbitarum* (Berk. Et Rav.) Thaxter. *Proc. Kansai Plant Prot. Soc*. **43**:9–10.

Milsha, G. and Girija, V.K. 2015. Choanephora pod rot: An emerging fungal disease of vegetable cowpea in Kerala, India. *SAARC Agri. News* **8**: 8.

Park J-H, Cho S-E, Hong S-H and Shin H-D. 2015. Choanephora flower rot caused by *Choanephora cucurbitarum* on *Abelmoschus manihot*. *Trop. Plant. Pathol*. **40**:147–149.

Pornsuriya, C., Chairin, T., Thaochan, N and Anurag S. 2017. Choanephora rot caused by *Choanephora cucurbitarumon Brassica chinensis* in Thailand. *Australasian Plant Dis. Notes* **12**:13.

Sally, K. M., Abdul Wahab, M. and Nirmala Devi, S. 1995. Seasonal occurrence of chilli (*Capsicum annuum* L.) diseases in Kerala, India. *J. Spices Aromatic Crops* **4** : 86-87

Saroj, A., Kumar, A., Qamar, N., Alam, M., Singh, H. N. and Khaliq, A. 2012. First report of wet rot of *Withania somnifera* caused by *Choanephora cucurbitarum* in India. *Plant Disease* **96**: 293. doi:10.1094/PDIS-09-11-0801.