Research Note :

Study on etiology of the purple blotch disease of onion

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Onion (*Allium cepa* L.) is an important bulb crop of India belonging to the family Alliaceae. In India, the onion crop occupies an area of 0.4546 million hectares with a total production of 6034.25 million tonnes (Anonymous, 2005-06). In Andhra Pradesh, it is grown over an area of about 0.022 million hectares with an annual production of 197 million tonnes (Anonymous, 2005-06). In Guntur district of Andhra Pradesh it is cultivated in an area of 0.001239 million hectares with an annual production of 0.019680 million tonnes (Anonymous, 2006). Several factors contribute to the low productivity of onion. Diseases like purple blotch, downy mildew, Stemphylium blight, basal rot and storage rot are known to be more significant in reducing the production of the crop. Of these, purple blotch is the most destructive disease, prevalent in almost all onion growing areas of the world causing heavy losses under field conditions. In Guntur district the disease has become prevalent causing heavy losses to onion farmers in recent times.

Onion seedlings samples of the variety 'Nasik Red' (N-53) from infected plants were collected and raised in pots. Leaf bits of 3-5 mm size from the diseased area along with a healthy portion were cut, surface sterilized with 0.1 per cent sodium hypochlorite for 60 seconds and rinsed in three changes of sterile water. The leaf bits were transferred aseptically onto sterilized Potato dextrose agar medium contained in Petri dishes and incubated at 28 $\pm$ 1^{0}C temperature in the laboratory. Ten days after incubation, when the growth of the fungus was seen on the medium, it was transferred aseptically to Potato dextrose agar slants. The fungal culture was purified by single spore isolation.

To purify the fungal culture by single spore isolation, the spore suspension was prepared by scraping the surface of the 10 days old fungal growth on the agar plate and the scrapings were made into a suspension using 1.0 ml sterile distilled water which was diluted further to have a suspension containing about 10,000 spores/ml. After confirming the presence of spores of *Alternaria porri* in the suspension, it was poured into Petri dishes containing 2 per cent sterilized agar medium aseptically. The Petri dishes were gently rotated for the even distribution of the spores on the medium. After incubation of Petri dishes for 12 hr, the spores well-spaced out were located under the microscope and marked out on the bottom of the dishes using a glass marking pen. Each single spore along with a bit of agar medium was scooped with the help of a sterilized scalpel and transferred aseptically to Potato dextrose agar slants. The culture was equally maintained by sub-culturing it at 15 to 20 days interval.

Identification of the fungus was made after examining the hyphae, conidiophores and conidia under microscope from mature pure culture of the fungus obtained from infected leaves of onion. Stage and ocular micrometers were used to measure the width of hyphae, length, breadth, beak length and number of septa of conidia. The measurements were recorded and compared with the standard measurements of the species given in the "CMI Descriptions of Pathogenic Fungi and Bacteria" (1952) and "Novel Dematiaceous Hyphomycetes" (Simmons, 2004).

The results indicated that the conidiophores were observed to be straight or flexuous, some time geniculate, septate, pale or mid brown in colour and measured upto 120

Table 1 : Morphological characters of mycelium, conidiophores and conidia of *Alternaria porri* (Ellis) Cif.

Characters	Mycelium (Hyphae)	Conidiophore*	Conidia*
Length	--	120 µm	100 – 300 µm
Width	1-10 µm	6 - 10 µm	15 - 20 µm
Beak length	--	--	100 - 300 µm
Beak width	--	--	2 - 4 µm
Colour	Hyaline to olive-buff to dark buff	Pale or mid brown	Pale brown to mid golden brown
Horizontal septation	Septate	3 – 12	7 - 12
Vertical septation	--	--	0 – 7

*Mean of hundred observations

ìm long and 6 to 10 µm thick, with one or several conidial scars (Table 1). A mature conidiophore usually produced a solitary conidium, but occasionally it also produced conidia in short chains. Conidia were observed to be straight or curved, rostrate, beak generally equal to the length of the body of the conidium, pale brown to mid golden brown in colour. Overall length of conidia ranged from 100 to 300 µm, 15 to 20 µm wide in the broadest part with 7 to 12 transverse and zero to several longitudinal septa. Conidia showed flexuous beak, pale in colour, 2 to 4 ìm thick and tapering.

Based on the colony characters and morphological characters of mycelium, conidiophores and conidia, the fungus was identified as *Alternaria porri* (Ellis) Cif. The description of the fungus, *Alternaria porri* was found comparable with that given in "CMI Descriptions of Pathogenic Fungi and Bacteria" (1952) and "Novel Dematiaceous Hyphomycetes" (Simmons, 2004).

The findings of the present study are corroborated by the observations of Cifferi (1930), Ellis (1971) and Chethana (2000), who reported *A. porri* as the causal agent of the disease, and the descriptions of the fungus in their reports are in conformity with descriptions of the fungus in the present study.

Since Thirumalachar and Mishra (1953) reported *A. porri* as the causal organism of the disease. Chethana (2000) isolated *A. porri* from onion plants affected with purple blotch disease and described it as the causal organism of the disease.

In the present study *A. porri* was consistently isolated from the diseased leaves of onion confirming the above report.

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