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Effectiveness of different Carbon, Nitrogen Sources on Growth of *Alternaria solani* isolated from *Lycopersicon esculentum* (Mill.)

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Abstract
Genus *Alternaria* belong to deuteromycetes having different species, which are destructive plant pathogen to the families such as Solanaceae, cucurbitaceae, brasicaceae. Tomato crop is from solanaceae grown in study area during rabbi and kharip season having nutritional and economical value. *Alternaria solani* cause early blight disease of tomato and lose the quality and quantity of crop. The results indicated that Eight isolates of the *A. solani* were identified and all test isolates showed a wide range of variability and growth of pathogen on different carbon and nitrogen sources in the media. Considering the significance of the disease and important of the crop, present investigation was under taken to determine the best carbon and nitrogen sources in the medium.

Keywords: Early blight of Tomato, *Alternaria solani*, Carbon, Nitrogen Sources

Introduction

Alternaria solani infect the various crops belonging to the several families and reduce yield both qualitatively and quantitatively. The genus *Alternaria* was first recognised by Nees in 1817. Species of the *Alternaria* genus are cosmopolitan, surviving both as saprophytes as well as weak parasites. In several cases, small dark coloured spots are also formed on pods and tender twigs (Valkonen and Koponen, 1990) [13]. A comprehensive, comparative account of morphological differentiation of different Alternaria species occurring on cucurbitaceous, brassicaceous and solanaceous crops are described by Khalid et.al. (2004) [7] and Deshwal (2004) [5].

Farmers get lower yield mostly due to pests, diseases. Productivity of tomato is lower due to fungal diseases. Among those diseases, early blight is of foliar diseases of tomato caused by *Alternaria solani* is the most destructive and widespread in temperate, tropical and subtropical regions of the world, which causes a highest reduction in the quality and quantity of fruit yield (Hijmans *et al*., 2000) [6]. It can severely damage incurring a loss of 50 to 80% on tomato susceptible hybrids varieties. *A. solani* can infect all parts of the plant (causing leaf blight, fruit lesions and stem collar rot) and result in severe damage during all stages of plant development (Abada *et al.,* 2008) [1]. According to morphological characters and physiological analysis of the pathogen, *A. solani* having large, long beaked and concatenated spores. The mycelium consisted of septet, branched, light brown hyphae, which turned darker with age. The conidiophores were short, 50 to 90 µm and dark colored. Conidia were 120-296 x 12-20 µm in size, beaked, dark colored and borne singly. However in culture they formed short chains. According to Singh (1987) [12] the conidia contained 5-10 transverse septa and 1-5 longitudinal septa. The organism is air-borne, soil inhabiting and the most common disease causing pathogen of the cultivated tomato in areas with heavy dew, frequent rainfall, and high humidity (Agrios, 2005) [2]. It may be seed borne and dispersed by water, wind, insects, workers and farm equipment. Spores can enter the leaf, steam or fruit. (Yonghao, 2013) [14].

The primary symptom of early blight is the appearance of small dark brown spots on the lowest and oldest leaves. The tissue around the primary lesions may turns bright yellow, and if lesions are numerous, the entire leaves may become necrosis and chlorotic. The spotsget enlarged, they develop concentric rings which give them a bull's eye. In favorable weather conditions, disease develop, lesions can become numerous and plants defoliate, which

damage the quantity and quality of tomato fruits (Kouyoumjian, 2007) [8]. Morphological, cultural, pathogenic and molecular variability of the pathogen (*A. solani*) was also studies earlier by many workers (Babu *et al*. 2000, Ahmad, 2002, Naik *et al*, 2010) [4, 3, 9]. Understanding the pathogen variability will help in developing the effective management strategies, therefore present study were attempted to explore cultural variability growth of eight different isolates of *A. solani* isolated from infected tomato samples from Nashik district.

Material and methods

Collection of Samples: Samples of fungal infected parts of tomato were collected randomly and fresh from the different tehsils of Nashik district of Maharashtra used for the isolation of fungus.

Isolation and culture preparation: Leaves of tomato showing early blight symptoms were collected from different tomato growing fields of Nashik district. The infected leaves were brought to laboratory and diseased leaves with *A. solani* would cut into small bits measuring about 5mm and surface sterilized in mercuric chloride solution for 1 min, rinsed twice with sterile distilled water. Pieces were then placed on Potato Dextrose Agar (PDA) medium and incubated under alternative 12 h light and 12 h dark at 28±2°C according to Naik *et al*., (2010) [9]. Pure culture of the fungus was obtained by Hyphal Tip Isolation Method. Fungi are identified from microscopic characters with the help of identification key by The Illustration of Fungi by D.S. Mukadam *et al*. Amongst the several geographical isolates collected from various fields, a representative isolate designation was picked up for detailed variability studies. These fungal isolates were grown on PDA slants, stored at 5°C in refrigerator and sub culturing was done subsequently at intervals of 30 days for further research studies.

Effect of different carbon and nitrogen sources on growth of *Alternaria solani*

A disc (0.5cm diameter) of mycelia and spores was taken from the periphery of 7-day-old cultures of fungus grown on PDA medium was inoculated into 250ml conical flasks, each containing 100 ml of Glucose nitrate broth. The broth contains (g/l): glucose 1g, potassium nitrate 0.25g, potassium dihydrogen ortho-phosphate 0.1g, magnesium phosphate 0.5g. This basic media was re placed by different carbon and nitrogen sources to study its effect on growth of *Alternaria solani* isolates. The flasks were allowed to incubate at room temperature for 15 days. After the incubation period dry mycelium weight was measured.

Results and Discussion

Effect of different carbon sources on growth of *Alternaria solani*

Carbon sources viz. fructose, lactose, sucrose and starch were used to study its effect on *Alternaria solani* isolates and results are given in table 1. It is clear from the table that fructose and sucrose stimulated the growth of *Alternaria solani* isolates whereas NY2, NS4 and NC6 showed minimum growth in presence of lactose. On the other hand, polysaccharides like starch reduce the growth of *Alternaria solani* isolates except NS4 and NS5.

Table 2: Effect of carbon sources on growth of *Alternaria solani* isolates

Carbon sources	Mycelium dry weight (mg)							
	NN1	NY2	NN3, NN1	NS4	NS5	NC6	ND7	ND8
Fructose	350	320	390	300	275	255	260	190
Lactose	220	125	175	190	160	180	195	170
Sucrose	240	297	305	245	275	225	245	205
Starch	130	120	140	180	195	120	135	145
Control	170	160	178	190	170	190	150	160

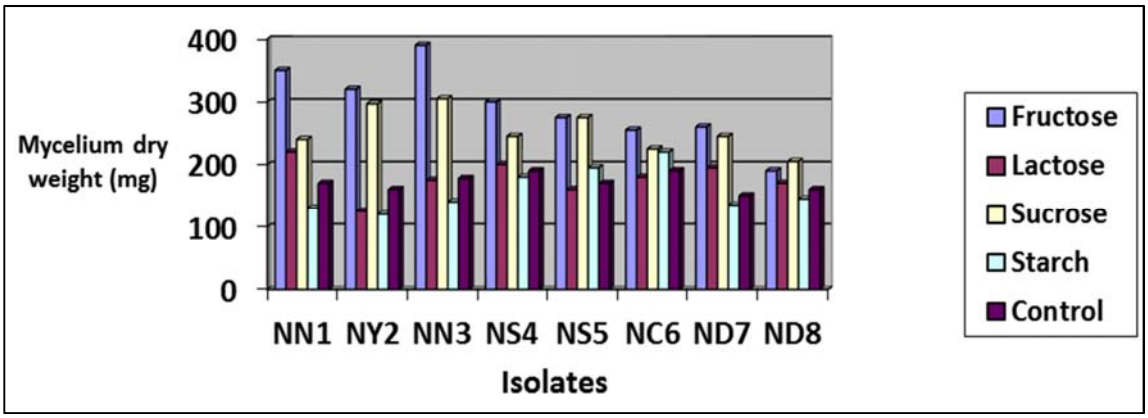

Fig 1: Effect of different carbon sources on Growth of *A. solani*

2. Effect of different nitrogen sources on growth of *Alternaria solani* - Nitrogen sources viz. NaNO2, casein, urea and peptone were used to study the growth of *Alternaria solani* isolates and results are summarized in table 2. It is clear from the table that Sodium nitrate (NaNO2) stimulated the growth of all *Alternaria solani* isolates. Casein was found to be responsible for increase in growth of NY2 and NN3 whereas, growth of NS4, NS5, NC6 and ND7 isolates was hampered due to casein. Urea and peptone was found to be responsible for increase in growth of all isolates except ND7.

Table 2: Effect of nitrogen sources on growth of *Alternaria solani* isolates.

Nitrogen sources	Mycelium dry weight (mg)							
	NN1	NY2	NN3	NS4	NS5	NC6	ND7	ND8
NaNO2	230	350	320	350	360	290	295	265
Casein	245	275	290	155	170	200	210	220
Urea	135	140	145	185	196	188	120	160
Peptone	170	160	175	200	165	170	130	160
Control	150	170	190	220	175	210	206	177

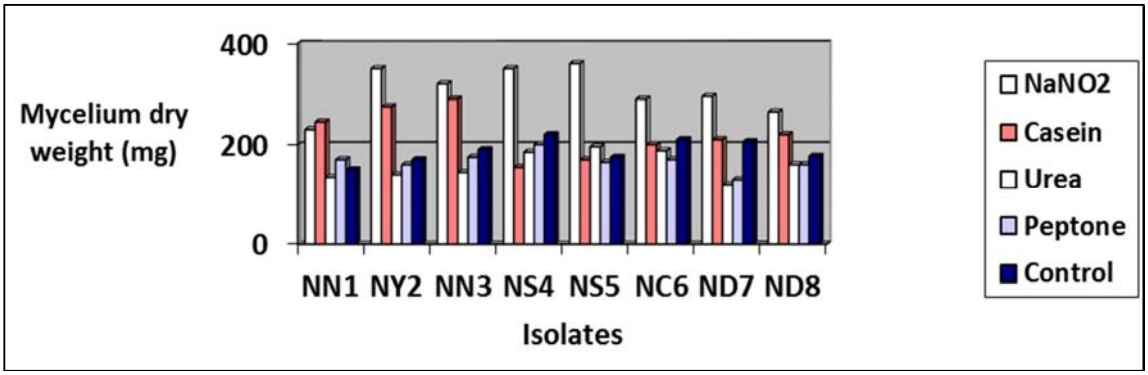

Fig 2: Effect of different nitrogen sources on Growth of *A. solani*

Conclusion

Alternaria solani is a very destructive fungus for tomato crop. The present findings clearly indicate significant variability in growth of eight isolates of *A. solani* on culture media containing different carbon and nitrogen sources.

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