
SHORT COMMUNICATION

Effect of trace elements on mycelial growth and sporulation of *Alternaria alternata* (Fr.) Keissler causing black heart of pomegranate

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Fruit rot of Pomegranate (*Punica granatum L.*) caused by *Alternaria alternata* is one of most serious post harvest disease in throughout India. Rotted pomegranates were collected from various localities of Maharashtra. A total fifteen isolates of *Alternaria alternata* were isolated from rotted Pomegranate. Their sensitivity was tested against carbendazim. MIC of all these isolates was obtained ranges from (834.6 µg/ml -1123.8 µg/ml). The isolate Aa13 was sensitive, while isolate Aa15 was resistant. Total of seven trace elements were used for the growth of *A. alternata*. There was significant variation in the growth of the both sensitive and resistant mutant in various trace elements. However, the growth was also higher in case of resistant strain when compared with sensitive isolate. Interestingly no trace element enhanced the growth of both the strains over control. Copper sulphate and cobalt sulphate were highly inhibitory. Ferrous sulphate gave higher sporulation in sensitive and resistant strain, while moderate sporulation in magnesium sulphate, manganese sulphate and sodium sulphate and without trace elements serve as control.

Keywords: *Alternaria alternata*, carbendazim, pomegranate, trace elements

INTRODUCTION

Fruit rot of Pomegranate (*Punica granatum L.*) caused by *Alternaria alternata* is one of the important post harvest diseases in India. The infection of *Alternaria alternata* causes spoils the quality of fruits for marketing purpose. Bhatt *et al.* (2000) recorded the *A. alternata* as the causal agent of leaf blight disease of tomato and capsicum which was confirmed record of this fungus from Kumaon hill of Uttar Pradesh. It can be managed through systemic and conventional fungicides. Effect of different nutritional sources like carbon and nitrogen and sporulation of sensitive and resistant mutant of *A. alternata* (Kadam, 2020). Growth and sporulation of *A. alternata* cases have been reported in India and abroad. Some important contribution with respect to the utilization of different nutritional studies of different fungal pathogens have been made by Ramjagathes and Ebnezar (2012); Taware *et al.* (2014). The aim of present study was to determine the role of trace elements in pathogenesis caused by *A. alternata* inciting black

heart disease to grapes and pomegranate (Gangawane, 2008; Dahiwale *et al.* 2009; Kartin *et al.* 2011; Renubala and Shukla, 2020; Aloji *et al.* (2021).

MATERIALS AND METHODS

Roving survey was made in the central fruits market of Maharashtra and field reported numerous diseases of Pomegranate, pathogens viz. *Aspergillus niger*, *Rhizopus strominifer*, *Sphaceloma punicae*, *Alternaria alternata*, *Colletotrichum sps.* Among this *Alternaria alternata* was found to be dominant in the storage houses of local and central fruit market, packing and also in orchards, hence it was selected for research problem. *Alternaria alternata* was isolated from rotted pomegranate, transferred on potato dextrose agar, slants and maintained at 4°C. Seven trace elements sources were selected for study. It is used individually and in mixture with carbendazim concentration used 50 µg/ml and 100 µg/ml in the Potato Dextrose Agar (PDA) medium. The plates were inoculated with resistant mutant Aa EMS-15 and incubated for 10 days at 27±2°C. After 10 days Percentage Control Efficacy (PCE) was calculated (Cohen, 1989).

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RESULTS AND DISCUSSION

Seven trace elements in the form of sulphate were incorporated in the media. Result is shown in Table 1. It was seen that there was growth of sensitive and resistant strains except for few trace elements. The growth was also higher in case of resistant strain when compared with sensitive isolate. Interestingly, no trace element enhanced the growth of both the strains over control. Copper sulphate and cobalt sulphate were highly inhibitory. Ferrous sulphate gave higher sporulation in sensitive and resistant strain while moderate sporulation in magnesium sulphate, manganese sulphate and sodium sulphate.

The similar results of the present study on the effect of trace elements to support maximum growth and sporulation in *Alternaria alternata*, *Alternaria carthami* and several *Alternaria spp* were reported by several researchers (Kumar *et al.* 2006; Gholve *et al.* 2015; Patil and Suryawanshi, 2015; Ghuge *et al.* 2019; Prakash and Prasad, 2019; Kadam, 2020). Similar studies on the effect of four trace elements i.e. Zinc (Zn), Boron (B), Magnesium (Mg) and Copper (Cu) on growth and sporulation of *Pyricularia oryzae*. Zinc, Boron and Copper were found to be most effective and promoted growth and sporulation at 2 ppm

(parts per million) concentration when we increased the concentration of these elements in the medium, growth and sporulation decreased (Renubala and Shukla, 2020).

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DECLARATIONS

Conflict of interest: Authors declare no conflict of interest.

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Table 1: *In vitro* effect of trace elements on the growth and sporulation of *Alternaria alternata* sensitive and resistant to Carbendazim causing fruit rot of Pomegranate.

Trace elements (0.01%)	Wild sensitive isolate		Resistant strain	
	Dry mycelial wt (mg/50 ml)	sporulation (8)DAI*	Dry mycelial wt. (mg /50ml)	sporulation (8)DAI*
Magnesium sulphate	367	++	382	++
Manganese sulphate	363	++	322	++
Copper sulphate	130	-	146	-
Cobalt sulphate	145	-	158	-
Sodium sulphate	353	++	376	++
Zinc sulphate	168	+	184	+
Ferrous sulphate	542	+++	582	+++
Control	567	+++	652	++++

No growth -; Less growth +; Moderate growth ++; Good growth +++; Abundant growth ++++ *Day After Inoculation

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