

Effectiveness of Resistance inducing Chemicals against Chilli Fruit Rot Pathogen incited by *Colletotrichum truncatum* under *in vivo* and *in vitro* conditions

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(Received 25 September 2021, Accepted 17 November, 2021)

(Published by Research Trend, Website: www.researchtrend.net)

ABSTRACT: Chilli is a famous crop for its daily usage for its flavor and pungency. It is vastly affected by several diseases specially, Fruit rot disease cause huge loss both in quality and quantity. Resistance inducers such as Nicotinic Acid, Napthalene acetic acid, Salicylic acid, Silicic acid and Sodium silicate were examined for control of *Colletotrichum truncatum* causing fruit rot in chilli at concentration viz., 50ppm, 75ppm and 100ppm by using culture plate assay. Salicylic acid with per cent inhibition of 96.65% found to be best in inhibiting mycelia growth of pathogen and found to be superior over other resistance chemicals both in culture plate assay and pot culture with less incidence of 21.6%. This study investigate management of *Colletotrichum truncatum* and further induce growth promotion in chilli plant when sprayed as foliar application. Therefore, the study provides dual promotion by managing pathogen as well as promote growth of plant and obtain better yield with quality produce. In order to increase awareness on the adverse effect of chemical pesticides among people, this research focus on ecofriendly alternatives. Hence, there is need to find alternative to chemical pesticide to manage chilli fruit rot.

Keywords: *Colletotrichum truncatum*, Chilli, Salicylic acid and Resistance inducers.

INTRODUCTION

Chilli is a famous crop for its daily usage for its flavor and pungency. Also known as wonder crop. It is vastly affected by several diseases specially, Fruit rot disease cause huge loss both in quality and quantity. Fruit rot caused by *Colletotrichum truncatum* (earlier known as *C. capsici*) (Damm, 2009) serious destructive pathogen around the world. In recent decades new type of agro chemicals called “plant activators” which protect plant by activating their defense system have been widely used because of their low health and environment risk. Resistant inducing chemicals are known as inducers of phytoalexins and/or elicitors of resistance in different plant species (Hadi and Balali, 2010). Salicylic acid (SA) is a plant phenolic compound, used as a plant growth regulator (Agamy *et al.*, 2013). Exogenous applied SA is also induced the defence in some crops (Murphy *et al.*, 2000). Salicylic acid (Sarwar *et al.*, 2011), have shown induced resistance in various crops. Systemic acquired resistance (SAR) inducers can be

chemical compounds, metabolites of the host plant, which induce plant resistance through activation of a plant’s signalling pathways such as the salicylic acid pathway. Salicylic acid is the first plant derivative phenolic compound to induce systemic acquired resistance. Ali *et al.*, (2020) described the use of Salicylic acid for management of Chilli vein mottle virus (ChiVMV). For that 0.2% Salicylic acid were used that showed disease severity reduce 28% as compared to control plant 46%. Jaiganesh *et al.*, (2019) used Salicylic acid as plant activator@50ppm On 40DAT as foliar application against chilli anthracnose which decreased the disease severity and increased the growth and yield parameter. Although, earlier several studies have been conducted for management of chilli fruit rot in which different chemicals have used against *Colletotrichum truncatum* and few are found highly effective. Keeping in view the present investigation was undertaken for effect of different resistance inducing chemicals manage fruit rot pathogen which wisely help in promotion of plant growth and yield.

MATERIALS AND METHODS

Isolation of Pathogen. Fruit rot affected chillies were isolated by standard tissue isolation method. The diseased chilli with typical symptoms were collected from 10 different chilli growing areas of Tamil Nadu. Infected portion of the fruit was cut into minute bits, surface sterilized in 0.1 per cent sodium chloride solution for 30 seconds washed in repeated changes of sterile distilled water and plated onto PDA medium in Petri dishes. Incubate at 30° and were observed for mycelial growth. The fungus was purified by single spore isolation technique. Confirmation of virulent isolate as *Colletotrichum truncatum* done by ITS primers.

Efficacy of Resistance inducing chemicals against *Colletotrichum truncatum*. Five resistance inducing chemicals viz., Nicotinic Acid, Napthalene acetic acid, Salicyclic acid, Silicic acid and Sodium silicate at concentration viz., 50ppm, 75ppm and 100ppm were evaluated against *Colletotrichum truncatum* by employing poisoned food technique. The desired concentrations were obtained by adding appropriate amount of stock solution of chemicals to potato dextrose agar taken in conical flask and then transferred to petriplates and repeated thrice for each treatment. Potato dextrose agar without fungicides served as control. Each plate was inoculated with a 5 mm mycelial disc of the pathogen taken from 7 days old culture of *Colletotrichum truncatum*. The inoculated plates were incubated in BOD incubator at 27°C for mycelia growth of pathogen. The colony diameter was recorded and per cent inhibition in each treatment over control was calculated by using the formula (Vincent,

1947). Radial growth of the fungus was measured with metric scale (mm). $I = C-T/C \times 100$ Where, I = per cent inhibition over control C = mean maximum radial growth of colony in control T = mean maximum radial growth of colony in treatment.

Effect of resistance inducing chemicals on chilli fruit rot incidence of chilli (Screening test – Pot culture). Pot culture studies were conducted to test the efficacy of certain resistance inducing chemicals for assessing their influence on the incidence of chilli fruit rot disease. The plants were given artificial inoculation by spraying the spore suspensions after pinpricking the plants with adequate spore load (5×10^5 conidia/mL) at 90 DAT in the evening hours. The crop was maintained in a poly house with frequent spraying of water to provide adequate moisture and relative humidity to enable successful infection by the pathogen. The components were sprayed individually at disease initiation stage and repeated once at fifteen days interval. Three replications for each treatment and a control were maintained.

RESULT AND DISCUSSION

Efficacy of Resistance inducing chemicals against *Colletotrichum truncatum*

The results conducted on the efficacy of compatible Strobilurin fungicides against *Colletotrichum truncatum* (Table 1, Fig. 1) indicated that Salicyclic acid was found highly efficient in controlling the growth of *Colletotrichum truncatum* at concentration viz., 100 ppm and inhibition percentage was reported 96.66% respectively followed by Salicyclic acid at 75 ppm. Least efficient was recorded in Nicotinic acid at 50ppm with inhibition percentage of 34.77% (Fig. 2.)

Table 1: Effectiveness of Resistance inducing chemicals against *Colletotrichum truncatum* causing Chilli fruit rot.

Sr. No.	Resistance inducing chemicals	Mycelial growth			Percent inhibition%		
		50ppm	75ppm	100ppm	50ppm	75ppm	100ppm
1.	Nicotinic Acid	5.87	4.46	3.23	34.77	50.44	64.11
2.	Napthalene acetic acid	5.11	3.74	2.05	43.22	58.44	77.22
3.	Salicyclic acid	0.9	0.5	0.3	90.00	94.44	96.66
4.	Silicic acid	3.27	3.03	1.28	63.66	66.33	85.77
5.	Sodium silicate	5.72	5.43	4.83	36.44	39.66	46.33
6.	Control	9.00					
	CD (0.05)	0.21	0.21	0.1	-	-	-

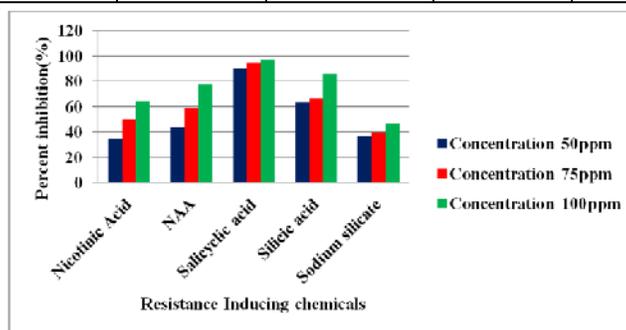
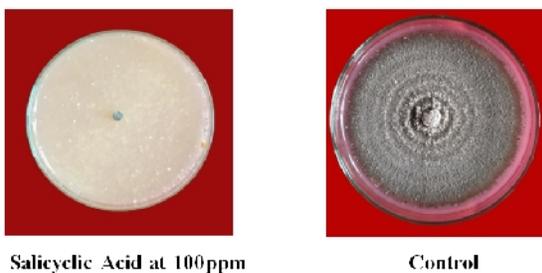


Fig. 1. Effectiveness of Resistance inducing chemicals against *Colletotrichum truncatum* causing Chilli fruit rot. Shanthini et al., *Biological Forum – An International Journal* 13(4): 928-931(2021) 929



Salicyclic Acid at 100ppm

Control

Fig. 2. Effective treatment of Resistance inducing chemicals against *Colletotrichum truncatum*.

Effect of resistance inducing chemicals on chilli fruit rot incidence of chilli (Screening test – Pot culture).

Among the various resistance inducing chemicals, Salicyclic acid @ 100 ppm was the most effective (21.6

%) in reducing the chilli fruit rot followed by Salicyclic Acid (50 ppm) (21.8%). It was followed by Silicic acid (100 ppm) (30.3%), Salicyclic acid (20 ppm) (35 %), Silicic acid (50 ppm) (41.7 %). Nicotinic acid at 20 ppm (56.3%) was least effective (Table 2). Vechet *et al.* (2009) observed that foliar application of salicyclic acid increased the resistance in wheat plants against powdery mildew pathogen. Geat, (2016) reported that Salicyclic acid foliar application at 5mM concentration gave 67.86% disease control in Pusa jwala chilli. Bussabong *et al.*, (2021) described that Exogenous application Salicyclic acid at various concentration(0, 0.5, 1 and 1.5 mM) induce disease resistance to banana leaf spot caused by *Curvularia eragrostidis* with reduced disease severity by 77.88%.

Table 2: Effect of resistance inducing chemicals on Chilli fruit rot incidence (Screening test – Pot culture).

Concentration	Nicotinic acid	Silicic acid	Sodium silicate	Naphthalene Acetic acid	Salicyclic acid
20 ppm	56.3	47.2	54.5	55.1	35.0
50 ppm	52.8	41.7	49.2	50.8	21.8
100 ppm	45.1	30.3	42.4	43.6	21.6
Control	62.4				
C.D. (p=0.05)	2.30	3.42	4.26	3.94	0.75

CONCLUSION

Chilli is a famous crop for its daily usage for its flavor and pungency. This wonder crop affected by *C. truncatum* reduce the quality and quantity. Therefore, certain resistance inducing chemicals were used. Among them Salicyclic acid showed best result. Hence, this study investigate management of *Colletotrichum truncatum* and further induce growth promotion in chilli plant where sprayed as foliar application. Therefore, the study provide dual promotion by managing pathogen as well as promote growth of plant and obtain better yield with quality produce.

FUTURE SCOPE

Resistance inducing chemicals like Salicyclic acid is a key plant hormone regulating plant immunity. Salicyclic acid plays a vital role on resistance to biotic stresses in different plant-pathogen systems. Safe and practical use of Salicyclic acid as a plant defense activator and growth regulator can create a new beginning for Integrated disease management for various pathogens with an effective management of disease as well as increase the yield and quality of crop produce with dual purpose in one chemical.

Acknowledgement. The authors are thankful to the Department of Plant pathology, Agricultural College and Research Institue, Madurai for helpful in conducting the experiments.

Conflict of Interest. None.

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How to cite this article: Shanthini, V. D.; Theradimani, M.; Thiruvudainambi, S.; Renuka, R.; Hepziba, S. J. and Brindhadevi, S. (2021). Effectiveness of Resistance inducing Chemicals Against Chilli Fruit Rot Pathogen incited by *Colletotrichum truncatum* under *in vivo* and *in vitro* conditions. *Biological Forum – An International Journal*, 13(4): 928-931.