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To Evaluate *in vitro* Bio-efficiency of Different Plant-Extracts against *Colletotrichum gloeosporioides* Penz. and Sacc. causing Fruit Rot of Aonla

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A B S T R A C T

Colletotrichum gloeosporioides Penz. and Sacc. is associated with aonla, in that fruit rot of aonla is one of the contributing factors for this low productivity. Therefore, the ecofriendly and environmentally safe management of fruit rot disease with the use of plant extracts is necessary. Different plant extracts evaluated under *in vitro* condition against the mycelial growth of *Colletotrichum gloeosporioide.* Plant extracts *viz., Allium sativum* (82.74 %), *Azadirachta indica* (80.77 %), *Ocimum sanctum* (77.1 %) mycelial growth inhibition of fungus under laboratory dual culture technique.

Introduction

Aonla (*Emblica officinalis.*Gaertn.) is one of the major fruit crop in the State of Maharashtra. The anola is affected by number of fungal pathogens such as *Colletotricum gloesporioides.* Penz. and Sacc. (fruit rot) *Ravenelia emblicae* Styd. (rust), *Fusarium* spp. (wilt), *Penicillium citrinum* Thom. (fruit rot or blue mould), *Phomopsis phyllanthi* Punith (soft rot), *Phoma putaminum* Speg. (dry fruit rot), *Aspergillus terreus* (fruit rot) *etc*. Among them, the fruit rot caused by *Colletotricum gloesporioides.* Penz. and Sacc. is a major disease of aonla fruit and responsible for causing 2- 29 per cent yield loss (Sohi, 1975).

Keeping in view economic importance of aonla and losses incurred due to fruit rot disease, present investigations on the various aspects *viz.,* survey, symptomatology, pathogenicity test, morphological and cultural characteristics, efficacy of different fungicides, bio-agents, plant extracts were undertaken during the season of *Kharif* 2018-2019 at Department of Plant Pathology, College of Agriculture, Badnapur, V.N.M.K.V. Parbhani. The results obtained on the above aspects during the present

investigations are being interpreted and presented in the following paragraphs.

Prashanth *et al.,* (2008) evaluated the plant extracts of eucalyptus, garlic extract, ocimum leaf extract, *Polyalthia longifolia* leaf extract inhibited the growth of *C. gloeosporoides* the causal organism of pomegranate anthracnose.

Jadav *et al.,* (2008) reported that garlic bulb (10 %) extract was effective in inhibiting the growth of *Colletotrichum gloeosporioides*.

Materials and Methods

In vitro evaluation of different phyto-extracts

Plant based pesticides which are relatively economical, safe and non-hazardous can be successfully used against the plant pathogenic fungi. The following plant extracts/botanicals were selected to know their efficacy in inhibition of *Colletotrichum gloeosporioide* Penz. and Sacc. (as virulent one). Antifungal activity of different plant extracts were studied under *in-vitro* condition. The nine medicinal plant species *viz., Allium cepa, Allium sativum* Linn., *Catharanthus roseus, Ocimum sanctum, Azadirachta indica, Bougainvillea spectabilis, Gliricidia maculate* L., *Sapindus marginatus, Eucalyptus* spp. Control were used to study antifungal activity.

Preparation of phyto-extracts

Fresh healthy plant parts (leaves/cloves/bulbs) collected from fields were washed with distilled water and air-dried. 100 gms of each plant extract was crushed in 100 ml of acetone (Garlic and Onion crushed in 100 ml of distilled water) (v/v). The extract was filtered through double layered, muslin cloth and further filtrated through Whatsman No.1 filter paper using funnel and volumetric flasks (100 ml cap.).

To study the antifungal mechanism of plant extract, the poisoned food technique was used (Nene and Thapliyal, 1982). An appropriate quantity of each plant extract (100 %) was separately mixed thoroughly with autoclaved and cooled (40 ^{0}C) PDA medium in conical flasks (250 ml cap.) to obtained desired concentrations of 10 % (10 ml solution mixed with 90 ml molten PDA media). The PDA medium amended separately with plant extracts was then poured (10 ml/plate) into sterile glass petri plates (90 mm dia.) and allowed to solidify at room temperature.

After solidification of PDA, all the treatment and control plates were aseptically inoculated by placing in the center a 5 mm mycelial disc obtained from a week old actively growing pure culture of *Colletotrichum gloeosporioide* Penz. and Sacc. Plates containing plain PDA without any botanical extract served as untreated control. For each test botanical extract, three plates / treatment were maintained. All these plates were then incubated at 27 ± 2 ^{0}C temperature for a week or till the untreated control plates were fully covered with mycelial growth of the test fungus.

All these plant extracts were evaluated @ 10 per cent and observations on radial mycelial growth of the test pathogen were recorded at 24 hrs. interval and continued till growth of test pathogen in untreated control plate was fully covered. Per cent inhibition of test pathogen was also calculated by applying the formula given by (Vincent, 1927).

$$\text{Per cent inhibition (I)} = \frac{C - T}{C} \times 100$$

Where, C = growth (mm) in control plate

T = growth (mm) in treatment plate

Results and Discussion

In-vitro evaluation of plant extracts against *C. gloeosporioides*

The extracts of nine botanicals (each @ aqueous conc. of 10 %) were evaluated *in-vitro* against *C. gloeosporioides* and the results obtained on its mycelial growth and inhibitions are presented in the results revealed that all the nine botanicals evaluated were found fungistatic against *C. gloeosporioides* and recorded significantly reduced mycelial growth of the test pathogen over untreated control (Table 1, Fig. 1 and Plate 1).

Radial mycelial growth

At 10 per cent concentration, mycelial growth of the test pathogen was ranged from 15.53 mm (*Allium sativum* Linn.) to 68.32 mm (*Cathuranus roseus*) against untreated control (90 mm). However, significantly least mycelial growth was recorded with *Allium sativum* Linn. (15.53 mm). This was followed by the botanicals *viz.*, *Azaradirchta indica* (17.30 mm), *Ocimum sanctum* (20.61 mm), *Gliricidia maculate* L. (38.43 mm), *Bougainvillea spectabilis* (40.72 mm) *Allium cepa* (45.34 mm), *Sapindus marginatus* (50.13 mm) *Eucalyptus spp.* (55.05 mm) and *Catharanthus roseus* (68.32 mm) depicted in (Table 1, Fig. 1 and Plate 1).

Per cent mycelial growth inhibition

At 10 per cent, mycelial growth inhibition of *C. gloeosporioides* was ranged from 24.08 % (*Cathuranus roseus*) to 82.74 % (*Allium sativum*) per cent. However, significantly maximum mycelial growth inhibition was recorded with *Allium sativum* (82.74 %). This was followed by the plant extracts *viz.*, *Azadirachta indica* (80.77 %), *Ocimum sanctum* (77.10 %), *Gliricidia maculate* L. (57.32 %), *Bougainvillea spectabilis* (54.75 %) *Allium cepa* (49.62 %), *Sapindus marginatus* (44.29%) *Eucalyptus* spp. (38.83 %) and *Catharanthus roseus* (24.08 %) presented in (Table 1, Fig. 1 and Plate 1).

The results of present investigation resembling the findings of earlier workers *viz.*, Mukherjee *et al.*, (2011), Anteneh *et al.*, (2013), Hegde *et al.*, (2014), Sonawane and Sumia Fatima (2016), Gwa and Nwankiti (2017).

Table.1 Details of experiments

Treat. No.	Name of Plant extracts	Common name	Dose	Plant part used
T_1	*Allium cepa*	Onion	10 %	Bulb Extract
T_2	*Allium sativum* Linn.	Garlic	10 %	Clove Extract
T_3	*Catharanthus roseus*	Periwinkle	10 %	Leaf Extract
T_4	*0cimum sanctum*	Tulsi	10 %	Leaf Extract
T_5	*Azadirachta indica*	Neem	10 %	Leaf Extract
T_6	*Bougainvillea spectabilis*	Bougainvillea	10 %	Leaf Extract
T_7	*Gliricidia maculate* L.	Giripushpa	10 %	Leaf Extract
T_8	*Sapindus marginatus*	Soap nut	10 %	Fruit Extract
T_9	*Eucalyptus* spp.	Nilgiri	10 %	Leaf Extract
T_{10}	Control	-	-	-

Table.2 *In-vitro* efficacy of different plant extracts against radial mycelial growth and per cent inhibition of *C. gloeosporioides.*

Tr No	Treatments	Common Name	Colony Dia. of Pathogen*(mm) 10%	% Inhibition
T_1	*Allium cepa*	Onion	45.34	49.62 (44.55)
T_2	*Allium sativum* Linn.	Garlic	15.53	82.74 (65.45)
T_3	*Catharanthus roseus*	Periwinkle	68.32	24.08 (29.38)
T_4	*0cimum sanctum*	Tulsi	20.61	77.1 (61.40)
T_5	*Azadirachta indica*	Neem	17.30	80.77 (63.99)
T_6	*Bougainvillea spectabilis*	Bougainvillea	40.72	54.75 (47.72)
T_7	*Gliricidia maculate* L.	Giripushpa	38.43	57.32 (49.20)
T_8	*Sapindus marginatus*	Soap nut	50.13	44.29 (41.72)
T_9	*Eucalyptus* spp.	Nilgiri	55.05	38.83 (22.84)
T_{10}	Control	-	90.00	00.00 (00.00)
	SE ±	-	**0.93**	**1.14**
	C.D. @ 0.01	-	**2.58**	**3.16**

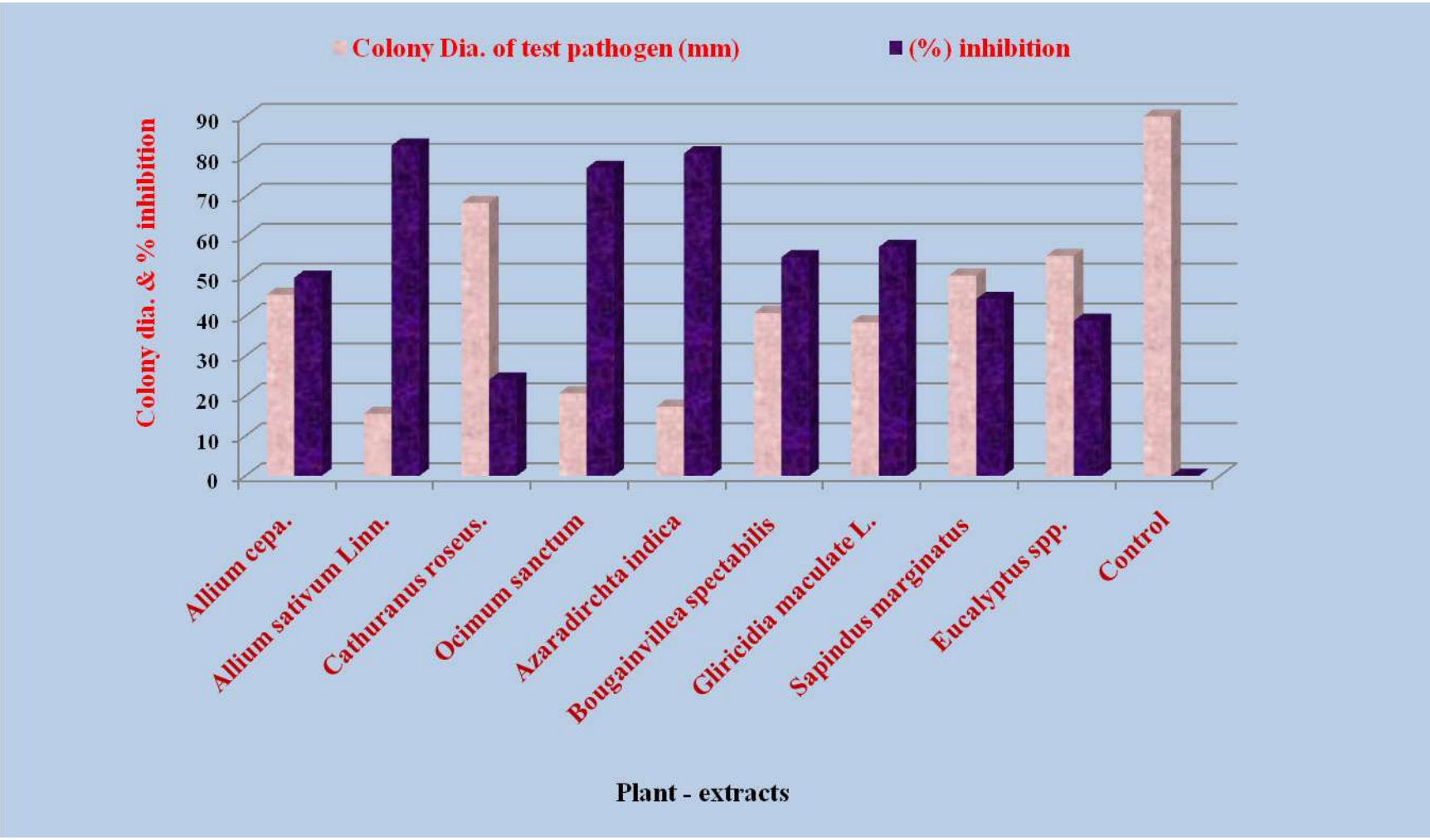
*Mean of three replications; Dia.-Diameter; Conc. - Concentration;
Figures in parenthesis are arc sine transformed value.

Plate 1

In-vitro **inhibitory efficacy of different plant extracts at 10% on radial growth and inhibition of *C. gloeosporioides* Penz. and Sacc.**

T_1 : Onion
T_2 : Garlic
T_3 : Periwinkle
T_4 : Tulsi
T_5 : Neem
T_6 :Bougainvillea
T_7 :Giripushpa
T_8 : Soap nut
T_9 : Nilgiri
T_{10} : Control

Fig.1 *In-vitro,* effect of different plant extracts on radial mycelium growth and per cent inhibition of *C. gloeosprioides*



References

Anteneh, A., Amare, A. and Kebede, W. (2013). Evaluation of antifungal activity of plant extracts against papaya anthracnose (*Colletotrichum gloeosporioides) J. Pl. Path. Microb*. 4: 10.

Gwa. and Nwankiti A. O. (2016). Evaluated efficacy of some plant extracts in *in vitro* control of *Colletotrichum* species, causal agent of yam (*Dioscorea rotundata Poir*) tuber rot. *Asian Journal of Plant Science and Research*, 2017, 7(2): 8-16.

Hegde, Y. R., Tippeshi, L., Chavhan., Rajalaxmi, S., and Keshgond. (2014). Antifungal activity of plant extracts on *Colletotrichum gloeosporioides* infecting *Jatropha curcas The Bioscan*. 9(1): 283-286.

Jadhav, S. K., Diwakar, M. P., Sawant, U. K. and Kadam, J. J. (2008). Management of leaf spot disease of kokum incited by *Colletotrichum gloeosporioides*. *J. Pl. Dis. Sci*. 3(2):193-196.

Mukherjee, A., Khandker, S., Islam M. R. and Sonia, B. Shahid. (2011). Efficacy of some plant extracts on the mycelial growth of *Colletotrichum gloeosporioides. J. Bangladesh Agril. Univ*. 9(1): 43-47.

Prashanth, A., Arun, R. S., Naik, M. K., Patil, M. B. and Rajesh, S. P. (2008). Evaluation of fungicides, bioagents, and botanicals against pomegranate anthracnose. *Indian J. Plant Protec*., 36(2): 283-287.

Sonawane, B. N. and Sumia, Fatima. (2016). evaluated antifungal activity of some exotics plant extracts against fruit rots fungal pathogens such as *Colletotrichum gloeosporioides, Alternaria alternata, Cladosporium tenuissimum, Fusarium oxysporum, Penicillium digitatum* and *Rhizopus stolonifer*.

Sohi, H. S. (1975). Anthracnose in tropical fruit. In: *Adv. Myco. Pl. Patho.* 193-216.

Vincent, J. M. (1927). Distortion of fungal hyphae in the presence of certain inhibitors. Pp. 159-180.

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