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Research Article

Studies on Integrated Management of Alternaria fruit rot of Grape disease using plant extracts in mixture with Aureofungin

Kadam K. S.

Department of Botany, K.K.M. College, Manwath-431505, Dist. Parbhani (MS), India

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Abstract

Fruit rot of grape causes due to a fungus *Alternaria alternata.* The isolates of *Alternaria alternata* were tested against Aureofungin, integrated disease management of disease have been emphasized now a days hence plant extract alone and in mixture with Aureofungin were used for management of fruit rot of grapes caused by resistant mutant as *Alternaria alternata.* Seven plant were selected for this study, it was observed that individually all plant extract showed some antifungal activity, the percentage control efficacy (PCE) on fruit rot of grapes. This PCE was higher due to *Oscimum sanctum* (66.81%), *Zingiber officinale* (63.34%), *Allium sativum* (46.93%), *and Terminalia chebula* (51.26%) individually. It was appears that addition of Aureofungin in plant extracts, increased PCE in all cases. Use of aureofungin in mixture with plant extracts was more significant.

INTRODUCTIN

Fruit rot of grapes (Vitis vinifera L.) caused by many fungal pathogens, of these Alternaria fruit rot of Grape is important in field as well as during storage and transport (Chahal and Malhi, 1969; Krishnauah et al, 1983; Rao, 1994). Aureogungin is most effective fungicide against *Alternaria* (Ghosh and Gemawat, 1976; Krishna et al, 1998). Integrated disease management of a disease has been emphasized now–a-days. Hence plant extracts alone and in mixture with Aureofungin were used for management of fruit rot of Grape caused by resistant mutant of *Alternaria alternata.*

MATERIALS AND METHODS

In *vitro* study was undertaken on Czapek Dox agar medium while in *vivo* on grape fruits. For this purpose twenty isolates of *Alternaria alternata* were collected from on fields and markets of different regions of Maharashtra. The observation for the pathogen as made by preparing slide and isolation on the medium. The identification of pathogens was through the referring earlier literature. It was noted that *Alternaria alternata* causes fruit rot of Grapes.

Sensitivity of *Alternaria alternata* isolates to Aureofungin was studied by food poising technique (Nene & Thaplial, 1993). Minimal inhibitory concentration (MIC) was calculated as described by Molnar et al (1985). It was noted that, MIC of highly sensitive isolate (Aa-1) was 324.89µg/ml while that of resistant isolate (Aa-19) was 974.74 µg/ml. During present investigation, disease resistance of the pathogen was developed by chemical mutation and it was used for further study as suggested by Dekker (1982). The EMS-Aa-3 mutant was used for present study.

Aqueous plant extracts were prepared by gridding 50 gm fresh leaves with 50 ml sterile distilled water and considered as 100 %. Czapek –Dox agar plates were treated with Aureofungin (800 µg/ml) and plant extracts, alone and in mixture (1:1) and resistant mutant of *A. alternata* was inoculated at the centre of the petriplates.

The plates were incubated at 26±1ºC. The plates without treatment served as control. The percentage control efficacy (PCE) was calculated 8 days after incubation period. The PCE (percentage control efficacy) was calculated using formula (Cohen, 1989).

$$PCE = 100 \left[1 - \frac{X}{Y}\right]$$

Where x = Diameter of colony on treated agar plates,

y= diameter of colony on control agar plates. For in *vivo* study, grape fruits were surface sterilized with 0.01% Hgcl2 solution and washed 10 times with sterile distilled waterand treated with Aureofungin (1200 µg/ml) and aqueous plant extracts, alone and in mixture (1:1) and inoculated with spore suspension of resistant mutant of *A. alternata* by pin prick method and incubated at 26 ± 3ºC. The fruits without treatment served as control. Percentage disease index (PDI) was calculated after eight days as described by Datar and Mayee (1985) and then on PDI, percentage control efficacy was calculated by following equation-

$$PCE = 100 \left[1 - \frac{X}{Y}\right]$$

Where, x = Percentage disease index of treated fruits

y = Percentage disease index of untreated fruits.

Table-1: Percentage control efficacy (PCE) plants extract individually and mixture with Aureofungin (800 µg/ml) against resistant mutant of *Alternaria alternata* on agar plates.

Sr. No.	Plant extracts	Individually PCE	Mixture PCE
1	*Allium sativum L.*	46.93	66.28
2	*Annona sqamosa*	10.55	37.62
3	*Oscimum sanctum L.*	66.81	73.81
4	*Pongamiapinnata*	31.69	54.26
5	*Terminalia chebula Retz.*	51.26	65.47
6	*Tridexprocumbense*	33.67	56.55
7	*Zingiberofficinale*	63.34	76.27
8	Aureofungin(800µg/ml)	44.67	-
SE±		6.46	5.02
CD @ 5%		15.30	11.89

Values are Mean ± Standard Error

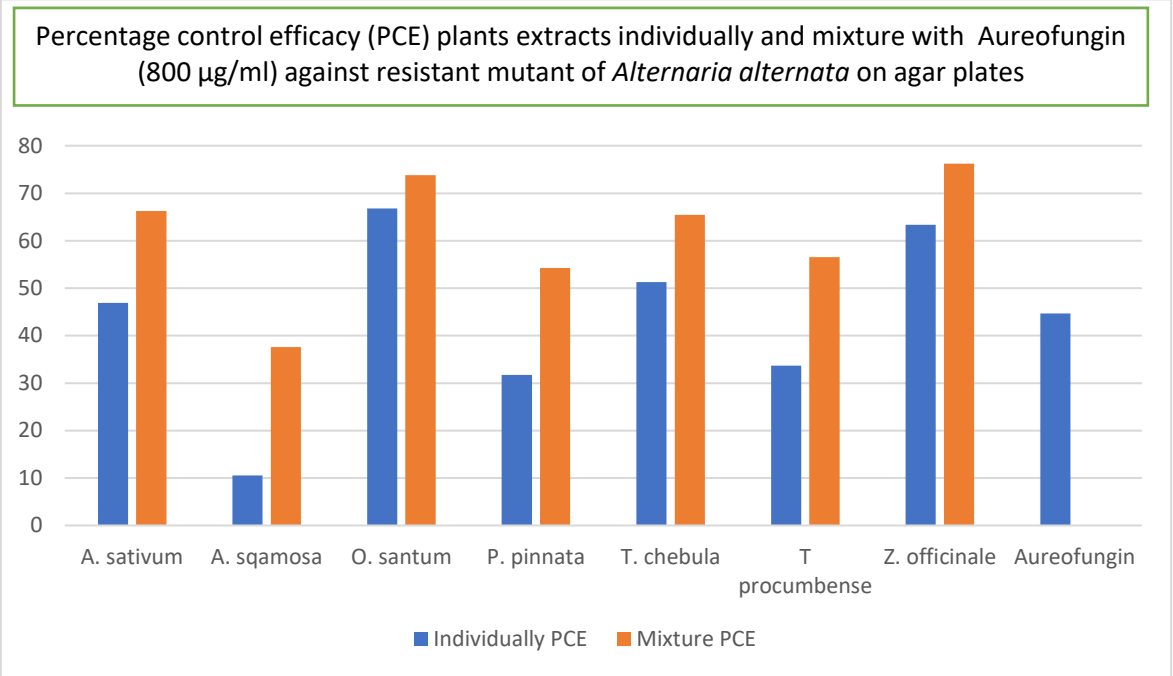


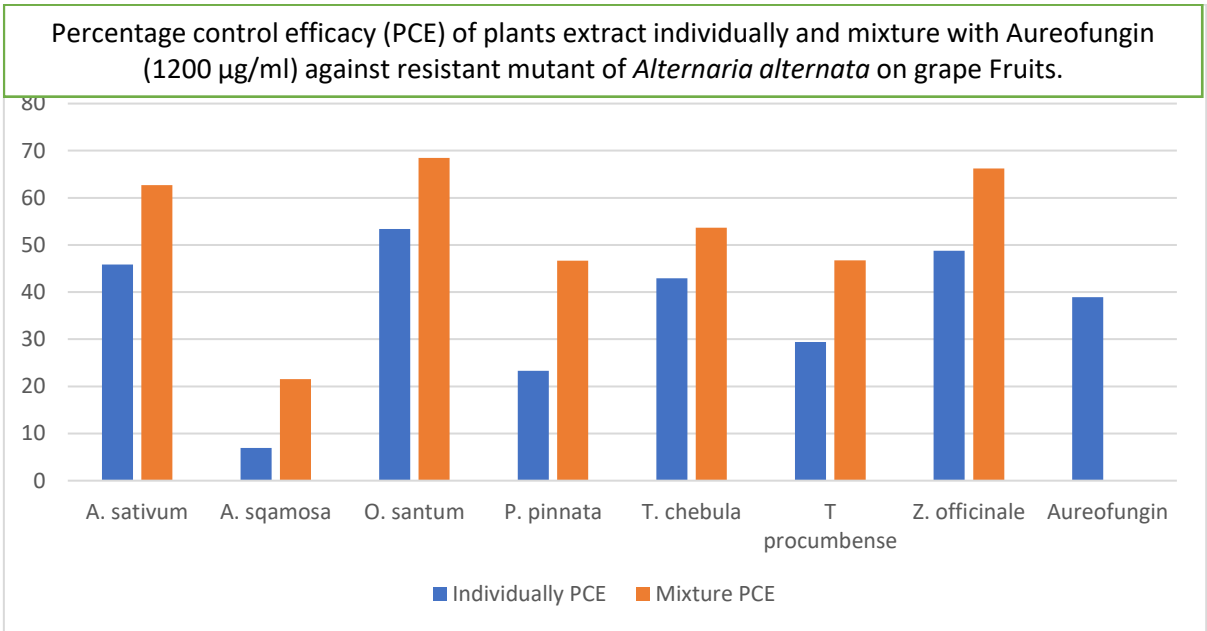
Table-2: Percentage control efficacy (PCE) of plants extract individually and mixture with Aureofungin (1200 µg/ml) against resistant mutant of *Alternaria alternata* on grape fruits.

Sr. No.	Plant extracts	Individually PCE	Mixture PCE
1	*Allium sativum L.*	45.84	62.72
2	*Annona sqamosa*	6.94	21.54
3	*Oscimum sanctum L.*	53.41	68.49
4	*Pongamiapinnata*	23.33	46.66
5	*Terminalia chebula Retz.*	42.93	53.67
6	*Tridexprogumbense*	29.44	46.75
7	*Zingiberofficinale*	48.79	66.25
8	Aureofungin(800µg/ml)	38.94	-
SE±		5.46	6.13
CD @ 5%		12.94	14.52

Values are Mean ± Standard Error

RESULTS AND DISCUSSION

In the present study total seven plant extracts were tested individually or in mixture with Aureofungin against resistant mutant of *Alternaria alternata* (Table 1 and Table 2). It was seen that individually all the extracts of plants were inhibitory to the Aureofungin resistant mutant of *Alternaria alternata*. Among all plants extracts, *Oscimum sanctum* (66.81 and 53.41%), *Zingiberofficinale* (63.34 and 48.79%), *Allium sativum* (46.93 and 45.84%), *Terminalia chebula* (51.26 and 42.93%) were highly effective as they showed PCE more than Aureofungin individually. When Aureofungin was used in mixture with the extracts of all these plants, there was again increase in the PCE against the tested pathogen.



The PCE was always higher than that of the Aureofungin alone in all the cases. Plant extracts in mixture with Aureofungin (800µg/ml) / Aureofungin (1200 µg/ml*)* and *Zingiber officinale* found highest PCE (76.27% and 66.25%) followed by *Oscimum sanctum* (73.81% and68.49%) respectively.

Results from the present study could be correlated with the studies made by Ganapathy and Narayanasamy, 1993 repoted that the toxicity of *Allium cepa* L., *Allium sativum* L., *Ocimum sanctum*, has been tested against *Alternaria* spp. and found to be effective. The garlic (*A.sativum*L.), ginger (*Zingiber officinale* Rosc) and neem (*Azadirachta indica*A. Juss) extracts were effective against *A. alternata* (Rahman *et al.*, 1999). Singh and Majumdar (2001) tested water and acetone leaf extracts of neem, datura, tulsi, bulb extracts of ginger, turmeric, onion and garlic against *A. alternate* and found that datura, garlic, ginger, neem and turmeric were effective. Rao (2006) found neem leaf extract and *A. sativum*bulb extract as effective botanicals against *A. helianthi*. Fawzi et al (2009) reported that ginger was most effective to inhibit the growth of *A. alternata*. Thaware (2010) also reported that the garlic clove extract showed maximum mycelial inhibition (63%) followed by neem (33%), karanj (26.66%) and tulsi (27.77%) against *A.alternata.* Rahman et al (2015) *Adhatodavasica*extract showed the maximum inhibition of mycelial growth of *A. porri*followed by *A.indica* and *Ocimum sanctum* extract respectively. Patil and Suryawanshi (2015) showed that *Zingiber officinale*, *Allium sativum*gave fruitful results when used individually. Mudyiwa et al (2016) showed that the plant extracts of Ginger and garlic had significantly stronger effect on reducing mycelia growth, reducing spore germination and causing high inhibition percentage of A. solani. Fayaz Ahmad,et al (2017) plants extract of *Allium sativum, Curcuma longa*, *Melia azedarach*, *Zingiber officinale* significantly reduced *A. solani* growth on PDA. Zade et al (2018) evaluated that garlic extract was found most effective against *A. alternata*. Among eleven botanicals tested, significantly highest average mycelial growth inhibition was recorded with *A. sativum*, followed by *Z. officinale*, *A. indica* (Kadam et al, 2018). Mangwende et al (2019) reported that Allium, Datura and Zingiber inhibited growth of A. alternate. Six plant extracts *viz*., *Adhatoda vasica* (Nees), *Azadirachta indica* (A Juss). *Ocimujm sanctum* (L), *Allium sativum* (L), *Datura metal* (Linn) and *Zingiber officinale* (Rose) were selected to evaluate their *in vitro* efficacy against the *A. solani*. *Allium sativum* was the most effective one against *A. solani*, followed by *A.indica*.

REFERENCES

Chahal DC and Malhi CS, 1969. Fungi associated with rotting of stored grape in the northern western India. *Indian Jr. Hort.*, **26**(1&2): 186 – 192.

Cohen, E. 1989. Evaluation of tenpropimorph and futriatol for control of sour rot, blue mold and green mold lemon fruit. *Plant Dis.*, **73**:807-809.

Datar VV and Mayee CD, 1985. Chemical management of early blight of tomato. *Jr. of Marathwada Agri. Univ.*, **10** (3): 278 – 280.

Dekker J, 1982. Counter measures for avoiding fungicide resistance. In: Fungicide resistance in crop Protection (Eds.J. Dekker and Georgopoulos S.G.). CAPD, Wageningen, Netherlands, pp 177-186

Fawzi EM, Khalil AA and Afifi AF, 2009. Antifungal effectof some plant extracts on *Alternaria alternata* and *Fusarium oxysporum*. *African Jr. of Biotechnology*, **8**(11):2590- 2597.

Fayaz Ahmad, FazliRaziq, NajeebUllah, Hakim Khan &Naseerud Din 2017. In vitro and in vivo bio-assay of phytobiocidal effect of plant extracts on *Alternariasolani* causing agent of early blight disease in tomato. Jr.l Archives of Phytopathology and Plant Protection, **50**(11 -12).

Ganapathy T and Narayanasamy P, 1993. Screening plant products effective against tikka and rust diseases of groundnut. *Crop Diseases, Innovative Techniques and Management* (Eds.) Sivaprakasam, K. and Seetharaman, K., Kalyani Publishers, New Delhi, 347-355.

Ghosh SK and Gemawath PD, 1976. Evaluation of fungicides against Alternariasolani in vitro. *Proc. Indian Acad. Sci.*, **84**(5): 155 – 158.

Kadam Vasudha A, DN Dhutraj1, DV Pawar and DD Patil, 2018. Bio Efficacy of Bio Agents and Botanicals against *Alternariaalternata*(Fr.) Keissler Causing Leaf Spot of Pomegranate. *Int. J. Curr. Microbiol. App. Sci.*, **7** (11): 1146-1155.

Krishna K, Akbar M and Kalpanasastry, R, 1998. In vitro evaluation of fungicides against *Alternaria carthami* Choudury incitant of leaf spot of safflower. *Indian Journal of Plant Protection*, **26** (2):181-182.

Krishnaiah J, Prasad S, Giridhrrsing T Shhankarligan, T Thirupatak, 1983. Control of Alternaria rot of grapes by using wax. *Sci. and Cult.* **49**(12): 391 – 393.

Mangwende E & Q Kritzinger& TAS Aveling, 2019. Control of Alternaria leaf spot of coriander in organic farming. *Eur J Plant Pathol.* 32:110

Molnar AL, Hornok and Pesti M, 1985. The high level of benomyl tolerance in Fusarium oxysporum is determined by synergistic interaction of two genes. *Experimental Mycology*, **9**: 326 – 333.

Mudyiwa RM, Chiwaramakanda S, Manenji BT, Takawira M, 2016. Anti-Alternaria solani activity of onion (*Allium cepa*), Ginger (*Zingiber officinale*) and Garlic (*Allium sativum*) in vitro. *Intr. Jr. of Plant & Soil Sci.*, **10**(4): 1-8.

Nene YL, Thapliyal RN, 1993. Evaluation of fungicides in Fungicides for Plant Disaease Control (3rd ed.). Oxford, IHB Pub. Co. New Delhi, P. 331.

Patil JS and Suryawanshi NS, 2015. Management of *Alternaria alternata* causing fruit rot of Strawberry using various plant extracts. *Int. J. of Life Sciences*, Special Issue, A5

Rahman SM Mustafijur, Sikder Md. Maniruzzaman, ShohanaNusrat, AbulKhair 2015. *In vitro* Evaluation of Botanical Extract, Bioagents and Fungicides against Purple Blotch Diseases of Bunch Onion in Bangladesh. *Advances in Zoology and Botany*, **3**(4): 179-183.

Rao VG, 1994. Alternaria disease of grape, Drakshvritta Souvenir**. 6:** 137

Rao MSL, 2006. Studies on Seed borne fungal diseases of sunflower and their management. *Ph.D. Thesis, Univ.* Agric. Sci., Dharwad, India.

Singh J and Majumdar VL, 2001. Efficacy of plant extracts against *Alternaria alternata*, the incitant of fruit rot of pomegranate (*Punic agranatum* L.). *Indian J. Mycol. and Pl. Path.*, **31**: 346-349.

Thaware DS, Fugro PA, Jadhav YT, Magar SV, Karande RA, 2010. *In vitro* Evaluation of different fungicide, plants extracts and bio-agents against *Alternariaalternata*(Fr.) keissler causing leaf blight of cowpea, *International J Pl. Protection*, **3**(2):356-360.

Zade SB, YV Ingle and RW Ingle, 2018. Evaluation of fungicides, botanicals and bio-agents against *Alternaria alternata* incitant of leaf spot of soybean. *Journal of Pharmacognosy and Phytochemistry*, **7**(5): 1687-1690.

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