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Fungitoxicity of plant extracts against *alternaria* blight of fennel incited by *Alternaria alternata* (Fr.) Keissler

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Abstract
Alternaria blight of fennel incited by *Alternaria alternata* (Fr.) Keissler is an important disease which is known to causes heavy yield loss. Disease management with chemicals is economically not viable and also not safe for the environment. Therefore, the persent investigations aimed to carry out the test of plant extracts against *Alternaria alternata* under *in vitro* (by poisoned food technique) and *in vivo* conditions. Among these plant extracts, extract of garlic clove was observed most effective in inhibiting mycelial growth (85.77%). The plant extracts were tested *in vivo* by applying as foliar application (5%). Among these garlic clove extract was found most effective in reducing disease intensity (38.62%) and increasing seed yield (49.54%).

Keywords: *Alternaria* blight, fennel, *Alternaria alternata*, plant extracts

Introduction
India is known as the land of spices. It is the largest producer, consumer and exporter of spices in the world. These have been considered indispensable in seasoning of food, flavouring of beverages, perfumery, cosmetics and medicines. The lure of spices prompted explorers like Columbus and Vasco de Gama to undertake hazardous sea journey to discover India "the land of spices" (Sastry and Sharma, 2001) [8]. Fennel (*Foeniculum vulgare* Mill.) belongs to the family *Apiaceae*. In India, the seeds are also used for mastication and chewing either alone or with betel leaves (Agarwal *et al*., 2001) [1]. Fennel is attacked by a number of diseases *viz*., Ramularia blight, powdery mildew, seedling damping off, root rot and *Alternaria* blight. More than 50% of the inspected fields showed *Alternaria* blight symptoms on fennel with an incidence ranging from 30 to 100% in Italy (Infantino *et al.,* 2009) [5].
Alternaria blight of fennel caused by *Alternaria alternata* is a serious bottleneck in augmenting fennel (*Foeniculum vulgare*) production in Gujarat (Chaudhari and Patel, 1987) [4]. The disease manifests itself on all above ground plant parts in the form of angular, black depressed lesions on the basal leaves. Small dark spots were observed, that soon developed into necrotic areas on the fennel stalks (Infantino *et al.,* 2009) [5] which later become larger and covered with grayish white erumpent growth. With the advancement of infection, lower and older leaves defoliate, stem and peduncles are covered with rectangular spots. Disease management with chemicals is economically not viable and also not safe for the environment. Therefore, the persent investigations aimed to carry out the test of plant extracts against *Alternaria alternata* under *in vitro* (by poisoned food technique) and *in vivo* conditions.

Material and Methods
Collection, isolation and identification of the pathogen
Infected plants of fennel were collected from farmer's field and isolations were made from the infected plants showing typical symptoms of *Alternaria* blight on potato dextrose agar (PDA) medium and culture purified by single spore technique. For further confirmation or identity of the fungus, the culture was sent to ITCC, Division of Plant Pathology, IARI, New Delhi and identified as *Alternaria alternata* with I. D. No. 9256.13.

Efficacy of Plant Extracts (*in vitro*)
Laboratory experiment was carried out to find out the efficacy of five plant extracts (Neem, Garlic, Datura, Tulsi, Lantana) with three (5, 10 and 15 per cent) concentrations against *A. alternata* on growth inhibition of the pathogen by poisoned food technique (Schmitz,1930) [9].

Plant parts were thoroughly washed with sterilized distilled water and were ground separately in grinder using equal amount of sterilized distilled water to get stock solution. The mixture was squeezed with double-layered sterilized cheese cloth. The extract thus obtained was considered as of 100 per cent concentration. It was further diluted to get 5, 10 and 15 per cent of concentrations using sterilize distilled water. Required quantity of each plant extract was mixed thoroughly in sterilized melted PDA aseptically under laminar flow and thoroughly mixed to get desired concentrations, medium amended with desired quantity of plant extract was poured aseptically in sterilized Petri dishes and was allowed to solidify. Each plate was inoculated with 2 mm disc of mycelial bit taken from the periphery of 10 days old culture *A. alternata* growing on PDA. The inoculated Petri dishes were then incubated at 25 ± 1 ˚C. Four Petri dishes were used for each treatment serving as four replications. Petri dishes without plant extract served as control. Experiment was conducted in Completely Randomized Design (CRD). Colony diameter was measured after 7 days of incubation. Per cent growth inhibition was calculated as per formula (Vincent, 1947) [12].

$$I = \frac{(C-T)}{C} \times 100$$

Where

I = Per cent mycelial inhibition

C = Diameter of the colony in check (average of both diagonals)

T = Diameter of the colony in treatment (average of both diagonals)

Efficacy of plant extracts (*in vivo*)

A field experiment was conducted for two consecutive years (2013-14 and 2014-15) during *rabi* season at Agronomy Farm, S.K.N. College of Agriculture, Jobner with susceptible local cultivar of fennel. The crop was sown in last week of October in RBD with four replications. Along with control, following plant extracts were analysed, Neem leaves @ 5%, Garlic cloves @ 5%, Datura leaves @ 5%, Tulsi leaves @ 5%, Lantana leaves @ 5%. For preparing plant extracts of plant parts including leaves and bulbs to be tested were first washed with tap water followed by sterilized water and then air dried. Weighed plant material was crushed in warring blender using 1:1 w/v, amount of distilled water using 100 g of leaves and bulbs, separately and filtered through double layered muslin cloth. This was considered as 100 per cent concentration and used for dilution to make needed dilution. The plant extracts were diluted with water in 5 per cent concentration separately and sprayed on plants. Two foliar applications of all the plant extracts were applied and started just after disease initiation in the field and second spray was given after 15 days of first spray. Per cent disease intensity was recorded after 15 days of second spray. The disease intensity was recorded as per 0-5 rating scale given by Jaiman *et al*. (2013) [6] with slight modifications as follows after 15 days of last spray of fungicides. Randomly selected five plants from each field were rated as per following description and per cent disease intensity (PDI) was calculated as per following formula of Wheeler (1969) [13]. The seed yield was recorded in q/ha.

Table 1: Disease rating scale for blight of fennel

S. No	Description	Grade
1	No incidence/ Healthy	0
2	Symptoms on leaf tip and leaves only	1
3	Symptoms on leaves and petiole	2
4	Symptoms on leaves, petiole and stem	3
5	Symptoms on leaves, petiole stem and inflorescence	4
6	Symptoms on leaves, stem, inflorescence including Seed	5

$$PDI = \frac{\text{Sum of numerical disease rating}}{\text{No. of plants assessed x Maximum disease rating}} \times 100$$

Results and Discussions

Effect of plant extracts

Effect of plant extracts *viz*., neem, garlic, datura, tulsi and lantana were tested at different concentrations against *A. alternata* both *in vitro* and *in vivo.*

Effect of plant extracts (*in vitro*)

Effect of different plant extracts was studied against *A. alternata* causing blight of fennel, under *in vitro* conditions. Results of mean analysis revealed that maximum mycelial growth inhibition was observed in garlic clove extract (85.77%) followed by datura (80.18%), lantana (60.20%) and neem (45.05%) and minimum in tulsi extract 23.16 per cent (Table2). Among three concentration of individual plant extract, 5, 10 & 15 per cent concentrations were found at par to each other in inhibiting mycelial growth. Interactions between plant extracts and concentration were significant.

Our results are in agreement with the result of Singh and Majumdar (2001) [10] reported that growth of *Alternaria alternata* responsible for fruit rot of pomegranate was effectively inhibited even at 5 per cent concentration in of *Allium sativum, Allium cepa, Azadirachta indica, Datura stramonium* and *Ocimum sanctum.* Several workers have attempted plant disease control by plant extracts. These finding are supported with the results of earlier workers, working with *Alternaria* spp. on senna (Tetrawal and Rai, 2007) [11] sunflower (Chattopadhyay, 2001) [3].

Effect of plant extracts (*in vivo*)

Effect of plant extracts was studied against *Alternaria* blight of fennel under field conditions. Results of pooled analysis (Table 3) revealed that minimum disease intensity (49.46%) was recorded in garlic clove extracts with 38.62 per cent decreased intensity. It was significantly superior over neem and tulsi other. This was followed by datura (53.96%), Lantana (56.48%) and neem (58.36%). Tulsi extract was found least effective as it gave (62.44%) higher intensity. Garlic clove extract proved most effective *in vitro* and *in vivo* in controlling *A. alternata* (Kumari *et al.*, 2006; Tetrawal and Rai, 2007 and Bochalya *et al.* (2012) [7, 11, 2].

The pooled data of seed yield revealed that maximum seed yield (14.88 q/ha) was recorded in garlic clove extract with increased seed yield (49.54%) over control followed by datura (13.93 q/ha.), lantana (12.95 q/ha). Minimum seed yield (10.98 q/ha) was recorded in tulsi. All pooled data of seed yield, except tulsi leaf extract were found statistically significant over control.

Table 2: Effect of plant extracts on mycelial growth inhibition of *Alternaria alternata* after 7days of incubation at 25+1^{0}C

Plant extract	Percent growth inhibition* at different concentration (%)			
	5	10	15	Mean
Neem (Leaves)	40.45 (39.49)	46.28 (42.87)	48.42 (44.09)	45.05
Garlic (Cloves)	82.26 (65.09)	86.43 (68.38)	88.61 (70.28)	85.77
Datura (Leaves)	74.51 (59.68)	81.84 (64.78)	84.20 (66.58)	80.18
Tulsi (Leaves)	21.01 (27.28)	22.92 (28.60)	25.55 (30.36)	23.16
Lantana (Leaves)	56.88 (48.95)	60.34 (50.97)	63.37 (52.75)	60.20
Control	0.00 (0.00)	0.00 (0.00)	0.00 (0.00)	0.00
		S.Em+	C.D (5%)	
Plant extract (P)		0.57	1.58	
Concentration (C)		0.80	2.24	
P x C		1.39	3.88	

*Average of four replications
Figures in parentheses are angular transformed values

Table 3: Effect of plant extracts on *Alternaria* blight of fennel and seed yield

Plant extract	Concentration (%)	Per cent disease intensity			Decrease in PDI over control (%)	Yield (q/ha)*			Increase in yield over control (%)
		2013-14	2014-15	Pooled		2013-14	2014-15	Pooled	
Neem (leaves)	5	57.66 (49.41)	59.06 (50.22)	58.36 (49.81)	27.57	12.65	11.85	12.25	23.11
Garlic (cloves)	5	48.25 (44.00)	50.66 (45.38)	49.46 (44.69)	38.62	15.10	14.65	14.88	49.54
Datura (leaves)	5	52.67 (46.53)	55.24 (48.01)	53.96 (47.27)	33.05	14.00	13.85	13.93	40.00
Tulsi (leaves)	5	61.25 (51.50)	63.62 (52.90)	62.44 (52.20)	22.51	11.21	10.75	10.98	10.35
Lantana (leaves)	5	55.85 (48.36)	57.11 (49.09)	56.48 (48.72)	29.90	13.07	12.82	12.95	30.15
Control	-	79.67 (63.20)	80.58 (63.85)	80.13 (63.53)		10.00	9.90	9.95	
S.Em+		1.41	1.50	1.46		0.51	0.47	0.49	
CD (p=0.05)		4.36	4.63	4.49		1.57	1.45	1.51	

*Average of four replications
Figures in parentheses are angular transformed value

References

1. Agarwal S, Sastri EVD, Sharma RK. Seed Spices, Production Quality, Export. 2001;1:109-114.
2. Bochalya MS, Shekhawat KS, Singh R, Chohan PK. Management of *Alternaria alternata* causing *Alternaria* fruit rot of brinijal under *in vitro* conditions. Bio. Pestic. Int. 2012;8(2):131-137.
3. Chattopadhya C. Yield loss attributable to *Alternaria* blight of safflower (*Carthamus tinctorius* L.) and some effective control measures. J Mycol. And Pl. Pathol. 2001;31:298-302.
4. Chaudhari SM, Patel AJ. Chemical control of *Alternaria* blight and Ramularia blight of fennel (*Foeniculum vulgare*). Indian J Mycol. Pl. Pathol. 1987;17(3):348-350.
5. Infantino A, Giambattista Di G, Pucci N, Pallottini L, Poletti F, Boccongelli C. First report of *Alternaria petroselini* on fennel in Italy. New Dis. Repts. 2009;19:26.
6. Jaiman RK, Patel NR, Patel KD, Agalodiya AV, Patel PK. Management of Ramularia blight in fennel. Inter. J Seed Spices. 2013;3(1):50-51.
7. Kumari L, Shekhawat KS, Rai PK. Efficacy of fungicides and plant extracts against *Alternaria* blight of periwinkle (*Catharanthus roseus*). J Mycol. Pl. Path. 2006;36:134-137.
8. Sastry EVD, Sharma RK. Status of seed spices research in Rajasthan. In Seed Species-Production Quality and Export. (Eds.) Pointer Publishers. Jaipur (Rajasthan). 2001, 19-40.
9. Schmitz H. Poisoned food technique. Second Edn. Industry of Engineering Chemical. London, USA. 1930, 333-361.
10. Singh J, Majumdar VL. Efficacy of plant extracts against *Alternaria alternata* the incitant of fruit rot of pomegranate (*Punica granatum* L.). J Mycol. Pl. Path. 2001;31:346-349.
11. Tetarwal ML, Rai PK. Effect of epidemiological factors on *Alternaria* blight of senna (*Cassia augustifolia* Vahl.). Annals of Plant Protection Science. 2007;15:148-150.
12. Vincent JM. Distortions of fungal hyphae in the presence of certain inhibitors. Nature. 1947;150:850.
13. Wheeler BEJ. An introduction to plant disease. John Wiley, London, U.K. 1969, 301.