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## Integrated management of leaf blight caused by *Colletotrichum gloeosporioides* of *Piper longum*

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**Abstract**

Field trials were conducted during 2015-16 on integrated management of leaf blight of *Piper longum*. An attempt was made to manage *Colletotrichum gloeosporioides* pathogens in field condition by using fungicide, microbial antagonist, organic amendments and nematicide. The highest fresh weight of berries, lowest disease incidence and intensity of foliar disease caused by *Colletotrichum gloeosporioides* were observed in application of Neem cake + *Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb) and followed by the application of (Carbendazim + Mancozeb) respectively, While the minimum yield, highest incidence and intensity of foliar disease were recorded in control plot.

**Keywords:** *Piper longum*, *Colletotrichum gloeosporioides*, *Trichoderma viride*

**1. Introduction**

The fruits of the plant are very well-known medicine for diseases of the respiratory tract, viz. cough, bronchitis, asthma, etc; as counter irritant, analgesic when applied locally for muscular pains and inflammation and general tonic. *P. longum* is described in the ayurvedic and unani systems of medicine as a valuable drug used for treatment of various kinds of ailments (Viswanathan, 1995). Due to increasing demand at national and global level with the trend of 16.3% increase per annum have added value to this plant species, in prioritized list by national medicinal plant board of India. The plant *Piper longum* suffers heavy losses due to different diseases especially by *Colletotrichum* blight, root knot nematodes, and root-rot complex. Rotting of leaves and vines during monsoon season is caused by *Colletotrichum*, necrotic spot and blights on the leaves during this months are caused by *Colletotrichum* and *Cercospora* these disease some times causes partial or total crop loss, Satyarajan and Naseema (1985)<sup>[22]</sup>. reported that *Piper longum* is a host for *Colletotrichum gloeosporioides* penz. Naik and Hiremath (1986)<sup>[13, 14]</sup>. confirmed the pathogen identity of *Colletotrichum gloeosporioides*, which was isolated from anthracnose lesion on *Piper betel* in Karnataka. Naik et al.(1987)<sup>[20]</sup>. reported that none of piper betel garden in seven districts of Karnataka was free from the disease caused by *Colletotrichum gloeosporioides* with incidence of 11 to 19%. The disease appears usually in the month of August and September when there is high and continuous humidity in the atmosphere, but it also been observe in comparatively dry weather in October and November in certain areas. Noticed the intensity of *Colletotrichum* blight disease ranges from 12 to 32.4 per cent in *Piper longum* (Alam., 2004)<sup>[1]</sup>.

**Materials and Methods****Experimental site**

The field experiment was conducted at Betelvine Research Station, Divthana. Tq. Akot, Dr. Panjabrao Deshmukh Krishi Vidhyapeeth, Akola during 2015-16 to find out the effect of different treatments for the management of leaf blight of *Piper longum*. For experimental layout the Randomized Block Design was used with Three replications and eight treatments was taken *i.e.*

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T <sub>1</sub>	Neem cake @ 500kg/ha.+ <i>T. viride</i> @ 10kg/ha.
T <sub>2</sub>	T <sub>1</sub> +Carbofuran 3%CG @ 20kg/ha.,
T <sub>3</sub>	T <sub>2</sub> +(carbendazim +Mancozeb) @ 1kg/ha.
T <sub>4</sub>	Neem cake @ 500kg/ha.,
T <sub>5</sub>	<i>T.viride</i> @10kg/ha.,
T <sub>6</sub>	Carbofuran 3%CG @ 20kg/ha.,
T <sub>7</sub>	(Carbendazim +Mancozeb) @ 1kg/ha.,
T <sub>8</sub>	Control.

### Study of symptoms of leaf blight

The diseased leaves of *Piper longum* infected with *C. gloeosporioides* were collected from Betelvine research station, Divithana. The pathogen attacks only the leaves and infection is confined to leaf blades and many occasionally be extended to leaf sheath. Elliptic to oblong spots of variable size appears on both surfaces, but more on the upper. In case of very severe infection, most of the leaves may dry up, presenting a bad appearance in the field, in such case the loss may be more than 50 per cent. Similar type of symptoms also described by Satyarajan and Naseema(1985) [22]. Shahzad(2002) [23]. Symptoms caused by leaf blight were noted in the field and microscopic characters in the laboratory with the help of simple microscope.

### Isolation of leaf pathogen

The isolation of pathogen was done on Potato dextrose agar medium by leaf tissue method. The plates were incubated in a B. O. D. incubator at 25±2 °C for 5 to 6 days and the growth of fungal colonies recorded every day.

### Numerical rating scale

The infection of leaves was rated in 0-4 scale as given in Annual report of All India Co-ordinated Research Project betelvine(1988-89). The leaf blight disease incidence and intensity was recorded at 15, 30, 45 days after spraying/ soil application by counting the number of diseased plants and total plants. The yield fresh weight were also recorded. Then Per cent disease intensity(PDI) and incidence was calculated by using formula given by McKinney(1973) [2].

### Numerical rating scale for foliar disease intensity

Scale	Remark
0	No disease spot on leaf
1	Trace(5% infected area of leaf )
2	Moderate(6 to 10% infected area of leaf)
3	Severe(11 to 25% infected area of leaf)
4	Very severe(above 25%infected area of leaf)

### Result and Discussion

The pathogen was isolated from infected leaves and stem of *Piper longum*. The infected plants parts leaves and other parts were placed on sterilized potato dextrose agar medium by leaf tissue method (Rangaswami, 1972) and identified as *Colletotrichum gloeosporioides* (penz.) sacc.

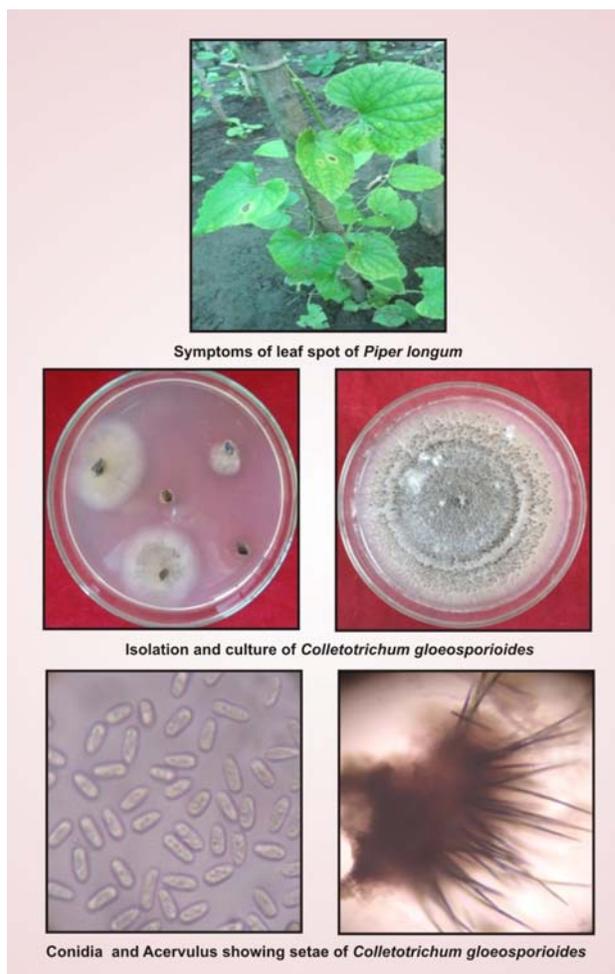


Fig: 1

### Effect of Treatments on Incidence of Colletotrichum Blight of Piper Longum in Vivo Conditions

The results of the field experiment revealed that, The lowest disease incidence was found in combination treatment(T<sub>3</sub>) Neemcake +*Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb) (14.63%) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb (15.44%) at 15 DAT. Whereas, highest disease incidence was found in control *i.e.* 22.76 per cent after first soil application/spraying. At 30 DAT minimum disease incidence was found in combination treatment (T<sub>3</sub>) Neemcake +*Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb) (11.78%) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb (13.00%) after second soil application / spraying. Whereas, maximum disease incidence was found in control *i.e.* 25.13 per cent after second soil application/spraying. At 45 DAT minimum disease incidence was found in combination treatment (T<sub>3</sub>) Neemcake +*Trichoderma viride* + Carbofuran + (Carbendazim + Mancozeb) (07.72%) followed by treatment (T<sub>7</sub>) Carbendazim + Mancozeb @ 1kg/ha.(09.75%) after third soil application /spraying. Whereas, maximum disease incidence was found in control *i.e.* 27.40 per cent after third soil application/spraying. Similar results were reported with Jayalakshmi *et al.*(1998) [11]. And Patel and Joshi(2001) [17]. Reported the maximum inhibition of *Colletotrichum gloeosporioides* by *Trichoderma viride*. And also Narasimhudu *et al.*(2002) [15]. in turmeric and Poornima *et al.* (2007) [19]. neem cake was found to be best in disease suppression at 45 DAT against the *Colletotrichum*

*gloeosporioides* in *Piper longum*. and Gaikwad (2000) [5, 6]. Gaikwad *et al.*(2002) [5, 6]. and Kurian *et al.*(2008) [11]. reported that carbendazim + mancozeb (0.2%) was effective against *Colletotrichum gloeosporioides*.

### Effect of chemical, bioagent and botanical on intensity of *Colletotrichum* blight of *Piper longum*

The results of the field experiments revealed that, At 15 DAT in that the minimum disease intensity was recorded in combination treatment(T<sub>3</sub>) Neemcake + *T. viride* + Carbofuran +(Carbendazim + Mancozeb)(04.38%) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb(04.66%). after first soil application/spraying. Whereas maximum disease intensity was recorded in control *i.e.* 9.94 per cent after first soil application/spraying. At 30 DAT minimum disease intensity was recorded in combination treatment(T<sub>3</sub>) Neemcake +*Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb)(02.91%) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb(0.2%)@1kg/ha.(03.07%) after second soil application /spraying. Whereas, maximum disease intensity was recorded in control *i.e.* 11.49 per cent after second soil application/ spraying At 45 DAT minimum disease intensity was recorded in combination treatment(T<sub>3</sub>) Neemcake +*Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb)(01.55%) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb(02.16%) after third soil application/spraying. Whereas, maximum disease intensity was recorded in control *i.e.* 13.83 per cent after third soil

application/ spraying. Similar results were concurrence with Alam *et al.*(2002) [1]. *Azadirachta indica* extracts were most effective in inhibition of conidial germination against *C. gloeosporioides* at 5:1.5(w/v) concentration. Patil *et al.*(2009) [16]. reported the mancozeb + carbendazim(0.2%) was found effective with 33.38 per cent disease control in *Piper longum*. and also Mishra and Pandey(2014) [12]. in turmeric reported that the management of leaf spot(*Colletotrichum gloeosporioides*) disease of turmeric through rhizome treatment with Carbendazim + Mancozeb gave the best result for rhizome germination(91.13%).

### Effect on yield of berries

Total fresh weight of berries of all pickings from each treatment were recorded. Maximum yield recorded in the treatment(T<sub>3</sub>)- Neemcake +*Trichoderma viride* + Carbofuran +(Carbendazim + Mancozeb)(11.03 kg/plot) followed by treatment(T<sub>7</sub>) Carbendazim + Mancozeb @1kg/ha.(9.33 kg/plot). And minimum yield recorded in control plot(06.33 kg/plot). Similar results were reported with Acharya and Padhi(1988) [3]. Ingle *et al.*(2010) [9]. Kurian *et al.*(2008) [11]. and Rao *et al.*(2012) [21]. reported the high cost –benefit ratio was achieved in rhizome treatment and foliar application of Carbendazim + mancozeb at 45 and 90 DAP(1:1:92). And also Pawar *et al.*(2013) [18]. reported that the seed yield data indicated that *T. harzianum* produced highest seed yield(2778 kg/ha). And also Eifediyi *et al.*(2015) [4]. applying neem seed cake, however gave the highest yield at 3t/ha.

**Table 1:** Effect of chemical, bioagent and botanical on disease incidence, intensity of leaf blight and yield of *Piper longum*

Treatment	Per cent disease incidence**				Percent disease intensity***				Yield/ plot in kg.
	Before spraying	15DAT	30DAT	45DAT	Before spraying	15DAT	30DAT	45DAT	
T <sub>1</sub>	20.83	17.07 (4.12)*	15.04 (3.87)	12.60 (3.55)	7.16	5.22 (2.28)*	3.94 (1.98)	2.69 (1.63)	8.16
T <sub>2</sub>	20.73	16.26 (4.03)	14.63 (3.82)	11.38 (3.37)	7.22	5.05 (2.23)	3.66 (1.91)	2.55 (1.59)	8.83
T <sub>3</sub>	20.83	14.63 (3.82)	11.78 (3.43)	7.72 (2.78)	7.16	4.38 (2.07)	2.91 (1.70)	1.55 (1.24)	11.03
T <sub>4</sub>	20.73	18.29 (4.28)	16.66 (4.04)	14.22 (3.77)	7.22	5.88 (2.43)	4.16 (2.04)	3.05 (1.74)	7.50
T <sub>5</sub>	20.73	17.48 (4.17)	15.85 (3.97)	13.41 (3.66)	7.21	5.44 (2.33)	4.05 (1.84)	2.94 (1.71)	7.66
T <sub>6</sub>	20.73	19.10 (4.36)	18.29 (4.33)	17.48 (4.18)	7.22	6.11 (2.47)	5.22 (2.28)	4.11 (1.85)	7.00
T <sub>7</sub>	20.83	15.44 (3.92)	13.00 (3.61)	9.75 (3.12)	7.22	4.66 (2.15)	3.07 (1.73)	2.16 (1.47)	9.33
T <sub>8</sub>	20.83	22.76 (4.77)	25.13 (5.01)	27.40 (5.23)	7.16	9.94 (3.15)	11.49 (3.38)	13.83 (3.71)	6.33
F-test	NS	Sign.	Sign.	Sign.	NS	Sign.	Sign.	Sign.	Sign.
SE(M)±		0.12	0.12	0.09	--	0.11	0.07	0.06	0.26
CD at 5%		0.36	0.38	0.27	--	0.34	0.21	0.20	0.79

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