Indian Journal of Plant Sciences ISSN: 2319–3824(Online)
An Open Access, Online International Journal Available at http://www.cibtech.org/jps.htm
2014 Vol.3 (2) April -June, pp.76-80/Das et al.
Research Article

EFFECT OF PLANT EXTRACT ON FOLIAR BLIGHT DISEASE OF SOALU CAUSED BY *COLLETOTRICHUM GLOESPORIDES* PENZ

Ranjana Das, K. Das and R.K. Rajan
Central Muga Eri Research &Training Institute, Central Silk Board, Ministry of Textiles, Lahdoigarh - 785700, Jorhat, Assam
**Author for Correspondence*

ABSTRACT
An *in vitro* and *in vivo* experiment was conducted to evaluate the efficacy of 18 different plant species at five different concentration viz., 1%, 4%, 10%, 15% and 20%, against *Colletotrichum gloeosporioides* the causal agent blight disease of Soalu plant, *Litseas monopetela*. Out of entire plant species, *Bougainvillea spectabilis, Alium sativum and Chromolaema odoratum* were found most effective at all concentration in inhibition of mycelial growth and conidial formation of the pathogen. These were followed by *Ocimum sanctum, Peper betle and Tagetes eracta*. A pot culture studies was carried out by considering 9 different plant species found effective in *in vitro* studies. Out of which *B. spectabilis*, *A. sativum* and *T. eracta* at 20% concentration was found effective in controlling the disease in all the days of observation.

Keywords: *Blight Disease, Colletotrichum Gloeosporioides, Litseas Monopetela, Plant Extract*

INTRODUCTION
Muga silkworm, *Antherea assamensis*, Helfer, the producer of glittering golden yellow coloured silk endemic to Assam feeds on the leaves of a number of host plants specially Soalu, *Litsea monopetala*, a semi deciduous plant. The plant is known to be affected by various fungal pathogens a causing substantial loss in yield cause in defoliation, reduction in the total consumable leaf area also deteriorates the nutritional value. Brown blight is a serious disease of Soalu plant cause by *Colletotrichum gloeosporioides*. The disease occurs throughout the year and made maximum infection (73%) during April-May (Ann. Rep. RMRS 1995-96, 96-97). Das and Benchamin (2002) foliar diseases in Soalu can cause a yield loss of leaf 13.8% -33.5%. Due to environmental pollution, residue in soil, water and food materials and effect on non-target organisms, the use of chemical fungicides for diseases management is being discouraged in the present day crop husbandry. Effective control of diseases by plant product has been reported by many workers. But till to date no works on effect of plant product has been done to combat the blight disease of soalu. In this study an attempt has been made to evaluate the effect of plant extract of 18 (eighteen) different locally available plant species against *Colletotrichum gloeosporioides*, the causal organism of brown blight of soalu under laboratory condition and pot culture condition.

Soalu Plant

Blight infected twig

MATERIALS AND METHODS

The experiment was carried in Central Muga Eri Research (CMER&TI) and Training Institute, Central Institute, Ministry of Textiles, Lahdoigarh, Jorhat, Assam during 2011-2012.

Source of Pathogen

The pathogen, C. *gloesporides* was isolated from freshly infected Soalu leaves collected from the field of CMER&TI, Lahdoigarh, Assam and maintained by periodical subculturing on fresh medium.

Plant Extract

Fresh leaves of *Bougainvillea spectabilis, Hibiscus rosasinensis, Azadirachta indica, Acoras calamus, Tagates eracta, Adhatoda vasica, Peper bettle, Lantana camera Melia azedarach, Aegle marmelos, Chromolaema odoratum, Cassia sophera, Vinca rosea, Carica papaya,* rhizome of *Curcuma longam, Alium sativum, Alium cepa* and bulb of *Alium sativum, Alium cepa* were washed first with tap water then distilled water, then ground in a pestle and mortar by adding sterile @ 1:1 w/v and filtered through 2 layer muslin cloth. The extract was then shake overnight in horizontal shaker at room temperature. Water from the extract was then vaporized by water bath and the plant extract remained was then diluted 10 per cent for further studies by adding requisite quantities of sterile water. The plant extracts so prepared were heated to 40-50 ^{0}C for 10 min. to avoid contamination.

Five different dilution *viz*. 1:100, 5:100, 10:100, 15:100 and 20:100 were prepared from the crude extract by using distilled water.

In Vitro Study

To study the efficacy of plant extracts on mycelial growth of *C. gloesporides* poisoned food technique was used (Nene and Thapliyal, 2000). Petri dishes containing PDA were amended with plant extract, which were sterilized by passing through millipore membrane having 0.45 µm. Freshly cultured 7 days old mycelial disc (5 mm) of *C. gloeosporioides* growing on PDA medium were placed in the centre of the petriplate containing amended plant extract. Petriplate with fungus but without any amendment served as control. All the treatments were replicated for five times. Petriplates were incubated at 25$\pm$°C upto 7 days. Mycelia growth was measured after 7 days of incubation. From this study 9 best plant extract with five different concentrations were considered for pot culture test.

Sporulation

Medium amended with different concentration plant extract was poured aseptically into sterilized petriplates. Two centimeter long pieces of freshly collected, surface sterilized soalu leaves infected with *C. gloeosporioides* were placed in these plates @ 5 pieces per plate. The dishes were incubated at 25$\pm$1^{0}C in dark for two days for sporulation. The pieces were fixed and bleached in an alcoholic acetic acid mixture, cleared in lacto-phenol, stained with cotton blue and observed under microscope for counting the number of spores per microscopic field magnifications (400x).

Pot Culture Studies

A pot culture experiment was carried out in green house condition with the following treatments viz., T1: *B. spectabilis,* T2: *C. longam,* T3: *A. sativum,* T4: *L. camera,* T5: *A. indica,* T6: *H. rosasinensis,* T7: *T. eracta,* T8: *P. bettle,* T9:*C. odoratum,* T10: Control (water spray) at five different concentration viz., 1%, 5%,10%, 15% and 20%. Three months old seedling was raised in earthen pots (35 cm X 25 cm) in uniform sterilized soil mixture (4 kg/pot). Seedlings were inoculated with the virulent isolate of the pathogen by spray inoculation method. The spore concentration (1 X 10 ^{6} spore/ ml of water) was adjusted with the help of hemocytometer. Five seedlings for each treatment were considered for the experiment. The inoculated plants were kept for four days in the growth chamber having a 25 $\pm$ 1ºC with more than 90% relative humidity and 12 h photoperiod. Plants were then transferred to green house for further study. Data were recorded at ten and twenty days after inoculation. In each plant the total number of diseased and healthy leaves was recorded to calculate the Percent Disease Index (PDI) using the grading scale (1-5 grade), (Anonymous, 1984).

Grade 1, No infection;
Grade 2, 0-05% leaf lamina infected;
Grade 3, 06-25% leaf lamina infected;

Grade 4, 26-50% leaf lamina infected;
Grade 5, 51-100% leaf lamina infected.
The experiment was repeated thrice to get a convincing result.

$$PDI = \frac{\text{Sum of numerical value}}{\text{Total number of leaves observed X Maximum grading (5)}} \text{ X } 100$$

RESULTS AND DISCUSSION

The results presented in Table 1 showed that out of 18 (eighteen) plant extracts, 16 (sixteen) were found to be fungi toxic. *B. spectabilis., C. longam, A. sativum* and *C. odoratum* were found best plant species than the others showing complete inhibition of fungal growth against 86 mm in check. *A. indica, P. bettle, L. camera* and *T. eracta* were found to be effective in reducing fungal growth up to 04-08 mm diameter. *A. cepa, A. calamus* and *H. rosasinensis* were also effective in growth inhibition (12-18 mm), while the *O. sanctum* and *V. rosea* were intermediate in growth response (34-44 mm). Remaining botanicals did not show any reduction in growth of the pathogen and was almost at par with check (Table. 1).

Table 1: Effect of leaf extract of different plant species on linear mycelial growth in *Colletotrichum gloeosporioides*

	Mycelial growth in different concentration (mm)				
Plant Species	**01%**	**05%**	**10%**	**15%**	**20%**
Bougainvillea spectabilis	35	19	04	00	00
Curcuma longa	33	12	01	00	00
Alium sativum	09	06	02	00	00
Alium cepa	89	86	17	15	12
Carica papaya	88	86	84	82	82
Ocimum sanctum	82	76	49	31	32
Acoras calamus	82	86	59	17	17
Lantana camera	36	23	19	09	08
Hibiscus rosasinensis	68	34	33	21	17
Azadirachta indica	31	19	15	04	04
Tagates eracta	85	85	12	08	08
Adhatoda vasica	87	88	88	87	67
Peper bettle	62	39	21	07	07
Melia azedarach	87	78	78	52	47
Aegle marmelos	83	83	71	63	67
Chromolaema odoratum	30	18	08	03	00
Cassia sophera	84	83	83	82	83
Vinca rosea	77	67	43	38	38
Control	86				

C.D. at 5%
Within concentration 1 5.9
Between treatment 23.8
Control v/s rest 1 5..1

Similar trend of response were noted for sporulation of conidia (Table 2). No sporulation was recorded in the PDA plates amended with *B. spectabilis, C. longa, A. sativum and C. odoretum.* These plant extracts inhibited the sporulation of conidia almost completely 100% at the higher concentration followed by *A. indica, P. betle, L. camera and T. eracta* (7-14 nos) against 129 nos in check.

Per cent disease index (PDI) recorded in pot culture was found higher at lower dose of concentration of plant extract. But at higher dose of concentration PDI was decreased. But no decreases in PDI were recorded for *P. betle* and *C. odorata.* Highest PDI for all the plant species were recorded at 1% and 4% concentration, thereafter with increase in concentration of plant extract the PDI (except *C. odorata* and *A. indica*) was found decreases (Table 3). No infection by *C. gloesporiodes* was recorded at 20% concentration of B. *spaetabilis, A. sativum, and T. eracta*.

Table 2: Effect of leaf extract of different plant species on conidial sporulation in *Colletotrichum gloeosporioides*

Plant Species	Sporulation in different concentration (no.)				
	01%	**05%**	**10%**	**15%**	**20%**
Bougainvillea spectabilis	21.3	24 .2	19.4	0.00	0.00
Curcuma longa	33.3	34.6	18.5	0.00	0.00
Alium sativum	11.2	11.4	3.40	0.00	0.00
Alium cepa	89.0	86.0	64.9	45	42.8
Carica papaya	97.6	86.0	84.0	82.0	82.0
Ocimum sanctum	103	97.4	93.2	90.6	02.5
Acoras calamus	112.2	112.5	105.5	111.1	101.1
Lantana camera	36.6	33.0	.21.9	29.3	14.4
Hibiscus rosasinensis	101.2	110.5	103.5	101.1	101.1
Azadirachta indica	61.3	39.1	25.4	14.6	14.1
Tagates eracta	28.9	15.7	12.6	08.7	08.3
Adhatoda vasica	109.7	108.6	97.9	98.5	94.2
Peper bettle	34.9	29/6	21.7	17.2	07.6
Melia azadarach	87.0	78.0	78.0	52.0	47.0
Aegle marmelos	83.0	83.0	71.0	63.0	67.0
Chromolaema odoratum	40.0	38.0	18.0	13.7	0.00
Cassia sophera	112.6	112.3	104.5	112.1	101.4
Vinca rosea	117.4	121.2	115.4	112.1	102.0
Control (Only pathogen)	129.7				

C.D. at 5%
Within concentration 9.47
Between treatment 1 0.19
Control v/s rest 8.34

Inhibition of radial growth and effect on sporulation of pathogen are good parameters for screening antifungal activity. The fungitoxicity of leaf extract of *A. indica* (Narain and Satrapathy 1979, *O. sanctum* (Pathak ,1970), *A. sativum* (Singh *at al*., 2004), *B. glaba* and *P. betle*. (Shivaprakasm, 1994) against various plant pathogenic fungi has been reported earlier.
This is the first report of efficacy of botanicals to control the causal agent of blight disease of soalu. The present study showed encouraging results of using commonly available botanicals to curb the various plant diseases.

Table 3: Effect of plant extracts on per cent disease index of leaf blight of soalu, *Colletotrichum gleosporides.*

Treatments	PDI in different concentration (%)									
	After 10 days					After 20 days				
	1	**4**	**10**	**15**	**20**	**1**	**4**	**10**	**15**	**20**
T1: *B. spectabilis*	4.0	4.0	4.0	0.0	0.0	40	40	10	10	00
T2: *C. longam*	4.0	4.0	2.0	2.0	2.0	40	40	20	20	20
T3: *A. sativum*	4.0	4.0	0.0	0.0	0.0	40	40	10	10	00
T4: *L. camera*	4.0	4.0	3.0	3.0	3.0	40	40	30	30	30
T5: *A. indica*	4.0	4.0	4.0	2.0	2.0	40	40	30	20	20
T6:*H. rosasinensis*	4.0	4.0	2.0	4.0	4.0	40	40	40	40	40
T7: *T. eracta*	4.0	4.0	2.0	2.0	2.0	40	40	10	10	40
T8: *P. bettle*	4.0	4.0	4.0	4.0	4.0	40	40	30	30	30
T9: *C. odorata*	4.0	4.0	0.0	0.0	0.0	40	40	10	10	00
T10: Control (Water spray).	4.0					40				

REFERENCES

Das Ranjana and Benchamin KV (2000). Disaese of muga and eri plants: incidence pattern, intensity and control measures. *Proceedings of National Seminar on Sericulture R&D in Muga Eri*, 8-9 Nov, 2000, CMER&TI, Lahdoigarh, Jorhat, Assam 34-45.

Lakhamanana P, Parambaramani C and Mohan S (1988). Antifungal properties of certain plant extracts on grain mould pathogens of Sorgham bicolor L. Moench. *National Seminar on Management of Crop diseases with plant products, TNAU* 16.

Narain A and Satrapathy JN (1979). Antifungal characteristic of *Vincarosea* extracts. *Indian Phytopathology* **30** 36—40.

Nene YL and Thapliyal PN (2000). *Fungicides in Plant Disease Control* 3rd edition (Oxford and IBH Publishing Co. Pvt. Ltd) 531-532.

Pathak VN and Join JP (1970). Antifungal activity in leaf extracts of certain plants. *Labduet Science and Technology* 8-58.

Shivaprakasm K (1994). Prospective in the management of crop diseases. *Crop Diseases, Innovative Techniques and Management* (Kalyani publishers, New Delhi- 110002) 16-26.

Singha AK, Verma KP, Agarwala KC, Toorrary NK and Thakur MP (2004). Antifungal activities of different plant extracts against *Colletotrichum capsici*. *Advances in Plant Science* **17**(1) 337-338.