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Physiological Studies on *Pestalotia psydii* and its Chemical Control

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ABSTRACT

Studies were conducted on the physiological characters and chemical control of *Pestalotia psydii*. Among different fungus culture media Potato Dextrose and Agar-PDA gave maximum mycelial growth (89.75 mm) and acervuli (14.75) followed by Richard's Agar (70.43 mm, 8.00) and water Agar (46.25 mm, 5.00). Temperature of 30°C favored maximum colony growth (90.00 mm) followed by 35°C (84.25 mm), 25°C (74.50 mm) and 20°C (53.75 mm). Maximum acervuli production (13.25) was observed at 30°C. A pH of 6.5 favored maximum colony growth (89.25 mm) followed by 6.0 (71.00 mm), 5.0 (60.10 mm), 7.00, (51.75 mm) and 8.0 (41.85 mm). Similar effect was also observed for acervuli production at pH 6.5. Different fungicides viz., Score 250 EC, Dolomite 580 WP, Dithane M-45 and Diesomil Platinum 72 WP gave significant reduction in colony growth i.e. 2.18, 0, 0.50 and 0.72, respectively as compared to control (88.60mm) when used at recommended doses. Acervuli production was retarded up to 0.75, 0.0, 0.5 and 1.5 with the treatment of Score 250 EC, Dolomite 580WP, Dithane M-45 and Diesomil Platinum 72 WP, respectively as compared to control i.e. 15.75.

Key Words: Fungal pathogen; Chemical control; Guava

INTRODUCTION

Guava (*Psydium guajava* L.) is native to South America and West Indies. After the voyages of discovery in sixteenth century guava plant was taken to other parts of tropics and subtropics (Snowdon, 1990). In Punjab, it is cultivated on 62.7 thousand ha with an annual production of 531 thousand tonnes (Anonymous, 2004), which is very low as compared to other guava producing countries of the world. Among the other yield limiting factors, diseases play a very vital role. Anthracnose of guava, withertip and die back are very destructive diseases which result in very heavy yield losses.

Anthracnose of guava is caused by *Gloeosporium psydii*, which attacks the above ground parts of the plant resulting in the death of the branches. Spots on unripe fruits develop especially during the rainy season. Withertip of guava is another important disease which is characterized by yellowing and browning of leaves and the tips of twigs. The most characteristic symptoms include appearance of small pin head sized spots on the fruits. Affected fruits later on drop off. In moist weather, acervuli are produced in abundance on dead twigs. Disease is favored by comparatively higher temperature i.e. 30-37^{o}C and humidity (Tandon & Mitra, 1970). This disease has recently been reported in Pakistan (Shakir *et al*., 1991).

According to a preliminary survey it is a common disease but no exact estimates regarding the losses are available. Taxonomically the deuteromycetous genera of fungi viz. *Gloeosporium*, *Colletotrichum*, and *Pestalotia* cause plant diseases like anthracnose, withertip die back, etc belong to the order Melanconiales (*Sensu saccardo*).

Die back is a common disease of guava which is caused by *Pestalotia psydii*. Little research work has been carried out on the physiology of *Pestalotia psydii*, an important pathogen of guava. Studies on the different physiological aspects like, optimum temperature, culture media, pH ranges were made to have a better understanding of the physiology of this fungus for the growth and acervuli production. The main object of this study was to test the efficacy of different fungicides at their recommended doses under laboratory conditions on colony growth and acervulus production for the disease management of this fungus.

MATERIALS AND METHODS

The diseased specimens for these studies were collected from Sheikhupura and isolations from the diseased parts were made Riker and Riker (1936). Diseased specimens were cut into small bits and immersed in 1% sodium hypochlorite solution for two minutes and then rinsed sterilized water in each petriplate. The bits were then put on filter papers in sterilized petriplates in order to absorb excess of water present on them and were then transferred to solidified potato-dextrose agar (PDA) plates. To avoid bacterial contamination, streptomycin sulphate (1:10,000) and rose Bengal (1:30,000) was added to the medium after sterilization and before pouring. These plates were incubated at 30±2^{0}C. On sporulation of the fungus temporary mounts (glycerin water) were made and isolate was identified according to Pathak (1980.)

An actively growing inoculum of the fungus was placed in the center of petriplates to observe their effect on colony growth and acervulus production on different media. Observations on colony growth of the fungus were recorded in quadruplicate after 7 days and data on acervulus production was recorded after 15 days.

For calculating the number of acervuli culture discs from center of each petriplate were cut with the help of a 5 mm diameter flame sterilized cork borer. A 25 mL of medium was poured in each petriplate. After solidification of the medium, 6 mm diameter agar plug were cut from one week old culture with the help of sterilized cork borer, placed in the center of each petriplate and incubated at 30±2°C (Tuite, 1969). The pH of medium was adjusted with Beckman pH meter. For chemical control, measured amounts of different fungicides viz., Score 250 EC, Dolomite 580 WP, Dithane M 45 and Diesomil Platinum 72 WP were mixed in the media following the method of poisoned food technique, and retardation in colony growth and acervulus production were recorded accordingly. Data were analyzed statistically for interpretation of the results.

RESULTS AND DISCUSSION

The isolate from diseased branches showing dieback was identified as *Pestalotia psydii* based on the following characters: acervuli in culture black, scattered, with setae; Conidia, typically five celled, oblong, clavate, erect 13-35 x 6-12 µ; central cell thickest and gradually bulged; end cells hyaline, apical, conic or cylindrical cell drawn out into three hyaline, slender, elongated appendages; basal cell obtuse, erect, with a small hyaline pedicel.

Colony growth of *P. psydii* was maximum (89.75 mm) on PDA and minimum (46.25 mm) on water agar, which indicated that potato starch and glucose, the two constituents of PDA, favored the growth of the fungus. The colony sizes of fungus differed significantly from each other (Table I).

Acervulus number was minimum (5.00) on Water Agar, slightly more (8.00) on Richard's Agar but maximum number (14.75) on PDA. The number of acervuli differed significantly among various treatments (Table I). Similar response was observed by Singh (1971) who obtained a maximum growth of *Colletotrichum gloeosporiodes* on potato-dextrose agar whereas according to Nasrullah (1983) Richards agar was the best medium for the growth of *C. gloeosporioides*, an isolate form citrus withertip affected plants. Variations in the growth of different fungi on various culture media may be due to variations in the nutritional requirements for these fungi.

Out of four temperatures ranges 20, 25, 30, 35°C, maximum growth (90.00 mm) of the fungus was recorded at 30°C and it slightly decreased at 35°C but colony growth differed significantly (Table II). Maximum acervulus production (13.25) was observed at 30°C followed by 9.50 at 35°C, whereas acervulus production (6.50) was significantly higher than 4.00 at 20°C. (Table II).

Maximum colony growth of *P. psydii* was recorded at pH 6.5 (Table III). It decreased gradually towards alkalinity (pH 7.0 and 8.0) as well as acidity (pH 5.0 and 6.0). Fungi, like other microorganisms are also affected by the reaction of the surrounding medium for their growth and acervulus production. Similar results were reported by Jolly and Gambogi (1957) and Verma (1969). They reported pH 6.5 the most suitable for fungal growth of *Colletotrichum*

Table I. Effect of different culture media on colony growth and acervuli production of *(Pestalotia psydii)* the cause of dieback of guava

Observations	Colony growth (mm) on different media			No. of acervuli produced on different media		
	PDA	Richard's agar	Water ager	PDA	Richard's agar	Water ager
1	90.0	70.20	40.00	15	8	5
2	89.0	70.70	50.00	16	9	6
3	90.0	70.50	40.70	14	8	5
4	90	70.30	55.0	14	7	4
Mean	89.75a	70.43b	46.25c	14.75a	8.00b	5.0c

F value for Colony growth = 120.092** F value for acervuli production = 137.368**
**Highly significant (P<0.01) **Highly significant (P<0.01)

Table II. Effect of temperature on colony growth and acervuli production of (*Pestolotia psydii*) the cause of die back of guava

Observation	Colony growth (mm) at different temperature (C^0)				No. of acervuli produced at different temperatures (C^0)			
	20^0C	25^0C	30^0C	35^0C	20^0C	25^0C	30^0C	35^0C
R1	50.00	75.00	90.00	80.00	3.00	6.00	13.00	8.00
R2	60.00	78.00	90.00	90.00	4.00	7.00	14.00	9.00
R3	50.00	75.00	90.00	82.00	4.00	7.00	14.00	10.00
R4	55.00	70.00	90.00	85.00	5.00	6.00	12.00	11.00
Mean	53.75d	74.50c	90.00a	84.25b	4.00e	6.50d	13.25b	9.50c

F value for Colony growth = 86.696** F value for acervuli production = 102.139**
**Highly significant (P<0.01) **Highly significant (P<0.01)

Table III. Effect of pH (of media) on the colony growth and acervuli production of (*Pestolotia psydii*) the cause of die back of guava

Observation	Colony growth/mycelial growth (mm) at different levels of pH					No. of acervuli produced at different levels of pH				
	pH 5.00	pH 6.00	pH 6.50	pH 7.00	pH 8.00	PH 5.00	pH 6.00	pH 6.50	PH 7.00	pH 8.00
1	62.0	70.0	90.0	55.0	40.0	7.0	8.0	13	6	5
2	60.0	69.0	88.0	52.0	43.5	6.0	8.0	14	5	4
3	58.2	73.0	90.0	50.5	42.7	8.0	9.0	15	6	5
4	60.2	72.5	89.0	54.5	41.2	7.0	8.0	14	5	5
Mean	60.10	71.0	89.25	51.75	41.85	7.00d	8.25c	14.0b	5.5e	4.7e

F value for colony growth = 680.247** F value for accervuli production = 163.735
**Highly significant. (P<0.01) ** Highly significant (P<0.01)
The values sharing the same letters do not differ significantly

Table IV. Effect of fungicides on the colony growth and acervuli production of (*Pestolotia psydii*) the cause of die back of guava

Observation	Colony growth/mycelial growth (mm) treated with different fungicides					Acervuli production treated with different fungicides				
	Score 250 EC	Dolomite580 WP	Dithane M 45	Diesomil Platinum 72 WP	Control	Score 250 EC	Dolomite 580 WP	Ditlame M-45	Diesomil Platinum 72 wp	Control
1	1.25	0	0	0.4	87.25	0.75	0	1.0	2.0	15.00
2	2.0	0	0.5	0.8	86.25	1.0	0	0	1.5	16.00
3	3.0	0	1.0	1.0	92.0	0.50	0	0.5	1.0	15.5
4	2.6	0	0.5	0.7	88.5	0.75	0	0.5	1.5	16.5
Mean	2.18 b	0e	0.50d	0.72c	88.6a	0.75c	0a	0.5b	1.5d	15.75e

F value for colony growth = 1028.617 F value for accervuli production = 1018.25**
**Highly significant ** Highly significant

falcatum and C. Gloeosporioides.

Chemical control is the valid option for any of the disease management strategy. Being quick cheap and easy, despite of health hazard effects, chemical control of pathogens is advocated. Fungicides effectively retard the colony growth and acervuli production up to nil of this specific fungus. Dolomite 580 WP totally checked colony growth as well as acervuli production followed by Dithane M-45, Diesomil Platinum 72 WP and Score 250 EC as compared to control (88.6 mm) and 15.75, respectively (Table IV). Rewal and Ullasa (1988) has reported that Zineb, Chlorothalonil, Thiophante, methyl, prochlorza, ziram, dithionan, fosetyl aluminum, copper oxychloride and Carben-dazim gave good control of canker, *Pestalotiopsis psydii* and *Glomerella psydii*., the findings of these studies are in agreement with them.

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