Pathological and Physiological Studies on Anthracnose Disease of Guava Fruits

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Abstract: Guava fruits are subjected to infect by several plant pathogens derange the storage as a post-harvest diseases. Anthracnose is one of the most prevalent fruit rot diseases. This study focused on pathogens of anthracnose, which infected guava fruits at post-harvest. Pathogenicity, host range, morphological and physiological characteristics were studied. *Colletotrichum gloeosporiodes,* and *Pestalotiopsis psidii* were isolated from guava fruits. Clementina cv was more susceptible to *P. psidii* and *C. gloeosporiodes* infection, while pepper, cucumber, and zucchini fruits were resistant to *P. psidii*. Navel orange and beans are less susceptible to infect by *C. gloeosporiodes*. The temperature from 25-30°C was the optimum degree for the growth of *C. gloeosporiodes,* while the temperature from 30-35°C was optimum for *P. psidii*. The appropriate pH for all fungi under study was 6.5, followed by 6 pH. PDA was the appropriate solid medium for the growth of *C. gloeosporiodes*, while Richard's Agar was the most favored for growth of *P. psidii*.

Keywords: Anthracnose, *Colletotrichum gloeosporiodes,* Guava, *Pestalotiopsis psidii*

INTRODUCTION

Guava trees (*Psidium guajava*) grow in tropical and subtropical regions (Salazar *et al*., 2006). Guava contains antioxidants, phytochemical, essential oils, polysaccharides, minerals, vitamins and enzymes (Sumra *et al.,* 2018). According to the statistics of the Ministry of Agriculture in Egypt, the total cultivated area of guava in 2014 was about 40831 feddans producing about 349626 tons (Atawia *et al.,* 2017). Guava fruits are infected by many plant pathogens include anthracnose. Anthracnose attack on all above ground parts of plant causes the death of branches spots on unripe fruits develop especially during the rainy season. The most characteristic symptom includes appearance of small pin heads sized spots. In moist weather acervuli are produced in abundance on dead twigs. Anthracnose is a common fruit rot disease with a wide host range, causing severe economic loss, which has been reported on a wide variety of crops, including avocado, almond, coffee, guava, apple, dragon fruit, cassava, mango, sorghum, pepper, potato, and strawberries (Abd-Sattar *et al*., 2005; Amusa *et al*., 2005; El Marzoky 2008, 2009, 2013 Sarkar, 2016 and Kimaru *et al*., 2018). *Pestalotiopsis psidii,* and *Colletotrichum gloeosporioides* have been reported as causal agents of guava anthracnose (Rahman *et al*., 2003). The objective of this study aimed to define the causal organisms of guava anthracnose and investigate morphological, physiological, and pathogenicity for *Pestalotiopsis psidii* and *Colletotrichum gloeosporioides*.

MATERIALS AND METHODS

Isolation and Identification of the causal fungus:

During 2016-2018 samples of naturally infected guava fruits showing anthracnose disease or fruit rots symptoms were collected from different commercial markets in Ismailia and Suez governorates. Infected guava fruits were collected in sterile polyethylene bags and brought to Plant Disease Laboratory, Agricultural Botany Dep., Faculty of Agric., Suez Canal Univ. A separate polyethylene bags were used for each fruits type. Infected fruits were surface sterilized in 70% ethanol and then rinsed to sterile distilled water for 4-5 times. Adjacent infected parts of fruits were cut into small pieces (2 mm diameter) and transferred to Petri dishes containing sterilized Potato Dextrose Agar (PDA) medium, then plats were incubated at temperature room 25±2°C for 6-10 days. The plates were examined daily and after incubation periods, the fungi grown from the fruit specimens were transferred to PDA in Petri dishes and purified following hyphal tip culture method (Gupta *et al*., 2017). The pure culture was grown on PDA Petri dishes. Identification study was done based on morphological characters and formation of fruiting bodies, and spores or conidia under a light microscope. The recorded pathogens were identified in the Mycological Center, Faculty of Science, Assiut University. In all cases, pure fungal colonies were kept in refrigerator at 5^{o}C as stock cultures for further experiments. The frequency of isolated fungi from fruit rot and anthracnose disease was separately calculated according to the following formula (Hossain and Bashar, 2011).

% Fungal frequency = Number of isolates of each fungus/Total number of all isolates x 100.

Morphological studies:

The characterization of *Pestalotiopsis psidii*, and *Colletotrichum gloeosporiodes* were studied on Potato Dextrose Agar (PDA) medium at 25±2°C 7 days after inoculation.PDA was poured in Petri dishes 9 cm, and were inoculated with 5 mm diameter culture discs of each pathogen, which grown for 10 days. Shape, color and edge of colony, size and shape of conidia of each pathogen, size and shape of appressoria of *C. gloeosporiodes* were recorded by using Leica LAS EZ imaging software with Leica DM500 optical microscope. The morphological characteristics were described according to (Sawant *et al*., 2012; Vasić *et al*., 2017).

Pathogenicity tests:

Guava fruits at medium sized apparently free from diseases and bruises were harvested at maturity

stage from winter season crop. Fruits were collected when color turning stage and the skin color turns slightly yellow from light green. They were divided into requisite lots for further handling. Pathogenicity tests were done to confirm that isolates able to cause infection and appearance typical symptoms. Pure isolate of *P. psidii*, and *C. gloeosporiodes* was tests for their pathogenic capabilities on fresh guava fruits. The fruits were washed under running tap water, dried and surface sterilized with ethanol 70%. Spore suspension ($5x10^5$ spores/ml) of the pathogen was prepared using PDA cultures grown for 10 days by grinding it with sterile distilled water and injected in fruits by using micro pipette. The fruits were injected with sterile distilled water served as control. Ten fruits were used for each pathogen. The fruits were arranged in batches of five fruits in clean polythene bags, each moistened with sterilized moist cotton to create a micro-humidity chamber and incubated at 25±2°C. Different fruit diseases were identified based on associated symptoms. The diameter of infected aria was recorded every 2 days after the onset of symptoms and converted to rot indices (Hossain, 1989). The index included 1= 1-6 mm, 2= 7-12 mm, 3= 13- 18 mm, 4= 19-24 mm, 5= 25-40 mm diameter of infected aria (Oladiran and Iwu, 1993).

Host range:

This experiment was done to determine pathological ability of *P. psidii*, and *C. gloeosporiodes* on some vegetables and fruits (Orange Abu Surra, Orange Balady, Clementine mandarin, banana, tomato, pepper, cucumber, bean and zucchini). The selected fruits were washed under running tap water, dried and surface sterilized with ethanol 70%. Spore suspensions (5×10^5 spores/ml) of the pathogens were injected in samples. Ten replicates of each pathogen were used. Check treatment was prepared by injected fruits with sterile distilled water. The fruits were arranged in batches of five fruits in clean polythene bags, each moistened with moist cotton to create a micro-humidity chamber and incubated at 25±2°C. The diameter of infection was recorded every 2 days after the onset of symptoms and evaluated infection as mentioned above.

Physiological studies:

Effect of temperature:

Colletotrichum gloeosporiodes, and *Pestalotiopsis psidii* were subjected to different temperature conditions to study the optimum temperature level for the growth of fungus. Potato dextrose agar (PDA) was poured into Petri dishes under sterilized condition (5 replicate for each pathogen) and inoculated with 5mm diameter culture discs of different isolates grown for 10 days by using sterile cork borer. Inoculated Petri dishes were incubated at 10, 15, 20, 25, 30, 35 and 40°C. Colony diameter was recorded daily for 6 days after inoculation.

Effect of pH:

Colletotrichum gloeosporiodes, and *Pestalotiopsis psidii* were subjected to different pH levels (4.0, 4.5, 5.0, 5.5, 6.0, 6.5, 7.0, 7.5 and 8.0 pH) to study effect of pH on the growth of fungus. This experiment was done on liquid media (PDA broth). PDA broth was adjusted to the desired pH by adding 0.1 N NaOH or 0.1 N HCl. 100 ml of the medium was poured in 250 ml conical flask and autoclaved at 121°C under at least 15 psi of pressure for 20 min. The flask containing liquid medium were inoculated with 8mm diameter culture discs of each pathogen which grown for 10 days and incubated at 25±2°C. The mycelial mat was washed three times with 0.2 M potassium phosphate buffer (7pH) and three times with distilled water. The mycelial mat was weighed, dried for 2h at 90°C, placed in desiccators for 1h, and then reweighed the dry weight Bidochka *et al.* (1990).

Effect of different solid media:

Six different solid media were used in this study for assessing the growth of pathogens (*C. gloeosporiodes* and *P. psidii*). Each culture media was prepared in liter of water and autoclaved 121°C under at least 15 psi of pressure for 20 min. Potato Dextrose Agar (PDA) (200g potato, 20g dextrose and 20g Agar agar), Oat Meal Agar (30g oat flakes and 20g Agar agar), Malt Extract Agar (25g malt extract and 20g Agar agar), Czapek's Agar (30g sucrose, 2g sodium nitrate, 1g potassium dihydrogen phosphate, 0.5g magnesium sulphate, 0.5g potassium chloride, 0.01 ferrous sulphate and 20g Agar agar), Sabouraud's Agar (20g dextrose, 10g peptone and 20g agar Agar) and Richard's agar (50g sucrose, 5g potassium dihydrogen phosphate, 10g potassium nitrate, 2.5g magnesium sulphate, 0.02ml ferric chloride and 20g Agar agar) (Khanzada *et al*., 2018). Each culture media was poured in 9cm Petri dishes (five replicate for each pathogen). Petri dishes were inoculated with 5mm diameter culture discs of each pathogen which grown for 10 days and incubated at 25±2°C. Fungal growth was measured from the bottom side of the Petri dishes by averaging the two diameters taken at right angles for each colony after 6 days from inoculation.

Statistical analysis

All statistical observations were carried out on the mean value of the three replications. Analysis of variance (ANOVA) was subjected to statistical analyses using a computer program Costat software (version 6.311). Means were separated using LSD < 0.05according to (Steel *et al.*, 1997) to compare the effects of treatments on the different fungi.

RESULTS

Isolation and identification of the causal fungi:

Fruit rot is a serious plant disease that infects fruits in orchards and markets. During the 2016-2018 seasons, 260 fungal isolates were isolated from guava fruits, which were collected from different markets in Ismailia and Suez Governorates. *Guigonardia mangiferae* (sexual stage of *Phyllosticta capitalensis*), *Colletotrichum gloeosporiodes* and *Pestalotiopsis psidii* were isolated from guava fruits. Data presented in Table (1) and Fig. (1) showed that *G. mangiferae*

was the dominant pathogen on guava fruits, which frequented at 34.62%, followed by *P. psidii* and *C. gloeosporiodes*, which were isolated from Ismailia at 30.77% and 23.1%, respectively. *G. mangiferae* was identified and recorded in the Mycological Center, Faculty of science, Assiut University as a first report of *G. mangiferae* on Guava in Egypt (AUMC No. 13926). On the other hand, *P. psidii* was the dominant pathogen on the guava fruits in Suez Governorate.

Table (1): Frequency (%) of occurrence of fungal pathogens isolated from guava fruits:

Governorates	Isolate of fungi	Number of isolates	Frequency%
Ismailia	*Colletotrichum gloeosporiodes*	60	23.1%
Ismailia	*Guignardia mangiferae*	90	34.62%
Ismailia	*Pestalotiopsis psidii*	80	30.77%
Suez	*Pestalotiopsis psidii*	30	11.54%

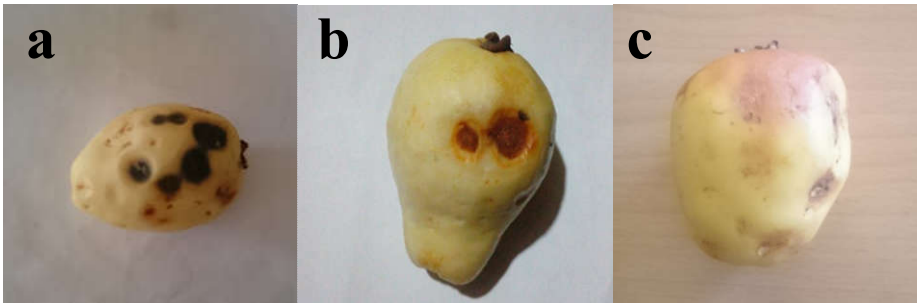

Fig. (1): Symptoms of different plant pathogens on guava fruits: (a) symptoms of black spot, (b) symptoms of anthracnose caused by *Colletotrichum gloeosporiodes*, (c) symptoms of anthracnose caused by *Pestalotiopsis psidii*

Morphological studies of pathogenic isolated fungi:

The characterization of *P. psidii,* and *C. gloeosporiodes* were studied on Potato Dextrose Agar (PDA) medium after 7 days from inoculation. Morphological shape, color and edge of colony, size and shape of conidia for each pathogen, size and shape of *C. gloeosporiodes* appressoria were studied and recorded by using Leica DM500 optical microscope.

Morphological characters of *P. psidii* were studied on PDA medium after 10 days old culture. Colonies had a smooth, eve to undulating, colorless pure white. Acervuli formed on the aerial mycelium contained black, slimy conidiophores were hyaline and branched.

Conidial shape of *P. psidii* was studied under light microscope. Conidia appeared as fusiform with five celled, straight or slightly curved Fig. (2). The cell comprised three colored median cells, apical and basal hyaline cells with appendages. Conidia measured 21.52-22.97 × 6.37-6.53 µm five celled with three brown central cells, the first two darker than the third one. The basal cell had a single appendage 3.20µm. The apical cell had 2-3 appendages with the following dimensions: first 14.19 µm, median 12.58 µm and third 13.97 µm long.

Morphological characters of *C. gloeosporiodes* were studied on 10 days old culture. The developed colonies of *C. gloeosporiodes* was salmon to grey, and was investigated under microscope, where Conidia were straight cylindrical with rounded ends. The size of conidia varied from 14.52-17.51 × 4.24-6.23 µm, margin of appressoria were ovoid to slightly irregular in shape, dark brown in color, and ranged from 11.07 x 5.36µm Fig. (3).

Pathogenicity tests:

Pure isolates of *P. psidii* and *C. gloeosporiodes* were tested on fresh guava fruits to study their pathogenic capabilities. Data showed that all tested pathogens were able to cause fruit rot on guava fruits. *P. psidii* was shown the most isolated pathogenicity on guava fruits at 16.5mm with rot index (3), followed by *C. gloeosporiodes at* 15 mm with rot index (3).

Host range:

This experiment was done to determine the pathogenicity of *P. psidii* and *C. gloeosporiodes* on fruits of some vegetables and fruits (Navel orange, Balady Orange, Clementine mandarin, Banana, Tomato, Pepper, Cucumber, Bean and Zucchini). According to the data in Table (2), and Figs. (4-6) Clementine mandarin was the most susceptible to *C. gloeosporiodes* at 22 mm with a rot index of (4), followed by zucchini, banana, tomato, cucumber, pepper, and Balady Orange at 21.2mm, 16.1mm, 16.2mm, 11.6mm, and 11.2mm with rot indexes of (4, 3, 3, 3, 2, respectively), and beans and Navel orange at 4.3mm and 2.3mm with rot index (1). Clementine mandarin was the most susceptible to *P. psidii* at 40.1mm, followed by Balady Orange, Banana, Navel orange, and Tomato at 40.1, 19.1, 19, 16.2, 13.6 mm with rot index (5, 4, 4, 3, 3, 1) respectively, on the contrary other tested fruits such as pepper, cucumber, and zucchini were resistant.

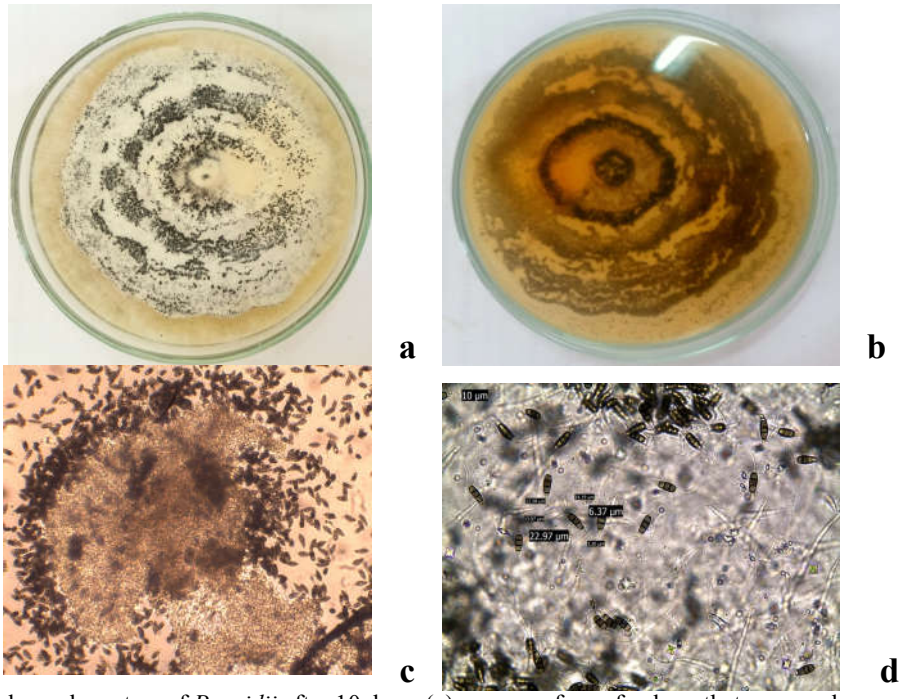

Fig (2): Morphology characters of *P. psidii* after 10 days: (a) upper surface of colony that appeared as smooth, eve to undulating, colorless pure white with acervuli formed, (b) reverse view of colony, (c) acervulus, (d) conidia of *P. psidii* that appeared as fusiform with five celled, straight or slightly curved

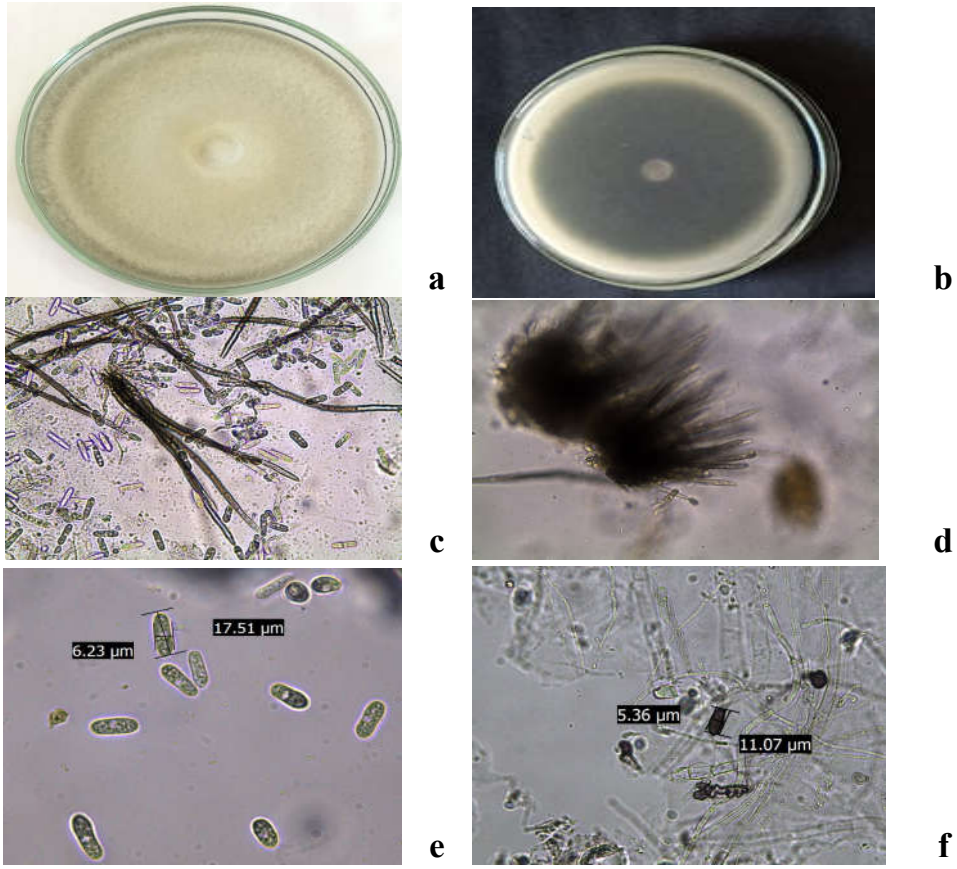

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Fig (3): Morphology characters of *C. gloeosporiodes* on PDA after 10 days: (a) upper surface of colony of *C. gloeosporiodes* that was salmon to grey, (b) reverse view of culture, (c) setae, (d) acervulus (asexual fruiting body that are small) from which setae (hair-like or spinelike) growth has formed. Acervuli contains numerous conidia (spores) (e) conidiospore appeared as straight cylindrical with rounded ends, (f) appressoria were ovoid to slightly irregular in shape, dark brown in color, and ranged from 11.07 × 5.36 µm.

Table (2): Host rang of *C. gloeosporiodes* and *P. psidii*:

Crops	*C. gloeosporiodes*		*P. psidii*	
	Fruit rot diameter (mm)	**Rot index**	**Fruit rot diameter (mm)**	**Rot index**
Navel orange	2.3	1	16.2	3
Balady Orange	11.2	2	19.1	4
Clementine mandarin	22	4	40.1	5
Banana	16.1	3	19	4
Tomato	16	3	13.6	3
Pepper	11.6	2	·	0
Cucumber	14.2	3	·	0
Bean	4.3	1	6	1
Zucchini	21.2	4	·	0

The index included 1= 1-6 mm, 2= 7-12 mm, 3= 13- 18 mm, 4= 19-24 mm, 5= 25-40 mm diameter of infected aria (Oladiran and Iwu, 1993). L.S.D. at 0.05% Fungal (F) 0.46
Treatments (T) 0.80 F*T 1.39

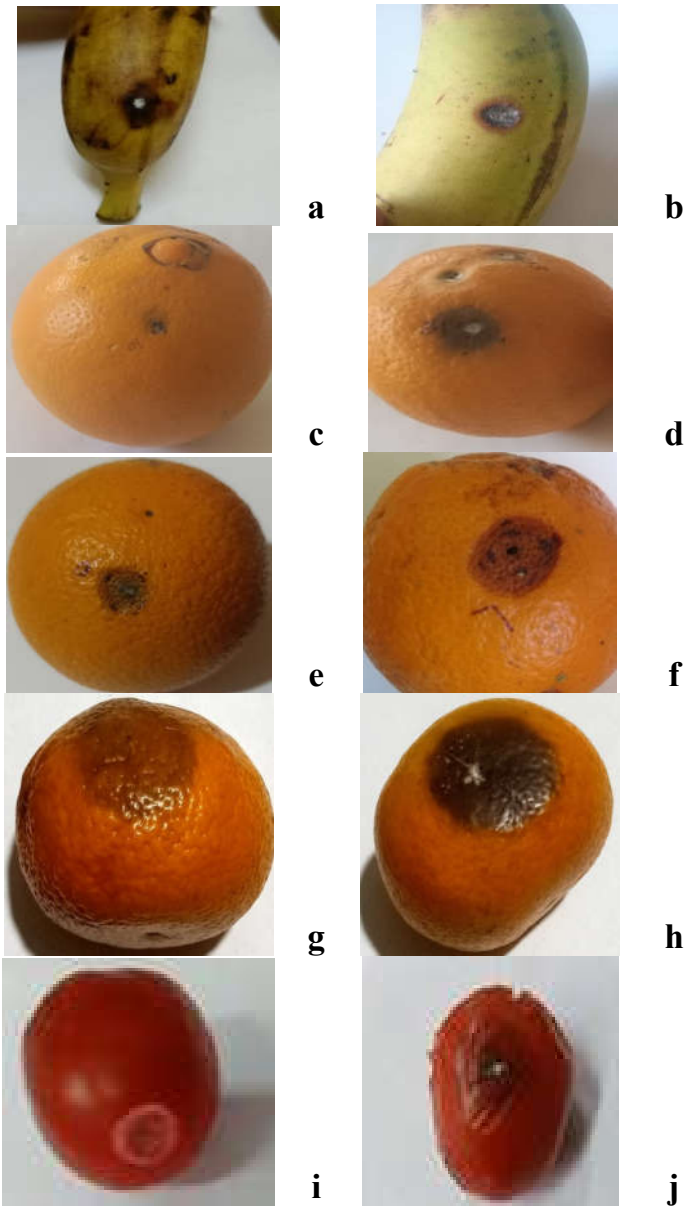

Fig (4): Host range of *C. gloeosporiodes* and *P. psidii* on different fruits: (a) *C. gloeosporiodes* on banana, (b) *P. psidii* on banana, (c) *C. gloeosporiodes* on Navel orange, (d) *P. psidii* on Navel orange, (e) *C. gloeosporiodes* on Balady orange, (f) *P. psidii* on Balady orange, (g) *C. gloeosporiodes* on Clementine mandarin, (h) *P. psidii* on Clementine mandarin, (i) *C. gloeosporiodes* on tomato, (j) *P. psidii* on tomato

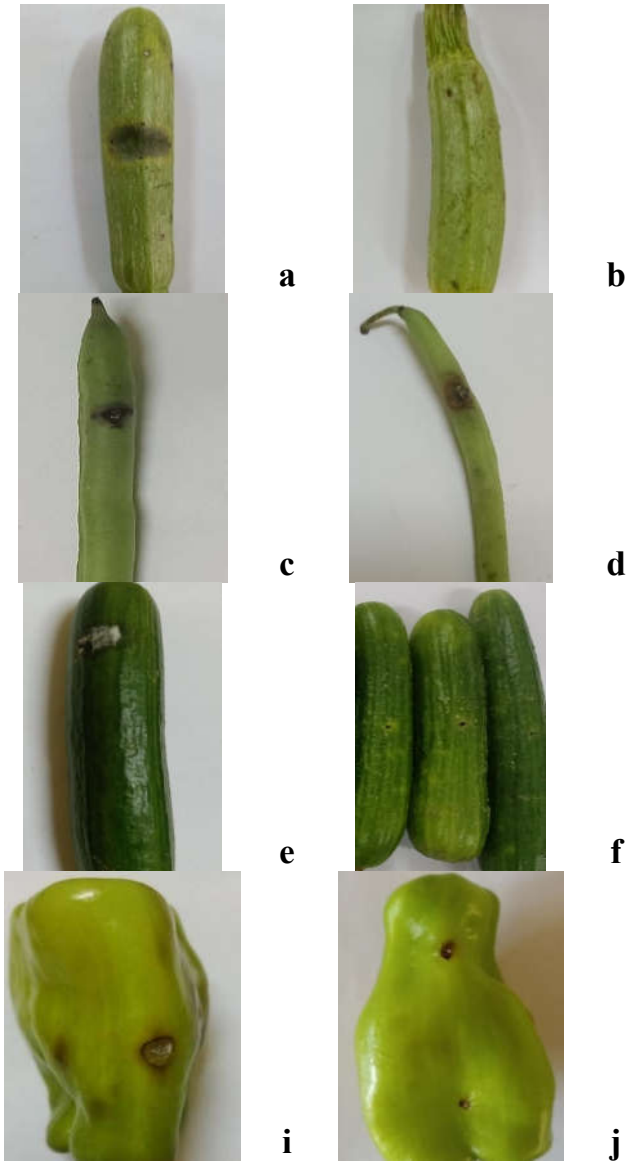

Fig (5): Host range of *C. gloeosporiodes* and *P. psidii*on different vegetables: (a) C. *gloeosporiodes* on zucchini, (b) *P. psidii*on zucchini, (c) *C. gloeosporiodes* on bean, (d) *P. psidii* on bean, (e) *C. gloeosporiodes* on cucumber, (f) *P. psidii* on cucumber, (g) *C. gloeosporiodes* on pepper, (h) *P. psidii* on pepper.

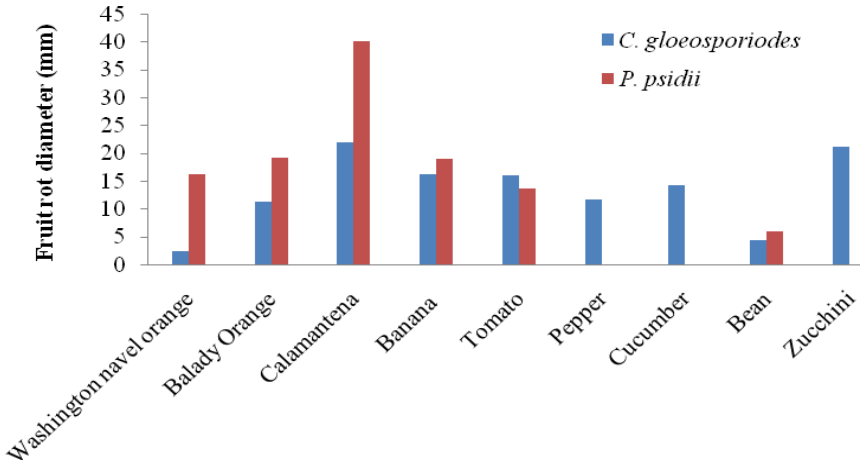

Fig. (6): Host rang of *C. gloeosporiodes* and *P. psidii* on different fruits and vegetables

Physiological studies:

Effect of temperature:

This experiment was prepared to find out the effect of temperature degrees on fungal growth to find the optimum temperature. Data presented in Table (3) and Fig. (7) showed significant different between treatments, which 25–30°C was the optimum temperature for growth of *C. gloeosporiodes* at 76.2–70.5 mm after 6 days from inoculated, followed by 20, 35, and 15°C at 53.8, 36.5, and 24.6 mm, respectively, while 20–25°C was recorded as optimum temperature for growth of *P. Psidii* 6 days after inoculated at 60.1-74.5 mm, followed by 30, 15, and 35°C at 54.5, 34.1, and 24.3 mm respectively. In this regard no fungal growth was obtained at 10 and 40°C for each tested pathogen.

Table (3): Effect of different temperature degree on mycelial growth of tested pathogens after 6 days:

Temperature Degrees	Fungal growth diameter (mm)	
	P. psidii	***C. gloeosporiodes***
10°c	0	0
15°c	24.6	34.1
20°c	53.8	60.1
25°c	76.2	74.5
30°c	70.5	54.5
35°c	36.5	24.3
40°c	0	0

L.S.D. at 0.05 % Fungal (F) 0.11
Treatments (T) 0.17 F*T 0.30

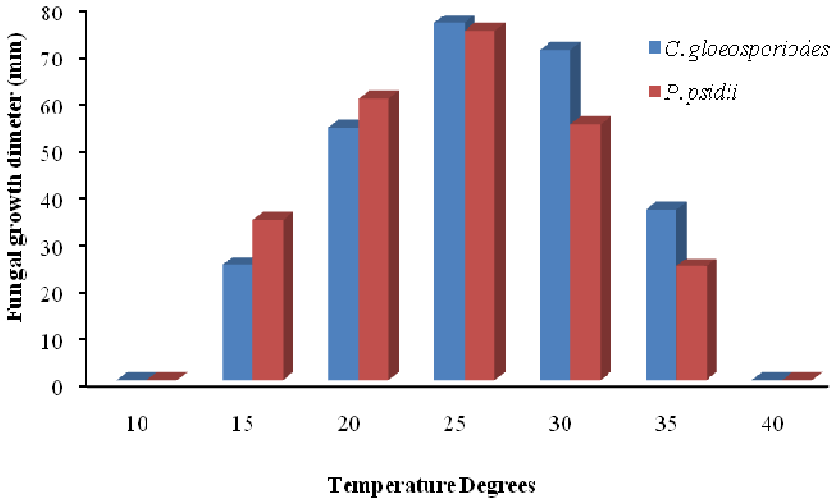

Fig. (7): Effect of different temperature degree on mycelial growth of tested pathogens after 6 days

Effect of pH:

It was necessary to study pH as it might be one of the factors influencing pathogenesis, as different fungal pathogens require a particular range of pH for their growth and development. Data presented in Table (4) and Fig. (8) showed the ability of tested pathogens on growth at the different pH degree on PDA broth medium, where was founded significant different between treatments. *C. gloeosporiodes* produced the high production of mycelial dry weight at pH 6.5 after 10 days3.7 mg, whereas, *P. psidii* produce dry growth matt at the 6.5 mg at the same pH degree and incubation period. Fungal dry weight of the tested fungi at the extreme pH 4 and 8 degree showed the lowest growth and dry weight for *C. gloeosporiodes*, *P. psidii*2.0, 4.0mg at 4 pH, respectively at the same time fungal growth at 8 pH showed the lowest growth of the tested pathogens C. *gloeosporiodes*, *P. psidii* 2.4, 4.5mg respectively.

Table (4): Effect of different pH on dry weight of tested pathogens after 10 days:

Degree of pH	Fungal dry weight (mg/100 ml)	
	C. gloeosporiodes	*P. psidii*
4pH	2.0	4.0
4.5 pH	2.3	4.4
5 pH	2.5	5.3
5.5 pH	3.0	5.5
6 pH	3.3	5.8
6.5 pH	3.7	6.5
7 pH	2.8	5.0
7.5 pH	2.6	4.8
8 pH	2.4	4.5

L.S.D. at 0.05 % Fungal (F) 0.01
Treatments (T) 0.02 F * T 0.03

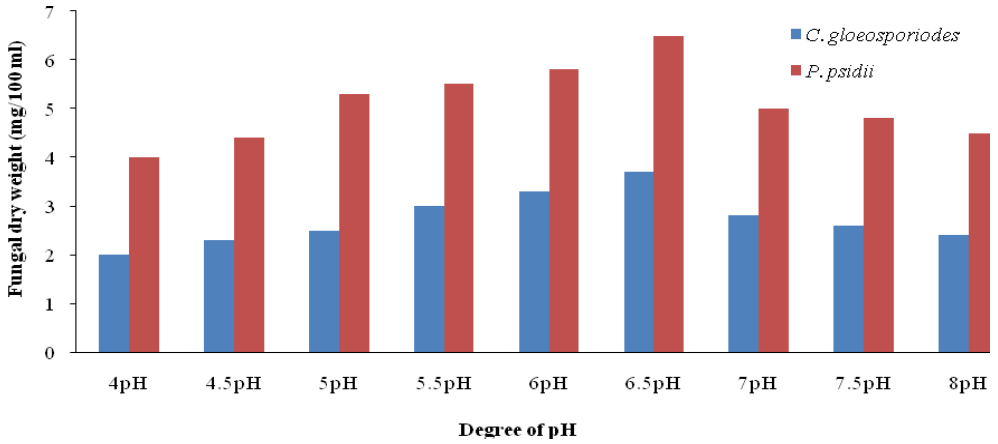

Fig. (8): Effect of different pH on dry weight of tested pathogens after 10 days

Effect of different solid media:

This experiment was prepared to find out the effect of different solid media on the growth of *C. gloeosporiodes* and *P. psidii*. The growth characters of isolates were studied on six different solid media. No significant different was observed between mycelial growth of *C. gloeosporiodes* and *P. psidii*. Significant different were recorded between different solid media on the same tested pathogens. The results presented at Table (5), Fig. (9) showed that Potato Dextrose Agar (PDA) recorded maximum growth of *C. gloeosporiodes* (76.8mm) followed by Richard's Agar (RA), Czapek's Agar (CZA), Sabouraud's Agar (SDA) and Oat Meal Agar (OMA) at 72.2 , 66.3 , 64.2, 57.1mm, respectively Fig. (10). RA was the most favored for growth of *P. psidii* at (79.9mm) followed by CZA, PDA, OMA and SDA at 71.2 ,68.5 ,64.1 and 57.9 mm, respectively Fig. (11).Malt Extract Agar (MEA) recorded the least growth of *C. gloeosporiodes* and *P. psidii*at 51.6mm and 52.6mm, respectively after 6 days from inoculation.

Table (5): Effect of different solid media on mycelial growth of tested pathogens after 6 days:

Solid media	Fungal growth diameter (mm)	
	C. gloeosporiodes	*P. psidii*
Oat Meal Agar	57.1	64.1
Potato Dextrose Agar	76.8	68.5
Richard's Agar	72.2	79.9
Sabouraud's Agar	64.2	57.9
Czapek's Agar	66.3	71.2
Malt Extract Agar	51.6	52.6

L.S.D. at 0.05 % Fungal (F) 1.31
Treatments (T) 1.85 F * T 3.21

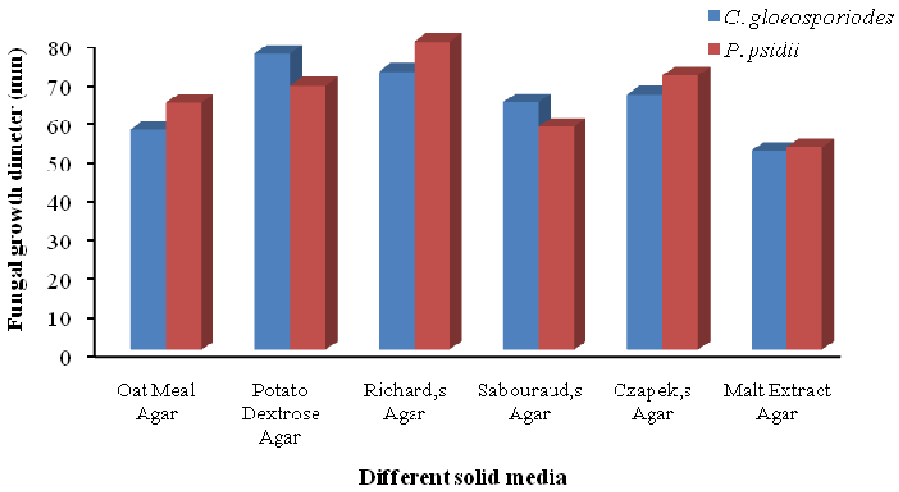

Fig. (9): Effect of different solid media on redial growth of *C. gloeosporiodes* and *P. psidii* after 6 days

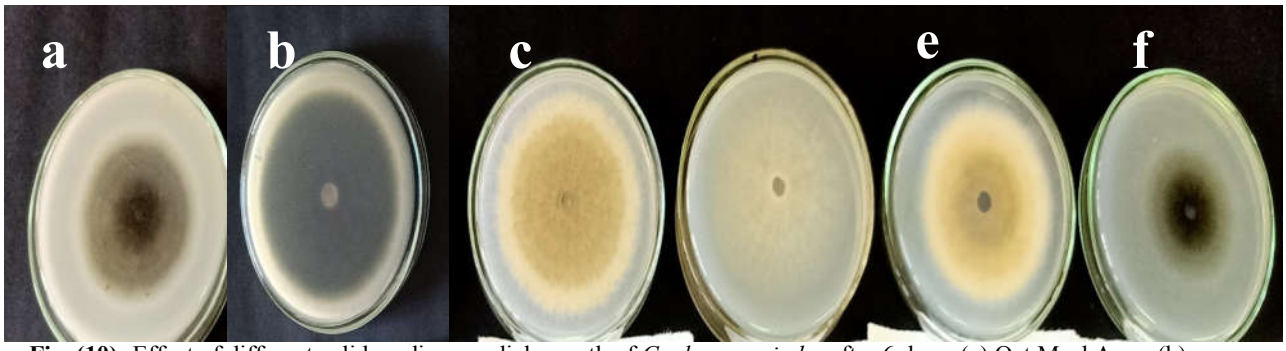

Fig. (10): Effect of different solid media on radial growth of *C. gloeosporiodes* after 6 days: (a) Oat Meal Agar, (b) Potato Dextrose Agar, (c) Richard's Agar, (d) Sabouraud's Agar, (e) Czapek's Agar, (f) Malt Extract Agar

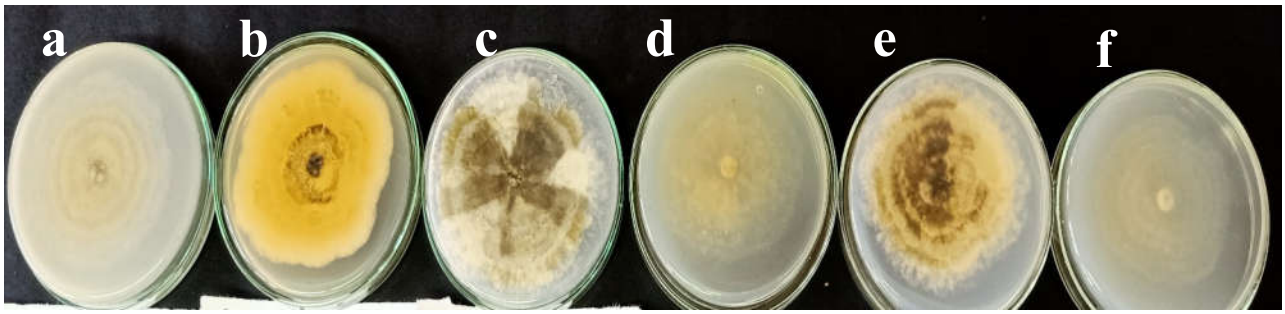

Fig (11): Effect of different solid media on radial growth of *P. psidii* after 6 days: (a) Oat Meal Agar, (b) Potato Dextrose Agar, (c) Richard's Agar, (d) Sabouraud's Agar, (e) Czapek's Agar, (f) Malt Extract Agar

DISCUSSION

Different plant pathogens were isolated from fruit and vegetables during the 2016–2018 seasons. Most of these isolates were isolated from guava fruits, such as *Colletotrichum gloeosporiodes* and *Pestalotiopsis psidii* obtained results were in accordance with (Rahman *et al*., 2003; Amusa *et al*., 2005). Studies revealing the effect of temperature degree on fungal growth reveal that 25–30°C was the optimum temperature for the growth of *Colletotrichum gloeosporiodes* in agreement with (Kumara and Rawal, 2010; Hubballi *et al*., 2011), while20–25°C was the optimum temperature for *Pestalotiopsis psidii*, this reported in different reviews by (Hopkins and Mc Quilken, 2000; McQuilken and Hopkins, 2004; Chen *et al*., 2013).

The effect of pH on fungal growth trials reveals that the optimum pH level for growth of *C. gloeosporiodes* and *P. psidii*w as obtained at 6 and 6.5 PH, followed by 5.5 pH, which is consistent with (Lilly and Barnett, 1951; Kumara and Rawal, 2010) reported that a medium with pH values between 5 and 6 at the time of inoculation was suitable for most fungi. According to them, fungi generally tolerate more acidic than alkaline conditions.

Richard's Agar medium was the favorable growth medium and was studied under lab conditions for *P. psidii* which showed the maximum growth rate. The obtained results are in agreement with (Mishra, 1983), while maximum growth of *Colletotrichum* was on PDA that reported in different reviews by (Dharbale *et al*., 2019; Majumdar and Mandal, 2019).

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دراسات مرضية وفسيولوجية على أمراض الانثراكنوز في ثمار الجوافة

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الجوافة من الفاكهة المنتشرة في مصر، وتصاب بالعديد من مسببات الأمراض في الفترة ما بعد الحصاد. الانثراكنوز من الأمراض الشائعة المنتشرة والتي تصيب العديد من المحاصيل. ركزت هذه الدراسة على أهم مسببات مرض الانثراكنوز والتي تصيب ثمار الجوافة في فترة ما بعد الحصاد. تم دراسة القدرة المرضية وتحديد المدى العوائلى ودراسة الخصائص المرفولوجية والفسيولوجية لهذه المسببات المرضية. تم عزل الفطريات *Colletotrichum gloeosporiodes* و *Pestalotiopsis psidii* من ثمار الجوافة.

١. أظهرت دراسة المدى العوائلى أن.الكلامنيتنا كانت أكثر قابلية للإصابة بفطر *P. psidii* و *C. gloeosporiodes* بينما اظهر الفلفل والخيار والكوسة مقاومة ضد فطر *P. psidii* وكانت الفاصوليا والبرتقال أبوسرة اقل قابلية للإصابة بفطر *C. Gloeosporiodes*.

٢. أما بخصوص درجة الحرارة فكانت درجة الحرارة من ٢٥-٣٠°م هي الدرجة المثلي لنمو فطر *C. gloeosporiodes* بينما كانت درجة الحرارة من ٢٠- ٢٥°م هي الدرجة المثلي لفطر *P. psidii* .

٣. وأظهرت النتائج أن pH الملائم لجميع الفطريات تحت الدراسة ٦.٥ يليه pH ٦.

٤. وكان PDA هو الوسط الغذائي الملائم لفطر *C. Gloeosporiodes* بينما أعطت بيئة Richard's Agar أعلى معدل نمو لفطر *P. psidii*.

الكلمات المفتاحية: الانثراكنوز، *Colletotrichum gloeosporiodes*، الجوافة، *Pestalotiopsis psidii*