



ISOLATION OF PATHOGENIC FUNGI CAUSING STEM AND FRUIT ROT DISEASE ON DRAGON FRUIT GROWN IN KATHIGE VILLAGE, DAVANAGERE, KARNATAKA.

CHANDINI.K.C¹ and SUSHMA H.S²

¹Associate professor, ²PG student, Department of Botany, I.D.S.G. Govt . College, Kuvempu University, Chikkamagaluru. Karnataka

Abstract: Nowadays Dragon fruit crop has become very important due to its high nutrient content. But farmers are facing serious problem in cultivating Dragon fruit crop due to several fungal diseases resulting in yield loss. So the present study was undertaken to isolate the pathogenic fungi causing stem, flower and fruit rot disease on *Hylocereus undatus* (Haw) Britton & Rose. (Dragon fruit) plant Kathige village, Honnali Taluk, Davangere District. It is necessary to identify the causal agent in order to manage the disease. There were 21 pathogenic fungal species isolated from diseased part of stem, root, flower and fruit. Among them 18 spp. isolated from stem part, nine from flower, four from fruit and only one sp. from root part. *Colletotrichum gloeosporioides* isolated in all samples causes Anthracnose of stem, root, flower and fruit and is most widely reported sp. Flower and fruit rot caused by *Bipolaris caktivora*, *Colletotrichum truncatum* results in yield loss. There is an increasing demand for Dragon fruit due to medicinal and industrial uses the production should be productive and profitable. But because of fungal disease Dragon fruit production become reduced. As the fruits are imported and exported to meet the demand it is necessary to identify the fungal pathogen for the monitoring of the diseases.

Key words: Stem rot, Dragon fruit, Pathogen, Fungi, Anthracnose.

I. INTRODUCTION

Hylocereus undatus (*Selencereus undatus*) (Haw) Britton & Rose., commonly known as Pitahaya or Dragon fruit belongs to the family Cactaceae and is native to the tropical forest regions of Mexico, Central America, and South America (Mizrahi *et.al.* 1997). Dragon fruit plant is profusely branched perennial xerophyte (Phylloclade) with climbing habit bearing oblong to oval, red edible fruit with white pulp and black seeds cultivated commercially throughout tropical and subtropical region of India, Asia, Mexico, United states, Australia etc. Recently cultivation of Dragon fruit introduced in India. Local farmers are very much interested in cultivating such exotic fruits with high nutritive value to improve their economy and also to meet the demand. But currently farmers are experiencing many problems like fruit yield losses due to fungal diseases which hits profitability. Many diseases have been reported in India, to mention some of them are stem rot, stem canker, fruit and flower rot diseases. There is about 17 genera and 25 species of plant pathogens currently infecting dragon fruits. The majority causes fungal diseases in stem, fruits, and flowers, two bacterial, one viral and a nematode disease. Anthracnose is frequently reported and is relatively the most destructive fungal disease of dragon fruit. (Balendres and Bengoa.2019). Most commonly reported diseases are Fruit and stem rot caused by *B. caktivora*, canker by *Neoscytalidium dimidiatum* is considered as new disease (Porntimon *et.al.* ,2012) was found in dragon fruit plantations., anthracnose of *Colletotrichum* species and viral disease by Cactus virus X. The most recent report was anthracnose caused by *C. siamense* in India (Abirami *et al.*, 2019) and *C. karstii* in Brazil (Nascimento *et al.*, 2019). The main purpose of this study was to observe the incidence and to identify the pathogenic causal agents of fungal disease on dragon fruit plant that appeared in Kathige village, Honnali Taluk, Davangere District.

II. MATERIALS AND METHOD

2.1. Study area

The study was carried out in Kathige village of Honnali taluk, Davangere district. Of Karnataka state.(Fig. 1-2) Situated 14°28' N latitude, 75°59' longitude and 602.5 metres (1,977 ft) above sea level.. District receives average annual rainfall of 644 mm (25.4 in). It is located 54 KM towards west from Davanagere. 14 KM from Honnali. The work was mainly conducted to know the presence pathogenic fungi in *Hylocereus undatus* or *Selencereus undatus* (Haw) Britton & Rose which belongs to Cactaceae family.



Fig:-1. Davanagere District Honnali Taluk Map.



Fig:-2. Kathige Village

2.2. Collection of samples

Diseased part of like stem, flower, root and fruits samples of *Selencereus undatus* samples were collected in selected region of Kathige village of Honnali taluk, from June to August 2021 in sterilized condition and stored in clean polythene bag for the isolation of pathogenic fungi carried to the Department of Botany, I.D.S.G Government College, Chikkamagaluru.

2.3 Surface sterilization of sample

The collected samples were washed with running tap water to remove solid and dust particles. Stem, flower, root and fruits samples was cut in to small fragments (0.5-1cm). Then the samples are surface sterilized using 0.5% Sodium hypochlorite solution for 2 minutes which is followed by 90% ethyl alcohol for 2 minutes. Then the samples are washed using distilled water 1-2 times and kept aside and dried using sterile blotting paper. (Dobranic *et. al.*, 1995)

2.4. Isolation of pathogenic fungi

For the isolation of pathogenic fungi Potato dextrose agar media supplemented with tetracycline or streptomycin to avoid the bacterial contamination was used and samples were inoculated into the petri plates containing medium. To each Petri plates about six stem fragments are placed while one at the centre and five are arranged at the periphery of the plate, in the same manner both root and fruit fragments are inoculated in the sterilized condition, then petriplates were sealed and incubated it for 3 -7 days at room temperature ($25\pm2^{\circ}$). Obtained fungi were identified on the basis of colony characteristics and microscopic examinations by using relevant literature (Watanabe. 2010. Nagamani. *et.al*, 2005, Gilman. 2001 Barnet .1972)

III. RESULTS AND DISCUSSION

This work was mainly concentrated on the isolation of pathogenic fungi causing stem, flower, fruit and root rot diseases in Dragon fruit plantation of Kathige village, Honnali Taluk , Davangere District from June – September 2021. Before the development of the fruit the fungal pathogens located in different parts of the plant. These pathogenic fungi were isolated from four parts of Dragon fruit plant tissue. We could able to isolate 21 pathogenic fungal species from diseased part of dragon fruit plant responsible for nine diseases. Among them .18 spp. isolated from stem part, nine from flower, four from fruit and only one sp. from root part. *Colletorichum gloeosporioides* isolated in all samples and is responsible for anthracnose on stem, root ,flower and fruit, *Bipolaris caktivora*, *Colletorichum truncatum* found on both flower and fruit, *Fusarium poae* , *Novel bipartite*, *Scytalidium dimidiatum*, *Helicoon* , *Blastobotrys nivea* found on stem and flower. Highest disease incidence of anthracnose on stem, flower and fruit was recorded in the study area (Table.1) (Fig.3. a- j).

Anthracnose on stem, root, flower and fruit rot was predominant in all the samples caused by *Colletorichum gloeosporioides* and is frequently reported most destructive fungal disease of Dragon fruit (Balendres and Bengoa. 2019), Same case was reported from Malaysia on the stem and fruit of the plant. (,Masyahit *et.al.*2009). *C. gloeosporioides*, *Bipolaris caktivora* and *C. capsici* were associated with fruit rot diseases have been reported as postharvest diseases of this plant (Athipunyakom.*et.al.*2009 and Sornvilai *et.al.*2012.). Anthracnose can also reduce yield. In India 30% of dragon fruit plants were infected and caused yield reduction (Abirami *et al.*, 2019). Followed by stem rot is similar to the stem canker of Dragon fruit disease caused by *Neoscytalidium dimidiatum* in Taiwan (Chuang *et.al.* 2012) and China (Yi.*et.al.* 2015.). Plants showing canker (*N. dimidiatum*) also fails to recover as spots that develop into canker subsequently leads to rotting of the stem (Chuang *et al* 2012). Infection of *N. dimidiatum* in fruits also results in rotting which makes the fruit pulp quality unacceptable (Ezra *et al.*, 2013). Flower and fruit rot caused by dangerous pathogen *B. caktivora* has been reported in Israel, China, Korea and Japan causing both pre and post-harvest rot diseases. (Ben-Ze' ev. *et.al.*2011) and *C.truncatum* causes anthracnose of Dragon fruit and same was reported in China (Guo *et.al.*2014) and Malaysia (Vijaya *et.al.* 2015). *Botryoshaeria dothidea* causes blotchy red brown lesions on the stem. *Fusarium poae* causes stem rot (Hawa *et.al.*2017).. *Helicoon* sp. isolated from stem of Dragon fruit and is an aeroaquatic hyphomycetes reported by Goos *et.al* in 1998 from submerged detritus. Few spp. were also isolated from leaves and twigs of *Populous* and *Pinus* tree by Sameer *et.al.*1998. *Iyengarina elegans* also recovered from the stem part which also an aquatic sp.may be invaded through rain water. Environmental factors like continuous heavy rain fall, humidity, warm temperature have significant effect on incidence of fungal disease in Dragon fruit plantation (Athipunyakom .*et.al* ,2012). The flowers are the first source of inoculum of fungal pathogens causing the disease on post-harvest dragon fruits (Ocurn *et.al.*2015). We have isolated *Bipolaris caktivora*, *Clletorichum truncatum* only from flowers and fruits may be because the initial flowering takes place after rainy season. So that fungal conidia reside in the flower but do not cause any infection till the formation of fruits. Once the fruits are formed the fungal conidia germinates results in rotting of the fruits

FIG.3. INFECTED STEM AND FRUIT ROT DISEASES OF DRAGON FRUIT PLANT AND FUNGAL PATHOGEN

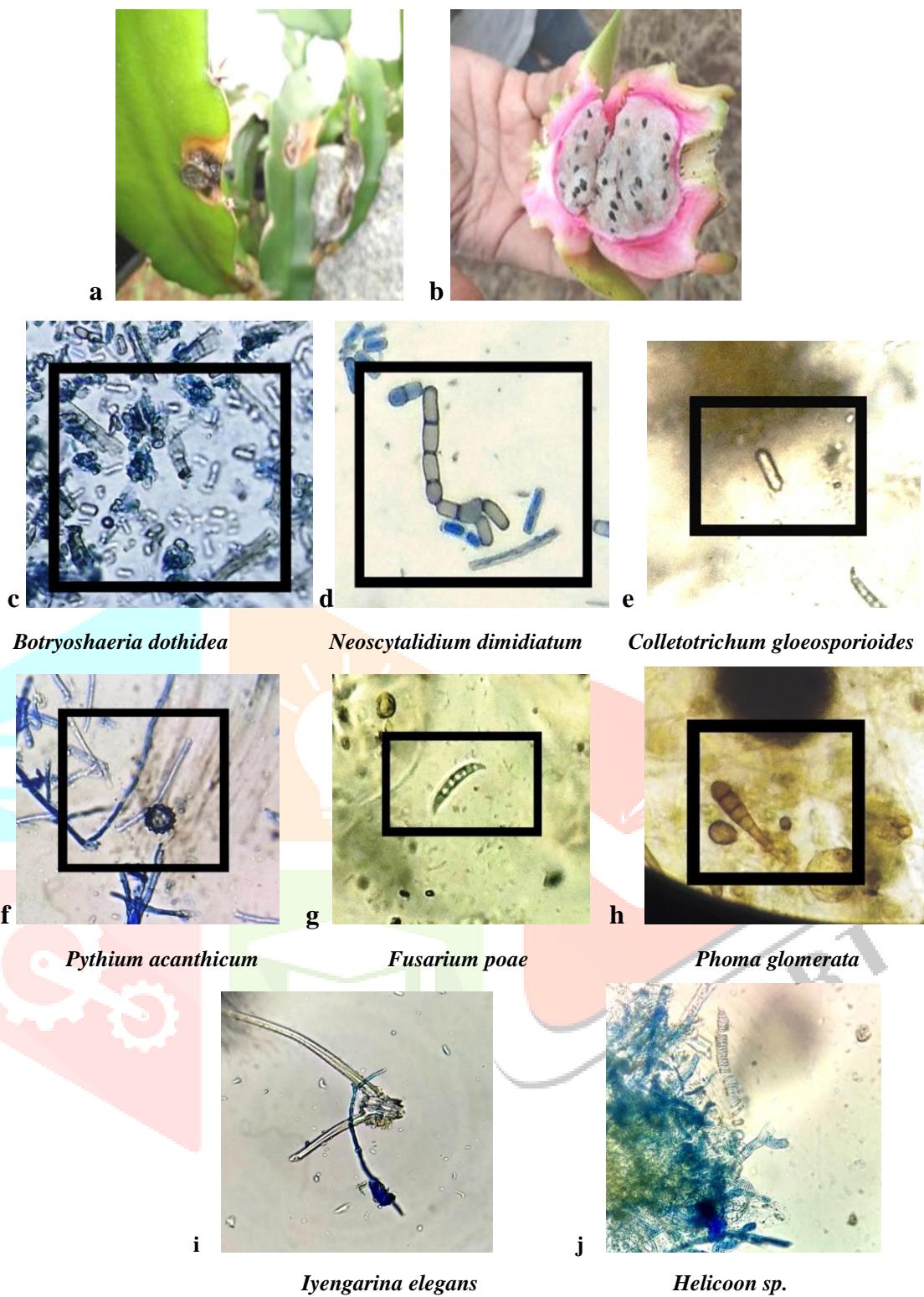


Table 1:- Occurrence of Pathogenic fungi causing stem and fruit rot diseases on dragon fruit

SL No.	Name of the fungi	Name of the diseases Part of Dragon fruit plant				Name of the disease
		Root	Stem	Flower	Fruit	
1	<i>Neoscytalidium dimidiatum</i>	-	✓	-	-	Stem rot
2	<i>Diplodia frumenti</i>	-	✓	-	-	Stem blight
3	<i>Phoma glomerata</i>	-	✓	-	-	Stem blight
4	<i>Bipolaris caktivora</i>	-	-	✓	✓	Flower rot Fruit rot
5	<i>Fusarium poae</i>	-	✓	✓	-	Stem rot flower rot and wilt
6	<i>Fusicoccum sp.Corda.</i>	-	✓	-	-	Stem lesions
7	<i>Novel bipartite</i>	-	✓	✓	-	Stem rot Flower rot
8	<i>Colletorichum gloeosporioides</i>	✓	✓	✓	✓	Anthracnose Stem, root flower rot
9	<i>Clletorichum truncatum</i>	-	-	✓	✓	Flower rot Fruit rot
10	<i>Botryosphaeria sp.</i>	-	✓	-	-	Blotchy red/brown spot
11	<i>Scytalidium thermophilum</i>	-	✓	-	-	Stem rot
12	<i>Scytalidium dimidiatum</i>	-	✓	-	-	Stem canker
13	<i>Helicomyces ambigus</i>	-	✓	-	-	Stem rot
14	<i>Botryosphaeria dothidea</i>	-	✓	-	-	Stem rot
15	<i>Endocalyx thwaitesii</i>	-	✓	-	-	Stem rot
16	<i>Lacellinopsis spiralis</i>	-	✓	-	-	Stem rot
17	<i>Pythium acanthicum</i>	-	✓	-	✓	Basal rot
18	<i>Helicoon sp.</i>	-	✓	-	-	Stem and root rot
19	<i>Blastobotrys sp.</i>	-	✓	-	-	Stem and root rot
20	<i>Iyengarina elegans</i>	-	✓	-	-	Stem and Flower rot
21	<i>Zymonema sp.</i>	-	-	-	✓	Flower rot

IV. CONCLUSION

It can be concluded from the results that *Colletorichum gloeosporioides* was the causal pathogen of stem rot, *Colletorichum truncatum* and *Bipolaris caktivora* were the causal pathogen of flower and fruit rot causes major loss in Dragon fruit production in the study area. The flowers are the place of fungal inoculum leads to the fruit rot disease of Dragon fruit plant in Kathigae village. Incidence of fungal diseases increasing day by day throughout the world due to unsanitary gardening practices and few spread through contact between healthy and infected plant. High humidity, continuous rain fall with poor movement of wind enhances spreading of diseases. The diseases of Dragon fruit should be managed by using common eradication method i.e., Removal of infected debris and host plant material, healthy sanitary practices to reduce the inoculum and use of fungicides enhance the Dragon fruit production.

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