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ASSESSMENT OF AGE OF BANANA FRUIT AND PACKAGING MATERIAL ON DEVELOPMENT OF FRUIT ROT AGAINST ANTHRACNOSE DISEASE CAUSED BY *COLLETOTRICHUM GLOEOSPORIOIDES*

C.S. Azad[1], R.D. Ranjan[2]* and Anil Paswan[3]

[1]Deptt. of Plant Pathology, [2]Deptt. of Plant Breeding and Genetics, [3]Deptt. of Extension Education
Bihar Agricultural College, Sabour, Bhagalpur-813210, Bihar, India
***Corresponding author** (R.D. Ranjan) **Email :** rakeshdeoranjan@rediff.com*

ABSTRACT

Banana, fruit rot is incited by *Colletotrichum gleosporioides* which has been the most serious post-harvest disease of immature and mature fruit. The usual control by fungicides prohibited in many countries reduces their commercial value. A study was carried out at the Plant Pathology Laboratory of Rajendra Agricultural University, Pusa Samastipur to determine Effect of age of banana fruit on development of fruit rot and packaging materials on post harvest control plantain (*Musa paradisiaca*) fruit rot. Each cultivar were inoculated with a spore suspension of *C. gloeosporioides* (10^6 spores/ml) and incubated for disease development under room temperature (28 ± 1°C) for one week. From the result obtained out of four different age of banana 30, 45, 75 and 90 days) maximum incubation period (9) was found in 75 days old banana fruit after harvest whereas minimum incubation period was in 30 days old banana fruits. The mean maximum number of days (17.3) was required for complete rotting (100%) found on 75 days old age banana fruit which was followed by 45 days old banana fruits (12.6 days) whereas mean minimum days (8.6 days) required to complete rotting was found on 90 days old banana fruits. Among four packaging material viz., Glazed paper, News paper, Butter paper and polyethene, Butter paper was found to be best for different level of fruit rotting as it required 20 days for 100 per cent of rotting followed by Glazed paper whereas polyethene materials was found to be least effective as it required 11.3 days for 100 per cent of rotting followed by News paper i.e. 165 days.

Key words **:** *Anthracnose, Colletotrichum gloeosporioides, banana, packaging material.*

Banana (*Musa* species*)* the "queen of tropical fruit" is considered to be one of the oldest fruit known to mankind. The banana which cultivated, are namely *Musa acuminata, Musa balbisiana.* The genus Musa is in the family *Musaceae*. Banana is the second largest fruit crop, is an important staple food commodity around the world. Banana is consumed as a staple food, fresh fruit or for processing. It also serves as a boost to farm income for millions of people in the tropical region. It is an important source of high-calorie energy and contributes about a quarter of the energy requirement of almost 70 million people in the West and Central African sub- region. It is also the fourth most important commodity at global level next to rice, wheat and dairy products (Hays, 1966).

In Bihar, the production areas are broadly grouped in two zones. They are Vaishali and Koshi. About 40% areas lies in Vaishali belt (Zone I) and the rest 60 per cent area is in Koshi belt (Zone II), Production has been seriously decreased and threatened by diseases and pests and soil fertility problems. Like other crop, banana also suffers from many fungal, bacterial, and viral diseases which are considered economically important. Amongst the diseases, fruit rot of banana is the most serious one causing heavy damage to the crop. Several organism are responsible for the fruit rot of banana *viz*., *Colletotrichum gloeosporioides*, *Colletotrichum musae Pyricularia musae*, *Fusarium* spp., *Verticillium theobromae*, *Ceratocystis paradoxa, Botryo diplodia theobromae* etc. It infects mature as well as green fruits. The infected fruits are rendered unfit for consumption and fetch low price. The diseases are a major constrains of banana production both in field and also at post harvest. Several postharvest diseases of banana had been reported worldwide but fruit rot /anthracnose diseases had been reported as being the most prominent (Chadha, 2001). In view of the above, the current study was undertaken to screen different age of banana fuits and effective packaging materials against *C. gloeosporioides* for anthracnose disease resistance.

Table-1 : Effect of age of banana fruit on development of fruit rot.

Sl. No.	Age of banana fruit	Incubation Period*	No. of days required level of rotting %		
			25	50	100
1.	30 days	6	6.0	7.6	11.6
2.	45 days	7	7.5	9.0	12.6
3.	75 days	9	10.0	13.0	17.3
4.	90 days	6	5.8	6.6	8.6
	S. Em. +		0.1	0.2	0.2
	CD at 5%		0.3	0.7	0.6

*Average of five replications.

Table-2 : Effect of packaging materials against Colletotrichum gloeosporioides.

Sl. No.	Packaging material	Incubation Period*	No. of days		
			Different level of rotting		
			255	50%	100%
1.	Glazed paper	7	10.8	13.3	18.3
2.	News paper	6	8.5	11.3	16.5
3.	Butter paper	9	11.6	15.8	20.0
4.	Polyethene	6	8.0	9.8	11.3
5.	Control	3	5.6	7.5	10.3
	S. Em. +		0.2	0.3	0.5
	CD at 5%		0.7	1.1	1.3

*Average of five replications.

MATERIALS AND METHODS

Laboratory experiments were conducted at Rajendra Agricultural University, Pusa, Samastipur, Bihar during the year 2004. Banana fruits of susceptible cultivars (Chenia) were harvested at ripening stage and were brought to the laboratory for screening of susceptible stage and packaging material against anthracnose disease.

Effect of age of banana fruits on development of fruit rot : Age of the banana fruits were calculated from days after shooting. The different age of banana fruits i.e. 30 days, 45 days, 75 days, and 90 days old were taken to study the development of fruit rot. The fruits were washed in running tap water. Surface sterilized with 95% ethyl alcohol and subsequently subjected to pin prick were inoculated with 10^4 spores/ml concentration made from 7 days old culture grown on PDA. The inoculated fruits were incubated at 28 ± 2^0C and maintaining more than 90 per cent relative humidity. The experiments were carried out in five replications. Observations were recorded on first appearance of disease symptoms after inoculation followed by number of days required for 25, 50 and 100 per cent rotting of fruits (Sugha *et al*. 2002)

Effect of packaging material on development of fruit rot : The different packaging material viz., Glazed paper, News paper, Butter paper and Polyethene were taken to study the development of fruit rot. The fruits were washed in running tap water. Surface sterilized with 95 per cent ethyl alcohol and subsequently subjected to pin prick injury with sterilized needle. The fruits were inoculated with 10^4 spores/ml of water made from 7 days old culture grown on PDA. The inoculated fruits were incubated at 28 ± 2^0C, maintaining more than 90 per cent relative humidity after wrapping.

The experiment was carried out in five replications. Observations were recorded on first appearance of disease symptoms after inoculation followed by number of days required for 25, 50, 100 per cent of rotting of fruits (Sugha *et al*. 2002)

RESULTS AND DISCUSSION

Effect of age of banana fruit on development of fruit rot : Age of fruits was the important factors for severity of the disease, 75 days old banana fruits were found to be more resistant than 45 days and 90 days old fruits. Ninety days old fruits were found to be susceptible to *C. gloeosporioides* infection, which require minimum days

(6 days) to complete rotting of banana fruit in comparison to other age groups of banana fruit. This may be probably due to increase in sugar and other enzymes at ripening stage which favors growth of *C. gloeosporioides* (Table 1). Mishra and Kumar (1993) also reported that guava fruits were least susceptible at green stage than turning ripe, ripe to fully ripe stages. Duran *et al*. (1999) reported that the papaya fruits were susceptible to *C. gloeosporioides* at all stages. Simmond and Mitchell, 1940; Duran *et al.* 2002 and Bauri, 2002 reported in field condition that fruits of banana from October planting in plant crop and April planting in first ratoon vis-a-vis harvesting period with low relative humidity recorded intensity of post harvest diseases i.e. anthracnose of fruit rot.

Effect of packaging materials against *Colletotrichum gloeosporioides* : *In vitro* studies on packaging materials were inhibitory to rotting of fruit incited by *C. gloeosporioides*. Number of days required for hundred per cent of fruit rotting was found to more in case of butter paper i.e. 20 days followed by Glazed paper i.e. 18.3 days whereas it was found to be least in case of Polyethene i.e. 11.3 days followed by News paper i.e. 16.5 days indicated in Table-2. Silvis *et al*. (1976) reported that the hands for banana wrapped in Polyethene bags had prolonged storage life and recorded minimum spoilage. Rao and Chundawat (1991) obtained results on similar line. According to Manleitner *et al*. (2002) reported that the influence of various packaging materials on shelf life and fruit quality of strawberries was evaluated results indicated that especially the non-perforated film significantly increased shelf life due to a inherent modified atmosphere. Fruit firmness, weight loss and rot were significantly improved by using non-perforated films. Similar results were obtained by some other workers i.e. Mortuza *et al.* (2002), Pereira (2003) and Gamaga (2004).

CONCLUSION

Ninety days old fruits were found to be vulnerable stage of banana fruits to get *C. gloeosporioides* infection. Among packaging material butter paper was found to be most effect on fruit rotting followed by Glazed paper whereas, Polyethene proved to be least effective against fruit rot of banana followed by News paper.

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