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Physiological Characterization of *Colletitrichum gloeosporiodes* Inciting Fruit Root of Papaya

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Various fungi were found associated with the fruit rot of papaya (*Carica papaya* L.) among all *Colletotrichum gloeosporioides* was found dominant under south Gujarat condition to cause anthracnose. Vital role of temperature and humidity was found in case of anthracnose disease of papaya. Optimum temperature ranges from 30-35°C as well as 60-80% relative humidity for minimum fruit rot (anthracnose) was found in this research while fruits stored above or below this temperature showed blemishes.

Key words: *Colletotrichum gloeosporioides, Carica papaya*, Relative Humidity, Anthracnose.

Papaya is one of the most important fruit crop cultivated in Hawaii, Malaysia, Burma, Sri Lanka, India, Queensland, South Africa, Tanzania, Kenya and other tropical and sub-tropical countries of the world. In India, It is successfully grown all over the country and is available round the year. It occupies a cultivated area of 106 thousand hectares. It is habitually cultivated tropical fruit crop in south Gujarat. The fruits are heavily prone to the fruit rots and it is the major cause of the post harvest losses. So it is important to study association of different pathogens with papaya fruit rot and impact of environmental factors on it.

MATERIALS AND METHODS

Effect of temperature on fruit rot

To know the effect of the external abiotic factors such as temperature and humidity on the fruit rotting fungi and their effect on fruit rotting, five equally matured healthy papaya fruits cv. Taiwan red Lady were brought to laboratory and washed under tap water. The fruits were then disinfected by dipping them in sodium hypo chlorite (one part sodium hypo chlorite + three part distilled water) solution for 30 seconds, and three subsequent dipping in distilled sterilized water to remove all the traces of sodium hypo chlorite from the fruit surface and inoculated with C. gloeosporides (1 X 108 cfu/ml) by Sterilized sharp edged knife making 1 cm diameter wound about 0.5 cm deep on sterilized fruits surface under aseptic condition. Sterile cotton pad of about 5.0 sq. cm was dipped in spore suspension of C. gloeosporides (@1X108 cfu/ml) and swabbed over the wounded surface of the fruits. Such inoculated fruits were kept in the incubator at 20, 25, 30 and 350C temperature. Whereas, incubated at 50, 75, 90 and 95 per cent each humidity in incubator at 28±20C each in case of testing effect of humidity.

Observations were recorded on time taken for symptoms initiation as well as days required for 25, 50 and 75 per cent rotting of fruits.

RESULTS

Temperature and humidity played important role in infection of various fungi on the fruit as well as in the spread of the rotting.

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Management of the fruit root can be well planned if the role of temperature in fruit rotting will be known. Four different temperature ranges were tried for development of fruit rots in papaya fruits. The results revealed from the experiments are shown in Table.

From the Table, it was observed that significantly least time (1.2 days) was required for the initiation of symptoms when kept for incubation at 300C temperature. whereas, for 25 per cent rotting 3.1days, 50 per cent rotting 4.2 days and 5.0 days for 75 per cent rotting. Next best in order is 350C per cent humidity where, symptoms initiated on 2.0 days, while, 25, 50 and 75 per cent rotting was observed at 4.4, 5.3 and 6.8 days respectively, followed by 250C where 2.6, 3.9, 5.0 and 6.3 days and at 200C 3.3, 4.3, 5.9 and 7.1 days were required for symptoms initiation, 25, 50 and 75 per cent rotting respectively.

In terms of humidity it was depicted from the table, that as the humidity decreases, time taken for rotting increases. Significantly least time was taken for the initiation of symptoms 1.0 days in incubation at 90 per cent relative humidity whereas, for 25 per cent rotting 1.5 days, 50 per cent rotting 2.7 days and 4.2 days for 75 per cent rotting. Next best in order is 90 per cent humidity where, symptoms initiated on 1.7 days, while, 25, 50 and 75 per cent rotting was observed at 2.4, 3.6 and 5.0 days respectively, followed by 75 per cent relative humidity where 2.6, 3.2, 4.7 and 6.3 days and at 50 percent relative humidity 3.2, 4.4, 5.9 and 7.5 days were required for symptoms initiation, 25, 50 and 75 per cent rotting respectively.

DISCUSSION

Similar results were obtained by Baiyewu and Amusa (2005) and Chukwuka et al. (2010) who revealed that optimum temperature for maximum rotting ranges from 30-350C whereas, relative humidity at 60-80 per cent gave maximum rotting of Paw-paw fruit. Chowdhuary (1957) and Quimio (1973) obtained maximum mycelial growth of C.

Table 1. Effect of temperature on fruit rot caused by *C. gloeosporioides*

Sr. No.	Temp (^{0}C)	Time taken for fruit root (Days)			
		Initiation of symptoms	25 per cent rotting	50 per cent rotting	75 per cent rotting
1	20	3.3*	4.3	5.9	7.1
2	25	2.6	3.9	5.0	6.3
3	30	1.2	3.1	4.2	5.0
4	35	2.0	4.4	5.3	6.8
S. Em. ±		0.05	0.11	0.13	0.20
C. D. 5%		0.15	0.32	0.42	0.65
C.V. %		2.78	3.46	3.09	4.72

*Data are mean of five fruits as treatment

Table 2. Effect of humidity on fruit rot caused by C. gloeosporioides

Sr. No.	Humidity in per cent	Time taken for fruit rot (Days)			
		Initiation of symptoms	25 per cent rotting	50 per cent rotting	75 per cent rotting
1	50	3.2*	4.4	5.9	7.5
2	75	2.6	3.2	4.7	6.3
3	90	1.7	2.4	3.6	5.0
4	95	1.0	1.5	2.7	4.2
	S. Em. ±	0.04	0.10	0.09	0.20
	C. D. 5%	0.13	0.29	0.31	0.66
	C.V. %	2.89	4.31	3.14	5.21

*Data are mean of five fruits as treatment

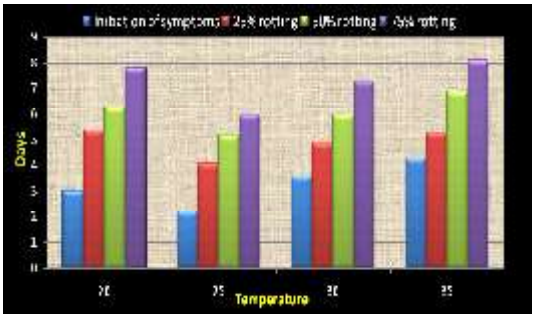

Fig. 1. Effect of temperature on fruit root caused by *C. gloeosporioides*

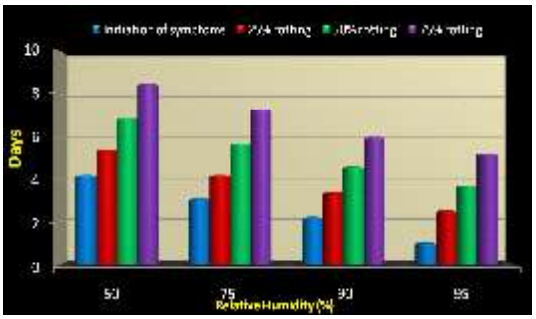

Fig. 2. Effect of humidity on fruit root caused by *C. gloeosporioides*

gloeosporioides, a fruit rotting fungi of papaya at 30° C. Rajak (1983), Naik (1985) and Hegde and Hegde (1986) reported maximum growth of the *C. gloeosporioides* at temperature of 25°C, 20-30°C and 20-35°C respectively.

CONCLUSION

The results exhibited that fruits incubated at 30°C temperature cause faster symptoms initiation of Papaya anthracnose (1.1 days) as well as taken lesser time (5.0 days) for 75 per cent rotting as compared to other incubation temperatures. Whereas, in case of humidity incubation at most 95 per cent humidity found to cause early symptoms initiation (1.0 day) as well as quick rotting of the fruits (4.7 days for 75 % rotting) as compared to lower humidity incubation. Time taken for rotting was found increased with decrease in humidity percentage. It is needful to avoid the accordance of both such congenial condition during storage to avoid the post harvest damages of the papaya fruits.

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