Research Paper :

Effect of relative humidity on conidial germination of *Colletotrichum capsici* and *Leveillula taurica* and disease development in chilli

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SUMMARY

Laboratory experiments were conducted to study the effect of relative humidity levels on conidial germination of *Colletotrichum capsici* and *Leveillula taurica* and disease development in chilli (var. Parbhani Tejas). Results indicated that conidia of *C. capsici* and *L. taurica* could not germinate at 10% RH up to 48 hours of incubation. Maximum conidial germination of both these species took place at 100% RH followed by 75, 50 and 25%RH. Symptoms of *C capsici* on leaves were not observed at 10% RH and on fruits at 10 and 25% RH up to a fortnight. Incubation period was minimum at 100% RH and steadily increased as humidity levels decreased. Powdery mildew symptoms on leaves up to a fortnight were not observed at 10, 25 and 100% RH. These developed within a week's period at 50 and 75% RH.

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Key words : conidial germination, *Colletotrichum capsici, Leveillula taurica,* Incubation period

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Anthracnose (*Colletotrichuium cpasici*) and powdery mildew (*Leveillula taurica)* are major diseases of chilli in the country (Eswarmurthy *et al.,* 1996; Mathur *et al.*, 1972; Pawar *et al.,* 1985). Losses to the tune of 53.70 per cent due to anthracnose (Jindal *et al.,* 1994) and up to 47.75 per cent due to powdery mildew (Gohokar and Peshney, 1981) have been reported. However, very less work has been done on effect of environmental parameters on various steps in disease cycle.

Also available reports are varying probably because of variation in isolates of these pathogens. In the light of this situation, present study was planned to study the effect of relative humidity on spore germination of *Colletotrichum capsici* and *Leveillula taurica* on disease development *in vitro.*

MATERIALS AND METHODS

Conidial germination of *Colletotrichum capsici* and *Leveillula taurica* was studied at 10, 25, 50, 75 and 100 % humidity levels by slide germination technique as suggested by Singh and Lodha (1985) and (Chung and Lee (1986). For this standard cavity glass slides were used. In each cavity slide, 0.1 ml. of sterilized water was dropped. These were uniformly dusted with freshly harvested conidia of *C. capsici* and *L. taurica*. Each set of cavity slide was replicated thrice. The slides thus prepared were transferred to desiccators in which humidity levels were maintained by using different specific gravities of sulphuric acid (Stevens, 1916). The desiccators were kept on laboratory benches and temperature during this period was 27.9^{0}C as maximum and 12.7^{0}C as minimum. Observations regarding conidial germination were recorded at 24 and 48 hours of incubation by using light microscope. Approximately 300 conidia / cavity were examined.

Pathogenic effect of *C. capsici* and *L. taurica* was studied *in vitro* at relative humidity levels of 10, 25, 50, 75 and 100%. For this, apparently healthy leaves and fruits of chilli (var. Parbhani Tejas) were collected from field. These were surface sterilized for two minutes in 0.1% mercuric chloride solution and were subsequently rinsed in three changes of sterilized water under aseptic condition. Spores of *C. capsici* and *L. taurica*

were separately dusted on them and they were transferred in sterile Petriplates without lead, these plates were then transferred to desiccators having various humidity levels. The humidity levels were adjusted as per technique suggested by Stevens (1916) with sulphuric acid of various specific gravities. The development of symptoms on inoculated leaves and fruits was recorded by daily observations.

RESULTS AND DISCUSSION

It is seen from results (Table 1) that conidial germination of *C. capsici* was not observed up to 48 hours at 10% RH, while conidia germinated readily from humidity levels ranging from 25 to 100 per cent. At both the incubation periods, maximum conidial germination was observed at 100 % RH which was significantly superior to rest of the RH levels. It was followed by 75, 50 and 25 % RH in order of merit where the proceeding level being significantly superior to succeeding.

Table 1 : Conidial germination of *C. capsici* as influenced by relative humidity levels

Sr. No.	RH levels %	Mean conidial germination (%)	
		Hours of incubation	
		24	48
1.	10	0.00 (0.00)	0.00 (0.00)
2.	25	11.20 (19.55)	26.67 (31.11)
3.	50	27.61 (31.69)	36.69 (37.29)
4.	75	55.60 (48.22)	73.63 (59.08)
5.	100	75.67 (60.47)	83.15 (65.73)
	S.E.±	0.57	0.59
	C.D. (P=0.05)	1.74	1.80

Figures in parenthesis are assign values

Results of Table 2 indicate that conidial germination of *L. taurica* could not take place at 10 % RH; it steadily increased as the humidity levels were increased. At 24 hours of incubation, maximum conidial germination was observed at 100% RH. This was followed by 75, 50 and 25% RH, in order of merit where the preceding level of RH was significantly superior to succeeding levels. At 48 hours of incubation, maximum conidial germination was observed at 100% RH and both the levels of RH were significantly superior to remaining levels of RH.

Table 2 : Conidial germination of *L. taurica* as influenced by relative humidity levels

Sr. No.	RH Levels %	Mean conidial germination (%)	
		Hours of incubation	
		24	48
1.	10	0.00 (0.00)	0.00 (0.00)
2.	25	20.76 (27.13)	26.66 (31.11)
3.	50	32.73 (34.88)	49.01 (44.43)
4.	75	50.60 (45.34)	59.26 (50.36)
5.	100	55.35 (48.04)	61.95 (51.88)
	S.E.±	0.58	0.70
	C.D. (P=0.05)	1.75	2.11

Figure in parenthesis arcsine values

Chung and Lee (1986), Thakur and Khare (1992), Mishra and Gupta (1994) mentioned that high humidity *i.e.* 90-100% was conducive for spore germination of *C. capsici*. Results of present study are also similar to the findings of these workers. Regarding effect of RH on conidial germination of *L. taurica,* Nour (1958), Clerk and Ayesu Offei (1967) and Caesar and Clerk (1985) stated that higher humidity levels are favourable for conidial germination. These results are in agreement with the observation of present study. However, Zwirn (1943) mentioned that RH between 52-75 % was conducive for conidial germination of *L. taurica*, which differed from observation of present study. This difference can be attributed to variation in isolate of *L. taurica*.

It is seen from the result depicted in Table 3 that relative humidity levels have influenced incubation period of anthracnose. Symptom development was not observed up to a fortnight on either leaves or fruits at 10 % RH. These were not visible on fruits at 25 %.RH. Incubation period was minimum at 100 % RH and steadily increased when RH levels were decreased the highest being at 25% RH.

Table 3 : Effect of relative humidity on development of symptoms of anthracnose on chilli. (Var. Parbhani Tejas) *in vitro*

Sr. No.	RH (%)	Days required for symptom expression	
		Leaves	Fruits
1.	10	-	-
2.	25	10	-
3.	50	7	7
4.	75	6	6
5.	100	4	4

It is seen from results depicted in Table 4 that symptoms of powdery mildew on leaves were not observed at humidity levels of 10, 25 and 100 %. These developed within a period of week after artificial inoculation at 50 and 75 % RH. Manale (1984) Kim and Park (1988), Kaur *et al.* (1989), Beura and Das (1991) have mentioned that extremely wet season or high humidity is conducive for the development of chilli

Table 4 : Effect of relative humidity on development of symptoms of powdery mildew on chilli (var. Parbhani Tejas) *in vitro*

Sr. No.	RH (%)	Days required for symptom expression on leaves
1.	10	-
2.	25	-
3.	50	7
4.	75	7
5	100	-

anthracnose. These observations are similar to the observations made in present study. Regarding development of powdery mildew Ondieki (1972) and Keshwal and Choubay (1983) have reported 74.9 and 68.70 % as optimum relative humidity, respectively for disease development. These observations are more or less on similar line with the observations of present study.

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REFERENCES

Beura, S.K. and Das, S.C. (1991). Relation of anthracnose and bacterial leaf spot complex of betelvien with weather parameters. *Orissa J. Agric Res.,* **4** (142) : 105 –106.

Caesar, J.C. and Clerk, G.C. (1985). Germinability of *Leveillula taurica* (powdery mildew) conidia obtained from water stressed papper plants. *Canadian J. Bot.*, **63**(10): 1681 – 1684.

Chung, B.K. and Lee, S.B. (1986). Effect of conidial number and nutrition on the germination of conidia in *Colletotrichum capsici* causing red pepper anthracnose. *Korean J. Pl. Prot*., **25**(1): 41-46.

Clerk, G.C. and Ayesu Offei, E.N. (1967). Conidia and conidial germination in *Leveillula taurica*. *Ann. Bot.* Nos., **31**(124): 449 -454.

Eswaramurthy, S., Jagannathan, R. and Rani, P. (1996). Control of fruit rot and die-back of chillies with chemicals and plant products. *Indian Cocoa, Arecanut & Spices J.*, **20** (3): 93.

Gohokar, R.T.and Peshney, N.L. (1981). Chemical control of powdery mildew of chilli. *Indian J. agric Sci.,* **51** (9) : 663 -665.

Jindal, K.K., Gupta, S.K. and Shyam, K.R. (1994). Studies on germination, vigor index and micro flora of bell papper seeds from healthy and diseased fruits. *Indian J. Mycol Pl. Pathol.,* **24** (3): 227-228.

Kaur, S., Cheema, D.S. and Omprakash, J. (1989). Correlation of various factors on the disease expression of anthracnose of chilli. *Indian Phytopath.,* **42** (2): 277.

Keshwal, R.L and Choubay, P.C. (1983). Studies on control of powdery mildew of chillies. *Pesticides*, **17**(12): 30- 32.

Kim, C.H. and Park, K.S. (1988). A predictive model of disease progression of red paper anthracnose. *Korean J. Pl. Pathol.,* **4**(4): 325-331.

Manale, V.B. (1984). Investigations on anthracnose of chilli (*Colletotrichum capsici*). M.Sc. (Ag.) Thesis, Marathwada Agriculture University, Parbhani, (M.S.) India, 1-76 pp.

Mathur, R.L., Singh, G. and Gupta, R.B.L. (1972). Chemical control of powdery mildew of chilli caused by *Leveillula taurica*. *Indian J. Mycol. Pl. Pathol.,* **2**: 182 -183.

Mishra, A and Gupta, Om (1994). Influence of environment on growth and sporulation of *Colletotrichum dematium. Indian J. Mycol Pl. Pathol.*, **24** (2) : 85-87.

Nour, M.A. (1958). Studies on *Leveillula taurica* and other powdery mildews. *Trans. Br. mycol. Soc.*, **41**:17-38.

Ondieki, J.J. (1972). Control of powdery mildew of Capsicum with certain systemic and non systemic fungicides. *Acta Hort.,* **33**:137-142.

Pawar, R.N., Utikar, P.G. and Shinde, D.A. (1985). A study of powdery mildew of chilli. *J. Maharashtra agric. Univ*., **10**:218.

Singh, S. and Lodha, S. (1985). Varietal reaction and evaluation of fungicides *in vitro* and *in vivo* against powdery mildew of chilli. *Indian J. agric. Sci.,* **55**(2):85-87.

Stevens, N.E. (1916). A method for studying the humidity relations of fungi in culture. *Phytopathology*, **6**: 428-432.

Thakur, M.P. and Khare, M.N.(1992). Epidemiology of mung bean anthracnose. *Indian J. Pulse Res.*, **5**(1): 49-52.

Zwirn, H.E. (1943). Water content of fungus spores. *American J. Bot.*, **37**: 636-639.

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