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Growth Study of *Cercospora capsici* Causing Leaf Spot Disease of Chilli on Different Media, pH and Temperature

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Abstract: ***Chilli (Capsicum annum L.) is a universal spice of India. It affects mainly with fungal diseases like Cercospora leaf spot which plays a vital role for the qualitative loss mainly affects on leaf. It has become a serious problem in some of the major growing states of India particularly in the early stage of crop. An investigation was carried out to study growth of Cercospora capsici on different media, pH and temperature at Department of Plant Patholgy, College of Horticulture, VCSG UUHF, Bharsar, Pauri Garhwal. Under this experiment different media including both synthetic and non-synthetic were tested for the growth of the pathogen. Among five media evaluated, maximum mycelial growth was observed on Potato dextrose agar (75.08mm) and minimum growth was observed on Corn meal agar (51.03mm) at 30th day of incubation. Hence, non-synthetic media than synthetic media favours the maximum mycelial growth of the pathogen. Different pH values and temperature levels were also tested for the pathogen. The studies revealed that the fungus grew maximum mycelial growth at pH 6.0 (48.22mm) followed by pH 7 (45.85 mm) and least growth observed at pH 9.0 (24.55mm). And at 25°C temperature (46.43 mm) showed the maximum mycelial growth of the fungus while minimum mycelial growth was observed at 35°C temperature (16.24 mm).***

Keywords: Chilli, Cercospora leaf spot, media, ph and temperature

1. Introduction

Chilli (*Capsicum annum* L.) belongs to family Solanaceae. It is a major cash earning crop in India introduced by Portugese in 16th century. India is the largest producer and consumer of chilli among others major producers in the world. The area under chili cultivation is 287.05 ha with production 3406.03 MT (Horticulture Statistics at a Glance, 2017). Chilli is a warm season perennial crop and can be grown throughout the year.

Chilli is famous for its pungency, pleasant aromatic flavor and high colouring substances. Green chillies are rich in Vitamin A and C, minerals and protein. Dry chillies are also rich in Vitamin A and D. Successful production of chillies have been affected by as many as 83 different diseases, in which fungi (Walker, 1952 and Rangaswami, 1979) like Cercospora leaf spot, damping off, wilt, anthracnose (dieback/fruit rot), leaf spots, powdery mildew, bacterial diseases (soft rot and bacterial wilt). Due to Cercospora leaf spot disease, photosynthetic process is disturbed and leaves becomes deformed resulting weakens plant, premature defoliation which ultimately lowers the yield and market value (Franc *et al.,* 2001). The pathogen has been first isolated and named from bell pepper by Heald and Wolf (1911) and later studied by several researchers (Chupp, 1953; Vasudeva, 1963; Meon, 1990; Lim and Kim, 2003 and Bhat *et al.,* 2008). Leaf spot diseases caused by fungus have been a major destructive disease of groundnut and could cause a yield loss of up to 50% or more (Izge *et al.,* 2007). Loss due to this disease has been estimated to 21% in bidi tobacco field under normal monsoon conditions in Gujarat (Kumar *et al.,* 2016).

Cercospora leaf spot of chilli plays a vital role for the qualitative loss mainly affects on leaf. The causal agent *Cercospora* mainly is seed borne, however, the pathogen is also able to survive for at least one year in plant debris and soil also. Primarily their spores are dispersed by wind and is favored by prolong rainfall, 92% relative humidity and 25 to 35ºC temperature. Below 90% relative humidity, the disease does not develop. The fungus survives in plant debris, primary infection coming from air-borne spores derived from it. The disease is more severe in wet weather than in dry weather and becomes destructive in high relative humidity (Cerkauskas, 2004).

2. Materials and Methods

Growth characters on different solid media

The growth characters of the fungus was studied with different solid media namely Carrot dextrose agar media, Potato dextrose agar media (PDA), Oat meal agar media (OMA), Malt extract Agar media, Corn meal agar media. All the media were sterilized at 121ºC on 15 pounds pressure for 15 minutes. 20 ml of each of the medium poured into 90 mm diameter petri plates. Such plates were inoculated with five mm disc of fungal growth and incubated at 25ºC. Each treatments were replicated four times. The fungal colony was measured for 30 days at 5 days interval.

Growth on different pH

Potato Dextrose Agar was used as basal medium. The pH of the media was adjusted using 1 M alkali (NaOH) or 1 M acid (HCL) for different pH concentrations *viz.*, 5.0, 6.0, 7.0, 8.0 and 9.0 were inoculated with five mm disc of fungal growth and incubated at 25°C. In each case, four replications were maintained. The fungal colony was measured after 15 days of incubation.

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Growth on different temperature

Potato Dextrose Agar was used as basal medium. The different temperature levels were tested for the growth of *Cercospora capsici viz.*, 15, 20, 25, 30 and 35ºC. In each case, four replications were maintained. Five mm mycelial disc was transferred into each petri plates containing sterilized PDA media. The fungal colony was measured after 15 days of incubation.

3. Results and Discussion

Growth of *C. capsici* on different solid media

The growth characters of the fungus were studied on five different solid media. Maximum growth of the pathogen at 30th day was observed on T_2 (Potato dextrose agar media) (75.08 mm) which was significant media tested viz., T_1 (Carrot dextrose agar) (71.03 mm), T_4 (Malt extract powder) (64.19 mm), T_3 (Oat meal agar) (62.00 mm) and minimum growth of pathogen was recorded on T_5 (Corn meal agar media) (51.03mm).

Table 1: Effect of different media on mycelial growth (mm) of the pathogen

S. No	Media	5 days± S.E.(m)	10 days± S.E.(m)	15days± S.E.(m)	20 days± S.E.(m)	25 days± S.E.(m)	30 days± S.E.(m)
T_1	Carrot dextrose agar	8.79 ±0.20	25.08±0.99	43.82±0.06	51.10±0.29	58.80±0.39	71.03±0.14
T_2	Potato dextrose agar	13.35 ±0.18	33.06±0.39	46.25±0.72	53.85±0.41	63.76±0.21	75.08±0.2
T_3	Oat meal agar	5.35±0.11	19.45±0.17	37.94±0.27	43.85±0.20	50.67±0.38	62.00±0.11
T_4	Malt extract agar	6.99±0.12	23.90±0.25	40.44±0.37	44.94±0.25	52.22±0.16	64.19±0.18
T_5	Corn meal agar	3.83±0.08	14.90±0.12	27.98±0.28	34.72±0.31	41.64±0.34	51.03±0.12
	SE(d)	0.21	0.71	0.57	0.43	0.44	0.25
	$C.D_{(0.05)}$	0.45	1.53	1.23	0.92	0.95	0.55

Growth on different pH

The effect of different pH levels on the growth of fungus *Cercospora capsici* was studied. The reaction of the medium was adjusted to required pH levels viz., 5, 6, 7, 8 and 9. The maximum mycelial growth of the fungus was obtained at pH 6 (48.22 mm) followed by pH 7 (45.85 mm), pH 5 (40.03 mm) and pH 8 (38.08mm). However, the minimum growth of the fungus was recorded at pH 9 (24.55 mm).

Table 2: Effect of different pH on mycelial growth (mm) of the pathogen

T. No	pH	Growth (mm)± S.E.(m)
T_1	5	40.03±0.18
T_2	6	48.22±0.17
T_3	7	45.85±0.28
T_4	8	38.08±0.23
T_5	9	24.55±0.30
S.E.(d)		0.34
$C.D_{(0.05)}$		0.73

Growth on different temperature

The effect of different temperature on the growth of fungus *Cercospora capsici* after fifteen days of inoculation at different temperatures were recorded. The maximum mycelial growth of the fungus at T_3 (25°C) (46.43 mm) temperature was maximum growth of the pathogen and significantly superior over all other temperatures followed by T_2 (20°C) (36.16 mm), T_4 (30°C) (30.14 mm) and T_1 (15°C) (21.18). Minimum mycelial growth was observed at temperature of T_5 (35°C) (16.24 mm).

Table 3: Effect of different range of temperature on mycelial growth (mm) of the pathogen

T. No	Temperature (°C)	Growth (mm) ± S.E.(m)
T_1	15	21.18±0.23
T_2	20	36.16±0.30
T_3	25	46.43±0.22
T_4	30	30.14±0.26
T_5	35	16.24±0.21
S.E.(d)		0.35
$C.D_{(0.05)}$		0.76

4. Conclusion

In Table 1 Potato dextrose agar (75.08 mm) showed maximum growth of the pathogen while minimum growth was observed in Corn meal agar media (51.03 mm). Among different pH levels tested in table 2, it grew maximum in pH 6 (48.22 mm) while minimum in pH 9 (24.55 mm) and table 3 showed maximum mycelial growth at 25ºC temperature (46.43 mm) whereas 35°C temperature showed (16.24) poor growth of *C. capsici*.

References

[1] Bhat, F. A, Dar, D. M, Teli. M. A. and Ahmad, M. F. 2008. Frogeye leaf spot of bell pepper in Kashmir: prevalence and cause. *Karnataka Journal Agricultural Science*.21 (**3**): 460-461.

[2] Cerkauskas, R. 2004. Pepper Diseases. Cercospora Leaf spot. AVRDC- The World Vegetable Center, Shanhua, Taiwan. pp. 741.

[3] Chupp ,C. 1953. *A monograph of fungus Genus Cercospora*, Ithaca. New York. pp. 667.

[4] Franc, G D, Harveson, R. M, Kerr, E. D. and Jacobsen, B. J. 2001. Disease management in sugarbeet production M.Sc. Thesis University Nebraska Coop. pp. 131-160.

[5] Heald, F. D. and Wolf, F. A. 1911. New species of texas: Fungi. *Mycologia.* 3: 5-22.

[6] Horticulture Statistics at a Glance. 2017. Area and production of crops.

[7] Izge, A. U. Mohammed, Z. H. and Goni, A. 2007. Levels of variability in groundnut (*Arachis hypogaea* L.) to Cercospora leaf spot disease- implication for selection. *African Journal of Agricultural Research.* 2(**4**): 182-186.

[8] Kumar, N. D, Karegowda, C., Murali, R. Sayiprathap, B. R., Mahesh, M., Nagaraj, H. Raju, J., Rudrappa, K. B, Manu, T. G., Kavitha, T. H. and Mahantesh, S. B. 2016. Frog Eye Leaf Spot disease of FCV Tobacco caused by *Cercospora nicotianae* in Southern Districts

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of Karnataka. *Journal of Pune and Apllied Microbiology*. 10(**1**): 401-406.

[9] Lim, Y. S. and Kim, B. S. 2003. Sporulation of *Cercospora capsici* causing Cercospora leaf spot of pepper. *Research in Plant Diseases*. 9(**3**): 162-165.

[10] Meon, S. 1990. Infection of Chilli by *Cercospora capsici*. *Pertanika* .13(**3**): 321-335.

[11] Rangaswami, G. 1979. *Diseases of vegetables. In: Diseases of crop plants in India.* 2nd ed. McGraw Hill Book Company, New Delhi. pp. 345-347.

[12] Vasudeva, R. S. 1963. Indian *Cercosporae*. IARI, New Delhi. pp. 254.

[13] Walker, J. C. 1952. *Diseases of vegetables crops.*1st ed. McGraw Hill Book Company. New York, USA. pp. 306-308.

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