RESEARCH ARTICLE

EFFECT OF ENVIRONMENTAL CONDITIONS ON THE DEVELOPMENT OF ALTERNARIA BLIGHT OF TOMATO (*LYCOPERSICON ESCULANTUM* MILL.)

P.C. Singh[1]*, Ramesh Singh[2], P.P. Tripathi[3] and A.K. Singh[4]

[1,2]Department of Plant Pathology , TDPG College, Jaunpur 222002
[3]Krishi Vigyan Kendra, East Kameng 790102
[4]Krishi Vigyan Kendra, Tirap 792129

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Abstract: The environmental factor play very important role in the development of the plant disease. Alternaria blight of tomato during two year is observed 2014-15 and 2015-16 crop season. The disease appears in the 3rd week of November in both the year. Maximum disease incidence 40.5% was observed in the 4th week of January 2014-15 and 2nd week of January 2015-16 crop season. When the average temperature and relative humidity 14.1 and 84.2% on the average disease incidence was observed 3rd week of January 2014-15 and 2nd week of January 2015-16 crop.

Keywords: Environmental factor, Alternative, Tomato

INTRODUCTION

The tomato (*Lycopersicon esculantum*) is one of the most popular vegetable crops in India. The center of origin of Tomato (*Lycopersicon esculantum*) is south America. Tomato (*Lycopersicon esculantum*) is belong to family- Solanaceae and genus - Lycopersicon. Hybrid variety in India are of the recent origin with the technology most successful in Tomato(*Lycopersicon esculantum*) result in large area coverage. Tomato is grown on variety of soil ranging from sandy to clay. Soil pH level should be between 6.0 to 7.0 for getting a good crop.

Tomato (*Lycopersicon esculantum*) dose not come up well under extreme weather conditions. Excess humidity predisposes tomato to many diseases. Day temperature of 28 ^{o}C and night temperature of 18 ^{o}C is ideal for its growth. Sun light is essential for the crop to produce vitamin 'C'. Tomato (*Lycopersicon esculantum*) is also reached in medicinal value. Tomato (*Lycopersicon esculantum*) is most severely affected by various (Viral, Nematodes, Mycoplasma, Bacterial and Fungal diseases) twenty diseases of tomato (*Lycopersicon esculantum*) reported from different part of country. Alternaria blight of tomato caused by *Alternaria alternata* f.sp. *lycopersici* is the serious disease the crop in U.P. . It's well documented that environmental factors play very important role in the development of the plant diseases. The symptoms like dark brown, sunken lesion often with irregular yellow margin may occur on many germplasm. The leaf symptom of dark brown to black canker with concentric zonation occur on stem near the soil line or above ground . Therefore, the present investigation was under taken to find out the role of atmospheric temperature and relative humidity in the development of Alternaria blight of tomato. To study the effect of atmospheric temperature and relative humidity on disease development, the plant were raised in a highly sick plot (3 X 2 m) with previous known history of Alternaria blight of tomato during two consecutive crop season *viz.,* 2014-15 and 2015-16. The experimental was carried out in a randomized block design (RBD) with four replications at Students from Pilikothi of T.D.(.P.G.) College, Jaunpur. Disease incidence was recorded at weekly interval in experimental plots.

The disease appeared in the third week of November in both the years during 2014-15 and 2015-16 which increase gradually with decrease in temperature and increase in relative humidity. Maximum disease incidence (40.5%) was observed in the fourth week of January during 2014-15 crop seasons when the average temperature and relative humidity were 14.1 and 84.2% respectively. On an average the disease incidence was at par with third week of January 2014-15and second week of January 2015-16 (Table 1 & 2). Thus it may be concluded that in general the disease incidence increased with the decrease of atmospheric temperature and increase the relative humidity (Fig. 1 & 2). There was no further increase in disease incidence as the temperature raised though the relative humidity was sufficient enough.

MATERIAL AND METHOD

To study the effect of atmospheric temperature and relative humidity on disease development. The plant were raised in a highly sick plot (3x 2 m^2) with previous known history of Alternaria blight of tomato during two constutive crop season *viz.,* 2014-15 and 2015-16. The experiment was carried out of RBD with four replication. As soon as the disease was observed the number of plant infected were recorded. Subsequently the disease incidence was recorded weekly and it was correlated with atmospheric data. Thus the data on the maximum and minimum temperature and relative humidity for

*Corresponding Author

growth and development of the disease were recorded. The information of atmospheric temperature and relative humidity was collected from the meteorological observation Babatpur, Varanasi.

RESULT AND DISCUSSION

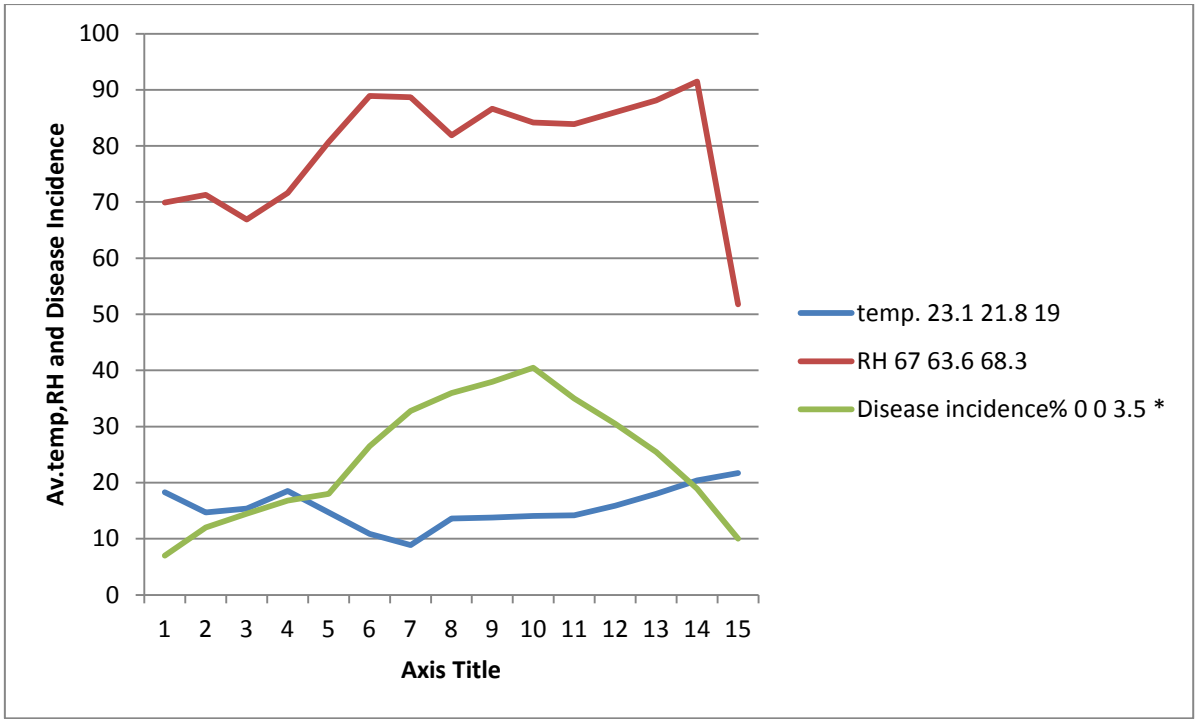
It is well documented that environmental factor play very important role in the development of plant disease. There for the present investigation was under taken to find out the role of atmospheric temperature and relative humidity in the disease development of Alternaria blight of Tomato (*Lycopersicon esculantum*). The disease incidence was recorded at weekly interval in the experimental plot.

The data presented in the table – (1) and table – (2) and corresponding histogram Fig – (1 and 2) related with environmental factor *viz.* atmospheric temperature and relative humidity that play an important role in the disease development and also significant correlation was observed between that environmental factor and disease incidence. The disease appeared in the 3rd week in the both crop season during 2014-15 and 2015-16. Which increase gradually within the decrease the temperature and increase relative humidity.s Maximum disease incidence (40.5%) was observed in the 4th week of January during 2014-15, when the temperature and relative humidity were 16.1 ^{o}C and 63.5% during 2015-16 respectively. Further it was noted that disease incidence was observed when atmospheric temperature was near about 8.9 ^{o}C with 88.7% relative humidity. Hence it could be inferred from the result that tomato plant were most susceptible to infection when atmospheric temperature was near about 13.8 ^{o}C to 1 ^{o}C followed by maximum relative humidity.

Table 1. Effect of atmospheric temperature and relative humidity on the disease incidence during 2014-15.

Standard Week	Date	Temperature ^{o}C		Average temperature ^{o}C	Humidity	Average disease incidence %
		Maximum	Minimum			
44	29 Oct - 4 Nov.	31.5	14.7	23.1	67.0	00.0
45	05-11 Nov	31.5	12.6	21.8	63.6	00.0
46	12-18 Nov.	27.4	10.6	19.0	68.3	3.5 (10.78)*
47	19-25 Nov	26.6	10.0	18.3	69.9	7.0(15.34)
48	26Nov- 02Dec	25.0	4.4	14.7	71.3	12.0(20.26)
49	03-09 Dec	24.8	6.0	15.4	66.9	14.5(22.38)
50	10-16Dec	27.2	9.9	18.5	71.6	16.8(24.19)
51	17-23 Dec	20.1	9.5	14.7	80.7	18.0(25.10)
52	24-31Dec	14.3	7.5	10.9	88.9	26.5(30.98)
1	01-07Jan	12.7	5.2	8.9	88.7	32.8(34.93)
2	08-14Jan	18.9	8.2	13.6	81.9	36.0(36.85)
3	15-21 Jan	17.7	10.0	13.8	86.6	38.5(38.35)
4	22-28 Jan	18.8	9.3	14.1	84.2	40.5(39.52)
5	29Jan - 04 Feb	09.8	8.7	14.2	83.9	35.0(36.27)
6	05-11 Feb	23.8	8.0	15.9	86.0	30.5(33.52)
7	12-18 Feb	25.5	10.5	18.0	88.1	25.5(30.32)
8	19-25 Feb	27.5	13.2	20.4	91.5	18.9(25.76)
9	26 Feb- 04 March	30.1	13.2	21.7	51.8	10.0(18.43)
C.D. at 5%						(1.16)

*Transferred values indicated in parenthesis.

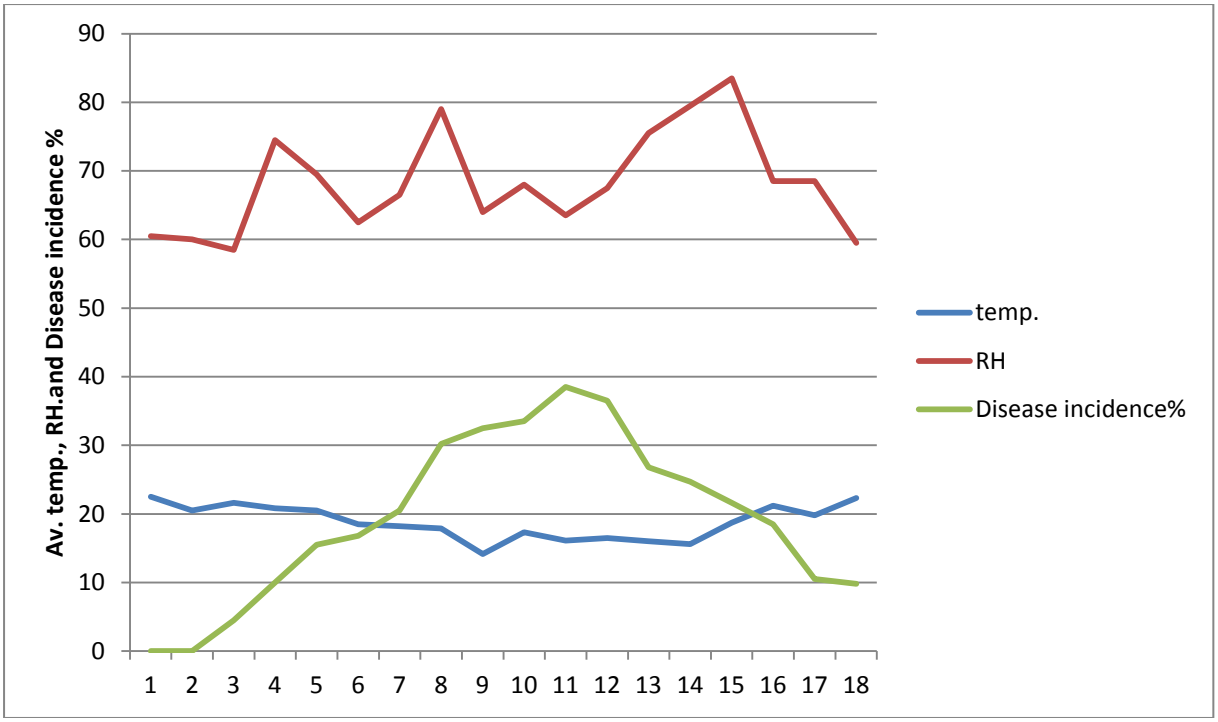


1-29 Oct - 4 Nov., **2** - 05-11 Nov., **3**-12-18 Nov.,**4** - 19-25 Nov, **5** - 26Nov- 02Dec, **6** - 03-09 Dec,**7**- 10-16 Dec, **8**- 17-23 Dec, **9**- 24-31 Dec, **10**- 01-07 Jan, **11**- 08-14 Jan, **12**- 15-21Jan, 13 – 22 – 28 Jan, **14** – 29Jan – 04 Feb, **15** – 05-11Feb, **16** – 12-18 Feb, **17** – 19 – 25 Feb,**18** – 26 Feb.-04 March.

Table 2. Effect of atmospheric temperature and relative humidity on the disease incidence during 2015-16.

Standard week	Date	Temperature °C		Average temperature °C	Humidity	Average disease incidence %
		Maximum	Minimum			
44	29 Oct - 4 Nov.	29.8	14.3	22.5	60.5	00.0
45	05-11 Nov	29.0	12.0	20.5	60.0	00.0
46	12-18 Nov.	30.2	13.0	21.6	58.5	4.5 (12.24)*
47	19-25 Nov	27.4	14.3	20.8	74.5	10.0(18.43)
48	26Nov- 02Dec	27.4	13.6	20.5	69.5	15.5(23.18)
49	03-09 Dec	26.2	11.5	18.5	62.5	16.8(24.19)
50	10-16Dec	25.2	11.3	18.2	66.5	20.5(26.92)
51	17-23 Dec	23.5	12.4	17.9	79.0	30.2(33.33)
52	24-31Dec	20.0	8.3	14.15	64.0	32.5(34.75)
1	01-07Jan	23.5	11.1	17.3	68.0	33.5(35.36)
2	08-14Jan	22.8	9.3	16.1	63.5	38.5(38.35)
3	15-21 Jan	23.2	9.8	16.5	67.5	36.5(37.16)
4	22-28 Jan	21.5	10.5	16.0	75.5	26.8(31.17)
5	29Jan - 04 Feb	20.4	10.8	15.6	79.5	24.7(29.80)
6	05-11 Feb	24.9	12.6	18.7	83.5	21.6(27.69)
7	12-18 Feb	27.7	14.8	21.2	68.5	18.5(25.47)
8	19-25 Feb	25.5	14.2	19.8	68.5	10.5(18.90)
9	26 Feb- 04 March	29.1	15.6	22.3	59.5	9.8(18.24)
C.D. at 5%						(0.69)

*Transferred values indicated in parenthesis.



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