Epidemiological study of Anthracnose disease of yam (*Dioscorea alata* L.) caused by *Colletotrichum capsici* under south Gujarat Condition

Abstract

The field-grown cultivar NAUDA-1 showed associations with a number of meteorological characteristics based on weekly assessments of anthracnose intensity. Significant positive connections were found in the correlation matrix between sunshine hours (0.5286) and maximum temperature (0.0094). On the other hand, there were notable negative connections found with wind speed (-0.8334), rainfall (-0.4883), relative humidity (-0.8108), and minimum temperature (-0.9339). The development of anthracnose was significantly influenced by the combination of these meteorological conditions.The variables that showed the greatest influence in positively influencing the intensity of anthracnose were the maximum temperature and the number of sunshine hours. Furthermore, in comparison to other metrics, the maximum temperature, relative humidity, and number of sunshine hours were found to be significant factors in the development of disease. This emphasises how intricately meteorological patterns interact to affect the anthracnose development in cv. NAUDA-1.

Key words: *Colletotrichum capsici*, epidemiology, *Dioscorea alata* L., Anthrcnose

Introduction

The Dioscoreaceae family includes the yam (*Dioscorea* spp.), a popular root vegetable. With over 600 species, most of which are found in tropical regions, its origins can be traced back to the Indo-Burmese region of Southeast Asia (Asiedu and Sart, 2010). Throughout Africa, Asia, Latin America, and Oceania, these perennial vines are extensively grown for their tubers, which are an essential source of starch. A total of 74.4 million tonnes of yams are produced worldwide from 8.8 million hectares of yam agriculture, with an average productivity of 8.5 tonnes per hectare (Anon., 2020). A total of 30,000 hectares are used for yam farming in India, yielding 80,000 metric tonnes (0.8 million) year with an average productivity of 28 tonnes per hectare (Thamburaj and Singh, 2015). India's primary yam-producing states are Gujarat, Maharashtra, The main foods of the Indians are two Asiatic yams: *Dioscorea alata* Linn. (larger yam) and *Dioscorea esculenta* (Lour.) Murkill (lesser yam). The yams used in pharmacological research are inedible (Thamburaj and Singh, 2015).

At different stages of growth, a variety of fungal and viral infections have been detected in edible yams. The most significant fungal diseases are anthracnose (*Colletotriehumgloeosporioides*Penz. and Sacc.), Cercospora leaf spot (*Cercospora* sp.), Curvularia leaf spot (*Curvulariaeragrostides* (Henn.) Meyer), leaf blight (*Pestaloptia* sp.), dry rot (*Botryodiplodiatheobromae* Pat., *Penicillium oxalicum* Currie and Thom, *Penicillium italicum* Wehmer), soft rot (*Rhizopus nigricans* Ehr., *Sclerotium rolfsii*Sacc.), and bacterial disease, namely wet rot (*Erwinia caratovora*sub.sp. *caratovora* Jones) in storage. Reports of yam mosaic disease indicate a viral infection. An aphid-transmitted potyvirus, which mostly affects *Dioscorea* species *D. alata* L., *D. cayenensis* L., *D. rotundata*Poir, and *D. trifida* L., is the cause of this disease(Mantell, 1980; IITA, 1993).

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This disease is increasingly common in India and affects all *Dioscorea* species annually, however it only affects D. alata in a serious way. According to Thamburaj and Singh (2015), the early indications were brown pinhead-sized patches on the leaves. As the disease progressed, the leaves and stems became entirely blighted and dried out. Disease reports were made on D. alata from the Rajasthani city of Udaipur (Prasad and Singh, 1960) and on Dioscorea sp. from the state of Mysore (Rangaswami *et al.*, 1970). *Colletotrichum* gloeosporioides Penz. and Sacc. causes yam anthracnose. This was originally documented in Rajasthan in a terrible form, resulting in a 70–80% yield loss in favourable weather conditions.

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Materials and Methodology

Epidemiology is the study of all the variables connected to the onset of disease. According to Singh (1996), the three main causes of the disease are a virulent infection, a susceptible host, and favourable climatic conditions that coincide with the outbreak. An attempt was made to investigate the impact of meteorological elements on the yam anthracnose illness, taking into account the disease triangle theory.

In 2016–17 (date of sowing: May 16, 2016 and date of harvesting: January 10, 2017) and 2017–18 (date of sowing: June 2, 2017 and date of harvesting: January 28, 2018), the experiment was carried out at College farm, Navsari Agricultural University, Navsari. NAUDA-1, A single type of yam was cultivated on a 20 by 20 metre space.

Progress of anthracnose disease in cv. NAUDA-1 under natural condition

The current analysis was conducted to determine the window time of the illness, vulnerable stage of the crop, and period/crop stage for the onset and progression of anthracnose across the full crop season. The crop was left completely unprotected, and no fungicides or bioagents were applied. Every agronomic procedure was carried out in accordance with the advice.

From crop germination until harvest, weekly observations were made on the severity of anthracnose and meteorological conditions in both years. In order to document the intensity observations, ten plants were chosen at random and labelled. Nine leaves total (three from the lower, three from the middle, and three from the upper side of each plant) were taken from each and examined to determine the severity of the anthracnose disease on a 0–6 scale (0–No infection, 1-0.1 to 10%, 2-10.1 to 20%, 3-20.1 to 30%, 4–30.1 to 40%, 5–40.1 to 50%, and 6- >50%). The grades were determined using the methodology recommended by Palarpawar and Ghurde (1989).

Per cent disease intensity was calculated by following formula:

$$\text{PDI} = \frac{\sum \text{of ratings of infected leaves observed}}{\text{No. of leaves observed X Maximum disease score}} \text{ X } 100$$

Correlation of anthracnose intensity with weather parameters

The weekly observations of the intensity of anthracnose during the Meteorological Standard Week (MSW) were documented. In order to ascertain the impact of diverse environmental physical factors on the development of the yam anthracnose disease, correlation regression analysis was used to analyse data pertaining to the intensity of anthracnose in relation to several meteorological parameters, including rainfall (mm), maximum temperature (Max. T.), minimum temperature (Min. T.), relative humidity (RH %), sunshine hours, and wind speed (km/h). The Meteorology Department of N.M. College of Agriculture, Navsari Agricultural University, Navsari provided the relevant data on the various weather factors from the previous week. As previously mentioned, the percentage of anthracnose illness intensity was noted. The various climatic characteristics that corresponded with the intensity of anthracnose detected during the crop season at regular week intervals were correlated.

Results and Discussion

The majority of epidemiological studies are classified into two categories: (1) those designed to examine the impact of as many host, pathogen, and environmental variables as possible on the development of disease (known as the Holistic approach); and (2) those in which the majority of the epidemic is explained by a limited number of key variables (known as the Meristic approach). Due to certain restrictions, a meristic technique was used in a single plot experiment that was appropriate for research conducted inside a disease triangle.

Progress of anthracnose in cv. NAUDA-1 under natural condition

The Meteorological Standard Week (MSW) was used to record the observations of anthracnose intensity from cv. NAUDA-1 grown at College Research Farm and Organic Farm, N.A.U., Navsari in the years 2016–17 and 2017–18, respectively.

After 105 and 110 days of planting, the initial anthracnose intensity was seen in the susceptible variety NAUDA-1, which was grown on May 16 and June 2, respectively, in 2016–17 and 2017–18. Since then, the illness has progressed linearly in both seasons. In the 2016–17 period, it first appeared on August 29 (3.33%) in the 33rd MSW and peaked on January 9 (48.67%) in the first MSW. It began on August 28, 2017 (6.67%) (the 34th MSW, 2017), and on January 8, 2018 (the 1st MSW, 2018), it reached the highest level. The highest increase in anthracnose intensity was noted in 2016–17 and 2017–18 on September 23 (the 38th MSW to October 14th MSW) (20.00 to 32.33%) and September 17 (the 37th MSW to October 8th MSW) (16.67 to 33.33%), respectively. Therefore, throughout the duration of the season, the period from September 17 (the 37th MSW) to October 14 (the 41st MSW) can be regarded as the window period for yam anthracnose (Tables 1 and 3).

Correlation of anthracnose disease intensity with weather parameters

An epidemiological study was conducted from the time the disease first appeared in the crop until it was harvested. Tables 2, 4, and 6shows the anthracnose infection in susceptible cv. NAUDA-1 and the associated weather conditions prior to Meteorological Standard Week (MSW). The findings demonstrated the disease's steady progression up to the harvesting stage.

2016-17

Symptoms of anthracnose first appeared in the 35th week of 2016. The previous two weeks, the 33rd and 34th MSW, saw 3.4 and 2.6 sunlight hours, and 2 and 12 mm (total 14 mm) of rainfall. The lowest temperature is 25 °C and the highest temperature is 29–30 °C, with relative humidity ranging from 83–90%. The anthracnose was more likely to begin under these circumstances. There were more suitable meteorological conditions, such as 23 °C, which was thought to be the anthracnose illness window time. The progression of the sickness was relatively slower from the 42nd MSW (2016) to the 2nd MSW (2017) than it had been in prior weeks. High temperatures (Max. T. 31–34 °C, Min. T. 14–17 °C, and Av. 22.60 °C) and low humidity (47% to 69%, Av. 56%) may be the cause of this.

The maximum temperature (0.0793) and sunshine hours (0.6404) showed a significant correlation with the percent disease intensity. On the other hand, the anthracnose intensity was found to be significantly and negatively correlated with the minimum temperature (-0.9432), relative humidity (-0.7928), rainfall (-0.3360), and wind speed (-0.5425). When it comes to the development of disease, the maximum temperature, relative humidity, and sunshine hours are more significant than other meteorological factors.

2017-18

Due to comparable meteorological conditions, rather identical tendencies regarding the anthracnose's progression were noted in the year that followed. The 35th MSW saw the same illness onset in 2017 as it did in 2016. The previous two weeks, on the 33rd and 34th MSW, saw 10 and 90 mm (total 100 mm) of rainfall and 6.2 and 3.3 hours of sunshine, respectively. There was a range of 29 to 31°C for the maximum temperature and 24 to 25°C for the minimum temperature, along with 83 to 90% relative humidity. The beginning of the anthracnose was promoted by these circumstances. Higher disease progression was caused by more suitable meteorological circumstances, such as the maximum temperature of 29–36 °C, lowest temperature of 23–24 °C (Av. 29 °C), rainfall of 28 mm, and relative humidity of 73–87 percent (Av. 80%) during the 38th to 40th MSW of 2017. The 38th and 40th MSW (2017) had a sharp rise in anthracnose because to the warm weather and high temperatures, which were thought to be anthracnose's window period. The progression of the sickness was relatively slower from the 41st MSW (2017) to the 2nd MSW (2018) than it had been in prior weeks. The occurrence of high temperatures (Max T. 29 °C to 35 °C, Min. T. 10 to 23 °C, Av. 25 °C) and 37 mm of rainfall with low humidity could be the cause of this (19% to 81%, Av. 50%).

The maximum temperature (0.0748) and sunshine hours (0.0274) were positively correlated with the percent disease intensity, according to Table 4 correlation analysis. In contrast, the anthracnose intensity was significantly and negatively correlated with the minimum temperature (-0.9038), relative humidity (-0.7524), rainfall (-0.4279), and wind speed (-0.7025). Thus, it seemed that the development of disease was significantly influenced by the maximum temperature, relative humidity, and number of daylight hours.

Pooled

The results of the last two years clearly show that anthracnose is a major issue in the Navsari district due to the presence of the virus, the local cultivation of vulnerable varieties, and the frequency of hospitable weather. After germination (20th - 34th MSW), the maximum temperature range of 29°C to 35°C (Av. 32°C), relative humidity of 50% to 60%, and rainfall of 885mm are more conducive for the start and development of anthracnose. The limited temperature range (Av. 30 °C to 33 °C) and high humidity (Av. 89.40%) are critical for the disease's rapid progression (38th - 41st standard weeks). In contrast to the preceding weeks (38th to 41st standard weeks), the disease's progression was slower during the 42nd week of the previous year and the 2nd week of the following year. Low temperatures (Av. 23–25 °C), less rainfall (Total 18.5 mm), and lower relative humidity (Av. 58%), may be the cause of this. The crop, which was sown less than 105 days ago, did not develop an anthracnose infection (Table 5).

A substantial and positive correlation was established between the highest temperature (0.0094) and sunshine hours (0.5286) when the percent illness intensity and weather parameter were associated (Table 6). Relative humidity (-0.8108), wind speed (-0.8334), rainfall (-0.4883), and minimum temperature (-0.9339) were shown to be strongly and negatively linked with the intensity of anthracnose. Each of these elements contributed significantly to the emergence of the illness. However, the development of the disease was mostly influenced by the maximum temperature and the number of daylight hours.

The current study's findings are consistent with previous researchers' reports. Dodd *et al.* (1991) provided epidemiology information regarding yam anthracnose. When it rained, the pathogen dispersed across crop canopies on water-borne conidia, causing symptoms on the leaves and stems. Even though free surface moisture was only apparent at 100% relative humidity, conidia germinate and develop appresoria at relative humidity levels between 95% and 100%. In their 1948 study, Roy investigated the association between the disease severity of betelvine leaf spot, which is caused by *Colletotrichum capsici*, and five climatic parameters: maximum temperature, minimum temperature, maximum relative humidity, minimum relative humidity, and rainfall. Regarding the rate at which the disease progressed, they observed varying types of responses in various betelvine cultivars. Maximum temperature and maximum relative humidity were found to have a positive and negative correlation, respectively, with disease severity when meteorological factors were subjected to multiple regression analysis.

The findings indicated that heavier and continuous rainfall along with warm weather was the cause of the increased anthracnose intensity. During the 38th and 41st standard weeks, when the crop was in the vegetative phase, this situation was present. Due to the significant loss this produced, it is thought to be the main factor limiting the area's yam tuber's commercial production. This is recognised as one of the factors contributing to the region's low production.

References

Anonymous, (2020) https://knoema.com/data/agriculture-indicators-production+yams

Asiedu R, Sart A. Crops that feed the World: Yams for income and food security. Food Security: Springer. 2010;2:305-315. DOI: 10.1007/s12571-01 0-0085-0.

Dodd, J.C., Estrada, A.B., Matcham, J., Jeffries, P. and Jeger, M.J. The effect of climatic factors on Colletotrichum gloeosporioides, causal agent of mango anthracnose, in the Philippines. *Plant Pathology*., 1991;40:568-575

IITA (1993). Crop Improvement division/Tuber root Improvement Program Archival Reports (1989-1993). Part III yam, *Dioscorea* spp. Ibadan, Nigeria, Pp: 20-85.

Mantell, S. H. (1980). Apical meristem-tip culture for eradication of flexuous rod viruses in yam (*Dioscorea alata*). *Trop. Pest Mgt.*, **26**: 170-179.

Palarpawar, M. Y. and Ghurde, V. R. (1989). Source of resistance in turmeric against leaf spot incited by *Colletotrichum capsici*and *C. curcumae, Ind. Phytopath.*, **42**: 171-173.

Prasad, N. and Singh, R. D. (1960). Anthracnose disease of *Dioscorea alata* L. *Curr.Sci.*, **29**: 66-67.

Rangaswami, G., Seshadri, V. S. and Lucky Chinnamma, K. A. (1970). Fungi of South India University of Agriculture Sciences, Bangalore. Pp: 193.

Roy, T. C. (1948). Anthracnose disease of betelvine (*Piper betle* L.) caused by *Colletotrichum dastur*; Roy, in *Bengal. J. Indian Bot. Soc*., 27: 96-102.

Singh, R. D. (1996). Relevance of epidemiology in integrated disease management. *Ind. Phytopath.*, **44**(2): 127-128.

Thamburaj, S. and Singh, N. (2015). Vegetables, tubercrops and spices. ICAR, New Delhi, Pp: 415-426.

Table 1: Meteorological parameters and anthracnose disease intensity on yam cv. NAUDA-1 in Navsari during 2016-17

MSW	Atmospheric Temperature (°C)		Relative humidity (%)	Rainfall (mm)	Wind speed (km/hr)	Bright sunshine hours	Anthracnose intensity (%)
	Max.	Min.					
20	36.0	26.4	70.9	0.0	6.8	9.2	0
21	33.5	28.4	70.6	0.0	13.0	8.6	0
22	34.7	28.1	67.1	0.0	9.9	9.4	0
23	34.2	28.3	80.4	0.0	9.8	7.5	0
24	34.3	28.3	75.7	0.5	12.4	7.2	0
25	33.6	27.2	73.0	5.1	8.2	3.4	0
26	32.7	25.2	85.5	85.4	8.3	4.8	0
27	30.0	25.6	89.5	201.0	7.7	1.9	0
28	30.1	25.5	87.3	20.5	8.7	0.7	0
29	29.9	24.4	85.9	85.5	7.2	2.7	0
30	29.5	24.3	89.3	86.0	4.7	0.4	0
31	28.3	24.5	92.7	213.0	5.9	0.6	0
32	29.2	24.5	91.2	17.0	9.0	1.7	0
33	30.2	25.5	84.0	2.0	8.5	3.4	0
34	29.9	25.0	83.4	12.4	7.5	2.6	0
35	30.4	24.8	82.2	21.0	5.4	4.1	3.3
36	30.1	23.9	80.8	150.0	6.4	6.4	6.7
37	30.3	23.6	88.6	20.0	3.6	4.9	10.0
38	28.7	23.6	93.4	290.0	3.2	0.4	16.7
39	31.1	23.1	85.0	66.0	3.5	4.5	20.0
40	29.8	23.9	89.6	59.0	3.7	2.9	26.7
41	30.4	22.7	84.3	37.0	3.3	5.6	29.7
42	33.5	19.9	70.1	0.0	2.3	8.3	32.3
43	33.1	18.3	61.1	0.0	2.5	9.3	34.7
44	31.9	17.2	63.2	0.0	3.1	9.5	36.0
45	33.5	14.5	51.9	0.0	2.5	9.4	36.3
46	33.2	15.9	53.7	0.0	2.8	8.7	38.7
47	33.1	13.4	46.6	0.0	2.6	9.3	39.3
48	33.7	13.1	52.5	0.0	2.4	9.7	41.3
49	32.6	15.2	50.7	0.0	3.8	9.0	43.3
50	32.0	13.3	49.6	0.0	3.1	9.4	43.7
51	32.1	14.5	49.7	0.0	3.3	8.7	44.3
52	31.5	12.2	49.9	0.0	3.0	9.0	46.4
1	31.3	12.3	56.5	0.0	2.5	8.8	47.0
2	27.6	12.0	54.4	0.0	3.8	8.6	48.7

Table 2: Correlation of anthracnose disease intensity and weather parameters (2016-17)

Weather parameters		r (Correlation)
Atmospheric temperature (^{0}C)	Maximum	0.0793
	Minimum	-0.9431*
Relative humidity (%)		-0.7928*
Rainfall (mm)		-0.3360*
Wind Speed (km/hr)		-0.8047*
Bright sunshine hours		0.6403*

Note: +/- 0.33331 Critical value (0.05%)

* Significant

Table 3: Meteorological parameters and anthracnose disease intensity on yam cv. NAUDA-1 in Navsari during the year 2017-18

MSW	Atmospheric Temperature (°C)		Relative humidity (%)	Rainfall (mm)	Wind speed (km/hr)	Sunshine Hours	Anthracnose intensity (%)
	Max.	Min.					
20	35.10	26.83	71.0	0.0	8.6	9.9	0
21	35.17	27.19	69.4	0.0	8.6	10.2	0
22	34.50	27.84	72.7	4.0	10.1	7.9	0
23	34.29	26.43	78.7	38.0	8.5	7.7	0
24	32.61	25.43	82.5	40.0	5.9	6.7	0
25	33.73	27.16	77.8	12.0	9.4	8.0	0
26	30.00	24.46	92.7	221.0	8.6	1.3	0
27	31.29	26.20	82.4	35.0	9.2	3.6	0
28	31.43	25.44	83.8	32.0	8.1	5.0	0
29	29.16	24.46	93.8	330.0	6.9	2.0	0
30	29.00	25.16	91.7	152.0	8.9	0.1	0
31	30.04	25.14	81.7	56.0	19.2	4.2	0
32	30.93	25.20	84.2	22.0	6.0	4.6	0
33	31.27	25.49	83.0	10.0	6.8	6.2	0
34	29.40	24.59	90.7	90.0	5.0	3.3	0
35	29.31	24.14	91.4	177.0	4.91	3.24	6.7
36	31.36	24.71	85.6	3.0	4.02	5.17	9.7
37	34.04	25.13	83.1	2.0	2.85	4.69	13.3
38	31.41	23.71	87.9	0.0	3.32	2.13	16.7

39	33.31	23.81	79.8	0.0	2.30	7.30	23.3
40	36.71	24.17	73.7	28.0	2.95	8.40	29.3
41	34.39	23.70	81.3	0.0	3.15	4.30	33.3
42	35.87	22.31	82.4	0.0	2.19	7.20	34.7
43	35.00	19.81	68.6	0.0	2.59	9.34	36.5
44	35.34	16.99	47.7	0.0	2.35	9.79	36.8
45	34.26	16.26	51.7	0.0	2.83	9.61	38.7
46	32.34	14.29	57.8	0.0	2.49	8.29	41.3
47	34.03	15.74	63.8	0.0	2.55	6.50	42.7
48	33.13	15.03	54.0	0.0	2.53	7.96	44.7
49	26.59	17.93	76.0	37.0	4.34	2.50	46.7
50	29.51	15.57	70.1	0.0	2.28	6.39	46.7
51	29.79	16.64	51.9	0.0	4.41	3.83	49.3
52	27.16	9.73	49.6	0.0	2.27	7.28	50.0
1	29.74	10.16	62.5	0.0	2.40	7.91	51.7
2	29.49	15.56	50.1	0.0	3.72	5.76	53.3

Table 4: Correlation of anthracnose disease intensity and weather parameters (2017-18)

Weather parameters		r (Correlation)
Atmospheric temperature (^{0}C)	Maximum	0.0748
	Minimum	-0.9037*
Relative humidity (%)		-0.7523*
Rainfall (mm)		-0.4279*
Wind Speed (km/hr)		-0.7025*
Bright sunshine hours		0.2736

Note: +/- 0.33331 Critical value (0.05%)

* Significant

Table 5: Meteorological parameters and anthracnose disease intensity on yam cv. NAUDA-1 in Navsari during 2016-17 and 2017-18 (Pooled)

MSW	Atmospheric Temperature (°C)		Relative humidity (%)	Rainfall (mm)	Wind speed (km/hr)	Bright sun hours	Anthracnose intensity (%)
	Max.	Min.					
20	35.55	26.63	70.9	0.0	7.7	9.6	0
21	34.31	27.77	70.0	0.0	10.8	9.4	0
22	34.58	27.95	69.9	2.0	10.0	8.6	0
23	34.22	27.36	79.5	19.0	9.1	7.6	0
24	33.46	26.89	79.1	20.3	9.1	6.9	0
25	33.65	27.19	75.4	8.6	8.8	5.7	0
26	31.34	24.81	89.1	153.2	8.5	3.1	0
27	30.64	25.89	86.0	118.0	8.4	2.8	0
28	30.79	25.46	85.6	26.3	8.4	2.9	0
29	29.54	24.41	89.9	207.8	7.1	2.4	0
30	29.23	24.73	90.5	119.0	6.8	0.3	0
31	29.17	24.80	87.2	134.5	12.6	2.4	0
32	30.06	24.83	87.7	19.5	7.5	3.2	0
33	30.72	25.47	83.5	6.0	7.6	4.8	0
34	29.64	24.78	87.0	51.2	6.2	2.9	0

35	29.84	24.48	86.8	99.0	5.2	3.7	5.0
36	30.74	24.30	83.2	76.5	5.2	5.8	8.2
37	32.16	24.34	85.9	11.0	3.2	4.8	11.7
38	30.07	23.65	90.7	145.0	3.2	1.2	16.7
39	32.21	23.47	82.4	33.0	2.9	5.9	21.7
40	33.25	24.04	81.7	43.5	3.3	5.7	28.0
41	32.39	23.20	82.8	18.5	3.2	5.0	31.5
42	34.70	21.09	76.2	0.0	2.2	7.7	33.5
43	34.03	19.04	64.8	0.0	2.5	9.3	35.6
44	33.61	17.11	55.5	0.0	2.7	9.7	36.4
45	33.86	15.38	51.8	0.0	2.7	9.5	37.5
46	32.76	15.11	55.8	0.0	2.7	8.5	40.0
47	33.59	14.56	55.2	0.0	2.6	7.9	41.0
48	33.41	14.09	53.2	0.0	2.5	8.8	43.0
49	29.60	16.59	63.3	18.5	4.1	5.8	45.0
50	30.78	14.43	59.8	0.0	2.7	7.9	45.2
51	30.92	15.56	50.8	0.0	3.9	6.3	46.8
52	29.34	10.98	49.8	0.0	2.6	8.1	48.2
1	30.53	11.23	59.5	0.0	2.4	8.3	49.4
2	28.54	13.77	52.2	0.0	3.7	7.2	51.0

Table 6: Correlation of anthracnose disease intensity and weather parameters (pooled)

Weather parameters		r (Correlation)
Atmospheric temperature (^{0}C)	Maximum	0.0094
	Minimum	-0.9339*
Relative humidity (%)		-0.8108*
Rainfall (mm)		-0.4883*
Wind Speed (km/hr)		-0.8333*
Bright sunshine hours		0.5286*

Note:+/- 0.23502 Critical value (0.05%)

* Significant