

# Air Monitoring of Cercospora Pathogenic to Groundnut in Nearby Village Area of Ambajogai

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**Abstract-Exploration of airborne spores of Cercospora over the fields of groundnut from June to September 2022 was carried out, by using Tilak Air sampler. The maximum concentration (8876/m<sup>3</sup> of air) of the spores was recorded in the month of September and highest daily means (644/m<sup>3</sup> of air) on 28<sup>th</sup> August 2022 during the Kharif season. The minimum concentration (6202/m<sup>3</sup> of air) of the spores was recorded in the month of August 2022.**

**The concentration of the spores of Cercospora was very significantly recorded during the seed formation stage of the groundnut crop. The number of the conidia deposited on the surface showed a positive correlation with airborne conidial concentration.**

**Key Words: - Cercospora, Groundnut, air monitoring.**

## INTRODUCTION

The tikka disease is the major disease of groundnut in India. The tikka leaf spot disease of groundnut (*Arachis hypogea* L.) caused by *Cercospora* sp, is very prevalent wherever the crop is grown and loses amount up to 50% (Jackson and Bell 1969). Feakin (1973) classified this as the most important airborne fungal disease of the crop. However, work on aerial dispersal of the conidia of the two pathogenic species for the single crop season., while Smith and Crosby (1973) studied only *C. aracludicola* in three season crops. Hence air sampling studies were conducted in groundnut field for one season and the results are presented in this paper.

Climate and Average Weather Year-Round in Ambajogai

In Ambajogai, the wet season is muggy/sticky/sultry unpleasantly warm and the air contains a lot of water and overcast, the dry season is mostly clear, and it is hot year-round. Over the course of the year, the temperature typically varies from 14°C to 38°C and is rarely below 11°C or above 41°C.

## Topography

For the purposes of this report, the geographical coordinates of Ambajogai are 18.733 deg latitude, 76.386 deg longitude, and 2,077 ft elevation.

The topography within 2 miles of Ambajogai contains only *modest* variations in elevation, with a maximum elevation change of 417 feet and an average elevation above sea level of 2,080 feet. Within 10 miles contains only *modest* variations in elevation (883 feet). Within 50 miles also contains *very significant* variations in elevation (1,516 feet).

The area within 2 miles of Ambajogai is covered by *cropland* (56%), *artificial surfaces* (15%), and *grassland* (13%), within 10 miles by *cropland* (72%) and *grassland* (11%), and within 50 miles by *cropland* (72%) and *grassland* (10%).

## Precipitation.

A *wet day* is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Ambajogai varies significantly throughout the year.

The *wetter season* lasts 4.5 months, from May 29 to October 12, with a greater than 24% chance of a given day being a wet day. The month with the most wet days in Ambajogai is July, with an average of 13.8 days with at least 0.04 inches of precipitation.

The *drier season* lasts 7.5 months, from October 12 to May 29. The month with the fewest wet days in Ambajogai is February, with an average of 0.6 days with at least 0.04 inches of precipitation.

Among wet days, we distinguish between those that experience *rain alone*, *snow alone*, or a *mixture* of the two. The month with the most days of *rain alone* in Ambajogai is July, with an average of 13.8 days. Based on this categorization, the most common form of precipitation throughout the year

is *rain alone*, with a peak probability of 46% on July 16.

#### Average temperature

The *hot season* lasts for 2.0 months, from March 28 to May 30, with an average daily high temperature above 36°C. The hottest month of the year in Ambājogāi is *May*, with an average high of 37°C and low of 26°C.

The *cool season* lasts for 3.5 months, from October 14 to January 30, with an average daily high temperature below 30°C. The coldest month of the year in Ambājogāi is *December*, with an average low of 15°C and high of 27°C.

#### Rainfall

Ambājogāi experiences *extreme* seasonal variation in monthly rainfall.

The *rainy* period of the year lasts for 6.7 months, from April 28 to November 19, with a sliding 31-day rainfall of at least 0.5 inches. The month with the most rain in Ambājogāi is *September*, with an average rainfall of 5.8 inches.

The *rainless* period of the year lasts for 5.3 months, from November 19 to April 28. The month with the least rain in Ambājogāi is *February*, with an average rainfall of 0.1 inches.

#### Humidity

The humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night.

Ambājogāi experiences *extreme* seasonal variation in the perceived humidity.

The *muggier period* of the year lasts for 5.7 months, from May 14 to November 3, during which time the comfort level is *muggy, oppressive, or miserable* at least 25% of the time. The month with the muggiest days in Ambājogāi is *July*, with 29.9 days that are *muggy* or worse.

The month with the fewest *muggy days* in Ambājogāi is *February*, with 0.6 days that are *muggy* or worse.

#### Sunny days/ Solar Energy

Solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day, the elevation of the Sun above the horizon, and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation.

The average daily incident shortwave solar energy experiences *some* seasonal variation over the course of the year.

The *brighter* period of the year lasts for 2.5 months, from March 7 to May 23, with an average daily incident shortwave energy per square meter above 6.7 kWh. The *brightest* month of the year in Ambājogāi is *April*, with an average of 7.1 kWh.

The *darker* period of the year lasts for 3.0 months, from June 20 to September 21, with an average daily incident shortwave energy per square meter below 5.3 kWh. The *darkest* month of the year in Ambājogāi is *July*, with an average of 4.9 kWh.

## MATERIALS AND METHODS

Air sampling was carried out by operating continuously volumetric Tilak Air Sampler (Tilak and Kulkarni 1970). The studies were conducted for the period from 23<sup>rd</sup> June 2022 to 28<sup>th</sup> September 2022. Slides were scanned for estimating the total number of spores and their percentage contribution. During the period of investigation, daily records of temperature, relative humidity and rainfall were maintained. The fungal material near the trapping site was collected to understand the source of these spores.

## RESULTS AND DISCUSSION

The spores of *Cercospora* occurred regularly. The spores of *Cercospora* are hyaline filiform, several celled uniseriate, 115-480 x 4.2-7.3 mm. The presence of spores was noted on old and dry leaves groundnut in the field in derbies form. The obtained results are presented in Fig. 1, to indicate atmosphere and meteorological conditions over entire period of investigation. The maximum spore concentration (8876/m<sup>3</sup> of air) was observed in the month of September 2022. During this month there was also a record of total rainfall 280 mm, the average relative humidity 88% and range of

temperature between 32.2<sup>0</sup>C and 33<sup>0</sup>C the highest daily mean concentration (644 m<sup>3</sup> of air) was recorded on 28<sup>th</sup> August 2022, when there was a record of average mean temperature 31<sup>0</sup>C relative humidity 85% and 7mm rainfall.

However, the spores were recorded in maximum number on rainless nights and also in rainy days during the period of investigation. The highest spore catch was recorded when there was moderately low temperature and high humidity. On an average these spores contributed 2.78% to the total air spora.

The incidence of Cercospora spores in the atmosphere was recorded throughout the period investigations. The spores were maximum (8876/m<sup>3</sup> of air) in the atmosphere in the month of September, because of high humidity and comparatively moderately high temperature. The spore were absent in the month of June and were less in concentration in September may be due to more rainfall showing washing off type effect and also due to high temperature. The lowest spore catch was recorded on 28<sup>th</sup> August 2022 when daily mean temperature was 31<sup>0</sup>C relative humidity 88% and rainfall 7 mm on that day. It clearly indicated that the occurrence

of adequate quantity of rainfall was the prerequisite condition and high humidity with moderately low temperature played an important role in the incidence of Cercospora spores in the atmosphere. The high concentration of spores recorded rain free days after the rains.

Similar observations were also made by Shanta (1960), Jensen and Boyle (1965, 1966), Sulaiman and Agashe (1995), Smith and Crosby (1973), Ramchander Rao (1987), Murdhankar (1990).

SUMMARY

1. Tilak Air Sampler was used for air sampling.
2. The studies were conducted for a Kharif season i.e. from 23<sup>rd</sup> June to 28<sup>th</sup> September 2022
3. The spores of Cercospora were recorded throughout the investigation.
4. Maximum concentration of the Cercospora spores types was correlated with the meteorological factors, disease incidence and growth stage of crop.
5. These investigations if are continued for long term may help in developing efficient disease forecasting system.

TABLE-1 Monthly concentration and % contribution of Cercospora to the total airspora over groundnut field during Kharif season i.e. from 23.06.2022 to 28.09.2022

REFERENCE						[4] Jensen R.E. and L.W. Boyle (1966). A				
Sr. No	Spore Type	June		July		Aug.		Sept.		Total Spore Con. m <sup>3</sup> of Air
		Spore conc./ m <sup>3</sup> of air	% Contribution	Spore conc./ m <sup>3</sup> of air	% Contribution	Spore conc./ m <sup>3</sup> of air	% Contribution	Spore conc./ m <sup>3</sup> of air	% Contribution	
1.	Cerco Spora	-	-	-	-	6202	41.13%	8876	58.87%	15078

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