MATERIAL AND METHODS

To catch airborne particles from environment, apparatus employed in every aerobiological work which has its own impact and limitations (Gregory, 1961) such apparatus is known as air sampler, which trap particles from air. Investigation decides the choice of every sampler for which it made.

The present investigation was carried out by using Tilak Air Sampler. Prof. S.T.Tilak was continuously working to device in air-sampler and after several trials a suitable air sampler was devised in 1968. This air sampler was awarded Government of India’s Prize for an Important Substitution instrument. In the present investigation spore trapping was done by operating continuously this air sampler. The technical description and method of working of the sampler is as follows.

DESCRIPTION AND MECHANISM OF TILAK AIR SAMPLER

The sampler provides a continuous sampling of air for 8 days and runs on electric power supply (AC 230 Volt)

Mechanically Tilak Air Sampler has two systems. In this instrument electric clock fitted and synchronised with drum through the orifice of projecting tube air is sucked at the rate of 5 litres/min. and fall on cellophane tape on the outer surface of drum. This tape is of 1.5 cm in breadth and stucked on the circumference of 67.2 cm of slowly rotating
drum. This drum rotates anticlock wise manner and fitted on clock system. The drum completes one circle in eight days, thus giving trace of catches for a week.

The tape is slightly coated with the petroleum jelly and face orifice a projecting tube 0.5cm. away from it. The drum rotates continuous with clock mechanism, giving continuous trace for 8 days. Before the tape is mounted on the glass slides, at the end of 8 days, it is divided into 8 equal parts measuring 8.4 cms. in length which again sub-divided in to two parts measuring 4.2 cms. and then cut. Each piece of the tape now obtained represents the 1 hours sampling area for a day or night accordingly. The tape for 12 hours is mounted on a slide in a glycerine jelly.

The air is sucked through tube with the help of a small fan having three frongs and fixes in the circular opening in the cover of air sampler so as to force air out of the collection chamber causing a negative pressure. An exhaust hole measuring 6 × 2.7 cm. is kept in the lid of the apparatus.

Tilak Air Sampler is a modified form of spore clock model of Panzer (1957) and model of spore collector. When it was compared with other spore traps, it was found that the Rotorod Sampler (Perkins 1957) is useful only for spot sampling although its collection efficiency is 85%. The Hirsat Trap (Hirsat 1952) has 45% collection efficiency and has the disadvantages of capital cost, power requirement and is not suitable for identification in culture and for trapping splash dispersed spores. The Panzers Slide Spore Collector (Panzer 1957) has 70% efficiency of collection, but has less
retention capacity and also requires attention after every 24 hours. Ramlingam constructed glass cylinder spore trap, recently which is not volumetric in nature. But Tilak Air Sampler has 75% efficiency of spore collection, high retention capacity, and portable, economical and provides continuous data of air sampling for eight days. It gives volumetric data (number of spores/ m$^3$), which is special feature of this sampler. It is also enable to analyse microbial population, both quantitively and qualitatively. As it provides continuous data, the diurnal periodicity, studies can be carried out in greater details.

**SAMPLING METHOD**

Sampling was carried out by operating continuously above described air sampler, with its orifice kept at constant height of 1 Metere above ground level in the bajra field. The air was sampled at the rate of 5 Litres per minute. The transparent changed after 8 days at about 18 hours. The exposed tape was cut into equal parts, each part representing 24 hours trace area. These 8 parts were again sub-divided into 2 parts, each representing 12 hours trace area of day or night accordingly. Exposed tape was cut into piece of 4.2 cm. The tape pieces were mounted on glass slides using glycerine jelly a mountant.

Glycerine jelly has the best optical properties for visual examination. Its composition and preparation is as follows.

- **Gelatine**: - 40 gm.
- **Glycerine**: - 120 ml.
- **Distilled Water**: - 140 ml.
Phenol: - 0.5 gm.

Measure quantity of glycerine and distilled water mixed in a beaker and heated in a water bath for 2-3 hours. During heating mixture, gelatine was added slowly by stirring to avoid the clumping. After complete dissolution of gelatine, phenol crystals were added as preservatives and metabolic inhibitor. After cooling, it forms a cake a glycerine jelly. This jelly was used for preparation of permanent slides.

SCANNING

Scanning was done regularly areas 9600 sq. microns of total area the trace obtained in a day, scanned under 10 × 45 eyepiece objective combination of the microscope. Assuming the trapping efficiency to be 75%, the counts were converted into number per m$^3$ of air. The identification of spores caught was based on 1) Microscopic characters 2) Comparison with parasitic and saprophytic fungal material, collected in and around the field. 3) Comparison with cultural characters. In all possible cases generic counts were made which are based on colour, shape, size and other diagnostic feature of spore.

The sampler being volumetric, the number of spore/ m$^3$ of air can be calculated by multiplying total number of spores’ catches by 14 which is conversion factor for Tilak Air Sample.
CONVERSION FACTOR

The conversion factor for Tilak Air Sampler is 14.2 to avoid confusion and for easy calculation 14 has been considered as conversion factor the spore concentration/m³ of air can be calculated. It is constant irrespective of locality, season and weather.

CALCULATION OF CONVERSION FACTOR

1. Sampled area  - 8.4cm × 1 cm +8.4 m² = 840000000 µm³.

2. Scanned area  -20 ×20 × 24 = 9600 µm³

3. Volume of air Sampled per minute  - 5 litres.

4. Volume air sampled in 24 hours  - 5 × 24 × 60 = 7200.

To convert one litre of air into cubic metre multiplies by 0.001000028.

5. Volume air sampled in 24 hours in term of Cubic meter

   - 7200 × 0.001000028 = 7.3m³

6. Volume of air sampled in the scanned area in 24 hours  - 9600 × 7200/1000000 = 69.12 litres.

7. Volume of air Sampled in the Scanned area during 24 hours

   = 1000/69.12

   = 14.20 m³

Hence the conversion factor for this Sampler is 14.2 but for easy calculation we use ‘14’. If total number of catches is 10
Then total number of spore/m$^3$ of air = $14 \times 10 = 140/m^3$ of air.

**MATEOROLOGICAL DATA**

During the period of investigation daily record of temperature, relative humidity, and rainfall was obtained from School Of Agriculture and Tehsil office Ambajogai.

Total monthly rainfall, temperature, and total concentration of spores is shown in Table VI-A (1) and Table VI-A(2) for two consecutive Kharif season i.e. 2013 and 2014.