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Burkard : Volumetric Spore Trap

A compact unit with built-in vacuum pump, designed to sample airborne particles such as fungus spores and pollens, continuously for periods of up to seven days without attention.

Particles are impacted on adhesive coated transparent plastic tape supported on a clockwork-driven drum. Performance of the standard model is similar to the trap described by Hirst in 1952 (Ann. App. Biol. 39, pp 257-265) but interchangeable orifices can be supplied to special order to improve the trapping efficiency for particles in the range 1 to 10 μm diameter.



The 7 Days Recording Volumetric Spore Trap is supplied with:-

- (1) One roll of 'Melinex' tape
- (2) one roll of double sided tape
- (3) One laboratory stand for coating Drum
- (4) One Perspex cutting block
- (5) Manual

Optional Item:-

- (1) Alternative lid assembly for 24 hour sampling directly onto glass slide
- (2) Interchangeable orifice size of 14 x 2 mm reducing to 5 mm.
- (3) Flow meter for measuring throughput at the sampling orifice.
- (4) Interchangeable battery pump 12V DC motor.
- (5) 12V mains adapter 80 –220 Colts.
- (6) Additional drum.
- (7) Mowiol (Adhesive).
- (8) Box of 50 glass slides (76mm x 24.5mm) for 24 hours measurement.

General Specification

Overall height : 94 cm (37 inch)

Working area of trap with standard vane : 0.89 m² (9.61feet²) through 53 cm (21 inch) radius.

Throughput : 10 liters/min (0.35 cfm)

Drum speed of 7 days recording : 1 revolution in 7 days at 2 mm/hour

24 hours lid assembly for sampling on to glass slide : 1 day (24 Hours) 2mm/hour

Standard orifice : 2 mm x 14 mm

Tape : Melinex clear tape 200 gauge

Shipping weight : Nett - 16 kg. Gross - 34 kg

Case size : 57 x 65 x 65 cm (23 x 26 x 26 inches)

Power requirements : Mains 220VAC or 12V DC

Features:-

- Continuous sampling up to 7 days without attention
- Built in vacuum pump
- Precision 7-jewel clock movement
- Interchangeable orifices
- 24-hour sampling option
- Reliable and simple operation
- Mains or Battery option

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Construction and Equipment Details

The trap is constructed from materials which are light in weight, making it readily portable for field use. All parts are treated to prevent corrosion against normal weather conditions and the unit finished in Oyster Green hammer enamel. Attention has been given to the changeover of drums, which is quick and simple in operation. Double-sided adhesive tape is used to secure the Melinex tape around the drum. The vacuum pump is available for use most voltages and frequencies. An alternative lid assembly is available to enable monitoring to be carried out over 24 hour periods.

Continuous Sampling

The principal advantage of the Burkard instrument is the continuous recording facility for long periods. Spores are impacted on adhesive coated transparent plastic tape (Melinex) supplied and supported on a drum with a fixed circumference driven by a 7-jewel clockwork movement. This assembly is mounted on a close fitting slide, which assists the user when inserting the drum with mounted tape into the main body of the instrument. The large vane makes the sampler sensitive to small changes in wind direction.

Power Requirement (Mains or Battery)

Vacuum pumps are mains **220VAC** or battery **12VDC** driven and are interchangeable. Adjustment of the 10-litre throughput is possible with either potentiometer or metering screw. A mains and battery pump option allows operation from either power source without changing the pump motor.

Standard of Reference

Built and developed with the assistance of scientists closely associated with problems relating to airborne particles such as fungus spores and pollens, the sampler has proved to be a standard of reference throughout the world. Although the instrument compares closely to the trap described by Hirst in 1952 (Ann app. Biol 39 pp. 257-265) its performance has been enhanced by the use of interchangeable orifices to improve the trapping efficiency for particles in the range 1-10 μ m diameter.



Alternative lid assembly for 24hours sampling directly onto glass slide



Perspex cutting block for sectioning the Melinex tape into hourly/daily samples



Laboratory stand for coating the recording drum

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Some Technical and working details about Burkard Volumetric spore trap system

Many different methods of monitoring the pollen and fungal content of the atmosphere are in current use. Where a daily count is required the exposure of a sticky slide each day is still the method of choice. In situations where retrospective reading are acceptable, the Burkard seven day recording spore trap is highly reliable.

(1) Principle of operation:

The Burkard spore trap is fitted with a drum, around which is placed a sticky cellulose strip. Clockwork mechanism moves the drum at a rate of 2 mm per hour past a narrow slit in the casing which encloses the drum. By means of a vacuum pump, air is sucked through this slit at a constant rate of ten liters per minute. This volume of air flows over the trapping surface, depositing pollen grains and fungal spores on the sticky strip.

(2) Preparation of the trapping surface

It is essential that the trapping surface be correctly coated to ensure the adherence of pollen grains and fungal spores. The manufacturers of the Burkard spore trap recommend an undercoat of Gelvatol, a water-soluble plastic. This, in turn is coated with vaseline, ensuring a surface that is considered optimal in terms of exposure to weather and adhesiveness. Where high humidity is a problem, 0.1% Tecnazine (4-chloro nitrobenzene) should be added to prevent the germination of spores. If high temperatures are experienced, a higher melting point paraffin wax may be used instead of vaseline.

(3) Locating the spore trap

The height at which the trap is positioned is critical. This determines the pollen harvest. Too high an elevation will yield a high proportion of tree pollens. When the trap is too close to the ground, airspora from local sources predominate. We have used a height of 3 meters above the ground for our aero-allergen counting program at the **Red Cross Children's Hospital**.

(4) Preparation of slides for microscopy

The deposit on the trapping surfaces is macroscopically visible and is known as the "trace". The cellulose strip is removed from the drum after seven days and divided into several equal sections, each representing a 24-hour period. There are several methods of preparing the strips for microscopy.

a. The acetolysis method eliminates extraneous debris, but is time-consuming. Permanently mounted slides may be prepared by adding a glycerine jelly mountant beneath the cover-slip and heat-sealing. A basic fuchsin stain may be used to facilitate the identification of pollen grains. It is essential that the stain, or mountant, be compatible with the adhesive used on the strip.

b. The count is determined by reading 3 longitudinal bands (each 1/3 mm in diameter) using an objective lens (x40) and ocular lenses (x10). This is equivalent to 1m³ of air.

c. When counts are used to estimate potentially allergenic airspora the aerobiologist should be familiar with known allergens. This should be done by correlating counts with skin test results. There are several pollen and fungi that appear on the slide in large numbers, but are not considered allergenic, e.g. Basidiospores.

(5) Identification

a. Fungi

The identification of airspora can be tedious and time-consuming. There are a number of excellent handbooks and atlases available as guides but long experience is the most useful aid. Access to a mycology laboratory is invaluable in identifying fungi.

Workers who identify fungi from agar cultures will find this very helpful in identifying single spores, found on slides. Again it is useful to establish which fungi are allergenic.



Three important fungi are:

- Alternaria
- Cladosporium
- Epicoccum

The clinical significance of aero-allergen identification in the Western Cape has been addressed in a recent study by Potter et al

b. Pollens

Pollen grains are identified morphologically. They are far more difficult to identify than fungal spores because of the similarity of different grains.

It is not possible to distinguish different grass species using light microscopy. A magnification of 400x is adequate. The eyepiece of the microscope should be fitted with a graticule so that pollen grains may be measured according to the calibrations. Features of pollen grains used in identification are size, shape, thickness of the exine (outer wall) and intine (inner wall) of the pollen grain.

The number and distribution of pores and furrows and whether the pollen occurs as a simple or compound grain are also important. Grains are measured according to their polar and transverse axes. A list of important aerospores is given in Table 1. Good communication with a botany department is invaluable.

(6) Meteorological effects

Meteorological data are only relevant if the data is obtainable from a site close to the sampling site. Meteorological parameters such as daily average temperature, humidity and atmospheric pressure, wind speed and direction and rainfall figures, may have a marked effect in the data obtained by the spore trap.

Airspora that consistently appear in significant numbers i.e. greater than 50 grains per cu.m.	
Fungi	Pollens
Alternaria Cladosporium Epicoccum Helminthosporium Pithomyces Stemphyllium	Compositae Fagaceae Grass Pinaceae Platanaceae Plantaginaceae Urticaceae

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Indian Distributor

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