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Research Protocol

Analysis of the TRIO.BAS Microbial Air Sampler Recovery Efficiency

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Abstract

The test had the purpose to evaluate the recovery efficiency of the TRIO.BAS Mono air sampler.

For this purpose, a cylindrical chamber was assembled and connected to the air sampler head. In this chamber bacterial spores were nebulised and were aspirated by the TRIO-BAS sampler. The efficiency of recovery was assessed by counting the number of bacterial colonies grown on a 10 cm nutrient agar plate. This test was performed at the Laboratory of Molecular Virology, Università degli Studi di Milano in Milan, Italy, on March 2018.

Keywords: *Active Air Sampler; Bioaerosol; Biological Laminar Flow Hood; CFU; Impact; Nutrient Agar; Recovery Efficiency; Spores; Sterilization; Strain*

Introduction

The aim of this test is to evaluate the recovery efficiency of the TRIO.BAS Microbial Air Sampler produced by ORUM International, Milan, Italy.

The air sampler

Characteristics

The TRIO.BAS microbial air sampler is a device that applies the "active air" collection principle of microorganisms present in an environmental bio-aerosol.

The air flow rate is 100 liters per minute and the known volume of aspirated air is prefixed (from 30 to 2.000 litres).

The aspirated air impacts onto the nutrient agar of a culture plate and the microorganisms are visible as Colony Forming Units (CFU) after overnight incubation at 37°C. The results are normally reported as number of CFU/m^3 of aspirated air.

The number of holes of aspirating heads were 300.

Figure: *TRIO.BAS MONO microbial air sampler.*

Materials

- Microbial Air sampler TRIO.BAS MONO.
- Trypticase Soy Agar – TSA medium.
- *Bacillus subtilis ATCC* 6633 spores.
- Spore nebulisation System.

The protocol

Description

The test strain was *Bacillus subtilis* ATCC 6633. The spores were introduced by nebulisation into a 50 cm long cylindrical chamber whose diameter corresponded exactly to the head of the air sampler. The chamber was placed inside a biological laminar flow hood to ensure that the air aspirated by the TRIO-BAS sampler was sterile (Figure 1).

Figure 1: *The spore nebulization system.*

The nebulised spores were aspirated with the sterile air and impacted onto a TSA nutrient agar medium (Trypticase Soy Agar medium, Becton Dickinson).

Preparation of *Bacillus subtilis* spore suspension

The Initial spore concentration of 2.7 x 10^8 was prepared and diluted with sterile water to obtain a final concentration of spores inside the nebulisation ampule of 8125 Spores/ml of water.

Nebulised Aerosolised spore inside the system mean: 4225

- Nebulisation initial volume of 2 ml
- Average nebulised volume: 0.52 ml
- Air sampler programming: 10 minutes x 100 lts/minute.

Results

Average mean CFU in culture plate = 256.

Standard deviation of the average of colonies = 45,96.

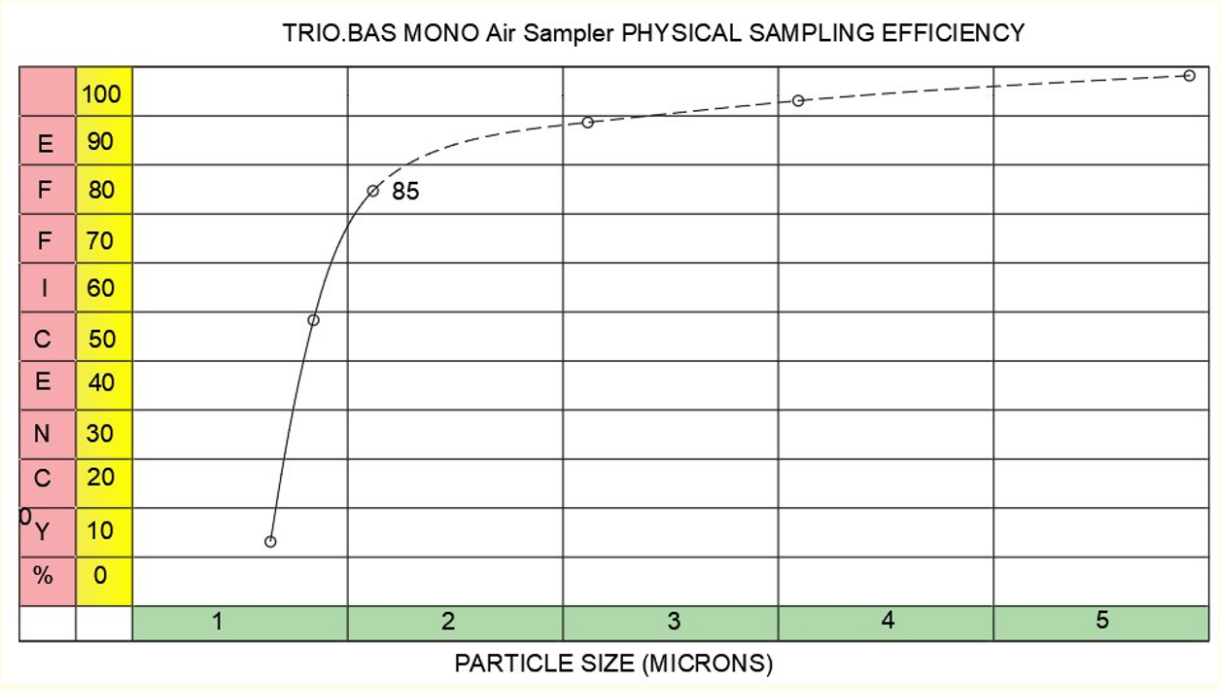

Figure 2

Nebulised spore recovery efficiency reported to the number of aspirating head holes: Mean % = 85,0.

The trend of the graph takes in account the results obtained in other worldwide tests carried out with a similar protocol.

Conclusion

The TRIO-BAS MONO collected spores of *B. subtilis* with high efficiency (85%) referred to the total head holes.

Bibliography

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