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### TESTING THE EFFECT OF THE SRS MEDILUX TW220-X AIR PURIFIER ON ARTIFICIAL CONTAMINATED MICROBIOLOGICAL AIR POLLUTION IN THE LABORATORY

**The aim of testing:** evaluation of the decrease of the population of bacteria *Bacillus subtilis* ATCC 6633 and mold *Aspergillus brasiliensis* ATCC 16404 after artificial air contamination in the laboratory before and after the operation of the germicidal air purifier SRS MEDILUX TW220-X

**Principle:** The presence of bacteria, molds and yeast in the air serves as an indicator of air quality in the room. This is influenced by many factors: the construction of the room, the presence and activities of persons and animals, the quality of cleaning, the ventilation of the room.

Aeroscope actively sucks air directly onto the agar culture medium in the device (0.125-0.25 m<sup>3</sup> within 1.25-2.5 minutes) and microorganisms are captured on it. Agars are cultivated in incubators. Bacteria, yeasts and molds caught on agar culture media grow in visible colonies within 3 to 5 days. After that, the agar media are then inspected and grown colonies counted.

**Equipment:** AIR-sampler System MAS-100 NT (Merck), germicidal air purifier SRS MEDILUX TW220-X (SRS Group, SK)

**Tools:** agar media for determination of total concentration of bacterial population PCA, batch 00847, exp.: 2021-05-18 (LMS, CZ), agar media for determination of total concentration of yeasts and molds YGC batch 00773, exp.: 2021-05-10 (LMS, CZ)

**Execution:** on April 20th, 2021, tested laboratory in the Institute of Clinical Microbiology (area 4,5 x 3,5 x 3 m) without normal daily operation, artificial contamination of the air by non-pathogenic reference strains, aeroscopic measurement of air pollution at regular intervals before and after the air purifier operation (see schedule below)

#### Methods:

1. Artificial contamination of the air by non-pathogenic reference strains – bacteria *Bacillus subtilis* ATCC 6633 and molds *Aspergillus brasiliensis* ATCC 16404
1. Aeroscopic measurement of air in the center of the room on the table, volume 0.125-0.25 m<sup>3</sup> per 1 agar medium, 2 agar PCA media to determine the total concentration of the population of bacteria + 2 YGC agar media to determine the total concentration of the yeast and fungal population, execution in time:
  - 11 a. m.
2. Connection of the SRS MEDILUX TW220-X germicidal air purifier into operation
3. Aeroscopic measurement in time:
  - 12 a. m.
  - 1 p. m.
4. Switch off the germicidal air purifier.
5. Cultivation of agar media in thermostats (agar media for determining the total concentration of the mixed bacteria population are cultivated in the thermostat under aerobic conditions at 37 °C, agars for the determination of the total concentration of the mixed population of yeast and molds are cultivated in a incubator under aerobic conditions at 22 °C).
6. Counting grown colonies after 3 and 5 days. The result was an absolute number of CFUs (colony forming units) per m<sup>3</sup>.
2. Creating a measurement log.



## Results 1:

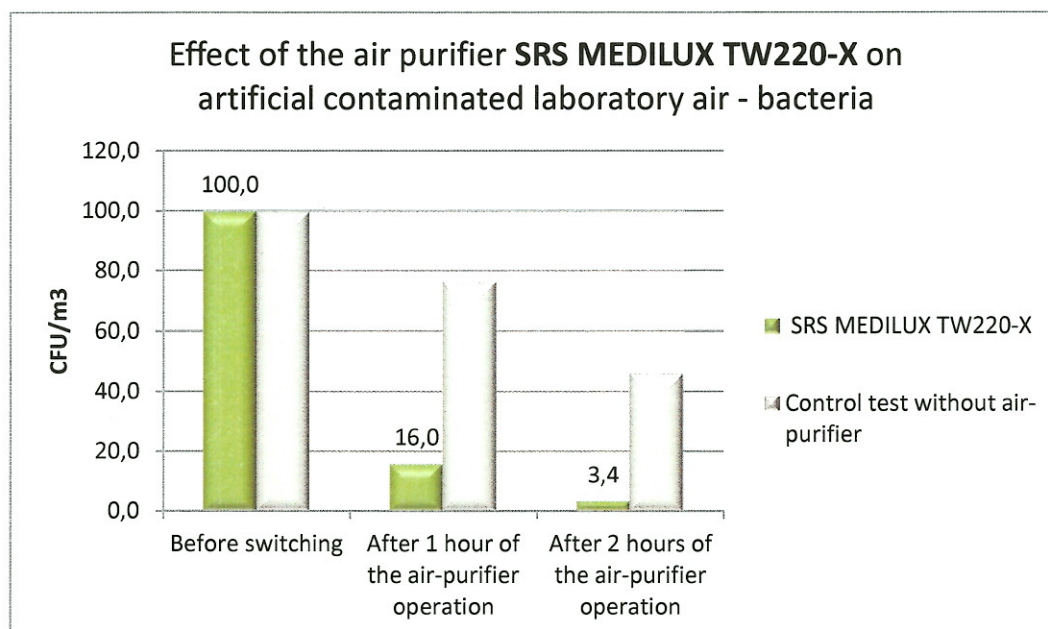
**SRS MEDILUX TW220-X air purifier results table of the effect on the artificial contaminated laboratory air pollution of bacteria *Bacillus subtilis* ATCC 6633, measurement before and after switching on the air purifier and results of control experiment of air development after artificial contamination without the involvement of an air purifier in the laboratory.**

INVOLVEMENT OF THE AIR PURIFIER IN THE LABORATORY			CONTROL EXPERIMENT WITHOUT THE INVOLVEMENT OF AN AIR PURIFIER	
BEFORE SWITCHING ON	3680 CFU/m <sup>3</sup>	100 %	4680 CFU/m <sup>3</sup>	100,0 %
AFTER 1 HOUR OF AIR PURIFIER OPERATION	588 CFU/m <sup>3</sup>	16,0 %	3576 CFU/m <sup>3</sup>	76,4 %
AFTER 2 HOURS OF AIR PURIFIER OPERATION	124 CFU/m <sup>3</sup>	3,4 %	2152 CFU/m <sup>3</sup>	46,0 %

Abbreviations: CFU/m<sup>3</sup> (colony forming unit in 1 m<sup>3</sup> of air)

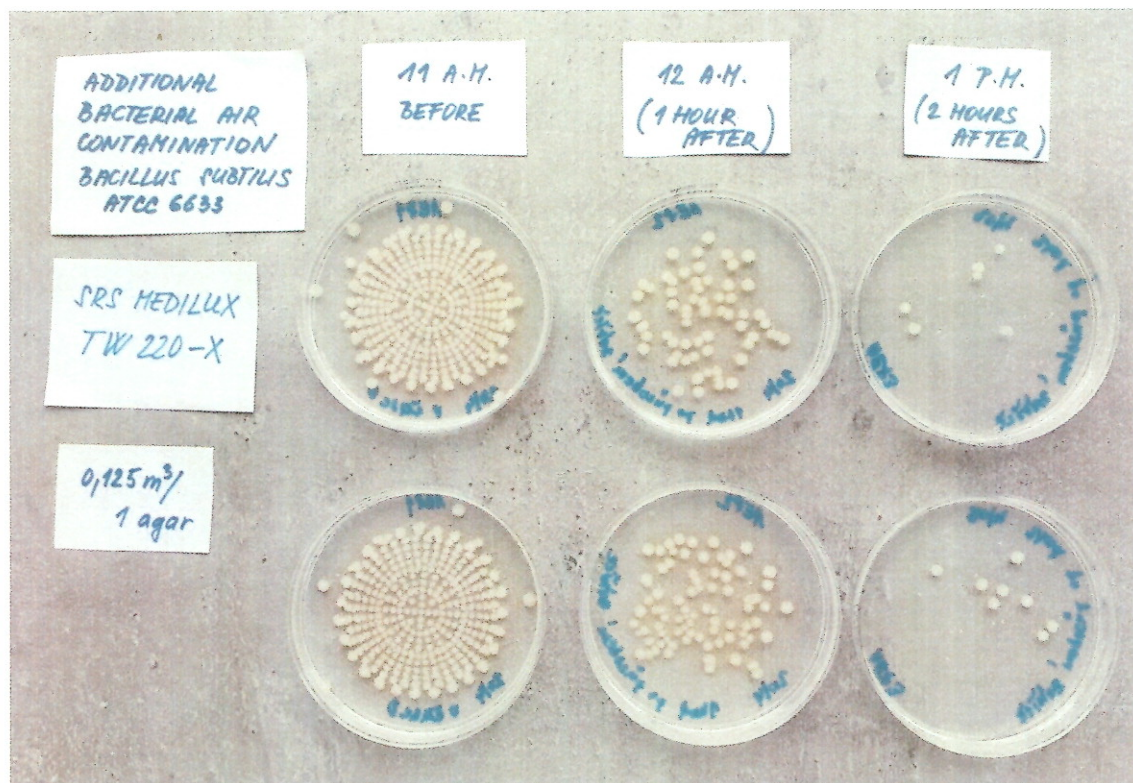
**Graphical presentation of the influence of the SRS MEDILUX TW220-X air purifier on artificial contaminated laboratory air pollution of bacteria *Bacillus subtilis* ATCC 6633, measurement before and after switching on the air purifier (CFU/m<sup>3</sup>)**

2





Photos of the results of testing the air concentration of bacteria *Bacillus subtilis* ATCC 6633 in the laboratory, measurement before and after the involvement of the air purifier, photos are taken after 48 hours of culture. Bacterial colony are visible on a Petri dish with transparent agar as white discs of different sizes



3

### Conclusion 1:

The presence of bacteria in the air of the room is influenced by cleaning and ventilation, but mainly by the movement and activity of people, which are an important source of bacterial contamination.

During the testing of artificial air contamination by the *Bacillus subtilis* ATCC 6633 test laboratory, the SRS MEDILUX TW220-X decreased by 16.0% after 1 hour compared to the number at the beginning of testing.

After 2 hours of operation of the device, a further decrease was recorded up to a total of 3.4% of the original number of tested bacteria in the room before connecting the device.

**The device is rated as effective in reducing the total concentration of bacteria in the air of the laboratory in as early as 1 hour.**

Note: the bacterial contamination of the air in this laboratory experiment is extreme. The detection of bacteria in the air in rooms with normal activity (household, office) is carried out about 20-100 CFU/m<sup>3</sup> of air according to the intensity of movement of persons and the activity performed.

## Results 2

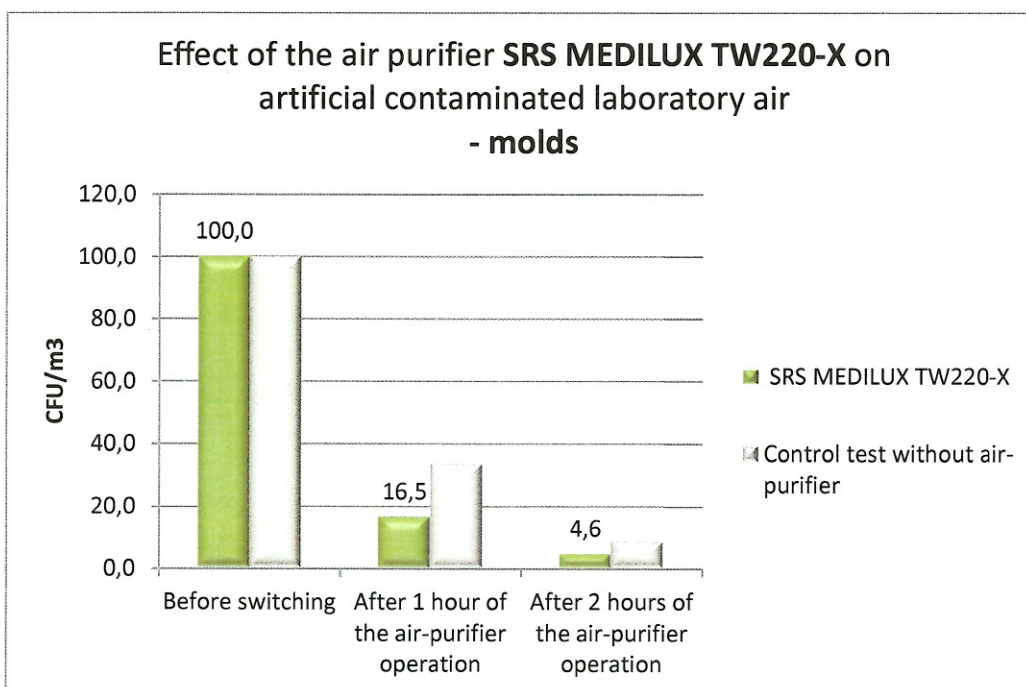
**SRS MEDILUX TW220-X air purifier results table of the effect on the artificial contaminated laboratory air pollution of the air purifier results table of the effect on the artificial contaminated laboratory air pollution of mold *Aspergillus brasiliensis* ATCC 16404, measurement before and after switching on the air purifier and results of control experiment of air development after artificial contamination without the involvement of an air purifier in the laboratory**

INVOLVEMENT OF THE AIR PURIFIER IN THE LABORATORY			CONTROL EXPERIMENT WITHOUT THE INVOLVEMENT OF AN AIR PURIFIER		
<b>BEFORE SWITCHING ON</b>	2104 CFU/m <sup>3</sup>	100%	708 CFU/m <sup>3</sup>	100.0%	
<b>AFTER 1 HOUR OF AIR PURIFIER OPERATION</b>	348 CFU/m <sup>3</sup>	16.5%	236 CFU/m <sup>3</sup>	33.3%	
<b>AFTER 2 HOURS OF AIR PURIFIER OPERATION</b>	96 CFU/m <sup>3</sup>	4.6%	60 CFU/m <sup>3</sup>	8.5%	

Abbreviations: CFU/m<sup>3</sup> (colony forming unit in 1 m<sup>3</sup> of air)

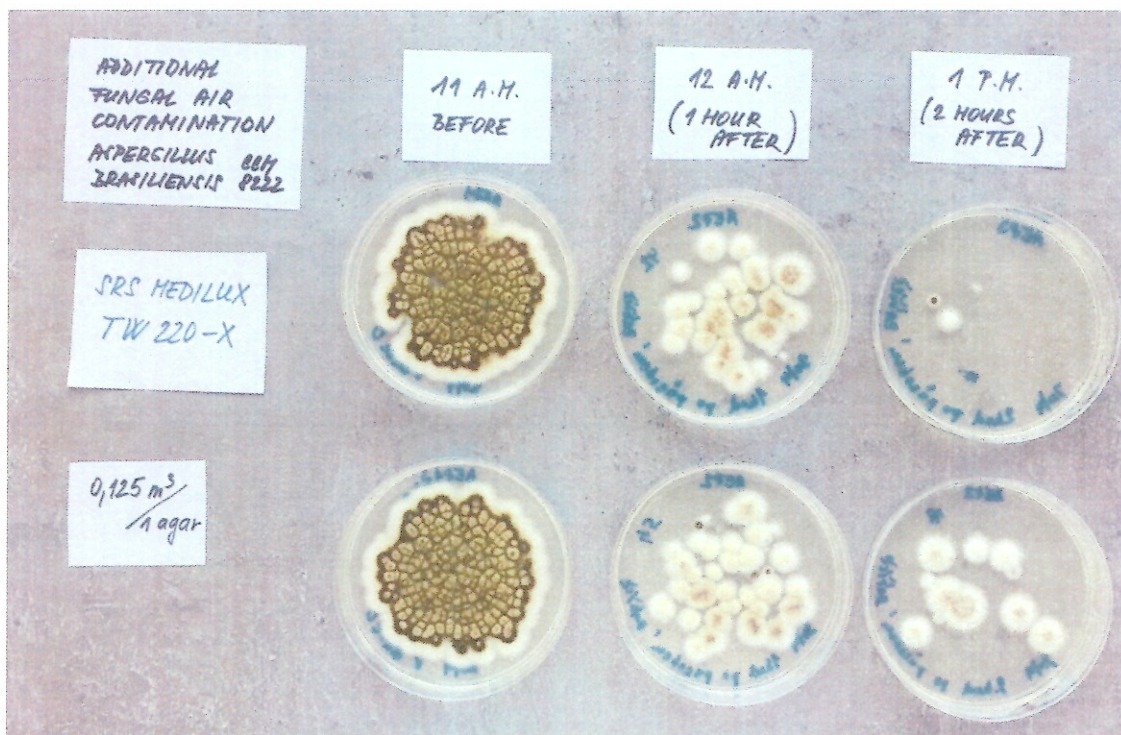
**Graphical representation of the influence of the air purifier on artificial contaminated laboratory air pollution of mold *Aspergillus brasiliensis* ATCC 16404, measurement before and after switching on the air purifier (CFU/m<sup>3</sup>)**

4





Photos of the results of testing the air concentration of mold *Aspergillus brasiliensis* ATCC 16404 in the laboratory, measurement before and after the involvement of the air purifier, photos are taken after 5 days of culture. Fungal colony are visible on a Petri dish with transparent agar as white discs of different sizes. In the case of a large number, they merge.



5

## Conclusion 2:

The presence of mold in the air is significantly influenced by building layouts, cleaning quality and ventilation of the room through open doors and windows, people are not a major source of air contamination by mold.

In testing the effect of the SRS MEDILUX TW220-X air purifier on artificial air contamination by *Aspergillus brasiliensis* in the laboratory air, a reduction was found to be 16.5% after 1 hour of operation of the device.

After 2 hours of operation of the device, a further decrease to 4.6% of the original number of molds was recorded before connecting the device.

**The device is rated as effective in reducing the total concentration of mold in the air of the laboratory in as early as 1 hour.**

Note: Contamination of air with mold in this laboratory experiment is extreme. The discovery of mold in the air in rooms with normal activity (household, office) ranges to about 10-20 CFU/m<sup>3</sup> of air.

In Hradec Kralove, April 30, 2021

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The log must not be interpreted other than the entire log.