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INDOOR AIR QUALITY OF A CAFETERIA WITH A ROTOR TURBINE VENTILATOR (RTV) AND CROSS-CORRELATIONS BETWEEN INDOOR AIR POLLUTANTS, OCCUPANCY RATE, AND METEOROLOGICAL PARAMETERS

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Abstract

Indoor air quality (IAQ) improvement potential of rotor turbine ventilator (RTV) was researched by setting up an RTV on the outer part of the chimney of a kitchen, located in a "windy" city, Çanakkale, Turkey. Efficiency of RTV was assessed by preliminary tests, conducted in a three-storey restaurant. After obtaining positive results in terms of airborne bacteria count (TBC) from these tests, long-term measurements were carried out in a cafeteria by air sampling before and after setting up the RTV. In addition to airborne bacteria measurements, concentrations of Total Volatile Organic Compounds (TVOC), Carbon monoxide (CO), Carbon dioxide (CO_2), ozone and (fine and coarse) particulate matters (PM) were also measured before and after the RTV installation on the funnel of the cafeteria. Moreover, temperature and relative humidity were measured on-line, and the meteorological parameters were recorded. Furthermore, the number of people in the cafeteria during the air sampling was counted. After the RTV installation, levels of TBC, sum of PM, TVOC, and CO_2 clearly decreased, while levels of ozone and CO showed no significant variation during the study. Overall, RTV has potential to improve IAQ, when combined with natural ventilation.

In addition to examining the efficiency of RTV, cross-correlations were found among the air pollutants, meteorological/thermal comfort parameters, and the occupancy rate, regardless of the RTV installation. Moreover, statistically significant relationships (p<0.05) were found for number of people in the cafeteria and levels of both CO_2 and TBC throughout the entire study.

Key words: airborne bacteria, indoor air quality, rotor turbine ventilator

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