Analisis Kualitas Udara Mikrobiologis dengan Parameter Bakteri dan Jamur pada Instalasi Pengolahan Limbah Tinja (IPLT) Kalimulya, Cilodong Depok, Jawa Barat = Analysis of Microbiological Air Quality with Bacteria and Fungi As Parameters At Sewage Treatment Plants Kalimulya, Cilodong, Depok, West Java

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Abstrak

Instalasi Pengolahan Lumpur Tinja (IPLT) merupakan pengolahan air limbah yang dirancang hanya menerima dan mengolah lumpur tinja yang berasal dari sistem setempat yang diangkut melalui sarana pengangkutan lumpur tinja. Lumpur tinja yang dihasil tersebut tentu harus diolah terlebih dahulu agar sesuai dengan baku mutu yaitu, Peraturan Menteri Lingkungan Hidup Nomor 68 Tahun 2016 Tentang Baku Mutu Air Limbah Domestik. Namun demikian, dalam proses pengolahan air limbah ini, tidak dapat dihindari kemungkinan terlepasnya pencemar udara mikrobiologis (bioaerosol) ke udara sekitar. Tujuan penelitian ini untuk mengetahui sumber pencemar, mengetahui total bakteri dan jamur di udara serta perbedaan konsentrasi bakteri dan jamur pada musim kemarau dan musim hujan, dan meninjau faktor lingkungan (suhu, kelembaban, dan Kecepatan angin) yang mempengaruhi konsentrasi. Penelitian ini dilakukan pada musim kemarau dan hujan dengan masing-masing lima hari pengambilan dan dilakukan di empat titik pada IPLT Kalimulya Depok (unit bak pengisian, digester anaerob, pemekat lumpur, dan biofilter aerob-anaerob). Dari hasil penelitian, rata-rata konsentrasi bakteri pada musim kemarau yaitu unit bak pengisian sebesar 243±265 CFU/m3, pemekat lumpur sebesar 155±326 CFU/m3, digester anaerob sebesar 154±157 CFU/m3, dan biofilter aerob anaerob sebesar 76±122 CFU/m3. Sedangkan pada musim hujan konsentrasi bakteri yaitu unit bak pengisian sebesar 33±24 CFU/m3, pemekat lumpur sebesar 25±62 CFU/m3, biofilter aerob-anaerob sebesar 21±20 CFU/m3, dan digester anaerob sebesar 16±13 CFU/m3. Kemudian pada musim kemarau, konsentrasi jamur pada pemekat lumpur sebesar 516±554 CFU/m3, unit bak pengisian sebesar 364±202 CFU/m3, digester anaerob sebesar 340±181 CFU/m3, dan biofilter aerob-anaerob sebesar 231±201 CFU/m3. Sedangkan pada musim hujan konsentrasi jamur pada unit bak pengisian sebesar 58±39 CFU/m3, pemekat lumpur sebesar 55±33 CFU/m3, digester anaerob sebesar, 36±32 CFU/m3, dan biofilter aerob-anaerob sebesar 32±23 CFU/m3. Sehingga, diketahui konsentrasi bakteri tertinggi ditemukan pada unit bak pengisian pada musim kemarau dan terendah pada digester anaerob pada musim hujan. Konsentrasi jamur tertinggi ditemukan di pemekat lumpur pada musim kemarau dan terendah pada biofilter aerob-anaerob pada musim hujan. Konsentrasi bakteri dan jamur berada dibawah standar baku mutu. Sedangkan korelasi antara faktor lingkungan terhadap konsentrasi bakteri dan jamur ditemukan di beberapa tempat dan terdapat juga perbedaan konsentrasi bakteri dan jamur pada musim kemarau dan musim hujan.
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Sewage Treatment Plants (STPs) are wastewater processing systems that are designed to process only stool mud received from local systems of stool mud transport. The stool mud received must be processed so that it abides to the standard of quality according to the Regulation of the Minister of the Environment Number 68 Year 2016 concerning Domestic Wastewater Quality Standards. However, in the treatment process, there is a probability for a microbiological air pollutant (bioaerosol) to be produced that cannot be avoided. This

research aims to analyze the source of pollution, the total amount of bacteria and fungi in the air, the difference of bacteria and fungi concentration between the dry and rainy season, and observe the environmental factors (temperature, humidity, wind speed) that affects bacteria and fungi concentration. This research was done during the dry and rainy season, each for a 5 day period in four observation points at the Kalimulya Depok STP (filling unit, anaerobic digester, mud concentrator and aerobic-anaerobic biofilter). The results of this research shows that the average bacteria concentration during the dry season is 243±265 CFU/m3 at the filling unit, 155±326 CFU/m3 at the mud concentrator, 154±157 CFU/m3 at the anaerobic digester, and 76±122 CFU/m3 at the aerobic-anaerobic biofilter. During the rainy season, the average bacteria concentration is 33±24 CFU/m3 at the filling unit, 25±62 CFU/m3 at the mud concentrator, 21±20 CFU/m3 at the aerobic-anaerobic biofilter, and 16±13 CFU/m3 at the anaerobic digester. The average fungi concentration during the dry season is 516±554 CFU/m3 at the mud concentrator, 364±202 CFU/m3 at the filling unit, 340±181 CFU/m3 at the anaerobic digester, and 231±201 CFU/m3 at the aerobic-anaerobic biofilter. As for the rainy season, the average fungi concentration is 58±39 CFU/m3 at the filling unit, 55±33 CFU/m3 at the mud concentrator, 36±32 CFU/m3 at the anaerobic digester, and 32±23 CFU/m3 at the aerobic-anaerobic biofilter. It can be seen that for the bacteria concentration, its highest value occurs at the filling unit during the dry season while its lowest value occurs at the anaerobic digester during the rainy season. For the fungi concentration, its highest value occurs at the mid concentrator during the dry season while its lowest value occurs at aerobic-anaerobic biofilter during the rainy season. The bacteria and fungi concentration values lie below the standard of quality. There are several correlations between environmental factors and the bacteria and fungi concentration values in some of the observed locations. There is also a difference between the bacteria and fungi concentration during the dry season and the rainy season.<i/>