Geophysical Research Abstracts
Vol. 20, EGU2018-17342, 2018
EGU General Assembly 2018

Effects of application of edible fungi residues on soil nutrients and heavy metal accumulation

Jun Li, Xue-Feng Hu, Ya-Li Zheng, Fan Luo, Si-Wen Lu, Jing-Long Zhao, and Guo-Jun Lan
School of Environmental and Chemical Engineering, Shanghai University, Shanghai, 200444, China (xfhu@shu.edu.cn)

The yield of edible fungi in China has made up more than 70% of the world's total, which produces about 116.89 million tons of the residues of edible fungi annually. A rate of re-utilization of the residues, however, is less than 40% in China. In order to raise the rate of re-utilization of the agricultural wastes, a field experiment on application of edible fungi residues as organic fertilizer was carried out in the suburb of Shanghai. The experiment included seven treatments, namely, a blank control without applying any fertilizers (CK), conventional chemical fertilizer (0.745 kg N/plot) (CF), swine manure (0.745 kg N/plot) (SM), agaricus bisporus residues (0.745 kg N/plot) (AB1), double amount of agaricus bisporus residues (1.49 kg N/plot) (AB2), flammulina residues (0.745 kg N/plot) (F1) and double amount of flammulina residues (1.49 kg N/plot) (F2). The area of each plot was 20 m^2, and each treatment was triplicated. Generally, the application of edible fungi residues increased the contents of organic matter, total nitrogen, available nitrogen, available potassium and available phosphorus effectively. The contents of soil nutrients for the CF treatment increased suddenly and attained maxima within two weeks, but then decreased rapidly. For comparison, these for the swine manure and edible fungi residues treatments increased slowly and the fertilizer efficiency maintained for a long time. Before rice harvesting, the content of available phosphorus in the soils for the SM and AB2 treatments was significantly higher than CK and the other treatments($p < 0.05$). The content of available potassium in the soils for the SM, AB2 and AB1 treatments was significantly higher than CK and the other treatments($p < 0.05$). There was no significant difference in the contents of As, Hg and Cd in the soils for the different fertilizer treatments($p > 0.05$). However, the content of Cu in the soils for the SM treatment was significantly higher than CK and the other fertilizer treatments ($p < 0.05$), highly suggesting the risks of Cu pollution to the soils after the application of swine manure. One-year application of edible fungi residues did not indicate any risks of heavy metal accumulation in the soils. The contents of Cu, Cd, As, Hg and Zn in the rice grains for the different fertilizer treatments were not significantly different, and all were much lower than the Chinese national standards for food safety (GB2762 - 2017). This suggests that one-year application of edible fungi residues and swine manure on the soils did not cause the significant accumulation of heavy metals in rice grains.

Keywords: edible fungi residues; soil nutrients; heavy metals; rice grains