**Characteristics of three organic fertilizers and their influence on the mobility of cadmium and arsenic in a soil-rice (*Oryza sativa* L.) system**

Xiao Tan1, Jinman Cao1, Jiahao Liu1, Jinhang Wang1, Guilan Duan2, Yinjie Zhang1, Aijun Lin1 \*

1*College of Chemical Engineering,* *Beijing University of Chemical Technology, Beijing 100029 (China)*

2*State Key Laboratory of Urban and Regional Ecology, Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences, Beijing 100029 (China)*

\*Corresponding author:

\*(A.L.) Phone: +86-10-6442-7356; E-mail: linaj@mail.buct.edu.cn

Manuscript to be submitted to

***Environmental Science and Pollution Research***

November 2021

**Supporting Information**

**Safety assessment method of organic fertilizer**

The single pollution index method and Nemerow comprehensive pollution index method were used for evaluation of the heavy metals content of organic fertilizers as shown in Equations (1) and (2):

Single pollution index:

where, *P*i is the single pollution index for a specific heavy metal element; *C*iis the average value of the specific heavy metal element in a sample; *S*i is the specific heavy metal pollution limit defined by the Chinese organic fertilizer standard (Ministry of Agriculture and Rural Affairs, 2012) which were applied as: As ≤ 15 mg·kg -1, Cd ≤ 3 mg·kg -1, Cr ≤ 150 mg·kg -1, and Pb ≤ 50 mg·kg -1. As the Chinese organic fertilizer standard lacks pollution limit values for Ni, Cu, and Zn, the pollution limits for these elements referred to the German standard for composting compost (Verdonck, 1998), which were applied as Cu ≤ 100 mg·kg -1, Ni ≤ 20 mg·kg -1, and Zn ≤ 400 mg·kg -1.

Nemerow comprehensive pollution index:

where *P*cis the comprehensive pollution index for total heavy metals in the sample; *P*imax is the maximum value of the Single pollution index; *P*iavg is the average value of the single-factor pollution index. The classification standards for individual and comprehensive pollution indices are shown in Table SI.

**Table S1**

Grade standard for single and comprehensive pollution indices.

|  |  |  |  |
| --- | --- | --- | --- |
| Single pollution index | Pollution level | Comprehensive pollution index | Pollution level |
| Pi ≤ 1 | Uncontaminated | Pc ≤ 0.7 | Safe |
| 1＜Pi ≤ 2 | Light pollution | 0.7＜Pc ≤ 1 | Cordon |
| 2＜Pi ≤ 3 | Moderate pollution | 1＜Pc ≤ 2 | Light pollution |
| Pi＞3 | Heavy pollution | 2＜Pc ≤ 3 | Moderate pollution |
|  |  | Pc＞3 | Heavy pollution |

**Table S2**

Pollution index values for heavy metals in HO, MO and SO.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Single pollution index *Pi* | | | | | | | Comprehensive pollution index *Pc* |
| As | Cd | Cr | Cu | Ni | Pb | Zn |
| HO | 0.21 | 0.34 | 0.39 | 0.79 | 0.39 | 0.40 | 0.65 | 0.65 |
| MO | 0.24 | 0.34 | 0.51 | 0.48 | 0.83 | 0.26 | 0.35 | 0.66 |
| SO | 0.29 | 0.47 | 0.24 | 0.21 | 0.22 | 0.26 | 0.19 | 0.38 |