

Effect of levels of copper and zinc and carbon: nitrogen ratio of compost materials on copper and zinc concentration of compost⁽¹⁾

Tein-Ming Su ⁽²⁾⁽⁴⁾ Cheng-Hsun Chung ⁽²⁾ Ting-Hsun Hsiao ⁽²⁾
Hsiao-Lung Liu ⁽³⁾ Yih-Fwu Lin ⁽³⁾ and Mei-Ping Cheng ⁽²⁾

Received: May 27, 2012; Accepted: Jul. 21, 2013

Abstract

The purpose of this study was to investigate the effect of levels of copper and zinc and carbon: nitrogen ratio (C/N ratio) of compost materials on copper and zinc concentration of compost. Layer hens fed with three levels of copper and zinc i.e., groups T1, T2 and T3 fed with 0, 5, 10 mg/kg of added copper as CuSO₄, and 25, 50, 75 mg/kg of added zinc as ZnSO₄, respectively. Collected excreta were mixed with rice hull to adjust C/N ratio at three levels i.e., groups C1, C2 and C3 were all excreta, C/N ratio = 20 ± 3 and C/N ratio = 30 ± 3 , respectively and moisture content was adjusted to 60% before 65 days of composting process. The results showed that fermentation temperature can reach 55°C for 5 consecutive days in each group. During composting period, C/N ratios of C1, C2 and C3 reduced 3, 9 and 15, respectively and losses of dry matter were between 32 and 37%. After composting, alfalfa relative seed germination (RSG) of group C1T3 was 88.46%, while alfalfa and rapeseed RSG all reached over 90% in others groups. Significantly higher RSG were found after composting than those before composting. Copper and zinc concentrations of compost were 1.50-1.69 and 1.26-1.47 times of those before composting. Concentrations of nitrogen, phosphorus, potassium and calcium were higher after composting than those before composting. Organic matter, organic carbon and C/N ratio were lower after composting than those before composting. In conclusion, copper and zinc concentrations of compost could meet the national quality standards of excreta compost when dietary copper and zinc were 16 and 112 mg/kg, respectively. It indicated that excreta of layer hens without composting could inhibit seed germination.

Key words: Carbon: nitrogen ratio, Compost, Copper, Excreta of layer hen, Zinc.

(1) Contribution No. 2126 from Livestock Research Institute, Council of Agriculture, Executive Yuan.

(2) Livestock Management Division, COA-LRI, Hsinhua, Tainan 71246, Taiwan, R.O.C.

(3) Animal Industry Division, COA-LRI, Hsinhua, Tainan 71246, Taiwan, R.O.C.

(4) Corresponding author, E-mail: tmsu@mail.tlri.gov.tw.