

An integrated crop-vermiculture system for treating organic waste on farmland

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Treatment of organic waste using earthworms and the effects of earthworms on soil has been well-documented. However, few research studies have combined the two. Typically, organic waste is processed by earthworms in special places, e.g., earthworm farms. Here, this study proposes a method based on field-breeding of earthworms to treat organic wastes: an integrated ecosystem of cropping, vermiculture, and organic waste treatment. In this paper, we introduces an integrated crop-vermiculture system for treating organic waste on farmland using earthworms (*Eisenia fetida*). Using alternating bands of crop ridges and worm-farming troughs, this system combines waste treatment and soil improvement (Figure 1). Three years of research was conducted on the processing of cattle dung, sewage sludge, and mushroom residue in this system using a summer corn/winter wheat crop rotation system in northern China. The results show that this system is an effective method for processing waste, as well as for breeding earthworms. Compared to conventional cultivation, the crop-vermiculture system used no tillage or chemical fertilizer input, and attained higher corn yield, improved soil porosity, and increased soil fertility. Although sewage sludge application had some cumulative effect on the heavy metal contents of soil, grain, and earthworms, short-term application was relatively safe.

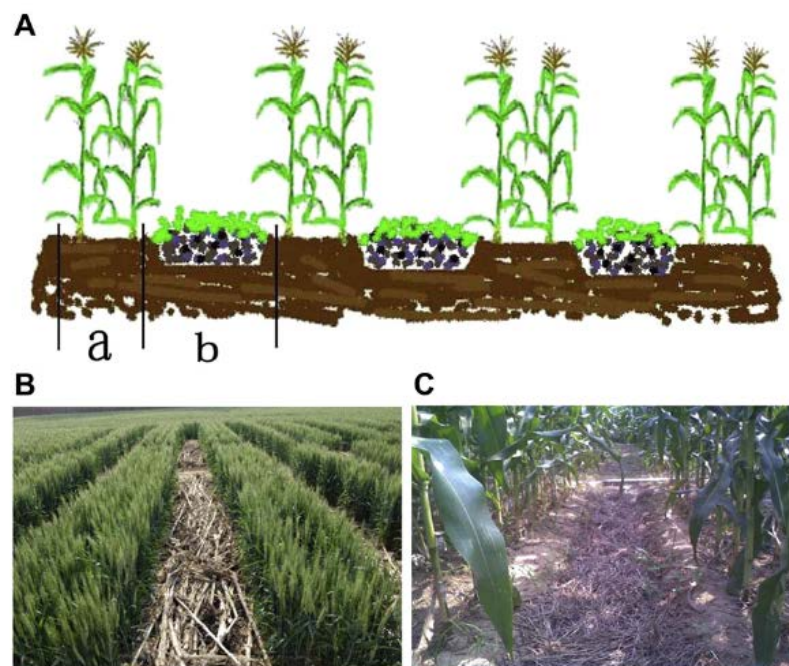


Fig. 1. The integrated ecosystem of crop-vermiculture waste treatment and field photographs. (A) The system consisted of alternating bands of 0.5-m-wide crop ridges (a) and 0.8-m-wide and 0.2-m-deep worm-farming troughs (b). Photograph of the crop-vermiculture planted in winter wheat (B) and summer maize (C).

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