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稻秸蚯蚓堆制后的物理、化学及微生物特性变化

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Changes in physical-chemical and microbial properties of rice straw through vermicomposting

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摘要 利用水稻秸秆与畜禽粪便（牛粪、猪粪和鸡粪）等干重混合物（RCD、RPM、RCE）接种蚯蚓（*Eisenia foetida*）进行堆制，研究堆肥产物的物理、化学及微生物特性变化。结果表明，蚯蚓堆制30 d后，稻秸牛粪、稻秸猪粪堆肥产物MBC含量显著下降；3种稻秸粪便混合物经蚯蚓堆制后，堆肥产物微生物代谢熵、脱氢酶和碱性磷酸酶活性增加，尤以RCD的变化明显。稻秸牛粪、稻秸猪粪及稻秸鸡粪混合物经蚯蚓堆制后，总固形物平均重量损失分别增加6.45%、4.22%和3.82%；pH值均降低，其中RCD显著降低。蚯蚓堆制有助于提高堆肥产物全氮、全磷和全钾含量，同时使碳氮比降低。水稻秸秆混入部分畜禽粪便经蚯蚓堆制可减少堆肥时间并提高堆肥质量，混入的粪便以牛粪最好，猪粪次之，鸡粪最差。

关键词： 水稻秸秆 蚯蚓堆制 物理化学特性 微生物

Abstract: Vermicomposting is a popular technique used for waste treatment (e.g. cow dung, pig manure and chicken excrement). In order to evaluate the feasibility of vermicomposting used for rice straw treatment, three kinds of rice straw and dung mixture (straw: dung=1: 1, dry weight) were set up: rice straw plus cattle dung(RCD), rice straw plus pig manure(RPM) and rice straw plus chicken excrement(RCE). The physical-chemical and microbial properties of end products obtained through composting and vermicomposting were analyzed respectively. The results indicated that vermicomposting decreased the microbial biomass carbon (MBC) in the end products of RCD and RPM significantly after thirty days, while increased the microbial respiration quotient (qCO_2), dehydrogenase and alkaline phosphatase activities in the end products of RCD, RPM and RCE, especially for RCD. The total solid loss (TS loss) in the RCD, RPM and RCE were increased through vermicomposting by 6.45%, 4.22% and 3.82%, respectively. Vermicomposting decreased the pH in the end products of three straw and dung mixture. The vermicompost obtained from RCD, RPM and RCE increased the contents of total nitrogen (TN), total phosphorus (TP) and total potassium (TK), while reduced C: N ratio compared with compost. The vermicomposting effects used for rice straw was followed with the order: RCD>RPM>RCE. The best dung suitable for vermicomposting was cattle dung followed by pig manure and chicken excrement.

Keywords: rice straw vermicomposting physical-chemical property microbe

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