Available online at www.sciencedirect.com

ScienceDirect

Procedia Environmental Sciences 31 (2016) 12 – 17

Procedia Environmental Sciences

The Tenth International Conference on Waste Management and Technology (ICWMT)

Advances in recycling and utilization of agricultural wastes in China: Based on environmental risk, crucial pathways, influencing factors, policy mechanism

Bin Wang[a,b,*], Faqin Dong[a,b], Mengjun Chen[a,b], Jingping Zhu[a], Jiangyue Tan[a], Xinmei Fu[a], Youzhi Wang[c], Shu Chen[a,b]

[a] *School of Environment and Resource, Southwest University of Science and Technology, Mianyang 621010, Sichuan, People's Republic of China*
[b] *Key Laboratory of Solid Waste Treatment and Resource Recycle of Ministry of Education, Southwest University of Science and Technology, Mianyang 621010, Sichuan, People's Republic of China*
[c] *Shude Huaiyuan middle school, Chengdu 611237, Sichuan, People's Republic of China*

Abstract

With the development of agriculture in China, the productions of agricultural wastes increase rapidly. The occurrence of agricultural wastes was unique in the different areas. The agricultural straw and livestock excrement are considered to be potential resources. Improper disposition of agricultural wastes not only result in environmental pollution, but also waste a lot of valuable biomass resources. The recycling and utilization of agricultural wastes are considered to be the important step in environmental protection, energy structure and agricultural development. However, the problem in China's current agricultural waste recycling impeded the achievement of scale ecological functions. The objectives of this study were to illuminate the potential environmental risk, recycling and utilization pathway, influencing factors and policy suggestions in the recycling and utilization progress of agricultural wastes. The survey provided the development mode of industrialization and scale of agricultural waste recycling. The recycling and utilization pathway of agricultural wastes were also analyzed. The crucial suggestions were proposed, such as cultivating new industry, building economy incentive standard, improving laws and regulations, and creating rural market strengthening medium and long-term plans of agricultural waste recycling. The resource consumption, ecological crisis and other issues caused by agricultural wastes were evaluated. It will provide more comprehensive fundamental information for the recycling and utilization of agricultural wastes during the modernization and urbanization of China.

Peer-review under responsibility of Tsinghua University/ Basel Convention Regional Centre for Asia and the Pacific

* Corresponding author. Tel.: +86-816-2818516; fax: +86-816-2818516.
E-mail address: greenworldwb@swust.edu.cn

Peer-review under responsibility of Tsinghua University/ Basel Convention Regional Centre for Asia and the Pacific
doi:10.1016/j.proenv.2016.02.002

Keywords: agricultural waste; potential value; influence factor; government policy; recycling; utilization

1. Introduction

In recent years, agricultural wastes have become the important pollution sources, and the problems caused by poultry and animal feces is global attention[1]. The random straw burning and livestock excrement in the agricultural country have caused a series of environmental problem. And direct combustion and arbitrary discard even become common ways, a serious threat to China's rural ecological environment and improvement in agricultural production and farmers' living conditions[2]. According to the research at home and abroad showed that all kinds of agricultural wastes, especially poultry, animal feces and crops straw, have a very high nutrition potential and can also improve soils for sustainable production ability[3]. Therefore, the effective transformation of agricultural waste recycling and utilization was important in the controlling of environment pollution. Besides, facing with the problem, it can also address the serious energy crisis.

China is a traditional agricultural country with considerable amounts of poultry farms, crops and so on. With the development of agriculture in China, the productions of straw and livestock manure increase rapidly. It lacks laws and regulations of agricultural wastes recycling. Therefore, agricultural wastes are a huge resource library. Unfortunately, the systematical evaluation on the resource utilization of agricultural wastes in China must be launched. The agricultural wastes from rapid expansion of animal farms and mushroom industries as well as other agricultural industries enter into environments[4]. Improper disposition of agricultural wastes not only result in environmental pollution, but also waste a lot of valuable biomass resources. However, few researches have been reported on utilization of agricultural wastes to reduce soil consumption[3,4]. Therefore, the agricultural waste disposal becomes an important aspect during the modernization and urbanization process. However, the crucial resources characteristics, utilization technologies, influence factors and socio-economic assessment on agricultural waste utilization still remain unclear. Therefore, they are urgently tracked and summarized through statistics analysis, experiments, field survey and geographic information. The recycling and utilization of agricultural wastes are considered to be the important step in environmental protection, energy structure and agricultural development.

The objectives of this study were 1) to understand the potential environmental risk of agricultural wastes, 2) to evaluate the recycling and utilization pathway of agricultural wastes, 3) to investigate the influencing factors on the recycling and utilization of agricultural wastes, and 4) to make policy suggestions for the agricultural wastes during the modernization and urbanization process in China.

2. Potential environmental risk and value of agricultural waste

A large number of agriculture wastes have been produced each year in recent years around the world[2]. Agricultural wastes annually increased at an average rate of 5%-10%[4]. The random abandon and unreasonable utilization would also result in air pollution, soil contamination, and so on. The burning of manure and straw will generate a lot of harmful gas, smoke and dust, seriously polluting our air environment[5,6]. Animal manure also contains many pathogens, parasite eggs, heavy metals and so on. A part of agricultural residues has even been directly discharged into water, leading to serious contamination of aquatic environment. The occurrence of agricultural wastes was unique in the different areas. The resource consumption, ecological crisis and other issues caused by agricultural wastes were illuminated. The potential environmental risk of agricultural waste in China can be evaluated by the amounts, distribution characteristics and sources of agricultural straws, animal excrements and so on.

Due to information and interest differences to agricultural waste recycling, the low efficiency in farmers and extension departments become the main cause. The amount of agricultural straw and animal wastes in China increased steadily[8]. According to the survey data[8,9], farmer's input and output index system can be built to illuminate the conversion efficiency of agricultural waste utilization, and deeply explore the regional differences, factors and so on. Furthermore, the innovation capacity can make society to be as a whole coordination. As an example[10], biochar is a relatively stable carboncious material converted from organic wastes. More attention and efforts were given to develop technologies on converting agricultural wastes into biochar[11]. Field experiments were being carried out on