

学 位 論 文 要 旨

Community-based Composting and Management of Leftover Food for Urban Agriculture 市街地農業のためのコミュニティベース食品残渣コンポスト化とそのマネジメント

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The development of urban agriculture varies from country to country and region to region depending on climatic, demographic, economic, social and cultural circumstances. The outcome of the study, therefore, would supplement existing urban agriculture (UA) in general approaches of literature. Focusing on social and technological approaches has led to promote the successful implementation of Urban Agriculture in developed and developing countries. Related to the Urban Agriculture concept, this paper stressed the waste management in an urban area. A social approach was initiated in Fuchu city as community-based composting activity and a technology approach was conducted as an odor control experiment of its composting process. The community-based composting was the first action to be accepted by the farmers or residential people who had similar motivations and understandings to bear the risk of co-operation. The observation was found that management of organization required synergy endeavor of stakeholders in the related organizations among local government agencies, universities, research and development institutions, employers and others as it is the key factor to be able to continue well-functioning composting management system in the Urban Agriculture. Previous discussion explained that the conviction from the farmers in Fuchu city was an interesting in using compost from leftover food and they confirmed its ability to improve nutrients in their field. On the next stage, the community faced various obstacles and challenges that addressed in this study i.e. the risk of odor from composting facilities and unavailable of lunch servers. Thus, the obstacle had to be solved by technological approach in odor control. At the beginning some trials were as follows: starting with high quality feed stock, cutting corner for delay of fresh material, mixing between rich nitrogen feedstock and rich carbon feedstock, frequently turning of material position, shifting the smell into drainage-canal, and in active aeration. The observation of initial characteristics of the composting materials in different seasons and the monitor of its physical properties indicated that the

composting process was not satisfied for agricultural needs and environmental conservation. However, within a range of ammonia gas concentrations, no complain of odor was obtained from the residents. Another achievement was the reduction of ammonia gas by using clinoptilolite in composting of leftover-food. In particular, this study focused on the correlation between ammonia emissions and temperature at different doses of clinoptilolite in the thermophilic stage, which occurred in the early days of compost and from which ammonia gas was actively discharged. The addition of 31.5 – 47.2 % clinoptilolite to leftover food composting affected the reduction of ammonia emission and the composting properties. The results of this study demonstrate that natural zeolite from Japan “Itaya Zeolite-13” acts as an adsorbent and has great potential for removing ammonia from fermenters composting of leftover food especially in granular form (<4mm). Based on the results above, the possibility of extension of the community-based approaches was discussed in reference to another city in Japan, Denpasar or other city in the world. This paper also could be the answers and the solutions for Urban Agriculture problems which might be occurred in any city anywhere in near future. Any effort of composting will face the problem in "to how to mitigate the odor ". Technology approach in odor control and social approach in initiated the community-based approach in this study will contribute in the future of research and development of waste management. Especially Denpasar-Bali is the city which just started the development of community-based composting and realized on how the importance of community-based composting to promote Urban Agriculture.