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Ramiran 98

8th International Conference on Management Strategies for Organic Waste Use in Agriculture

8e conférence internationale sur les stratégies de gestion des déchets organiques en agriculture

Edited by José Martinez and Marie-Noëlle Maudet

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8th International Conference on Management Strategies for Organic Waste Use in Agriculture.

8ème Conférence Internationale sur les Stratégies de Gestion des Déchets Organiques en Agriculture.

Edited by José Martinez and Marie-Noëlle Maudet

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Résumé

Ce volume rassemble les actes de la 8e Conférence Internationale d'un Réseau FAO sur le Recyclage des Déchets Agricoles, Municipaux et Industriels en Agriculture (réseau RAMIRAN, précédemment appelé Réseau sur la Gestion des Déjections Animales), qui s'est tenue à Rennes du 26 au 29 mai 1998. Le thème de la conférence était les stratégies de gestion des déchets organiques utilisés en agriculture, et celle-ci était organisée en 5 parties :

- Stratégies de gestion des déchets organiques utilisés en agriculture
- Valeur agronomique des déchets organiques
- Mesure, modélisation et maîtrise des émissions gazeuses
- Traitement et gestion des déchets
- Impacts environnementaux

Six articles sont présentés dans la première partie sur le thème des stratégies de gestion incluant les systèmes experts, la modélisation et les aspects réglementaires. La deuxième partie comprend 11 articles sur la valeur agronomique et débute par une synthèse qui rappelle les bases historiques de l'utilisation agricole des déchets organiques. Afin d'aboutir à un recyclage efficace, il est en effet nécessaire de bien connaître et prédire la disponibilité en éléments nutritifs. Les différentes étapes du recyclage de déchets organiques s'accompagnent également de diverses voies de fuites de composés gazeux indésirables pour l'environnement. On distingue notamment l'ammoniac (NH_3), le protoxyde d'azote (N_2O) et le méthane (CH_4). Les inventaires et méthodes de réduction de ces gaz sont présentés à travers 9 articles dans la troisième partie de l'ouvrage. La quatrième partie décrit les techniques de traitement et de gestion des déchets, notamment des effluents d'élevage. Enfin la dernière partie présente les aspects environnementaux liés à l'utilisation de déchets organiques et notamment les métaux lourds apportés aux sols par les déjections animales et les aspects sanitaires.

Cet ouvrage rassemble les principaux auteurs impliqués sur ce domaine de recherche et présente, à la fois les derniers résultats de leurs travaux, mais également des considérations pratiques, nécessaires pour assurer une gestion optimisée des déchets organiques en agriculture.

General Abstract

This volume contains the Proceedings of the 8th International Conference of the FAO ESCORENA Recycling of Agricultural, Municipal and Industrial Residues in Agriculture Network (RAMIRAN, formerly the Animal Waste Management Network), held in Rennes, France, from 26 to 29 May 1998. The theme of the Conference was Management Strategies for Organic Waste Use in Agriculture and the Conference was divided into five parts:

- Management strategies for organic waste use in agriculture
- Agronomic value of organic wastes
- Measurement, modelling and control of gaseous emissions
- Processing and handling of wastes
- Environmental impacts

Six papers were presented in Part 1 on the theme: Management Strategies Covering Expert Systems, Modelling and Legislation. The second part consisted of 11 papers on the agronomic value including a review describing the historical basis for the application of organic wastes to land. To achieve proper recycling, it is essential to understand the crop availability of nutrients. The various stages of organic waste recycling provide numerous opportunities for the escape of environmentally active gases. The gases of greater concern include ammonia (NH_3), nitrous oxide (N_2O) and methane (CH_4). Inventories and methods for controlling these emissions were explored through 9 papers presented in Part 3. Part 4 covered the different aspects of handling and processing wastes in general. Special attention was given to animal manure, but also other wastes were considered. The final part on environmental aspects was mainly devoted to the metal content in animal wastes (4 papers) and hygienic problems.

The book brings together the leading workers in the area and provides an up-to-date account of the research together with implications for practical recommendations in this environmentally sensitive field.

These considerations led us to the conclusion that this book is timely and fills a void on a subject that lacks integrated scientific information.

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Preface

The 8th International Conference of the FAO ESCORENA Recycling of Agricultural Municipal and Industrial Residues in Agriculture Network (RAMIRAN, formerly the Animal Waste Management Network), was held in Rennes, France from 26 to 29 May 1998. The Conference gathered nearly 150 delegates representing more than 26 countries. Colleagues from all European countries, Japan, Canada, USA, Russia and Chile were present in Rennes.

The FAO European Cooperative Research Network on Animal Waste Management was formed in 1976. The principal activity of the Network is for members to exchange research information and to prioritise work topics, which are then undertaken by expert groups. The need to change the direction and name of the Network to RAMIRAN, was agreed at the last Network meeting in Godollo, Hungary in 1996. After 20 years of focusing on animal wastes, it is now necessary to include municipal and industrial wastes as these are increasingly spread on land and are also the cause of environmental pollution. Animal wastes remains a significant component of the Network's activities but would be considered in a more integrated manner with other wastes which have similar benefits and problems when spread on land.

The theme of the Conference was **Management Strategies for Organic Waste Use in Agriculture** and the Conference was divided into five sessions:

- Management strategies for organic waste use in agriculture
- Agronomic value of organic wastes
- Measurement, modelling and control of gaseous emissions
- Processing and handling of wastes
- Environmental impacts

During these session, 43 papers were presented, including four invited papers (C.H. Burton, J C Fardeau, J-M. Merillot and B.F. Pain). These papers are published in this book. In addition, 50 poster papers were displayed and for each a short oral presentation was allowed.

The Conference confirmed the importance of the ad hoc expert groups as the focus of Network activities between meetings. Progress on their activities will be reported at a workshop planned for 2000 to be held at the Institute of Agricultural Engineering, Milan, Italy. It is planned to hold the 9th major meeting in 2002, which will probably be hosted by the Research Institute of Experimental Veterinary Medecine at Kosice, Slovakia.

Part 1

Management strategies for organic waste use in agriculture.

Chairman : J.E. Hall (UK)

Management strategies related to legislative, economic, agronomic and environmental impact of organic wastes.

Invited Paper

Stratégies de gestion des déchets organiques prenant en considération leur impact législatif, économique, agronomique et environnemental.

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Abstract

As a result of scientific studies and public awareness, environmental protection is now recognized as one of the basic state policies. Strategies management of anthropic activities must, more than ever, take in account not only the environmental legislation corpus, but the concepts and principles that are used to build the public policies. Most of the times, it considers also economical and financial procedures (taxes and grants) and technical tools analysis (systemic analysis and flows balances). Agriculture is highly concerned because of its natural relations to environment and also because of its weight as a production / consumption chain.

In most cases, spreading is used for soil restitution of nutrients but with unbalanced flows resulting in environmental impacts. It is obvious that territorial regulation of a « back to soil strategy » must be built on the aptitudes of :

- *soils to be amended,*
- *crops to be fertilized,*
- *farms to gain profit,*
- *neighbours to agree,*
- *natural areas and ressources to be protected and exploited,*
- *.....*

When considering each elementary flow, the questions are : what kind of natural cycle is pertinent for a specific flow ? Where and how is it stored in nature ? The answer is different for carbon, nitrogen or phosphorus.

Résumé

Devant les résultats d'études scientifiques et face à la demande du public, la protection de l'environnement est maintenant reconnue comme une des politiques publiques des états.

Les stratégies de gestion des activités humaines doivent de plus en plus prendre en compte non seulement le corpus juridique et réglementaire de l'environnement mais aussi les concepts et principes sur lesquels sont construites les politiques publiques. Très souvent, elles intègrent aussi des procédures économiques et financières (taxes et subventions) et s'appuient sur des outils techniques (bilans et analyse systémique). L'agriculture est hautement concernée, par ses relations naturelles à l'environnement, mais aussi par son poids dans la chaîne de production / consommation.

L'épandage est une modalité très utilisée mais en raison du déséquilibre des flux, il conduit à des impacts environnementaux. Il est évident qu'une stratégie de retour au sol doit être basée sur l'aptitude :

- des sols à être amendés,
- des cultures à être fertilisées,
- des exploitations à être rentables,
- du voisinage à être d'accord,
- des zones et ressources naturelles à être préservées et exploitées,
- .....

Si l'on prend en considération chaque flux élémentaire, les questions qui se posent sont : A quel cycle naturel se rapporte-t-il ? Où et comment est-il stocké dans la nature ? La réponse est différente pour le carbone, l'azote ou le phosphore.

1. Introduction

Traditionally, management strategies of manufactured products cover the wide range of technical, economical and social considerations, which have learned to live together more or less quietly. The emergence of environmental considerations is relatively recent and leads to troubles. At this point of our knowledge and practices, we can say that :

- new questions that have to be taken in account are identified
- their solutions are not always correctly implemented
- it is often difficult to organise them into a global problematic
- it is even more difficult to translate them into actions

Applied to waste management, the level of difficulty increases of several points, because waste management is, more than other subjects, a conflict area. Further if you add "organic" to "waste", you again increase difficulty because of the complexity of the organic matter, of its reactive potential and of psychological considerations.

A management strategy results of the answers to the following questions :

- What is ideally wishful ? considering the global context
- What is socially acceptable ? considering the present situation
- What is readily feasible ? considering my specific position

These questions must be asked with a frequency depending on the speed of evolution of context, situation and position. However, this evolution is rather rapid because we actually live a period of construction under uncertainties. It means that the questions related to organic waste management must be answered through a prospective analysis, and with a proactive management policy as strategy means that you want to anticipate, to predetermine events and not to stay running after them.

So, the first point is to review the main environmental policies, to analyse their conception and development mechanisms in order to find how they can change in the next future. The second point is to detail the role of waste management policies and systems inside the range of environmental policies, and finally the third point is to describe the possible strategies for organic wastes. I will conclude on the future of the "back to soil" strategy applied to all kind of wastes.

2. The place and role of environmental policies

Maybe, the second part of our finishing century will stay in memories as the emerging period for environmental public policies. And maybe that future generations will find at least funny or completely crazy our polemic debates and our environment protection programs. But, the fact is that each state is building progressively its environmental policies through :

- the organisation of public services for control and incitation
- the development of a legislative corpus
- the modification of the existing economical rules

The role and respective weight of this different parts varies a lot from state to state resulting in more or less "hard" or "soft" regulation policies.

These policies answer to a social demand, as the public opinion has been aware of environmental impacts through scientific works. Aiming to modify our economical development conditions, basically responsible of environmental problems, it is not surprising that they use of financial mechanisms in order to change the value of things, activities and products.
If we look for details on environmental policies, we must consider on one hand the concepts, principles and tools on which they rely and on the other hand the different fields they cover and the way it is co-ordinated.

The concepts, principles and tools can be related to their rationale :

- economical changes	to	polluter/payer principle
- global public policies	to	sustainable development concept
- scientific approaches	to	systemic analysis
- engineering	to	best available technologies strategies
- ecological ideal	to	nature protection strategies

Environmental policies cover a wide range of problems. It results in specific thematic subpolicies, which can be gathered into groups :

- Natural Resources Quality Preservation (air, soils and water)
- "Wild" Nature Protection (biodiversity, protected areas, species in danger...)
- Production Activities Regulation (emissions regulation and waste treatment)

The third one is often the result of the others which give the background to assess the field and level of regulations.

Agriculture is highly concerned with environmental policies, because of its natural relations to nature. It is surrounded by :

- elementary fluxes and geo/biocycles
- space occupation and landscapes
- quality of its own natural resources
- wild life versus its domestication processes (fauna and flora)

The main problems with agriculture is that :

1. local impacts are the result of a collective behaviour. So the corrective actions must also be collective
2. agriculture covers a wide range of activities, and two main levels of production, e.g. vegetable growing and animal feeding, which have