

RESULTS OF THE ITALIAN NATIONAL RESEARCH PROGRAMME ON: “RECYCLING THE WASTES OF THE AGRO-INDUSTRIAL SYSTEM”

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ABSTRACT

The Italian national research programme on the agro-industrial effluents has come to an end. This programme had the goal to define and promote new technologies transferable to the industrial sector in view of their production and distribution for agricultural use and in order to define strategies for agronomic valorization of the wastes and develop technological innovations.

The study was defined in 1996 and started its activity on Nov. 1st, 1998. The first results were shown on the occasion of RAMIRAN 2000.

The specific goals are the followings:

- identification of solutions making it possible to eliminate water pollution due to direct discharge of wastes and of new technologies able to reduce and keep under control non point pollution sources through the optimization of the agronomic use of effluents;
- definition of technological packages for an appropriate field distribution with low environmental impact.

New prototypes of machines and plants as well as some information programmes for a more appropriate management have been designed and constructed. A DVD has been made in order to show the machines and equipment, realised within the framework of the Project, at work.

Keywords: *non point pollution, slurry tanker, manure spreader, animal wastes.*

INTRODUCTION

The CNR (National Research Council) has financed a research project on the basis of the following main considerations: rearing techniques both for animals and vegetal produce have deeply changed over the last decades; breeders/farmers need tools allowing them to carry on their activity without too many restraints; there is a general interest in protecting the environment. This means that there is a need to develop new technologies able to meet both the requests of the farmers and of those involved in the protection of environment.

THE STRUCTURE OF THE PROJECT

The structure and the main goals of the animal wastes subproject, considered in this paper, (the other subproject concerned olive mill wastes) were already presented at the RAMIRAN Workshop held in Gargnano (Pellizzi, 2000; Sangiorgi 2000; Tomati 2000).

The sub-project was structured in five research topics which are in turn subdivided into 27 sub-topics. Each one of them involved the work of one or more research units. In order to facilitate contacts, one e-mail address for each sub-topic is indicated.

The first topic (table 1) considered the territorial aspect, which is so important to planners and those responsible for the safeguard of the territory.

The second topic (table 2) considered the operational management problems. In fact it is important to understand the methods and constraints on the spreading of the waste, with a view

to maximising the fertilizing effect and minimizing pollution.

Table 1 - Analysis at territorial and environmental level

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- 1- Study cases defined in relation to the national situation of landless livestock farms and areas with high livestock loads (segreteria@adbpo.it)
 - 2 - Identification of small catchment basins (segreteria@adbpo.it)
 - 3 - Selection of mathematical models for nutrients release (maurizio.borin@unipd.it)
 - 4 - Identification of areas in which co-operative management of slurry is practiced (imeter@unipg.it)
 - 5 - Evaluation of the nutrients receptivity of the soils, also in relation to their vulnerability (grignani@agr.unito.it)
 - 6 - Identification of the obstacles preventing the agronomic management of waste and the adoption of collective systems (g.zucchi@stpa.unibo.it)
 - 7 - Agronomic management of wastes: amount of heavy metals distributed and removed by crops (a.figliolia@isnp.it)
 - 8 - Chemical -physical techniques for the decontamination of soils polluted by heavy metals (r.mauri@ing.unipi.it)
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Table 2 - Agronomic and managerial constraints in the areas considered and definition of the amount of nutrients to be applied. Development of a decision support software for farmers.

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- 9 - Definition of the real needs of nutrients by the crops (maurizio.borin@unipd.it)
 - 10 - Establishing the amount of slurry to be spread (grignani@agraria.unito.it)
 - 11 - Fertirrigation with animal slurry (giorgio.provolo@unimi.it)
 - 12 - Software design and set up for slurry management at farm level (giorgio.provolo@unimi.it)
 - 13 - Organization of slurry transport systems (giorgio.provolo@unimi.it)
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The third topic (table 3) deals with the development of solutions required by farmers, in terms of methods and technologies, on slurry tankers, manure spreaders, composters and separators.

Table 3 - Design, development and test of new equipment and machinery for treatment and distribution on the soil of slurry, manure and composted materials.

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- 14 - Systems for rapid or on-line slurry analysis (giorgio.provolo@unimi.it)
 - 15 - Design, construction and test of computerized slurry tankers and manure spreaders (paolo.balsari@unito.it)
 - 16 - Design, construction and test of machinery for composting separated solids (roberto.chiumenti@dvtpa.uniud.it)
 - 17 - Design, construction and test of GPS systems for slurry tankers (mazzetto.fabrizio@unimi.it)
 - 18 - Solid/liquid separation (s.piccinini@crpa.it)
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The fourth topic (table 4) deals with the control and reduction of environmental problems in general, and those resulting from the application of Leg.Decr. 152/99, dealing with the treatment of animal waste and all types of agricultural sewage, such as milking parlour effluents.

Table 4 - Development and test of new equipment and systems for the treatment of slurry and used waters.

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- 19 - Analysis of the operating characteristics of total pollution abatement installations (info@depuratori.it)
 - 20 - Slurry removal from stables and piggeries (g.bonazzi@crpa.it)
 - 21 - Balance pit and transport of slurry within the farm centre (giorgio.provolo@unimi.it)
 - 22 - Automatic design of slurry pits (giorgio.provolo@unimi.it)
 - 23 - Systems for energy recovery from animal wastes (s.piccinini@crpa.it)
 - 24 - Reduction of the volume of wastes produced in a farm (favali@sibaspa.it)
 - 25 - Design criteria of slurry pits and mitigation of landscape impact (imeter@unipg.it)
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The fifth topic (table 5) considered the consequences which the regulations in force, and those in the process of being drafted, might have on the future marketability of the new technologies devised within the Project.

Table 5 - Economical and legislative aspects

26 - Analysis of the regional, national, legislation and development of a software
(mariorita.daddezio@dsg.uniud.it)

27 - Development of a data base and of a common standard for slurry management (g.bonazzi@crpa.it)

Among other type of publications, at the end of the project, thanks to the cooperation with the CTU (Centro Televisivo Universitario) and the different research units, a DVD was made in order to show a few machines and some equipment at work. In particular, the two prototypes of an “intelligent” slurry tanker and an “intelligent” manure spreader, are shown at work. For the second one it is possible to see how the machine can rapidly change the amount of manure discharged thanks to an on-board field map showing possible limitations in the amount of nitrogen application. The driver of the tractor is also assisted by a GPS connected software, able to evaluate in real time overlappings or deviations from the right lane that can cause an incorrect distribution of nitrogen.

CONCLUSIONS

The CNR research project was devised on the basis of two general assumptions: the need to provide farmers with a full technological package allowing them to manage in an environment-friendly way the slurry and manure produced by animal rearing facilities, while safeguarding the nitrogen content of the waste, to facilitate its agronomic use; to give manufacturers the opportunity to produce up-to-date equipment allowing them to operate with an international perspective, and not just for a local market, and to provide farmers with softwares especially devised for correct agronomical utilisation of manure.

The Italian law in application of the nitrate directive was passed in 1999 (D.L.vo 152/99) but article 38 foresaw a special decree on the agronomic utilisation of manure and the definition of the vulnerable areas where the limitation of 170 kg/ha of nitrogen would apply.

At the end of July 2004 this decree has not yet been issued. This simply means that there are no market perspectives, in the short time, for the machinery and equipment realised within the project. As a consequence manufacturers and farmers dropped their interest in the development of the new technologies causing a delay in the solution of the environmental problems related with animal wastes management and in the development of new machinery and equipment.

REFERENCES

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Refer to the author’s address to obtain a copy of the DVD and of the CD containing the bibliography produced within the project.