A STUDY ON "ENVIRONMENTAL IMPACT OF AGRICULTURE"

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INTRODUCTION

Often, when speaking of the agricultural impact on the environment, one restricts any Consideration to processes of pollution of surface and ground waters from chemicals added to the soil during agricultural practices. No doubt, such processes exist and may have even a prominent Importance. They are caused either by water infiltration in soil, with the consequent possibility of nutrient and pesticide leaching, or, if water undergoes surface runoff, by erosion processes, that can lead sometimes to transport of relevant amounts of soil particles to water streams.

No doubt, the approach of reviewing every possible output from agriculture to different environmental compartments, either surface and ground waters or atmospheric air or even non-agricultural soil surfaces, is justified and environmentally sound. It is a first necessary step for attaining full environmental friendship of agricultural practices and for minimizing any possible impact. However, it represents only a small part of the impact of the agriculture on the environment and does not point out the actual role that agricultural practices play in their interactions with the environment. The more important environmental problems today are due to unbalancing or to lack of closure of the nutrient cycles, and to wrong choices made to this purposes. Since all nutrient cycles lie in soil as their hearth, they can only be managed through agricultural practices. In order to afford this topic in a more general and exhaustive way, it can be useful to speak in terms of sustainability.

Although it is common today to talk about sustainable agriculture, as well as of sustainability of any human activity, the meaning of "sustainable" is seldom defined.

Sustainable is a fashionable word. So, it is possible to mistake sustainable agriculture for

organic farming, or for some biological or biodynamic version of agriculture, or for the reduction of agrochemical inputs, or for the application of some recent EC directive or US EPA recommendation, and so on. As a matter of fact it is possible to realize the existence of some confusion of ideas with reference to the precise meaning of sustainability.

AIM : A study on "Environmental Impact of Agriculture."

OBJECTIVES

1) To study about the Evaluation of the impacts of human activities on soil biodiversity, functioning and services.
2) To study and Describe the diversity of soil organisms.
3) To study about the determination of relationships between soil biodiversity, functioning and ecosystem services.
4) To study about the Quantification of the economic values of soil ecosystem services.
5) To study and Develop the standardize tools and procedures to measure microbial and faunal diversity.

REVIEW OF LITERATURE

Wastes and residues: Disposal and utilization

As is well known, three possible strategies are available to dispose or re-utilize any waste or residue produced by human activities, including animal wastes: incineration, sanitary landfill, and recycling. The three practices are not absolutely alternative, because they may co-exist in large part or totally, but a strong political will is necessary in order to orientate the choices that technical operators are called to make. A good policy may seem sometimes a challenge: it may reveal to be fruitful only in the medium term.

Incineration seems to be a clean technology, at least at a first glance. Disposal of wastes by incineration allows energy recovery, so that theoretically, after the initial supply of fuel, a self-sufficient energy supply internal to the cycle will occur. As a matter of fact, however, the disposal is more apparent than actual, because incineration reduces the volume of wastes substantially, but not their mass. From municipal solid wastes, for instance, about one third, and sometimes much more of the initial weight, is transformed in inorganic slags, which contain some of the less important or noxious materials, and of course will still need to be disposed. The energy recovery sometimes will remain a dream. Finally, the risk of pollution from the emissions to the atmosphere cannot be neglected: organic (e.g., dioxins) and inorganic substances (e.g. Cadmium and mercury compounds) are among the most common and harmful compounds emitted. It is possible to abate the content of dioxins in the emissions by raising the combustion temperature at but the process becomes more and more expensive. It is also possible to abate the content heavy metals in the emissions, e.g., by washing the chimney smokes, but waters used to wash the steams will need of course further treatments. If such waters will be conveyed to a sewage treatment plant, they could heavily contaminate sewage sludge, making them unsuitable for application in agriculture. Incineration seems to become in fashion now as a disposal treatment for the animal manures which are the richest in nutrient contents. A big plant for incineration of poultry manure has been realized in England near Eye, and the realization of at least three big plants has been at present proposed in Italy. The three plants are programmed for the incineration of about 700 thousand tons of poultry manure per year, and should yield a recovery of electric energy of about 50 millions kW. The authors of such projects stress the importance of recovering energy from hardly disposable and fully recoverable biomasses. This opinion, of course, is disputable. More disputable perhaps is the convenience of dissipating carbon dioxide and especially nitrogen oxides, gases which are considered as responsible for the so-called greenhouse effect, from animal wastes so rich in nutrients, shortly after the Kyoto

Conference where many countries have recognized the importance and the urgency of reducing the emission of such gases. Landfill is another technology which can appear even more fascinating: wastes are disposed without apparent difficulties in appropriately selected areas and at the end their volume may be utilized to re-model the areas themselves e.g., to fill up opencast mines and to mould them pleasantly in order to give them new destinations, e.g., for recreational purpose. The first obstacle arises from the relative low availability of suitable land surface.

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utilized to re-model the areas themselves e.g., to fill up opencast mines and to mould them pleasantly in order to give them new destinations, e.g., for recreational purpose. The first obstacle arises from the relative low availability of suitable land surface. Due to their scarcity, landfill disposal becomes expensive. Another great difficulty is caused by the slow evolution of the landfill caused by the transformation of the disposed materials: landfills undergo a slow and continuous bedding along the years, with variations of volume,

emission of gases to the atmosphere in the short term, and leakage of potentially harmful percolates in the medium and long term. This requires the adoption of a number of cautions for many years, and such cautions mean additional expenses. Animal wastes are seldom disposed of through the use of sanitary landfills, at least officially. Recently, however, some cases of disposal of animal wastes have been reported via this way, especially when liquid or semi liquid effluents were treated and the sludge which originated from treatments were not easily accepted by local farmers. Recycling is in general the most difficult practice to face the problem, a t least in the case of many wastes. For this reason, though in the past recycling represented the most important way to add fertility to soils, it is now not popular as one could expect. On the other hand, recycling is the only totally sustainable strategy dealing with the problems of wastes. For this reason it must be

encouraged enthusiastically. As stated above, for many wastes recycling is not easy and requires the highest degree of professional competences. A wise policy in matter of wastes should promote and subsidize the formation of such competences.

For every kind of materials, recycling is the technology which prevents the existence itself of wastes. Recycling transforms any material, or complex of materials which actually could become wastes if their owner should get rid of them, in useful materials or even commercial products. Recycling of organic residues may give foods, feeds, fertilizers, and many other useful materials. Stabilization of the original organic matter is the ground of any process of recycling fermentable organic residues. So, the use of appropriate technologies is a key step to face the problem of recycling many categories of wastes. Among them, however, those concerning animal by products, as well as manure and effluents, are probably the more important from a quantitative and qualitative point of view. So, such processes are of great benefit for the human society.

Waste recycling: Need for processing

Many animal and plant by-products that are rich in organic carbon and nitrogen, such as leather

meal, ground feathers, horn and hooves, waste wool, oilseed cakes, and so on, are fertilizers as they are. They do not contain humic substances and normally do not need any fermentation process. The evolution of the organic matter of these organic fertilizers will occur directly in soil.

Another group of organic residues is composed of materials sometimes also rich in organic carbon, but comparatively poor in organic nitrogen, such animal dung, agricultural residues and urban refuse. They can be applied to the soil only after a period of fermentation of organic matter, often called "maturation". If applied to urban refuse, or to urban refuse mixed with wastes arising from any possible source (e.g., sewage sludge, ash from incinerators, organic matrices suitable also for producing organic fertilizers) the process of fermentation is generally called proof posting. All these organic residues, after fermentation, are generally denominated organic amendments. The process of fermentation of wastes is essential because the use of raw organic residues of this second group may be inappropriate for a series of reasons. The main results of a fermentation process properly carried out on organic residues to obtain organic amendments are the elimination of phytotoxic substances, the abatement of pathogenic organisms, the elimination of undesired seeds, the reduction of ferment ability with the connected stabilization of organic matter, the reduction of bad odours, and the increased easiness of handling. Since the process of fermentation of organic wastes plays an essential role in providing so many valuable properties from the agronomic point of view, it is imperative to follow its evolution both quantitatively and qualitatively. This is possible because, whereas the process proceeds, the total organic carbon content generally decreases, while the proportion of humified against non-humified carbon increases; on the other hand, the organic matter components undergo strong transformations due to the stabilization processes, which show some similarities to those occurring in soil for any organic substrate, including the organic residues or fertilizers of the first group previously cited. The use of parameters such as the degree of humification may be of help in order to follow the increase of actual amounts of humic fractions in the bulk organic material, while from a qualitative point of view the evolution of the organic matter can be monitored using electro focusing techniques.

The use of wastes in modern agriculture

We must debunk a myth. Organic amendments often do not fit the needs of modern agriculture. Of course soils need organic matter, especially in Mediterranean environments. In recent years the organic matter content in soils has generally decreased, sometimes to worrying levels, particularly due to the effect of increased soil tillage. However, farmers are generally reducing the intensity of tillage, at present, and may reasonably prefer to manage the organic matter balance of their soils simply by proper crop rotations and selecting different organic fertilizers. In modern agriculture, the application to the soil of organic amendments is somewhat troublesome. Undoubtedly the use of chemical fertilizer is general is more convenient for a farmer, due to the easier handling, storage, and other characteristics of feasibility. In addition, the use of organic amendments *per* se does not solve the problems of crop nutrition. The application *of* organic amendments to the soil is not sufficient to fit the nutrient requirements of modern crop varieties: their use ways accompanied by that of mineral fertilization.

In addition, before the addition of organic matter to the soil, it is necessary to take into account the balance of Soil organic matter. In a given pedoclimatic condition, turnover *of* organic matter in soil is controlled by the kinetics of mineralization rate of organic matter. Mineralization kinetics are correlated to the quality of organic matter and its humification degree. But variations in ecologically contrasted conditions can be dramatic, difficult to foresee and impossible to generalize, so that application rates and methodologies are not always simple: they take for granted an additional effort of farmers and their advisors.

In a certain sense, agriculture must adapt (or re-adapt set) lf to the use of organic amendments.

Needless to say, we must resolutely promote a widespread use of organic amendments in agriculture. But the use of organic amendments in agriculture is first of all an indispensable need of the human society. The primary requirement originates more in the human society than in the

agricultural practice.

Of course, organic amendments may play an important role in soil and improve many soil properties, including the behavior of chemical fertilizers. An integrated plant nutrition system is an approach which ensures that plant nutrition be environmentally, socially and economically viable. In this context, a judicious combination of mineral fertilizers with locally available organic sources of plant nutrients should be promoted. In fact, mixed applications are not only complementary, but synergistic, since organic inputs have beneficial effects beyond their nutritional components. The use of organic amendments, however, may also imply negative effects if their content of heavy metals and undesired elements is higher than the allowed amounts or, if maximum allowable levels have not been fixed, overcomes reasonable proportions. Sometimes the coolness of farmers, if not the full failure of the attempt to introduce the use of some organic amendments in agriculture, has been due to an ill-defined consideration of its properties. The definition of the agronomic value of organic amendments must be committed to the agronomists, on an experimental basis. Although it could seem paradoxical, however, some lists of technical parameters have been compiled in the Ministries of the Environment or even of the Public at least in Italy. The lack of professional competence and of a proper institutional origin is the first step towards bad results.

Sustainable agriculture and wastes

Agriculture, like any other human activity, can be defined as sustainable by completing the definition given at the beginning of this report. In practice, agriculture is a sustainable activity if fulfils simultaneously three different requisites:

(i) It must guarantee the conservation of environmental equilibrium so as to allow that productivity lasts on a permanently durable basis, i.e., should not lead in particular to dissipation of unrenewable materials or energy (sustainability of resources).

(ii) It must guarantee full safety to the farmer and any other operator, in addition to hygienic and sanitary safe conditions of the consumer (sustainability of human health).

(iii) It must guarantee economically convenient productions, i.e., a profit to farmers (economical sustainability). This last requisite is that more frequently forgiven. Sometimes it is also concealed, either with financial subsidies farmers or, worse, by frauds against consumers.

When applying the above principles to the transformation of organic residues in useful

fertilizers,

the use of organic amendments in agriculture reveals to be a fully sustainable practice and also

something more. In fact:

(i) For what concerns sustainability of resources, the use of organic amendments avoids both utilization of non-renewable resources and excess of energy expenses (for waste treatment, production of chemical fertilizers, and so on).

(ii) With respect to sustainability of human health, the use of organic amendments may avoid to the organic residues an improper fate, with indirect benefit for the human society.

(iii) Concerning the economic sustainability, the low cost of organic amendments is useful to the farmers, but even more to the entire human society, who does not afford different expensive solutions for the disposal f wasted materials.

First of all, in any case, organic amendments satisfy the simple revisited above, i.e., everything comes from the soil must be returned to the soil.

Standard economic approaches generally focus on public research as information on private efforts in agricultural research is limited, and on economic impacts such as productivity growth. Case studies provide richer information, through a narrative, and highlight the complex relationships among the various variables, events and actors, but it is difficult to standardize results and scale them up. The challenge for RIA is to take into account broader impacts that go beyond science and economic impacts, and to improve knowledge on impact-generating mechanisms. This has become more difficult as agricultural research and innovation systems are increasingly open and complex, and changing quickly. Observation of practices applied to agricultural research in five selected organizations confirms the difference found in RIA between academic research and in practice. In both, the assessment systems pursue the same objectives: 1) Learning: enhance the know-how to produce an environment conducive to socio-economic impact; 2) Capacity building: spread the culture of socio-economic impact to its researchers; and 3) Reporting to stakeholders: from accountability purposes to advocacy targeted to various audiences. The accountability objective, including estimating returns on the financial investment, poses complex challenges and is in tension with the learning and capacity building objectives. The future of RIA will depend on the capacity to improve estimation methods and gather quality information (which also takes into account non-economic impacts) and the sharing of good practices.

The literature points out key elements that identify the current strategic importance of RIA. As suggested by Rip (2003) the era of massive public investment in science based on a general expectation of positive outcomes has passed. Political systems, funding agencies and public research organizations (PROs) must demonstrate results from the public funds used. According to Rip, RIA serves not only to give an ex post delayed account of the impact of research; it needs to be more strategic and anticipatory to assist systematic improvements, and to better identify the full range of outcomes from R&D investment. This does not mean that ex post RIA is out of scope. Past experience is the main source of knowledge. This means that RIA should be designed and performed in such a way that it helps to improve impact generating mechanisms. Hence, RIA approaches must foster their credibility and, at the same time, adapt to different purposes and address different audiences. The objectives are not only related to accountability but also to advocacy and learning. A major challenge is therefore to better link evaluation approaches and evaluation strategies with learning and continuous improvement, as well as evaluation's more conventional role of justification (Shapira and Kuhlmann, 2003). A wide variety of methods for RIA are available. Based on the assessment of the US Advanced Technology Program — probably the most important RIA initiative ever — Ruegg and Feller (2003:17) present a set of different methods:

Analytical/conceptual methods for modeling and informing underlying program theory Survey method Case study: Descriptive Case study: Economic estimation Socio-metric and social network analysis Bibliometrics: counting, citing, and analyzing content of documents Historical tracing Expert judgment.

The list presented by Ruegg and Jordan (2007) in their overview of evaluation methods for R&D programmes is even more comprehensive and includes: econometrics, mission/impact mapping, foresighting, etc. Based on a survey of US public agencies, most of the organisations involved in R&D perform some kind of 'case studies'. A comprehensive presentation of the different methods is beyond the scope of this report. Other surveys are available and it would be burdensome to add a new serial presentation. Furthermore, the comprehensiveness would not help answer the questions of interest of this report: What are the gaps between theory and practice? How to match qualitative and quantitative approaches? How to learn from ex post studies to improve R&D management? Neither would it add value to the points raised in Section 1: How to take into account the different dimensions of impact? How to improve knowledge on impact generating mechanisms?

How to overcome the attribution problem?

Therefore, for sake of efficiency, this review focuses on two sets of methods. The first set is presented under the heading "Standard economic approaches" and follows Heisey et al. (2010) who use the same label to present econometric approaches and economic surplus techniques. These methods have been extensively applied in agriculture where they were first used in the late 1950s. Although a recent survey undertaken for the OECD presents the main results (Alston, 2010), it is necessary to return to the basics of these methods and to discuss their current limitations and challenges. The second set of methods includes what is generally referred to as “case studies methods”. If they are widely used in practice, they are also very heterogeneous. This section focuses on some approaches that aim at developing comprehensive and standardized approaches in order to strengthen the robustness of case studies. It also discusses the limitations and challenges of these approaches and concludes by a short discussion of the potential complementarily of standard economic approaches and approaches based on case studies.

DATA COLLECTION

Primary Data: Primary data is collected through the primary sources i.e., available facts and figures.

Secondary Data: Secondary data is collected through Journals, Magazines, Newspapers etc.

DATA ANALYSIS

The data is analyzed with the help of available facts and figures based on the impact of agriculture on environment. On the basis of analysis it was found that we have to make serious efforts towards beneficiary of the environment. To achieve long time beneficiary facility we have to take proper actions to save the healthy environment.

CONCLUSION

The use of organic amendments is important in modern sustainable agriculture. However, the use of organic amendments is an essential hinge not only in sustainable agriculture, but also for the equilibrium of the entire human society. In this sense, the practice of utilizing organic amendments properly in order to improve soil fertility transcends the meaning it has as an useful practice to be recommended in sustainable agriculture. Also, sustainable agriculture cannot be considered only as a form of agriculture to be recommended to farmers and encouraged with all the possible incentives. Sustainable agriculture is something more: is a keystone for a sustainable society.

SUGGESTIONS AND RECOMMENDATIONS

Modern agricultural practices use many kinds of chemicals such as fertilizers, pesticides, cleaners, crop preservatives to produce and keeping large amount of high-quality food. But every single of these chemicals has dangerous and unforeseen side-effects as like toxicity to non target organisms which causes to ecological imbalance. As described on the top, wrong agricultural practices cause to environment pollution in important dimensions. In other words, agricultural technical especially modern technical could make environment pollution in the event unless human would sensitive. For this reason humanity developed a new perspective to decrease the negative effects of agriculture. Sustainable agriculture which is a new agricultural technique seems environmentally friendly and it is supported by developed countries. Environmentally friendly agriculture has three common applications. These are good agricultural practices, organic agriculture and precision agriculture. Also rotation, sowing of legumes that able to nitrogen fixation and fallowing reduce the negative effect of agriculture on climate change. We suppose to make many researches about the agricultural practices which are featured by sustainability and ecologically friendly methods. As we know, water and air are the abandonment sources of agriculture and all vital activities. Environment that comprised by unpolluted air, water, soil, far from noise and other dirtiness, clean, beautiful, green and healthy is the biggest demand of present day human and guarantee of future.

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