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The Role of Good Practices in Water Protection Against Pollution from Agricultural Sources

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Abstract: The paper provides an overview of the agricultural economy in terms of agricultural development, especially in the field of application of agricultural techniques depending on climatic zones. Environmental protection and sustainable management of natural resources, prioritizing action behavior in terms of good practice methods in soil treatments, especially vulnerabilities on the types of fertilizers used, are part of the soil-plant-air-water equation. The change of paradigms in agriculture with climate change involves the adaptation of agricultural systems, the risks of using fertilizers in soil treatment, the interdependence of plant-soil-water in agricultural practice is also highlighted in the paper. One of the main objectives in the field of agriculture is to maintain a low level of greenhouse gas emissions generated by the agricultural sector without diminishing the importance of biosphere protection. The role of field research and studies has shown an important factor in reducing the carbon footprint per tonne of food produced from organic farming compared to conventional farming, mainly due to the abandonment of the use of chemical fertilizers and pesticides. So on Maslow's motivational scale, looking at the evolution of needs In relation to their satisfaction, we simulated the relative motivational value of the needs determined on the basis of experience. The aim of the following research is to collect data and information on the most efficient management models that will create the premises for agricultural practices applied to the soil by preventing the pollution of groundwater and surface water with nitrates from agricultural sources and by promoting the use of good practices farm. The Common Agricultural Policy (CAP) supports the Nitrates Directive by granting direct assistance and through rural development measures. There is also a growing trend in agro-ecological initiatives for which farmers can receive payments. nutrient management measures, such as the creation of buffer zones, as an element to stimulate environmental protection. During the research we tried to highlight aspects that, in our opinion, are important for the development of the agricultural sector through innovative rural development measures as part of the economy. But either we approach taking a stand on traditional agricultural practices that can lead to uncontrolled degradation of the fraternal canvas in protected areas, or we will presume good faith in short is that by law ferenda can regulate objectives that mainly combine science and the need for but knowing how to determine the zonal observance of good agricultural practices here is a real challenge in which we must constantly invest.

Keywords: waters; pollution; nitrates; soil; buffer zones

1. Introduction

The 1991 Nitrates Directive is one of the first EU legislation to control pollution and improve water quality. Although nitrogen is a vital nutrient that contributes to the growth of plants and crops, high concentrations of nitrogen are harmful to humans and nature. Agricultural use of nitrates in organic and chemical fertilizers is a major source of water pollution in Europe. Consumption of mineral fertilizers first fell sharply in the early 1990 and stabilized over the last four years in the EU-15, but in all 27 Member States nitrate consumption increased by 6%. In general, animal husbandry remains the main cause of over 50% of total nitrogen discharges into surface waters activities related to livestock and fertilizer management release nitrogen oxide (N2 O) and methane (CH4), greenhouse gases with a global warming potential of 310 and 21 times higher than CO2, respectively. If fully

implemented, the Nitrates Directive could reduce, by 2020, for example, N2 O emissions by 6% compared to 2000 levels and help combat climate change. The Common Agricultural Policy (CAP) supports the Nitrates Directive through direct assistance and rural development measures. For example, a number of Member States have included among agri-environmental initiatives for which farmers can receive payments for nutrient management measures, such as the creation of larger buffer zones around watercourses.

2. Materials and Methods

Most agricultural soils contain too little natural nitrogen available to meet growing requirements during the growing season. As a result, it is necessary to supplement the nitrogen naturally contained in the soil every year. Applying the right amount of nitrogen at the right time is the basic requirement for good fertilizer management. Nitrogen requirements vary considerably in different crops and within the same crop, the level of harvest being possible to be reached in a certain conjuncture of climatic and technological factors. Due to the specific behavior of nitrogen in the soil, fertilization with this nutrient and also techniques cultivation that influences its dynamics in the soil must be carried out in a way that minimizes losses with percolating water, thus reducing the risk of nitrate contamination of groundwater and surface water (Tecimen, 2017; Joshi & Chilwal, 2018; Işık, & Kırkpınar, 2020). Pesticide sales statistics are affected by privacy restrictions. The impact of these restrictions on data varies by Member State, type of pesticide and year. Regarding total pesticide sales in the EU 2011-2018, <3% of the volume is confidential. The method of simulating the diversity of fertilization methods was analyzed on development areas at territorial level compared to the forecasted productions, taking as barometer the rainy climate environment and soil characteristics.

3. Results

The soil can degrade depending on many objects. The pesticides applied must be as specific as possible to the source objective as they can have side effects on human health, non-target organisms and the environment. Thus, an important role in the application of fertilizers has multifunctional protection areas figure [1], which must be recognized as an integral part of agricultural areas, considering on the one hand that they maintain the ecological balance and contribute to biodiversity conservation: ensuring corridors for wildlife. , and on the other hand have the effect is to reduce the risks of pollution with plant protection products of water sources adjacent to agricultural fields, while avoiding the phenomenon of soil erosion. Thus, the multifunctional protection zones represent a major component of the rural landscape, being important for the protection of natural resources, such as water and soil, for the conservation of biodiversity and for obtaining a sustainable and competitive agricultural production. The different types of multifunctional protection areas between agricultural plots can be grass strips, strips of wild flowers as a source of pollen and nectar for pollinating insects or seeds for birds. There are also those protection areas with the role of natural barrier, such as forest curtains - hedges, ditches. The interaction between this natural barrier and the adjacent protection zone can be a source of biodiversity.

3.1. Overview of main findings

3.1.1. Stormwater management

1. It should not be neglected that adding fertilizers to improve soil quality can help increase soil structure performance, balance pH and, in some cases, help bind contaminants and reduce exposure, providing additional benefits to the property and biosphere of the environment. A farm through the use of good soil pH management practices can bring alternative benefits such as improving the environment and stormwater management.
2. The climatic changes faced by large commercial agricultural holdings being different from those of subsistence, of very small dimensions. Climate change is expected to affect farmers in the

south and south-east region of Romania in general and individually. Given that large farms usually have very specialized production, such as cereals and oilseeds, they are particularly vulnerable to the impact of frequent and long-term droughts, which affect their production and profit. But they are well-informed professionals, have the necessary technical and financial resources and have more options to adapt their agricultural systems to climate change through new technologies and irrigation systems.

3. Romanian agriculture has low productivity, and rural areas are disproportionally poor. An important factor in low productivity is the large share of small agricultural holdings. The sector needs to consider adaptation to a changing and less favorable climate going forward, as well as mitigate Gree House Gas (GHG) emissions. In Romania, especially in the Romanian Plain, the southern development area is analyzed. The climatic changes faced by large commercial agricultural holdings being different from those of subsistence, of very small dimensions. Climate change is expected to affect farmers in the south and south-east region of Romania in general and individually. Given that large farms usually have very specialized products, such as cereals and oilseeds, they are particularly vulnerable to the impact of frequent and long-term droughts, which affect their production and profit, such as in the agricultural holdings and cultivated area, according to the categories of use of the used agricultural area (Figure 3). However, they are well-informed professionals, have the necessary technical and financial resources and have more options to adapt their agricultural systems to climate change through new technologies and irrigation systems. [Figure 3]

3.1.2. Fertilization practices

Rapid development of fertilization methods and technologies using fertilizers extraradicular and liquid ones were due both to the possibility of controlled application ofaccording to the phases of vegetation, culture, agrofond and nutritional deficiencies as wellincrease cost efficiency indicators fertilization - economic results. Due to its peculiarities of geochemical behavior, it is difficult to manage both in monoculture and in isolation. Also, it is difficult to determine with sufficient precision the amount of nitrogen required for a certain crop during the active vegetation period, respectively to calculate the dose of nitrogen fertilizer to be applied for fertilization. The chemical composition for some classical fertilizers used in basic fertilization

Mineralization is more intense in autumn, when favorable conditions of temperature and humidity are met) and when there is also an increased risk of nitrate water pollution.

Nitrogen fertilizers in nitric form

The main types of nitrogen-containing fertilizers are:

- calcium nitrate with 15.5% N and 36% Ca;
- sodium nitrate with 16.4% N and 27% Na;
- potassium nitrate with 13.7% N and 46.5% K2O.

Fertilizers are distinguished by very high solubility in water, and the critical relative humidity determined at a temperature of 30 oC is high, respectively 46.7% for calcium nitrate, 72.4% for sodium nitrate and 87.5% for potassium nitrate. The most hygroscopic fertilizer in this class is calcium nitrate, and the least hygroscopic is potassium nitrate. When applied to the soil, nitric nitrogen remains in the soil solution, from where it is partially consumed by plants, partially enters into various reactions with other salts, and another part is leached (washed). The amount leached depends on the volume of water that infiltrates (increases with the intensity of infiltration), the speed of assimilation of plants (decreases with increasing consumption of plants) and soil porosity (decreases with increasing porosity). Smallholder farms, which practice subsistence farming, are very socially and economically vulnerable to adverse climatic events, in agriculture working directly about one third of the population. In some individual cases, farmers are specialized in the production of specific crops, such as onions or potatoes, thus increasing their level of vulnerability. In other cases, some intrinsic resistance can be found in smallholder communities due to the practice of organic farming

and resource recycling, low carbon economy, diversity of production, strong social relations and (in some regions) alternative sources of income. European countries traded nearly 1.8 million tonnes of pesticides per year during the period 1990-2018, representing more than 1/3 of the global share (Figure 2).

3.2. Figures, Tables , Significant data

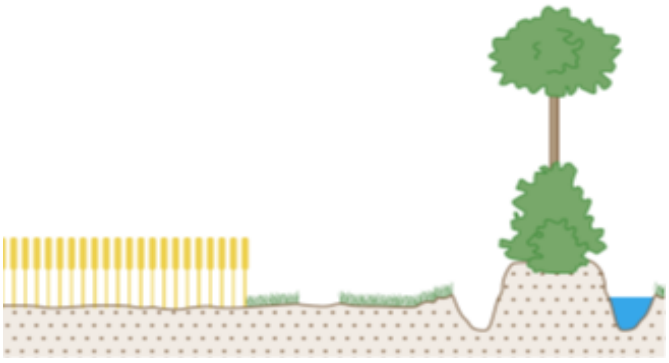

Figure 1. Multifunctional protection zones. Source MADR.

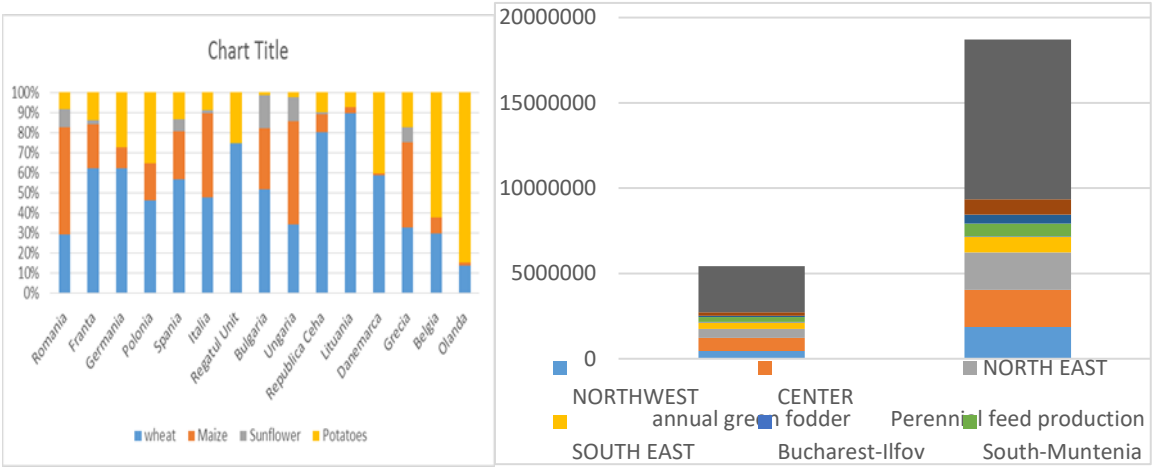

Figure 2. Regional Imports and Exports of Pesticides. Total amounts, 1990-2018. Source Rome, Jun 11 2020 FAQSTAT Pesticide Trade.

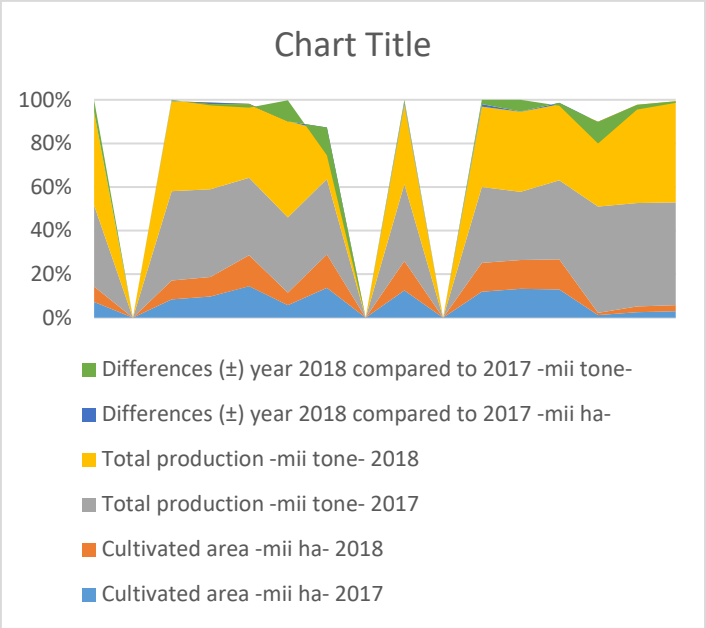

Figure 3. The categories of use of the used agricultural area. Source Statistical Yearbook 2018.

Table 1. Standards for the maximum amounts of nitrogen fertilizer that can be applied on lands.

Index Kg N / ha / an	**Standards for the maximum amounts of nitrogen fertilizer that can be applied on lands with slopes less than 12%**	**Standards for the maximum amounts of nitrogen fertilizer that can be applied on lands with slopes greater than equal to 12%**
pastures	100	80
Corn grain	130	80
Sugar beet	170	120
sunflower	100	80
wheat	120	90

Source: Statistical Yearbook 2018.

Table 2. The chemical composition for some classical fertilizers used in basic fertilization.

Index Kg N / ha / an	**Standards for the maximum quantities of nitrogen fertilizers that can be applied on lands with slopes less than 8%**	**Standards on the maximum quantities of nitrogen fertilizers that can be applied on land with slopes greater than or equal to 8%**
wheat	120	90
Corn grain	130	80
other cereals	100	80
Sugar beet	170	80
sunflower	100	80
vegetables	160	100
pastures	100	80

Source: Statistical Yearbook 2018

3.3. Formatting of Mathematical Components

The climate has a great influence on the processes of wind and water erosion of the soils through its main components wind and water.

And

P - average multiannual precipitation

T - multiannual average temperatures

The aridity index shows the following values in the climatic conditions in our country: around of 17 in the steppe area, 50 in the forest area and over 80 in the mountain area.

In our country, the Martonne Index or aridity index:

$$Iar = \frac{P}{T + 10} \quad (1)$$

4. Discussion

The expectations regarding the sustainability of the agricultural system have a long concern, what we propose is that, at the same time, we must not produce imbalances in the soil-water-plant equation. The balance of the biosphere beyond the establishment of the nutritional regime of plants is a prerogative, so we need to analyze the application of agricultural practices according to climatic characteristics and texture, soil topography. Not infrequently we tend to analyze statistical indicators to ensure the growth and development of cultivated plants according to optimal production. In the research we analyzed some of the vulnerabilities, in the sense that if the agricultural practices and tradition must have a common denominator when we talk about fertilizers depending on the four elements, the properties of the soil, the nutrients needed for the analyzed production of culture, climate but also the tradition of the place. Together, these elements can be sources of environmental protection. Analyzing the consumption of pesticides for some agricultural productions analyzed by development areas as in figure 1, it is not predictable the amount of pesticides used agricultural productions resulting from agricultural greenhouses, the main pollution factor being in open areas, or the environmental risk of pesticide use varies considerably from one pesticide to another, depending on the intrinsic characteristics of their active substances (toxicity, persistence, etc.) and patterns of use (volumes applied, period and method of application, culture and soil type, etc.). For these reasons, we did not pursue a level of measurement of the actual use of pesticides that would allow a better estimation of risks on crops, but primarily we analyzed by region the use or need for pesticides for different crops, unable to eliminate the need for fertilizers being excluded permanent pastures.

Currently, according to harmonized statistics on pesticide use, they are not available on a European scale. The role of monitoring the implementation of Regulation (EC) no. 1185/2009 on pesticide statistics, being vital for the provision of data on agricultural use on crops every five years starting in 2015. Indeed, annual data on sales statistics are available from 2011. Any nitrogenous fertilizer in organic form is mineralized as a result of the activity of bacteria present in the soil, ultimately resulting in nitric and ammoniacal nitrogen. The calculation method regarding the contribution of nitrogen from organic sources is important for the assessment of greenhouse gas emissions from agricultural activities. The nitrogen in the soil is found, almost entirely, in the organic matter, and only a small fraction of it is in an immediately assimilable form for plants. The use of pesticides is partly influenced by the economy (the most profitable crops are the most economically viable to treat) and partly by the local soil and climate conditions that determine the vulnerability of a site to pest infestation. It also depends on the type of agriculture (conventional or organic).

5. Conclusions

The International Treaty on Plant Genetic Resources for Food and Agriculture (2004) and the Global Strategy for Plant Conservation (2011–2020) adopted by the Convention on Biological Diversity in 2002 emphasize the need for efficient conservation of plant genetic resources for food and agriculture as a means of counteracting the current rate of biodiversity loss at global, regional, national and local levels. In this study, we consider the possibility of adapting the methods used to estimate carbon changes in the soil. For large-scale assessment, the schedule CO2 emissions from the soil should be taken into account. Many studies have evaluated cropland, grassland and marshland, while Schmidt (2008) evaluated the transition from natural land to agricultural land. For example, some studies show that change factors from permanent cover to an annual harvest, plus simultaneous factors for the changes of the crop management involves the achievement of a balance between the soil carbon and its kinematic function of the use and degradation of the soil. Not infrequently the concern is to follow the cyclicality of the crops used depending on the texture of the soil. But a technical formula cannot be validated precisely because depending on the periods of maintenance of the soil with fertilizers these techniques have to be controlled according to external factors.

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Conflicts of Interest: The authors declare no conflict of interest.

Abbreviations

PAC: Common Agricultural Policy
FAQSTAT: Food and Agriculture Organization
MRLs: Multiple Launch Rocket System
MADR: Ministry of Agriculture and Rural Development

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