USING PEDOLOGICAL AND AGROCHEMICAL INFORMATION FOR THE IMPLEMENTATION OF NITRATES DIRECTIVE IN THE ADMINISTRATIVE-TERRITORIAL UNIT VLADIMIRESCU

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Abstract: *Research goal is to gather, process and interpret scientific information on the physical, chemical and hydro-physical of soils to provide specialized technical support for the government authorities to develop the administrative territory Vladimirescu. Importance, originality and timeliness of work is the necesity of soil and environmental protection by implementing the Action Program for vulnerable zones to nitrate from agricultural sources, in Arad county, it being the focal point for monitoring the implementation of the Nitrates Directive for soil and crops, to ensure information for the country report on Nitrates Directive. Physico-chemical properties of soil samples (texture, pH, humus and N, P, K, content etc..) and biochemical and microbial diversity of the samples were analyzed in the Laboratory of OSPA Arad after national norms and standards approved by the Standards Association of Romania (ASRO). In terms of geomorphology, the village is located in Banato-Crisana Plain, part of the Western Plain of Romania, the eastern extremity of Arad Plain in the Cris-Mures interfluve, unit formed exclusively by the cumulative action of the Mures River. Agricultural land of the village has an area of 10.054 ha, consists of the following uses: arable (90.9%), pasture (8.7%), grassland (0.3%) and orchards (0.1%). By grouping the land units is resulting the following dominant soils: Psamosol (31,40 ha), Alluvial soils (1032,41 ha), Chernozem (65,69 ha), Eutryc cambisol (4304,85 ha), Pelosol (2587,75 ha), Vertisol (1009,75 ha), Gleysol (22,15 ha). Knowledge of these special features of the soil presents a theoretical and practical importance. Theoretical, because it provides to the expert the posibility to interpret the phenomena that occur in soil and to predict soil evolution in particular and the wider environment in terms of present and future health and warns the farmer what action should be taken to bring optimum soil conditions for growth and development of plan.*

Key words *: fertilizer, vulnerable area, livestock, monitoring, environmental protection*

INTRODUCTION

Knowledge of natural conditions and features of the ecological potential of land area for various utilities and certain cultures have a major economic and social importance for both large farms and small producers.

The geomorphological evolution of the considered space is related to the evolution of the marine area (Thetys) or lake (Pannonian) which generated the formation of soils, which during a agricultural year shows two extreme situations, namely: excessive humidity in winter and lack of moisture during the warm season, both situations resulting in a number of stress forms with negative effects on agro-ecosystem productivity and quality.

Among the environmental resources, water, air and soil are the most vulnerable and most often subjected to bullying polluting factors, with direct and serious consequences not only on environmental quality but especially on human health and other biota.

Based on these considerations, the authors try to present in this paper, based on themes drawn from scientific research conducted over several years and based on an impressive volume of data accumulated in the OSPA Arad archives the following:

Nutrient management in areas vulnerable to pollution by nitrates

Dissemination of information on nutrient management

The average pressure of nutrients from manure (kg N / ha)

Filling system for collecting and processing information to draft the report for Nitrates Directive.

MATERIAL AND METHODS

Coverage refers to an area of 11.150 hectares, of which 10.054 ha of agricultural land.

Research goal is to gather, process and interpret scientific information on the physical, chemical and hydro-physical of soils to provide specialized technical support for the government authorities to develop the administrative territory Vladimirescu the action plan on pollution caused by nitrates from agricultural sources, it being focal point for monitoring implementation of the Nitrates Directive soil and to provide information on country report on the Nitrates Directive.

Research of ecopedological conditions, data ordering and processing was done in accordance with the Methodology of Elaboration of Pedological Studies; (vol. I, II, III), developed by the ICPA Bucharest in 1987 and the Romanian System of Soil Taxonomy (SRTS-2012).

RESULTS AND DISCUSSIONS

Located in south county of Arad (45°09' `north latitude, 110 m latitude), on DN 7, Vladimirescu lies at a distance of 2 km from the city Arad and in the part of this administrative territory there are the villages: Vladimirescu, Mandruloc and Cicir.

The area of the village from the morphologically point of view is located in the Banato-Crisana Plain, sub-unity Mureş-Crişul Alb interfluve field, known as Aradului plain.

The perimeter of the village is located in Mures hidrographical basin, is in this sector lower there Mures river. For the mentioned streams are directed the excess water from rainfall, through a network of drainage channels, with a pumping stations served.

Moderately continental temperate climate with Mediterranean influence is manifested by weak mild winters and summers are not excessively hot, the average annual temperature is 10.9 ° C, and mean yearly rainfall being 591.9 mm (Timisoara station).

From the phytogeographic point of view the researched area belongs to the geo-botanical region of central Europe being strongly influenced by its border with south European geo-botanical region. Here we can meet different natural floristic elements depending on their background: European, Euro-asian, Boreal, Balcanic, Mediterranean, Iliric, at which we can add a large number of endemic plants.

Basic crops are wheat, barley, maize, sunflower, sugar beet, alfalfa and a wide range of vegetables.

By grouping of land units (UT) results in the following the dominant types of soils:

1. Psamosoil (distric, entic,), 31,40 ha;

2. Fluviosols (calcaric, mollic, entic, gleyed, pelic, entic-gleyed, pelic-gleyed, vertic-gleyed) 1032,41 ha;

3. Chernozems (cambic, gleyed, vertic-gleyed) 65,69 ha;

4. Eutryc cambisol (typic, mollic, vertic, gleyed, fluvic, prundic, stagnant, mollic-vertic, mollic-gleyed, pelic-gleyed, vertic-gleyed, vertic-stagnant, gleyed-stagnant) 4304,85 ha ;

5. Pelosols (typic, gleyed, gleyed-stagnant), 2587,75 ha;

7. Vertosols, (typic, gleyed, gleyed-stagnant), 2009,75 ha;

8. Gleysols, (pelic), 22,15 ha;

Regarding the quality classes (fertility) for the category of use arable land, is as follows: class I 1,85 ha (0,03%), class II 1453,02 ha (14,45%), class III 5452,50 ha (54,23%), class IV 2985,48 ha (29,69%) and class V 161,15 ha (1,6%).

The limiting factors that influence the quality of the soil cover is represented by soil reaction with low values 39,18% (11,3% strong acid, 27,88% moderate acid), the reserve of humus (moderate 8,64%, lower 20,48%), fine texture (moderate 40,03%, lower 26,48%), compaction degree (moderate 72,60%, lower 21,83%), goundwater moisture excess (severe 0,56%, moderate 68,21%, lower 24,74 %), flooding by overflow (very severe 8,10%, severe 0,99%), degree unevenness (severe 1,37%, moderate 23,52%, lower 70,12 %), moisture deficit (moderate 31,37%, lower 24,74%).

RESTRICTIONS

1. Soils

Vertosols: 19,99%

Pelosols : 25,74%

2. Soil texture and the hydroclimatic balance

soils with clay texture and hydroclimatic surplus balance: 5,15%

3. Compaction degree

moderately compacted: 72,60%,

4. Groundwater Depth alone or associated with the oscillatory nature of groundwater or soil texture.

groundwater depth below 2 m: 25,64 %,

groundwater depth between 2 and 3 m: 18.29 %

To remove the effect of polluting waste products is necessary for soil and livestock waste products to be carefully managed as a single system.

The problem is the use of physical, chemical and biological properties of soil as an acceptor for these waste products with minimum adverse effects on plants to be cultivated and the soil characteristics and groundwater and surface water quality.

From economic reasons and environmental order, it requires proper management of fertilizers in the agricultural and agro-livestock farm. To achieve this goal is necessary to draw up a plan of nitrogen fertilizer and other nutrients for each crop, field or plot that occupied by a particular culture. For Vladimirescu territorial administrative unit the nutrient production in individual houses is presented in the folowing table 1.

Depending on these factors, each soil has a maximum capacity to absorb and treat livestock waste. Potential mechanisms include the oxidation of biological soil treatment, ion exchange, chemical precipitation, absorption and assimilation by plants and animals.

Soil is a biological station with all stages of treatment and its ability to process complex organic substances depends on its properties and climatic conditions.

Selection of the manure management system depends on the location and circumstances in each complex, ideal for livestock farms is to be located in agricultural areas, on the wind direction from localitiesand to have sufficient land to allow for treatment and release waste products and allow easy control of leakage.

Table 1

Nutrient production and their transfer for Vladimirescu territorial administrative unit (in kg N / year)

Animal category	*Average weight*	*Number of animals*	*Transfer coefficient for nitrogen*	*Nitrogen production*
Baby Calves	*0-50*	*31*	*20*	*620*
Calves (0.3–1 year)	*50-250*	*47*	*35*	*1645*
Cattle (1- 2 ani)	*250-600*	*53*	*55*	*2915*
Cows	*>400*	*314*	*81*	*25434*
Pigs	*98*	*2170*	*13*	*28210*
Pigs for fattening	*68*	*781*	*11*	*8591*
Pigs for fattening	*90*	*1180*	*15*	*17700*
Pregnant sows	*125*	*72*	*10*	*720*
Sows with piglets	*170*	*137*	*38*	*5206*
Pigs (males)	*160*	*0*	*13*	*0*
Sheep / goats	*45*	*3480*	*7*	*24360*
Breeding Birds	*1.8*	*12120*	*0.36*	*4363.2*
Poultry fattening	*0.9*	*7580*	*0.36*	*2728.8*
Horses	*450*	*61*	*45*	*2745*
Total				***125238***

The factors that influence the functioning of soil as a scrubber system are: the cation exchange capacity, base saturation degree, biological status, infiltration rate, vegetation cover type, soil drainage, porosity, aeration, humidity, soil tillage.

The administration of residues from livestock farms is making in agricultural doses (down to achieve maximum production and phenomena that do not cause pollution with nitrogen, salts) able to increase soil fertility.

The quantity per hectare over a year, is the amount of manure containing 170 kg of nitrogen (Code of Good Agricultural Practice for protection of waters against pollution caused by nitrates from agricultural sources).

CONCLUSIONS

Due to issues relating to the existence of risks arising from the various manifestations of natural phenomena or due to unreasonable human interventions mentioned in this paper, the authors attempt to divest the descriptive theoretical to other analytical, offer practical solutions to sustainable management of soil resources.

Polluting agents such toxic substances and/or harmful, can accumulate in amounts exceeding the maximum allowable limits in both ground and surface waters and groundwater. Among these pollutants may be considered: livestock waste, municipal sludge (sewage and water) provinte sludge from processing sugar beet, flax and hemp, cellulose, etc..

Then, a special attention must be given to drawing up a fertilization plan and in particular to the use of organic liquid and semi-liquid effluents from farm or outside, because they may contain some elements or noxious substances such as heavy metals, capable of accumulate in the soil and cause toxicity phenomena in food chain.

The amount of mineral and organic fertilizers applied per unit area should not exceed 170-210 kg N / ha/year. It must be included the liquid nitrogen from manure directly on the ground reached by the animals during grazing. For farms in areas vulnerable to water pollution by nitrates is not be exceeded these specified amounts.

Such detailed knowledge of productive and technological characteristics of the contributing, restrictive or limiting factors of agricultural production, both in terms of the actual event and in terms of real possibilities for modifications, may be better for decision-making bodies (government, administration local) a valuable tool for achieving the most appropriate practical measures for the benefit of plant biomass production to improve its conditions of human life and the entire community.

Sustainable management of natural and anthropogenically induced resources is a modern form of land management, with the mission of maintaining and enhancing soil fertility and to enable long-term achievement of high quality food production.

This paper offers basic knowledge and methodological elements for evaluation and characterization of the natural and anthropogenic resources, in the hope that the information presented will arouse interest to the decision maker and in the near future the agricultural research and practice with environmental protection, will strive for development interdisciplinary studies, not being able to talk about a healthy environment without a healthy soil.

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