ABSTRACT

Romania, through its agricultural potential, has a real chance to secure their own resources necessary for food consumption and even produce a surplus of agricultural products for export, thus helping to balance the country's trade balance.

The application of Land Law (law 18/1991 and law 1 / 2000) have created some premises that led to the abolition of agricultural and livestock farms, passing to the increased application of agro-technical works that improper conduct of hill farming valley, the lack of rational crop rotations, fertilization of agro-based studies, grubbing of large expanses of grassland, etc, leading to the emergence of serious events that promote erosion, secondary salinization and reduction of natural soil fertility, propagation over as pathogens (disease, pests), which makes agricultural production to fall year after year.

To this end we considered neccesary to study issues relating to effective prevention and erosion control on sloping land, the making of an agroecosistem in witch the specialist to have a oversight function and of beneficiary, in order to grow fodder for the feeding of animals, which the organic manure produced would ensure fertilization would increase soil fertility.

PhD dissertation presents some features related to recovery poorly fertile lands, situated on slopes and under surface erosion. For the purpose it was intended to identify forage plants to capitalize on these agricultural areas, to establish an optimal soil fertility and to ensure an adequate nutrition for animals.

PhD dissertation has two parts, is divided into ten chapters and ends with a list of references and annexes.

First part – The state of knowledge, has two chapters:

Chapter I – Importance of capitalization for low productive eroded lands, dealing with soil erosion as a natural process, erosion factors, the damage caused by erosion, measures to combat this scourge, recovery of land subject to erosion by annual and perennial forage crops. It highlights the fact that surface erosion is caused by run-off that is created after the rains, erosion depth, created by the leakage of large amounts of water and soil on slopes and wind erosion by

wind, especially in arid areas, on sandy soils. Specified, further factors favoring erosion: relief, slope length, rainfall, soil texture and structure, vegetation and human productive activity.

It is pecified the role of annual and perennial forage crops to prevent and combat soil erosion on eroded lands.

Chapter II - Research carried out in the country and abroad on the influence of cultivated species and of fertilization on temporary pastures and annual fodder crops – research are highlighted abroad and in Romania on the influence of fertilzation production of alfalfa, sainfoin, temporary meadow. It further points out, research on the influence of fertilization on forage quality, species and fertilization influence on the mass of roots on some physico-chemical properties of soil, the influence of fertilization on some annual forage crops.

Second part – Contributions in making thesis, has eight chapters and it ends with conclusions, recommendations and a list of references.

Chapter III – Landscape characterization

In this chapter a description of the area in which studies were made, specifying the geographical location, climate, soil and vegetation.

The experiments were located in the north central part of the Central Moldavian Plateau, between Bâcu and Ipatele settlements on land with slopes of 10-25%, with the south-eastern exposition. The territory belongs to a temperate continental climate, characterized by cold winters and hot summers, with the frequency of winds from the north-west and west and more frequent rainfall in early summer.

The climate-diagrama in the experimental years (1999-2002) shows that higher precipitation occurred in May-July, 1999, 2001 and 2002. Periods of drought were in September of 1999 and 2002, in May 2000 and July 2001. Compared to multi annual average, deviations were lower at temperature and higher in precipitation. Thus, the amount of rainfall exceeded the annual average in May-June 2001 and May-July 2002.

In the studied area, group meets leached chernozem type soils with low mold sub eroded. Soil texture is loamy and clayey-sandy, with slightly alkaline pH, with low phosphorus supply (<6 ppm) and good supply of potassium (113-200 ppm).

The natural vegetation of the area is grass species characteristic of steppe climate. Permanent grasslands are in a continuous process of prairie scattered on eroded slopes, with species of xeromezofile grasses and legumes, such as *Poa, Festuca, Agropyron, Trifolium, Medicago* and *Melilotus*.

Chapter IV – The main objective of this paper is to establish opportunities to exploit low productive land in the Central Moldavian Plateau.

To get to the main objective it has been pursued several objectives:

- the influence of species and fertilization with organic or mineral fertilizers on the production of fodder;

- the influence of species and fertilization with organic or mineral fertilizers on the quality of fodder;

- the influence of species and fertilization with organic or mineral fertilizers on the roots mass;

- the influence of species and fertilization with organic or mineral fertilizers on some physico-chemical properties of soil;

- the influence of species and fertilization with organic or mineral fertilizers on economic efficiency.

Experience was held in the spring of 1999, as subdivided parcels method, with two factors, type 7 x 6, in four repetitions:

A factor – 7 graduations **species**: $\mathbf{a_1}$ – *Medicago sativa*, $\mathbf{a_2}$ – *Onobrychis viciifolia*; $\mathbf{a_3}$ – *Onobrychis viciifolia 50% + Festuca arundinacea* 50% $\mathbf{a_4}$ – *Medicago sativa* 50% + *Dactylis glomerata* 50 %; $\mathbf{a_5}$ – *Sorghum sudanense*; $\mathbf{a_6}$ – *Zea mays*; $\mathbf{a_7}$ – *Avena sativa + Pisum sativum ssp. arvense*.

B factor – 6 graduations **fertilization**: $\mathbf{b_1}$ – unfertilized, $\mathbf{b_2}$ – manure 20 t/ha annually; $\mathbf{b_3}$ – manure 20 t/ha every 2 years; $\mathbf{b_4}$ – manure 40 t/ha annually; $\mathbf{b_5}$ – manure 40 t/ha every 2 years; $\mathbf{b_6}$ – complex fertilizer (25-25-0) 200 kg/ha annually.

Well fermented manure of cattle was giving in the fall and the complex fertilizers were used in the spring.

Chemical composition of manure was 0,5% N, 0,3% P_2O_5 şi 0,7% K_2O. Production expressed as dry matter and statistical calculation was made using analysis of variance.

We determined the root mass, the volumetric weight, soil pH, content of P, K, humus and for plant samples was calculated on the dry matter content, total nitrogen, crude protein, crude fiber, crude ash, fat content .

Economic efficiency has been calculated on the basis of obtained productions, production costs, net income and rate of return.

Plants and soil quality analysis and interpretation of results were made according to current experimental techniques.

Chapter V- research on the influence of species and fertilization with mineral or organic fertilizers on forage production

This chapter highlights influence of species tested and fertilization on production. Results are presented annually and the average of four years.

Thus, by examining only the influence of species on the average production, it is found that best results were obtained from alfalfa (7.2 t/ha), sainfoin (7.2 t/ha) and sainfoin + tall fescue (6.7 t/ha) and lowest results in Sudan grass (4.2 t/ha).

Fertilization with cattle manure and fertilizer production complex influenced differently depending on the species and doses of fertilization.

Thus, alfalfa, high average yields were obtained from fertilization with manure 40 t/ha annually and manure 40 t/ha every two years (8.9 t/ha, ie 8.1 t/ha); from sainfoin production high average fertilization occurred with manure 20 t/ha per year (7.9 t/ha) and manure 40 t/ha per year (8.5 t/ha); to the mix + alfalfa orchard grass, the largest production media were obtained from fertilization with manure 40 t/ha and 40 t/ha every 2 years (7.8 t/ha and 7.1 t/ha) in tall fescue mixture + sainfoin, fertilizing with manure 20 t/ha annually and 40 t/ha per year resulted in recording the highest average yields (7.2 t/ha and 7.5 t/ha); at spring fodder, fertilize with manure 40 t/ha per year and 40 t/ha every two years has contributed to achieving the highest average yields (5.4 t/ha, ie 5.7 t/ha); maize silage, the highest average yields were obtained with manure fertilization 40 t/ha per year (6.1 t/ha) and compound fertilizers 200 kg/ha per year (5.9 t/ha); maize grain, the highest average yield was recorded at fertilization with manure 20 t/ha annually (7.5 t/ha) and complex fertilizer (7.6 t/ha); in the Sudan grass, average yields were higher on fertilization with complex fertilizer (5.2 t/ha) and manure fertilization 40 t/ha per year (5.5 t/ha).

Interaction species-fertilizing shows that the highest average yields resulted from fertilization with manure 40 t/ha at 2 years and manure 40 t/ha annually, alfalfa from 8.1 to 8.9 t/ha, 7.4-8.5 t/ha sainfoin, followed by orchard grass and alfalfa 7.2 to 7.7 t/ha and sainfoin + tall fescue 7.0 to 7.5 t/ha. Lower yields were obtained on Sudan grass (4.7 to 5.5 t/ha), mash (5.7 to 5.4 t/ha) and corn silage (5.6 to 6.1 t/ha).

Chapter VI – Research on the influence of species and mineral or organic fertilization on the forage quality

Chemical tests made on the species studied show that the highest crude protein content occurs in alfalfa (15.63 %) and sainfoin (15.66 %) and lowest in Sudan grass (4.89 %) and maize silage (5.65 %), leading to production of crude protein as well be different: 1134 kg/ha in alfalfa, 1192 kg/ha in sainfoin and only 213 kg/ha in Sudan grass and 311 kg/ha on corn silage.

Fertilization influenced also the crude protein content. Thus, the alfalfa, the highest protein content was achieved with manure fertilization 20-40 t/ha every 2 years (16.53 % and 16.25 %). On sainfoin, a higher content of protein was obtained from the application manure 20 t/ha per year and every 2 years (from 17.03 % to 16.16 %), the Sudan grass, fertilizing with manure 40 t/ha every 2 years has contributed to achieving the highest protein content (5.55 %).

On corn silage, manure fertilization complex yielded the highest protein content (6.24 %); on spring mash fertilized with manure 20 t/ha every 2 years and 40 t/ha per year had the highest protein content (19.20 % and 18.83 %).

Crude fiber content in plant was different, depending on the species and fertilization: lowest content was obtained in alfalfa and sainfoin to fertilize with manure 20 t/ha every 2 years and 40 t/ha per year (below 23 %) .

Capitolul VII – research on cultivated species and the influence of mineral or organic fertilization on the mass roots

The species studied and fertilization influenced the mass of roots: the largest amount of roots was obtained in Sudan grass (8.9 t/ha) and alfalfa (6.03 t/ha) and lowest in the spring mash (1.19 t/ha) and sainfoin + tall fescue mixture (3.36 t/ha).

Interacting species fertilization yielded different dates of the mass of roots. Thus, the alfalfa, the largest mass of roots was obtained from fertilization with manure 40 t/ha per year (8.10 t/ha); in sainfoin at the same fertilizer (5.32 t/ha). The same fact for sainfoin + tall fescue (4.59 t/ha) on orchard grass + alfalfa (5.41 t/ha), the Sudan grass (3.59 t/ha), corn silage (4.55 t/ha) and the spring meslin (1.30 t/ha).

Chapter VIII - Research on influence of cultivated species and the mineral or organic fertilization on some physical and chemical properties of soil

Analysis have been made on dimensional weight, which is different for different species and fertilization. Thus, on alfalfa, most weight was recorded at the control volume (1.43 g/cm^3) and compound fertilizers fertilization (1.42 g/cm^3), as the sainfoin (1.42 g/cm^3 and a 41 g/cm^3), the orchard grass + alfalfa (1.42 g/cm^3 and 1.41 g/cm^3), the sainfoin + tall fescue (1.42 g/cm^3 and 1.40 g/cm^3), the grass Sudan (1.43 g/cm^3 and 1.41 g/cm^3), maize (1.42 g/cm^3 and 1.41 g/cm^3) and spring mash (1.42 g/cm^3 and 1 41 g/cm^3). Studied factors also influenced some soil properties. Thus, pH value, under the influence of fertilization on alfalfa was 7.4 to 7.9, 7.4 to 7.9 in sainfoin, sainfoin mixture + tall fescue from 7.3 to 7.7, alfalfa + orchard grass 7.2 - 7.7.

Humus content was also influenced by fertilization. Fertilization with manure 40 t/ha per year resulted in obtaining the highest humus content: 3.07 % for alfalfa, sainfoin + tall fescue 2.74 %, orchard grass + alfalfa 2.9 %, and for sainfoin the highest content in humus has been obtained on fertilization with manure 40 t/ha per year (2.82 %).

Chapter IX - The influence of cultivated species and fertilization with organic or mineral fertilizers on economic efficiency

To calculate the economic efficiency technological estimates were made, data presented are the average values of the period studied. We calculated the total costs (lei/ha), production cost (lei/t), net income (lei/ha) and rate of return (%). Thus, for alfalfa, the largest net income

was obtained from fertilization with manure 40 t/ha (2150 lei/ha), for sainfoin, at the same fertilization (1840 lei/ha), the same for sainfoin + tall fescue (1560 lei/ha), for Sudan grass (1042 lei/ha), for silage maize (850 lei/ha) and for alfalfa + orchard grass, fertilization with manure 20 t/ha per year (1410 lei/ha) and for spring mash fertilized with manure 40 t/ha every 2 years (812 lei/ha).

The rate of return was also different depending on the studied species and the level of fertilization. Thus, the highest rate of return was for alfalfa with manure fertilization 40 t/ha every 2 years (155 %) for sainfoin fertilized with manure 40 tons per year (117 %), for alfalfa + orchard grass, fertilized with manure 20 t/ha per year (95 %), for silage maize fertilized with manure 20 t/ha annual with manure 40 t/ha every 2 years (78 %), for Sudan grass, fertilized with manure 40 t/ha per year (62 %) and for spring mash fertilized with manure 40 t/ha every 2 years (54 %).

PhD thesis ends with conclusions, recommendations and a list of references with authors from the country and abroad.