RESEARCHES CONCERNING THE FORESTATION ADAPTABILITY OF SOME LANDS FROM THE GALATI COUNTY

CERCETARI PRIVIND PRETABILITATEA PENTRU IMPADURIRE A UNOR TERENURI DIN JUDETUL GALATI

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Abstract: *As a result of an unreasonable exploitation of our country's pedological patrimony in time, the greatest part of the lands used for agriculture are degraded.*

Their utilization for agricultural purposes without any improvement leads to further degradation. The rehabilitation of such lands by afforestation represents the only advantageous solution from both an ecological and a socio-economical point of view.

Although our country possesses one of the greatest number of degraded lands in Europe, the afforestation rate is still very slow.

Afforestation represents a way of ecological reconstruction, a barrier against drought and erosion, a method of landscape rehabilitation. To achieve this, all the specialists in agriculture, forestry and biology must contribute, being backed up by a consistent financial support.

The present study performed in the Galati County monitored the state of quality of some degraded lands and the possibility to rehabilitate them by afforestation.

INTRODUCTION

The use of landed resources within agricultural ecosystems presupposes a thorough knowledge of the ways of manifestation and evolution of all restrictive factors.

As a consequence, we must perform pedological studies periodically which offer a primary database of morphological and physico-chemical characteristics on soil-mapping units (SU) and homogeneous ecological territory (HET). Through detailed soil surveys and soil evaluation we achieve a set of graphical and descriptive database which are necessary for the assessment, classification and evaluation of the soil resources of a given geographical area.

The soil cover is being studied in accordance with natural and anthropic factors which determine its natural qualities and fertility, with soil suitability for developing natural and cultivated phytocenoses.

Soil production capacity for various agricultural utilizations depends on general restrictive factors, such as: frequent drought, water-logging, erosion, landslides, etc. All these factors determine soil quality degradation leading to the decrease in agricultural land production capacity. From an I.C.P.A. assessment carried out together with regional offices for pedological and agrochemical

studies and other research units upon 12 million ha of agricultural lands (out of which about 7.5 million ha arable land), soil quality is affected by one or more restrictions. They are determined by either natural factors or human activity.

Legislative measures have been taken with a view to improving soil degradation in our country and abroad.

So, Law No. 137 /1995, concerning environmental protection , stipulates that the central authority for environmental protection and by consulting other ministries, has established a monitoring system for soil quality in order to know its actual state and evolution.

According to Decree No. 62 / August 21, 1998, a legal frame has been set up for improving about 2.5 million ha of degraded lands.

MATERIAL AND METHOD

This study had, as its major aim, the change of utilization category for a surface of 108.5 ha, out of which 28.70 ha arable field, degraded pasture (74.64 ha) and nonproductive(5.14 ha) into a forest planning unit.

The qualitative evaluation of this land was done according to a pedological study and soil appraisal in 2004 by the Regional Office for Pedological and Agrochemical Studies (O.J.S.P.A.) Galati. It was based upon Order 223 / August 13, 2002 of MAAP and also the Methodology for Pedological Study Elaboration ,Vols I, II, III of 1987. To aquire this, 15 pedological profiles with 52 soil samples have been used.

During the lab stage, a set of analyses were performed, such as:

- pH soil reaction - the potentiometric method;
- earthy-alkaline carbonates - the Scheibler method;
- the humus - the Walkley-Black (modified Gogoasa);
- mobile phosphorous - the Egner- Riehm-Domingo method;
- mobile potassium - the flame-photometric method;
- particle-size analyses - the Kacinski method;
- exchangeable base summing - the Kappen method;
- hydrolytic acidity;
- salt content.

The marks for these indicators are to be found in Vol. III of Methodology for Pedological Studies Elaboration (ICPA, 1987). Based on these studies a soil survey report was issued comprising : physico- geographical conditions, land evaluation and soil agrochemical characterization.

In order to draw up the soil survey report for establishing soil types and the inclusion in classes of capability for arable, pasture lands and others , complex pedological studies were used from O.J.S.P.A. archive, at a 1: 10000 scale.

The qualitative evaluation of the soil units was established according to the average mark of agricultural usage evaluation which were introduced into two classes of quality, the 4th and 5th, respectively.

RESULTS AND DISCUSSIONS

1. Geographical Position

The Relief. The territory under analysis is situated in the Covurlui Plain, with heights varying between 60 – 120 m, represented by a

fragmentary plain with a high energy relief (25-40m). Within this area, there are fragments of rough and steep slopes, with steep proclivities or vertical positions. The slopes and zones coterminous to the Ispat Sidex Iron and Steel Unit present forms of relief represented by waste dumps, quarries, borrow pits, etc.

Pedoclimatically, this area belongs to the calcareous chernozems microzone, with a warm climate in zones with wavy relief.

Surface Deposits Lithology. The parental material is made up of quaternary deposits of Pliocene Age, represented by loess and alluvial deposits. In the past, this area was a gulf of the Pliocene Sea where layers of sands, silts and clays were deposited.

At the contact between plain and meadow and along the valleys there are colluvial deposits resulted from water erosion on slopes.

Hydrography and Hydrology. The hydrographic network belongs to the Siret, a Danube tributary. It flows tangently in the south and it has few permanent tributaries, the Faloaia and the Calica brooks. They meet in the Catuşa Pond, which is also supplied by ground waters.

The Catuşa Pond has a 2.5-3m maximum depth and several water canals discharge residual waters from the Ispat Sidex into it. On the terrace, the ground water is to be found at great depths (over 10 m), without influencing pedogenesis processes, while in the valleys, it reaches the depth of 1-2m.

From a hydrogeological point of view, this area is situated in a zone with high-*depth upward waters.*

The Climate. The climatic characterization of this region was made after data registered at the Galati Weather Forecast Station. The yearly average temperature is 10.5 *C, while the sum of temperatures during vegetation periods is 3,827 * C, with a daily average on interval of 15.7 *C.

Yearly average rainfall represents 426 mm, with a maximum in June and a minimum in February. As for the annual repartition, the greatest quantity falls in May, June, July, while the lowest, in January, February, March, August and September. Annual dryness, according to E. De Martonne is grade 24, while on months, it varies from 14 (in August) to 64 (in January).

The Vegetation. It is characteristic to a steppe zone and it is made up of bushes (*Prunus spinosa, Crataegus monogina, Rosa canina*), trees (*Robinia pseudocacia, Populus tremula, Salis sp*.),and grassy vegetation (*Festuca vallesiaca, Bromus erectus, Stipa copilata, Carex sp.,* etc).

Other types of vegetation: *Cirsium avensis, Convolvulus sp., Amaranthus retroflexus, Brasica nigra*. Main crops in the area: wheat, maze, sunflower.

2. Soil Characterization

In order to characterize the soils proposed for afforestation, 15 pedological profiles and 52 soil probes have been taken for the occasion. Records with soil profiles from the O.J.S.P.A. archives have also been used and they belonged to

the pedological study. As a result of document investigation and soil mapping, we concluded that:

- The area of 62.65 ha is placed on slightly rough, prominent proclivity, affected by processes of surface erosion and active steps sliding. After analyses, a proxicalcaric regosol was identified: moderately eroded, developed on Eolian deposits, with a clayey , clayey-sandy texture, an Ao-C type profile, with the following soil formula:

$$RS\,ka \quad \frac{K1e12 - Tem - l/s/Pj2}{C - Ulmsf33Q7} \quad (1),$$

The lands within this area belong to the 5th class of suitability for arable land according to Annex 7-1 from I.C.P.A. instructions, Vol II, 1987 and they have the following formula:

$$VRS\ SG_3\ P_5E_3F_4U_2\text{-}l,h_3, \quad (2)$$

The same land enters the 4th class of capability for pasture land and it has the following formula:

$$IV\ RS\ G_3P_3E_2F_4Q_2\text{-}l,h_3, \quad (3)$$

For forest planning, the same land enters the 5th class of capability, according to Annex 8-1 from I.C.P.A. instructions Vol II,1987, with very low forest capability, with relief limitations, having this formula:

V-T (4)

- The area of 39.68 ha is placed on strong slopes, slightly affected by surface erosion and active steps sliding. The analyses led to the identification of the dominant soil type as being a proxicalcaric regosol, strongly eroded, developed on Eolian deposits, with clayey-sandy texture, with the following formula of capability:

$$Rska \quad \frac{K1e_{13} - Teg - s/s - Pj_3}{C/UlmsP_{30}/Nagf_{33}Q_7} \quad (5)$$

These lands belong to the 5th class of capability for the arable, according to I.C.P.A. instructions Vol. Vol. II, 1987, with this formula:

$$VRS\ SG_4P_5E_4F_4U_2\text{-}s,h_3, \quad (6)$$

The same land belongs to the 4th class of capability for pastures, with the following formula:

$$IVRS\ G_4P_3E_3F_4Q_2\text{-}s,h_3, \quad (7)$$

For forest planning, this land belongs to the 4th class of capability with formula: V-T .

- The area of 4.59 ha placed on very steep slopes, long and affected by strong surface erosion, with active steps sliding. Data interpretation resulted from analyses led to the identification of a proxicalcaric chernozem, strongly eroded, developed on Eolian deposits, with a clayey texture and which presents the following soil formula:

$$CZ\,ka \quad \frac{K1\,e_{13} - Tem - l/l - P^o\,Pj_3}{C - UL\,ms\,P_{30} - 2NBm\,f_{33}\,Q_7} \quad (8).$$

The land under discussion belongs to the 5th class of capability for the arable, according to Annex 7-1 from I.C.P.A. instructions, with this formula of capability:

$$VCZ\ SG_4P_5E_4F_4U_2\text{-}l,h_3 \quad (9).$$

All the land plots belong to the 4th class of capability for pastures, with this formula:

$$IVCZ\ G_4P_3E_3F_4Q_2\text{-}l,h_3\ (10).$$

For forest planning, they belong to the 4th class of capability (4).

- The area of 0.81 ha is placed on a very steep slope, affected by strong surface erosion and active steps sliding. All analyses identified a proxicalcaric erodosol, deeply eroded, developed on Eolian deposits with coarse and clay-sandy textures in the first two horizons, with subjacent rocks made up of unconsolidated or slightly consolidated silicated rocks, pre – Holocene, eubasic, with a AC-Cca-Cca2 profile and the following soil formula:

$$ERka\ \frac{Xca\ K1e_{14}\ \text{-}\ Teg\ \text{-}\ s/s\ \text{-}\ PjsPş}{C\ \text{-}\ UL\ ms\ P_{30}\ \text{-}\ 2\ Nag\ f_{33}\ Q_7} \quad (11)$$

The whole land area belongs to the 5th class of capability for arable land having this formula:

$$VER\ SG_5P_5E_4F_4U_2\text{-}s,h_3 \quad (12).$$

If we refer to capability for pasture lands, this land belongs to the 5th class of capability with this formula:

$$VER\ SG_5\ P_3\ E_4\ F_4\ Q_2\text{-}s,h_3 \quad (13).$$

For forest planning, this plot of land belongs to the 5th class of capability (V-T). The signification of formula symbols may be find in I.C.P.A. methodology vols. I-II, 1987.

As for the classes of quality resulted from evaluation profiles calculated according to I.C.P.A. methodology, Vol II, 1987, all the plots under analysis belong to the 5th class of quality as we may see in Table 1.

Table 1

Classification of lands according to classes of quality

No.HET	Surface-ha	Evaluation average mark	Class of quality
1	62,65	7	V
2	39,68	5	V
3	4,59	5	V
4	0,81	3	V
Average Values		5	V

3. The Setting Up of Classes of Suitability for Ecological Factors and Determinatives for the Main Forest Species

The values of ecological factors have been analyzed in order to determine the suitability of various forest species (evergreen oak, beech, hornbeam, linden

tree, sycamore maple, cherry tree, Hungarian oak, ash tree, oak tree, grey oak, acacia). According to I.C.P.A. methodology (1987), five classes of capability were established for the main forest species shown in Table 2.

Table 2

Classes of suitability for the main forest species

No.	Forest species	Class of suitability	Restrictive ecological factors
1	Evergreen	III	climate &soil
2	Beech	III	climate &soil
3	Hornbeam	IV	climate &soil
4	Linden tree	III	climate &soil
5	Sycamore maple	III	climate &soil
6	Cherry tree	IV	climate &soil
7	Turkey oak	V	climate &soil
8	Hungarian oak	IV	climate &soil
9	Ash tree	IV	climate &soil
10	Oak tree	III	climate &soil
11	Grey oak	IV	climate &soil
12	Acacia	III	climate &soil

From the data above, we may conclude that no species in particular fulfils very high or high rate of suitability. Average suitability rates are possible for evergreen oaks, beeches, linden trees, sycamore maples, oak trees and acacias, the main restrictive factors being the annual average temperature, yearly average rainfalls, soil hydro-physical data, the useful edaphic volume, soil reaction.

CONCLUSIONS

1. In order to rehabilitate degraded soils, it is necessary to carry out a quantitative and qualitative analysis of soil resources and take measures for improving their productive capacity.

2. The area under study must undergo afforestation with species with less restrictions, i.e. linden tree, oak tree, sycamore maple and beech.

3. It is, therefore, recommended to water and fertilize them on plantation as the major restrictive factors are the climate and the soil.

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