



"Vasile Goldiș" Western University of Arad

THE MAIN ECOLOGICAL FACTORS DETERMINING THE PROCESSES OF RECOVERY
AND IMPROVEMENT OF STANDS IN WESTERN PLAIN

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Abstract

Western Plain is one of the most affected regions from Romania by land degradations process. Apparently monotonous and oppressive expansion and elevation, biogeographic area chosen for hiding research therefore a wide variety of biota and types of vegetation, with multiple relationships and ecosystem processes, biodiversity original wood species in which interferes with grasses, forming complex Interesting, strictly determined by soil factor. This research reflects a deep need for ecological, economic and social, given the wide development of degraded lands in Western Plain and its consequences on the general state of society in this area. Only in Arad is estimated that the proportion of degradation in the agricultural sector achieve market share of about 40%, the most affected being the plains with herbaceous vegetation (interfluves of Cris White, Teuz and Mures). It is a situation that requires to be remedied, afforestation is certainly the most appropriate solution, but how, with what kinds and in what circumstances, only research can reveal.

Keywords: degraded lands, forest seedlings, environmental circuit, productivity

INTRODUCTION

Western Plain is distinguished by a number of features rarely seen in other fields of Romania. Bivalent mediological, Western Plain is accompanied by structural bivalence-floristic vegetation, which manifests itself in two coordinated ecological: warm-dry and hot-wet. Apparently monotonous and oppressive expansion and elevation, biogeographic area chosen for hiding research therefore a wide variety of biota and types of vegetation, with multiple relationships and ecosystem processes, biodiversity original wood species in which interferes with grasses, forming interesting complex, strictly determined by

soil factor [1, 14]. This variety was distorted natural and anthropogenic more pronounced, due to the extensive drainage and irrigation works of the main land, made of 2-3 centuries ago, works that essentially changed the hydrological regime on large surfaces, virtually the entire plain of Crasnei, Criș, Mureș and Timiș, leading to the emergence of new biotypes most favorable forests.

Hence the need became the theme aimed to conduct large-scale research on a wide territorial area to see the behaviour of various tree species in lowland abnormal environmental conditions, the relationship is otherwise ecotype plant-oriented: as potential adaptation pedohidric strong alternating regime, extremist and simulative [7]. There is special research

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that requires to be made subject to certain conditions: home, afforestation material, funds and manpower, security and maintenance.

The afforestation of large areas occupied by grassy plain but forest vocation, with ground sick, degraded and unbalanced diet has a double connotation pedohidric ecological, one of local importance, another of general importance:

- Replace the normal economic and environmental circuit downgraded territory in terms of productivity and functionality, making it more attractive, more valuable and useful to society;

- It brings an important contribution to increase the percentage of afforestation plains in particular and the country, in general. We know that Romania is weak wooded (in 26.5% of the total), and the forests they own have an uneven territorial distribution, which penalizes fields: 65% mountain, 28% in deal and only 7% from the field. Compared to the optimum ecological which is 35-40% for countries with similar climate and relief, Romania is one of the last places in terms of forestry coverage, leaving behind most neighbours (Bulgaria, the former Yugoslavia, Albania, Czech Republic, Slovakia Poland, Austria) [2, 10, 17].

An effective way to remedy this situation very disadvantageous in the current ecological crisis in drought, heat and extremism generally desertification have become current issues on the agenda, it is just introducing it in the ecological part of the vast forest land fund agriculture, which lost productive and protective value, because of the advanced state of decay. The action started in 2004 with land in Western Plain, was unfortunately interrupted. We hope it will be resumed in a near future. A strong argument in this respect would even work in this thesis, demonstrating and can show that "miracles" can be achieved through the establishment of forests on empty spots almost deserted, occupied by weeds and weed unproductive [9, 13].

Regarding the importance of the forest in this area without forest protection, reach if we consider the main functions, which help maintain ecological balance and living environment in a favourable structural-functional state [5].

Here's the thing, it is imperative to create as many forests, not destroy them. Moreover, the establishment of forests on bare land, degraded, unproductive, given that humanity destroys forests are increasingly concerned about achieving ever greater profits from wood products and leaving secondary environmental problems and maintain living conditions at a satisfactory level, is today a bold move and we could say against the current trend [3, 16]. More than ever,

the forest is exploited, abused and sought for selfish short term without recognizing the benefits of a protective order, and restoring hydrological regime, fixing carbon, producing oxygen and other effects, including its aesthetic role. No account can only hope that the forest is resistance against aridization, but also for the restoration of barren land, who have lost productive capacity, making them more useful, more attractive and more valuable.

MATERIAL AND METHODS

Study area is the central part of the Western Plain, the low plain (altitude below 100 m) between Chișinău-Criș and Secusigiu localities. The sections in the basin of three rivers: Crișul Alb, Mureș and Teuz (tributary of Körös). In this stretch of land were set up 10 blocks of improvement, totalling an area of 679 ha.

The research included 10 species of forest, part of the two main phytocenotic categories: basic species (oak, ash meadow, black walnut and white poplar) and species auxiliary mixing (maple, apple, pear and *Prunus cerasifera*). They include the main and most representative types of soils and degraded resorts in the area (Arad) that were coated with only herbaceous vegetation, although forest vocation, at least some of them was obvious, there are plenty nearby forest. Another important feature is the proximate neighbourhood with accompanying rivers' dams that cross the plain.

To ensure the security and proper care (maintenance) of crops, all perimeters were surrounded by high wire mesh fence (2.0 m height).

Near the perimeters of natural forests was a big advantage: all formulas for afforestation were inspired by their composition and structure.

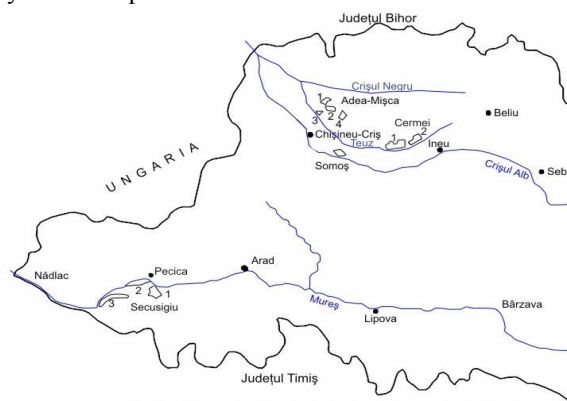


Fig.11. Schița amplasării perimetrelor de ameliorare în județul Arad

Fig. 1 The plan comprising the distribution of amelioration perimeters in Arad county

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The hydrographical network is rich and highly branched in rivers that once reached the plain, having rushed down the slopes of the mountains and very fast, slowing down their course, moving heavy, difficult to shed, often changing the direction, making numerous meanders in search of more favourable slopes flow in an extremely flat terrain, low altitude, the minimum level differences, almost horizontal.

Western Lowland eastern edge is the middle Danube Plain, considered the eastern outskirts of the Pannonian Plain. It is an area low (below 100 m elevation), with numerous inlets in the mountains (fjords), looking flat, tabular, plain without bumps, located at the foothills, with slightly inclined from east to west and from north to South (level drop of approx. 0.1-0.4 m / km), gravitating towards what might call centre clogged ancient seas.

In terms of geological strip of lowlands west of the tectonic contact is submerged lowland area (west) and the high Carpathians (east). Crystalline block, which forms the basis of the plain subsidence has general east-west orientation and is covered by a blanket Neogene molasses, consisting of deposits. Pliocene has variable thickness between 200-300 m, and in small depressions and 3,000 m, standing out from the rest of.

Under geographically distinct, plain have two altitudinal levels: low zone, depression, with altitudes below 100 m (lower and middle basin Criș) and the highest-looking porch (100-200 m altitude), north of Oradea.

Soils in the region have some common features which place them in terms silvoproductive within middle and lower (less high). So are high clay content, ease of structural instability (because of property inflatable slide and aggregates) pedohidric regime variable, based both on the presence of groundwater close to the surface and the accumulation of rainfall, poor water permeability and faulty movement with reversal of meaning, according to Seasonal variations in rainfall regime, predominant orientation of line hydromorphic variants, drafts and lastly, exposure to structural and chemical degradation. These processes are more intense, more dangerous in Western Plain low.

The climate is temperate continental, sub-Mediterranean hue (two maximum storm, of which the second lowest in autumn). A main feature of differentiation is the great uniformity and variation from month to month and year to climatic elements, due to outstanding uniformity of the territory, which, as has been shown has the appearance of large plain, flat, tabular, virtually free of irregularities.

Rainfall external level plain forest in the vicinity of the steppe: 577 mm / year in Arad, 635 mm / year in Oradea. As an annual basis, they are distributed two peaks, characteristically Mediterranean regions: first, higher in June (67.6 mm in Arad, Oradea 68.3 mm), the second lowest in October (48.0 mm in Arad, Oradea 55.5 mm). Between minimum levels are located more or less obvious (Fig. 2.3. And 2.4.). In the area, days with precipitation above 0.1 l / m²) occupies 1/3 of the total annual (average 128.3 days), while those with less than 20 mm totaled 4.3 days / year, which denotes a relatively favourable rainfall regime forest vegetation.

Main association is structured floors, with the top layer of trees main species *Quercus robur*, *Fraxinus angustifolia ssp. Pannonica*, *Fraxinus excelsior*, *Ulmus laevis*, *U. glabra*, *Alnus glutinosa*, *Acer campestre*, *Populus alba*, *P. nigra*, and in the lower part: *Acer campestre*, *A. tataricum*, *Pyraster Pyrus*, *Malus sylvestris*, *Prunus padus*, rarely *Carpinus betulus*, *Tilia platyphyllos*, *Tilia tomentosa*.

The shrub layer, which is well *Cornus sanguinea* are frequently developed, *Corylus Avellana*, *Viburnum opulus*, *Crataegus monogyna*, *Ligustrum vulgare*, *Sambucus nigra*, *Evonymus europaeus*, *Evonymus verrucosa*.

The productivity of these forests is high; trees can reach heights of 30-35 m, the higher ages.

The method currently used in crop establishment was well developed planting with seedlings (less than 25 cm high), aged 2-3 years, according to species, field ready by autumn deep rains (35-40 cm), disking, or scarification; there were times when, for lack of suitable seedlings were conducted and direct sowing of seeds (acorns) introduced fall under furrow.

Scheme planting seedlings generally applied comprises 5.000 / ha, a formula that meets the previously indicated composition and structure. In special cases, when they provided pure stands densities were higher or lower than the average: 6700 seedlings / ha (distance 1,5 / 1 m), 3,300 seedlings / ha (distance 2 / 1.5 m) and 1670 seedlings / ha (3/2 m distance). It can be seen that were made by mixing two main types: grouped in rows and privacy. Because of the additions, normal in this kind of work does not always those schemes remained in their original form designed. Changes that have occurred, however, are minor and do not influence the content of crops.

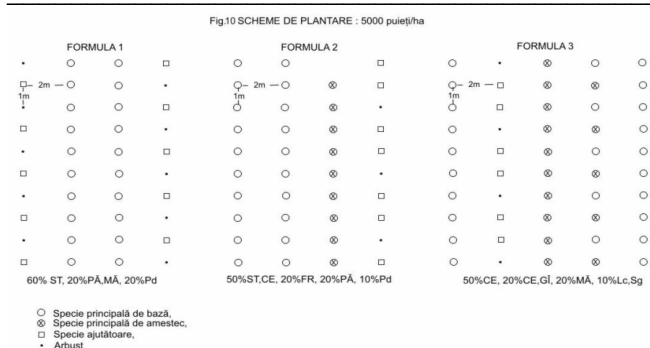


Fig. 2 Planting model: 5000 seedlings/ha

RESULTS AND DISCUSSIONS

Like any living organism in their growth and development seedlings are subjected to double determinism: the internal, which keep the species, the genetic heritage and the external in nature, which is found in the environment [15].

They fall into two categories:

- Direct, when they participate directly in the conduct of metabolic processes and is presented as material flow and energy is essential, indispensable life (water, light, heat, instead bases);
- Indirect, when the role of conditioning, when determining the level of direct accessibility factors (land geomorphology, substrate, soil). Currently, the latter are called and conditions.

In Western Plain, where they are located investigations (perimeters), conditions are roughly similar in large spaces; just different soil types, either because the substrate (clay, or silt), either because groundwater depth (with or without pseudo phenomena).

It follows that the main factors determining soil are two: humidity - the accessible course - and clay [4]. To these is added a third with slightly less importance, but essential for understanding the ecology of the species in plantations: trophicity. We must show that in the research level is generally low, led by state deficiency humus frequently (in most cases less than 1.8%) and nitrogen (typically below 0.10%).

Putting the equation all four components in a graphical representation, we obtain a sequence of ellipses with bipolar orientation, which we have called "green areas".

Unlike geographic areas, or phytogeographic that simple frequency counts through these means "space ecological factors of variation in the content of a given species which is found frequently or achieved the highest increases" [12]. Being plantations, so the presence anthropogenic imposed, unnatural in our building heights were used by species.

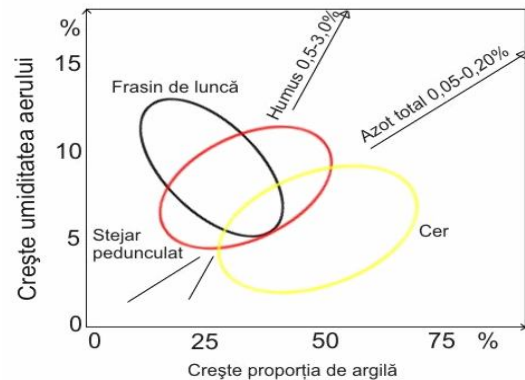


Fig. 40. Arealele ecologice a principalelor specii de bază din plantații. Schemă

Fig. 3 Ecological areas of the main species from plantations. Scheme:

From the graph follows:

- Species with the most complex ecological (the largest surface area) is heaven. Follow the tall oaks and ash descending order meadow.
- It may find ecological limiting factor, the following:
 - Accessible water: 2.0% in the sky, tall oaks and 4.5% to 5.0% ash meadow;
 - Clay fine and very fine: more than 71% to heaven, 52% to 40% of tall oaks and ash meadow;
 - Humus (horizon): 0.5% to heaven, 0.7% to 0.8% of tall oaks and ash meadow;
 - Total nitrogen (horizon) to require minimum 0.10%, 0.08% to 0.11% from tall oaks and ash meadow.

Values shown are guidelines limiting what can largely define the ecology of species taken in research, but the fry stage [8]. Might as more advanced stages of development they move in one direction or another, leading us to another quantitative ecology. Perhaps this translation will not be too high. One result is a significant compliance literature: according to a study on the ecological oak forests in Romania found that tall oaks intolerant, does not thrive on clay soils containing greater than 55%. The figure is very close to the value found for our current research (52%).

Three clarifications are necessary, however:

- Not indicate higher values of tolerance opposite, because they can increase much, without prejudice to the plant; conversely, up to a certain level, they represent benefits; only after they become negative forces, damaging (for example, water or heat in excess);
- The surface contour of ellipses does not include all cases encountered in plantations. Stock sporadic, isolated devoid of statistical coverage were met



outside, especially in the ecological intolerance. If not included in the contours, it is precisely because they are deviations, not the rule and no special significance on the ecology of a species or another [6].

- Areas of overlapping ellipses (double and triple) optima not organic. They are really complex edges, the requirements are similar, interfere, which can lead to future competition, or expulsion. In terms of topic, here we are in the proliferation of ecological niches and multiple favorability (a kind of generalized biogeographic paraoptim).

A paramount epistemological observation is that all species of trees and shrubs used in plantations, including oak, gave good results and are environmentally appropriate, may be recommended in afforestation work in the area [11]. But the need for methodological improvements appears, depending on the ecology and limitations that come each species. But this means that certain rules, which essentially are:

- To take account of hydrophilic species, such as the habitat of humid, with reserves of accessible water larger species to be reserved demanding more mesophilic;

- Do not exceed the limits of tolerance clay of species by placing them in biota improper - are soils with higher clay content than they can bear.

CONCLUSIONS

It is conceivable that the cultures of the 10 improvement perimeters gained some stability and have joined the line upward development in balance with the environment.

Natural result of this balance will be continual growth of seedlings and, in the absence of major climatic accidents, state achieve massive final time and purpose of any action for afforestation.

Characterization and monitoring of the environment of living and growing seedlings between the two moments, from hooking up the massive closure is not so devoid of interest.

Very important for catching, growth and development of seedlings are droughts that may possibly occur during their habituation to the environment, may jeopardize crops. Such periods, quite frequent in the steppe climates limit can be easily identified, in which the distribution over time of the precipitation is made in a certain relation to the temperature course in order to be able to distinguish two categories pluviotermics: surplus and the deficit of rainfall or moisture and dryness.

In our research, according to general rule this ratio was 1: 2, but baseline in building diagrams was not the

moon, as is customary, but decade (10 days), considering that this period is most appropriate for short-term droughts delimitation, knowing that the range for 15 consecutive days not a drop of rain fell, a "climate drought" authentic. In fact, the decade that representation system, was imposed for another reason: it is known that environments meteorological observations are given at the beginning, in a first phase of processing ten days, and only then monthly.

Pedohydric regime less favourable conditions were buffered by a clearing ecological factor: groundwater close to the surface at a depth at which plant roots can reach without great difficulty, in reasonable time.

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