

SANDY SOILS FROM OLTENIA AND CAREI PLAINS: A PROBLEM OR AN OPPORTUNITY TO INCREASE THE FOREST FUND IN ROMANIA?

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Abstract

In Romania, the afforestation projects of degraded terrains are carried out in accordance with the technical norms issued by the ministry responsible for forest management. According to recent statistics, across the country there is a significant area of different types of degraded lands, more than 0.4 million hectares being affected by wind erosion. The goal of this study was to highlight the best afforestation alternative for the sandy soils across Oltenia and Carei Plains, corresponding to ecological group number 93 of the Technical Norms regarding the compositions, schemes and technologies for forest regeneration and afforestation of degraded lands. The best alternative resulted by using an Analytic Hierarchy Process, that took into account eight criteria. The combination between black locust and bird cherry proved to be the best choice. The significant area of sandy soils across Romania, but especially the lands from Oltenia and Carei Plains should be regarded rather as an opportunity to increase the forest fund through afforestation than a problem for the local communities and national economy.

Key words: afforestation, AHP, Carei Plain, Oltenia Plain, sandy soils

INTRODUCTION

In Romania, forests account for 6.565 million hectares (27.5% of the total territory), most of them being distributed in mountain region (*i.e.* 59.7%), a third in hilly area (*i.e.* 33.8%) and only a small share in plain regions (*i.e.* 6.5%). The dominant species consist in beech (*Fagus sylvatica* L.), which accounts for 32% of the total forest area, followed by Norway spruce [*Picea abies* (L.) H. Karst.; 19%], oaks (Genus *Quercus* L.; 18%), silver fir (*Abies alba* Mill.; 5%) and other hardwoods [17]. The distribution of the forests on the main three historical regions (*i.e.* Transilvania, Muntenia and Moldova) is uneven, the forests across Transilvania accounting for a little bit more than the total forest area from the other two historical regions [15]. The same pattern exists also at county level, the ratio between the county with the lowest forested area and the one with the highest being 1:20 [3].

Several factors contributed to the current situation, deforestation, degradation of forests and/or irrational logging being perhaps the ones with the highest impact. As a

consequence, nowadays there are large areas across Romania that are vulnerable to desertification, the main ones being Southern Oltenia (known as “Sahara României”), Southern Moldova, Western Plain and Dobrogea [4], [6]. It is estimated that the total area affected by wind erosion in Romania accounts for 0.4 million hectares [1], out of which 250.000 hectares are located in Southern Oltenia [13]. The main factors that contributed in the last decades to the increasing area of sandy soils in this region are represented by irrational human activities, such as destruction of the irrigation systems and deforestation [21] and specific site conditions, such as the annual amount of precipitation which recorded the lowest value of 262.7 mm in 1992 [16]. From climatic perspective, Oltenia is known as the region from Romania that is very sensitive to drought [7]. In this context, the reforestation initiatives from the region that were restarted two decades ago, most of them using black locust monocultures are more than welcome. One example is the reforestation project surrounding Mârșani locality (Photo 1). In this

region the established forest stands represent the best economically land use option for the owners of degraded sandy lands [20].



Photo 1. Young black locust forest from Mârşani, Dolj County, Oltenia Plain (44.044899, 23.971666)

Source: original photo.

Another region vulnerable to drought and rich in sandy soils is Carei Plain. The pattern is similar with the one from Oltenia Plain (*i.e.* a low percentage of forests) [12], the majority of forest stands being mixed, as in the case of Mare Foieni Forest (Photo 2).



Fig. 2. Mare Foieni Forest, Satu Mare County, Carei Plain (47.727665, 22.304682)

Source: original photo.

The aim of this study was to compare different alternatives of afforestation of the sandy soils from Oltenia and Carei Plains.

MATERIALS AND METHODS

According to the Technical Norms regarding the compositions, schemes and technologies for forest regeneration and afforestation of degraded lands [18], the lands with sandy soils from Oltenia and Carei Plains are included into ecological group number 93.

These lands are covered by sand dunes that could reach two-three meters (Photo 3) or even eighteen meters, as is the case in Mârşani (Photo 4).



Photo 3. Sand dunes in Mare Foieni Forest, Satu Mare County, Carei Plain (47.727665, 22.304682)

Source: original photo.

The four alternatives recommended by the norms for the afforestation of these lands are the following ones: *Alternative 1*: 5-6 St + 4-5 Pl, Pl.c, Aj, Arb; *Alternative 2*: 6-7 St (St.b) + 3-4 Te.a, Fr, Ci, Ar, Pă + Arb; *Alternative 3*: 10 Pl.c, Pl and *Alternative 4*: 5 Sc + 5 MI, respectively (St – pedunculate oak (*Quercus robur* L.), Pl – silver poplar (*Populus alba* L.), Pl.c – grey poplar [*Populus x canescens* (Aiton) Sm.], Aj – accessory species, Arb – shrub species, St.b – greyish oak (*Quercus pedunculiflora* K. Koch), Te.a – silver linden (*Tilia tomentosa* Moench), Fr – European ash (*Fraxinus excelsior* L.), Ci – wild cherry (*Prunus avium* L.), Ar – Tatar maple (*Acer tataricum* L.), Pă – European wild pear [*Pyrus pyraeaster* (L.) Burgsd], Sc – black locust (*Robinia pseudoacacia* L.) and MI – bird cherry (*Prunus padus* L.), respectively).

In order to determine the best alternative for afforestation, an Analytic Hierarchy Process (AHP) was performed. AHP was described by Professor Thomas Saaty four decades ago, being nowadays used in several research projects based on multi-criteria decision analysis [10], [11]. The goal of this study (*i.e.* choosing the best alternative for afforestation of sandy soils) was decomposed into eight criteria that were independently analyzed. The chosen criteria consisted in: 1 – **number of species used** (the diversity of future forest; 1:

lowest number... 4: highest number), 2 – **diversity of non-wood forest products** (1: lowest diversity ... 4: highest diversity), 3 – **age of harvesting of the future forest** (1: highest age ... 4: lowest age), 4 – **production and availability of forest seedlings** (1: the most complicated ... 4: easiest), 5 – **root system** (1: less developed ... 4: best developed), 6 – **speed of growing** (1: lowest speed... 4: highest speed), 7 – **generative regeneration** (including the age when the young trees start to produce seeds; 1: lowest age ... 4: highest age) and 8 – **vegetative regeneration** (1: lowest ... 4: highest), respectively.



Photo 4. Sandy soils from Mârşani, Dolj County, Oltenia Plain (44.044899, 23.971666)
 Source: original photo.

AHP was performed by the aid of Expert Choice Desktop software (version 11.5), and the four alternatives were compared one to each other by taking into account the eight selected criteria.

RESULTS AND DISCUSSIONS

AHP ranking (4 alternatives x 8 criteria) is given in Table 1. Among the considered

alternatives, the fourth one (equal shares of black locust and bird cherry) proved to be the best option for afforestation of sandy soils from Oltenia and Carei regions (Fig. 1).

Table 1. AHP alternative ranking

Criterion	Alternative			
	1	2	3	4
1	3	4	1	1
2	3	4	1	2
3	2	1	3	4
4	2	1	3	4
5	3	4	1	2
6	2	1	4	3
7	3	2	4	1
8	2	1	3	4

Source: Original data.

Out of the more than fifty trees and shrubs which are often used for afforestation of degraded lands across Romania [9], black locust is a species that was planted both for productive and protective purposes, especially for controlling the wind erosion [8]. Bird cherry is also a fast growing species and due to its tendency to form thickets is an excellent species for windbreak shelterbelts [14].

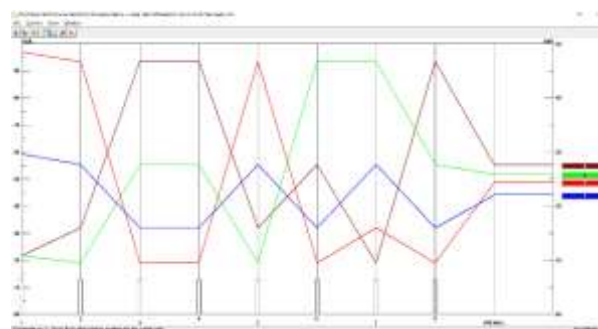


Fig. 1. The ranking of the four alternatives
 Source: original.

As regards the other species proposed by the norms, in the current context of climate aridity from some regions across Romania [19], special attention should be given to greyish oak, a species that is well adapted to arid site conditions in comparison with other oak species [5]. Important steps were done in this direction, a grayish oak seed orchard being recently installed in steppe region from southeastern part of the country [2].

CONCLUSIONS

The combination between black locust and bird cherry proved to be the best choice for afforestation of the sandy soils across Oltenia and Carei Plains. The main advantages of these two species consist in their ability to grow fast and to stabilize the “flying sands” usually in less than five years. These species are also preferred, to the detriment of the others proposed by the technical norms, due to the fact that their seedlings are very easy to produce in the nurseries and their prices are affordable.

The large area of sandy soils across Romania, but especially the ones concentrated in Oltenia and Carei Plains should be regarded rather as an opportunity to increase the national forest fund of Romania, than a problem for the local communities and national economy.

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