RESEARCH ON AFFORESTATION ON DEGRADED LANDS IN DOBROGEA REGION

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Abstract

This research is part of a series of papers devoted to the subject of wide interest because of the ecological importance of forest in the steppe area, accentuated by the deficient of areas covered by forest vegetation in mentioned region. .Dobrogea plateau is characterized by a steppe climate and chernozem type soils, with medium to high edaphic potential, but with severe moisture deficit. In these conditions, due to the lack of the protecting effect of the forest vegetation, have developed various soil degradation phenomena, mainly surface erosions of various degrees. For knowing how forestry plantations in this area behaved were mapped 1325.4 ha plantations installed in the period 1980-2008. Main species used for afforestation were acacia and honey locust on land with mild or strong surface erosion, and on land with very strong and excessive erosion were used acacia, black pine and, less, oleander. Installed stands performed low productivity classes (IV or V), and the state of vegetation is average or poor, according to site conditions. However, plantations have achieved a high degree of coverage of the soil and ensure a significant role in improving environmental conditions. In older acacia stands (over 20 years) manifests intense drying phenomena of trees and a notable decline of vegetation condition, which requires their recovery by regeneration felling.

Key words: (maximum 6): afforestation, degraded lands, stands, acacia, black pine.

INTRODUCTION

Increasing the area occupied by forest vegetation is mainly needed for the rehabilitation of areas affected by the phenomena of strong erosion, as a result of the restriction under the acceptable limits of the area occupied by forest vegetation. In plain regions, the disappearance of forests has led to frequent and prolonged droughts, with adverse effects on agricultural production and the general conditions of environment and life. Extended forest areas contribute significantly to reducing the impact of climate change and increase the chances to adapt to them, through the long-term storage of carbon in forest and balancing the national emissions of greenhouse gases.

The importance of afforestation works in the steppe zone is highlighted by interest shown by many researchers on the European (Molnar, C., Csatho, A., I., 2011, Parnikoza, I. 2011) and world (Cheng, Y., Tsagaanbandiin Tsendeekhuu., Narantuya, N., Nakamura, T., 2008, Sheng-Gong Li., Maki

Tsujimura., Atsuko Sugimoto., Gombo Davaa., Michiaki Sugita., 2006, Lili Jiang., Xingguo Han., Guangming Zhang., Paul Kardol., 2010). Research focused on the behavior of different forest species in thermal and water stress conditions specific to the steppe, along with evaluating the ecological effect of installed stands. Research in this direction have been made also in the Romanian steppe, some of them located Dobrogean steppe (Traci C., 1974, Greavu M., Mănescu M., 2001).

By mapping the afforested degraded land in Dobrogean steppe it will take a picture of the most often categories of degraded lands in these areas. Knowledge of the species most commonly used for afforestation will enable the development of appropriate implementation strategy for the next afforestation programs that will be developed in area.

Further research in the area will enable comparative studies on the evolution of forest species at different stages of stand development and monitoring of their condition for longer periods of time.

MATERIAL AND METHOD

Research area is located in the Dobrogea plateau, characterized by a high deficiency of moisture (average annual precipitation being about 400 mm) and average annual temperatures range between 10-11 ^{o} C (Donita N, et al, 2005). In the field were mapped and analyzed 1325,40 ha. From this surface, a percentage of 88% (1172,10 ha) are lands with forest vegetation, and 12% (153,3 ha) are wastelands (rocky lands). Afforestation of these areas was based on technical projects prepared by ICAS in 1988 and 2003 (Oprea, V. et al., 1987, Ungurean, C., 2003) or on summary projects compiled by O.S. Harsova.

Land research focussed on each mapped unit in hand, made observations being recorded on the type cards. These observations are related to the species used for afforestation, proportion, height and their vegetation state (gauged using a scale from 1-very good to 5-very very bad). Also were made notes concerning stress factors that acted on the stands, like neighbouring grazing, hunt stokes, fires, anthropogenic factors.

RESULTS AND DISSCUSIONS

The relative uniformity of the relief were are quartered analyzed mapped units (91% slopes and 9% plateaus), and lithology substrate (loess or limestone) led to a relative uniformity of soil conditions, reflected by the small number of soil classes identified (only three), chernozems being the most prevalent class (73,7%), followed by eroded soils, with a smaller percentage (22,6%) and immature soils, with the lowest percentage (3,7%).

In figure 1 are shown the degradation type identified on field (mapping was carried out in accordance with Traci. C, 1985). It is obvious that the most common degradation is surface soil erosion of different degree. On small surface appears lands whit excess water.

The average state of vegetation is 3,63 what would correspond to a normal state to the poor. A state of vegetation close to the normal, as can be seen from table 1, achieves oleander (3,29) and the poorer state of the vegetation is achieved by white poplar (4,00), followed by black pine, mahaleb cherry and acacia (about 3,70).

Table 1

Characterization of inventoried stands

Specifications	Species								
	black pine	acacia	white poplar	shrubs	maha-leb cherry	locust honey	vari ous deci-duous	ole-aster	manna ash
Surface	346,67	595,88	7,60	2,78	5,40	94,44	19,25	74,97	25,11
State index	3,67	3,67	4,00	3,29	3,92	3,50	3,08	3,40	3,90
Stand density	0,70	0,78	0,90	0,67	0,44	0,79	0,79	0,72	0,80
Closed crop	267,63	525,62	7,60	2,30	0,00	78,14	13,34	59,75	25,11
Average age	27	18	7	28	23	8	9	11	28

Acacia stands, who owns the largest share of surface (approximately 51%), are installed mainly on land with low to very strong surface erosion and features a medium state index of 3.67. The same state index is recorded to the following stands as representation (30%), the black pine stands, installed mainly on lands whit very strong or excessive soil erosion. The other species are commonly found on surfaces, up to 100 ha, the most common being locust honey and oleaster.

In table 2 are presented data on height and state index for main forest species mapped on main types of degradations.

Table 2

Characteristics of the main species used on degradation classes

Degradation type	Spe-cies	Sur-face	Fetures	Age categories (years)						
				0-5	6-10	11-15	16-20	21-25	26-30	31-35
Mild surface soil erosion	acacia	184,79	high (m)	0,3	6,6			6,9		
			state index	3,0	3,7			3,0		
Strong surface soil erosion	acacia	138,41	high (m)	2,1				9,5		9,6
			state index	3,0				3,8		3,0
Very strong and excessive surface soil erosion	Black pine	226,61	high (m)				6,0	8,9		6,2
			state index				3,0	3,6		3,8
	acacia	169,46	high (m)	2,4				7,4		
			state index	3,6				3,7		

It should be notice that, for Acacia, the heights are higher at stands installed on terrains with strong erosion than those on land with mild erosion. This shows that, besides the type of degradation, plantations

development is influenced by other factors, as previous land use, exposition, hillside position etc. The heights recorded at acacia are corresponding to fifth productivity class and for black pine the corresponding class is forth. This situation is normal for sites were the stands are installed, i.e. degraded lands with severe moisture deficit and deficiency of nutrients.

The ultimate goal of reforestation on degraded land works it constiuie improve soil and stop the degradation phenomena. In this respect it was estimated the effect of afforestation works have had on various types of degraded lands (figure 2).

Note that proportion of stands that succeeded the improvement of degradation is not directly related to the type of degradation (strength degradation). Other important factors in improving degradation are the stands age and the influence of other stress factors (grazing, fire, etc.).

CONCLUSIONS

Although they are installed on the sites with rough vegetation conditions, the vast majority of plantations have managed to close the massive, and thereby to contribute to the stabilisation of the phenomena of degradation and improve the environmental conditions.

The productivity of forest stands installed is low (in accordance with site conditions), and, in the case of the forest stands aged over 20 years it is noticed the degradation of vegetation state. In stands of acacia with age over 20 years, and with lower intensity in the black pine stands, it signals the intense drying phenomena that affects up to 80% of the trees. In these stands is indicated the intervention with regeneration cutting (for acacia stands) or with hygiene cutting (in black pine stands).

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