MAPLES DISTRIBUTION IN ROMANIA

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Abstract. *Maples of the genus Acer are distributed in the Northern Hemisphere, in North America, Europe and Asia. The species cross the equator in the Southern Hemisphere, only in Java and the surrounding islands. Although the area covered by maples is large, the species represent a small percentage of the total tree species. Research has shown the presence of maples in the Miocene. There was preserved fossil leaves, fruits and sometimes wood, pollen and even flowers. In our country there is information about Acer fossils from upper Oligocene. It became very frequent, with leaves and flowers in the Neogene deposits. In Romania there are five native species of the genus Acer, Acer pseudoplatanus (Sycamore maple), A. platanoides (Norway maple), A. campestre (Hedge maple), A. tataricum (Tatarian maple) and A. mosnspessulanum (Montpellier maple). Sycamore maple and Norway maple are main species that are found in upper story of the stands. Species appear in nearly all altitudinal plant belts from sub alpine forest field to the plain land. Two are the altitudinal plant belt more common for these maples, Mountain mixed stand belt for Sycamore maple and the hilly altitudinal plant belt with sessile oak, European beech stand and European beech-sessile oak stand for Norway maple. In relation to the maples regeneration, the study shows that in most stands with Sycamore and Norway maple in their composition, regeneration by seeds is common. The natural and artificial regeneration is being undertaken in close, but yet different proportions depending on the stands age.*

Keywords: *Sycamore maple, Norway maple, distribution, regeneration.*

Rezumat. **Răspândirea paltinilor în România.** *Speciile genului Acer sunt răspândite în emisfera nordică, în America de Nord, Europa şi Asia. În emisfera sudică, speciile se întâlnesc doar în Java şi insulele înconjurătoare. Deşi se întâlnesc pe o suprafaţă destul de mare, acerineele ocupă un procent mic din totalul speciilor. Cercetările au arătat că specii ale genului Acer au existat încă din Miocen. Genul Acer este cunoscut în stare fosilă sub formă de frunze, fructe iar uneori s-a conservat şi lemn, polen sau chiar flori. În ţara noastră genul Acer este descris din oligocenul superior devenind foarte frecvent, prin frunze şi flori în depozitele neogene. În Romania sunt cinci specii indigene din genul Acer, Acer pseudoplatanus (paltinul de munte), A. platanoides (paltinul de câmp), A. campestre (jugastrul), A. monspessulanum (jugastrul de Banat) şi A. tataricum (arţarul tătăresc). Paltinul de munte şi paltinul de câmp sunt specii principale de amestec care se regăsesc în etajul superior al arboretelor. Speciile apar în aproape toate etajele fitoclimatice din silvostepa până în etajul subalpin aşa cum era de aşteptat în etajul premontan de amestec în cazul paltinului de munte respectiv în etajul deluros de gorunete, făgete şi goruneto-făgete în cazul paltinului de câmp. În ceea ce priveşte modul de regenerare al acerineelor studiul arată că în majoritatea arboretelor care au paltini în compoziţie regenerarea acestora s-a produs pe cale generativă, în cadrul acesteia regenerarea naturală şi artificială fiind realizată în proporţii apropiate dar diferenţiată în funcţie de vârsta arboretelor.*

Cuvinte cheie: *paltin de munte, paltin de câmp, răspândire, mod de regenerare.*

INTRODUCTION

Species of the genus *Acer* are distributed in the northern hemisphere, North America, Europe and Asia, crossing the equator in the southern hemisphere, only in Java and the surrounding islands. The area occupied by maples is large but the percentage of the total woody species is small. Research has shown the presence of maples in the Miocene. Information assemble of maples date of apparition are not known (GELDEREN et al., 1994). Maples are known in the fossil state in particular in the form of leaves and fruits. There also was preserved wood, pollen and even flowers. In Romania there is information about *Acer* fossils from upper Oligocene (the Jiu Valley, the Almas Valley). It became very common with leaves and fruits in Neogene deposits (Salaj, Valcea, north-west of Oltenia, Sibiu, Maramures) (PETRESCU & DRAGASTAN, 1981). In Romania, there are five native species of the genus *Acer* (NETOIU et al., 2008), but there are also other species of *Acer* genus, non-native species like *Acer saccharinum* and *A. negundo (Annex).* Sycamore maple and Norway maple are main species found in the upper story of the stands. Hedge maple, Montpellier maple and Tatarian maple are species with an important role in the growth and pruning of the stands main species and in soil amelioration. These species are distributed in all altitudinal belts (DONITĂ et al., 1980).

MATERIAL AND METHODS

In order to study the spreading of native maples in Romania the database of national forest fund has been used. We are talking about effective areas determined by multiplying the compartment area, the percentage of species participation in stand composition and crown density of the stand. The class production and the way of regeneration were also studied.

To put in evidence the maples regeneration on the forests from the Timiş county over the years, the way of regeneration in relation to age was studied.

RESULTS AND DISCUTIONS

Like we said before, there are five native species of *Acer* species in Romania, Sycamore maple, Norway maple, Hedge maple, Montpellier maple and Tatarian maple. Sycamore maple and Norway maple are main species that are found in the upper story of the stands. Sycamore and Norway maple distribution in our country are shown in Fig. 1.

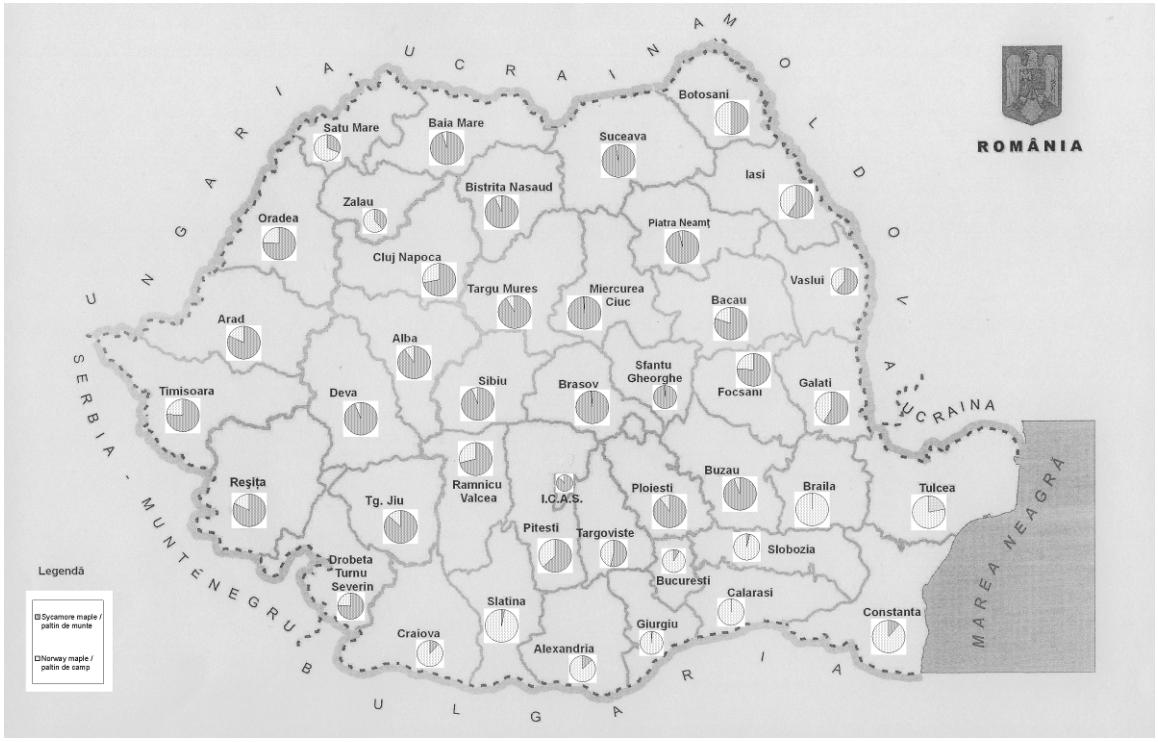
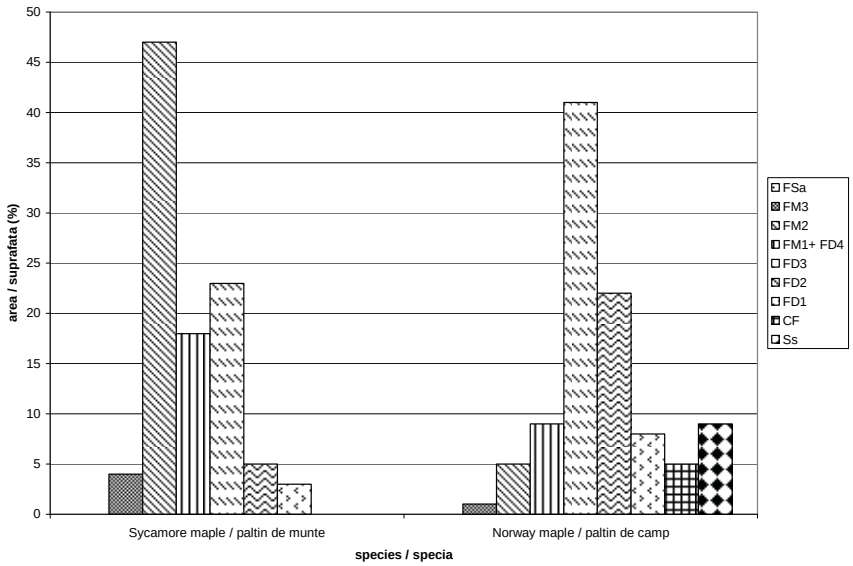


Figure 1. Sycamore and Norway maple distribution on Forest Administrations
Figura 1. Distribuția paltinilor pe direcții silvice.

The spreading on the altitudinal plant belt was study for these species and also the regeneration of maples (Fig. 2).



Fsa – subalpine;
FM3 – Mountain of Norway spruce;
FM2 – Mountain of mixed stand;
FM1+FD4 – Mountain premountain of European beech stands;
FD3 – Hilly stand with sessile oak stand, European beech stand, European beech – sessile oak mixed stand;
FD2 – hilly stand with *Quercus* sp. (sessile oak, Turkey oak, Hungarian oak and mixed stands) and hilly mixed hardwood forest;
FD1 – Hilly stand with common oak (and Turkey oak, Hungarian oak, sessile oak and mixed stand of them);
CF – Plain forest;
Ss – Forest steppe.

Figure 2. Distribution of maples in terms of altitudinal plant belts.
Figura 2. Distributia paltinilor pe etaje fitoclimatice.

We find Sycamore maple from the subalpine belt to the plain forests. The species is spread mainly in the Mountain mixed stand, where it represented 47% of total area occupied by this species. Sycamore maple occupied also a considerable area in the premountain European beech stands (18%) and hilly stand with sessile oak stand, European beech stand, European beech-sessile oak mixed stand (23%).

Norway maple is spread especially in the Hilly stand with sessile oak stand, European beech stand, European beech-sessile oak mixed stand (41%) followed by altitudinal belt-hilly stand with *Quercus* sp. (sessile oak, Turkey oak, Hungarian oak and mixed stands) and hilly mixed hardwood forest (22%). There is no a large area occupied by this species in the hilly stand with common oak (and Turkey oak, Hungarian oak, sessile oak and mixed stand of them) and plain forest. An explanation could be the small area occupied by the forest in this altitudinal belt.

A study was made about maples regeneration. The generative way is most common for Sycamore and Norway maples. The proportion of natural and artificial regeneration is similar (Table 1).

Table 1. Distribution of maples in terms of regeneration ways.
Tabel 1. Distribuţia paltinilor în funcţie de modul de regenerare.

No.	Way of regeneration	Sycamore maple		Norway maple	
		area			
		Ha	%	ha	%
1	Natural insemination	13,199.8	47	1,286.3	23
2	Artificial insemination	38.3	0	13.6	0
3	Seedlings	14,439.4	52	3,877.6	71
4	Stool-shoot	316.3	1	303.0	6
5	Root-shoot	0,7	0	1.5	0
Total		27,994.5	100	5,482.0	100
Natural regeneration					
Artificial regeneration		14,477.7	52	3,891.2	71
Total		27,994.5	100	5,482.0	100
Generative regeneration		27,677.5	99	5,177.5	94
Vegetative regeneration		317.0	1	304.5	6
Total		27,994.5	100	5,482.0	100

The maples regeneration over the years is interesting and the fact is highlighted by the analysis of the regeneration and the age classes (Figs. 3 and 4).

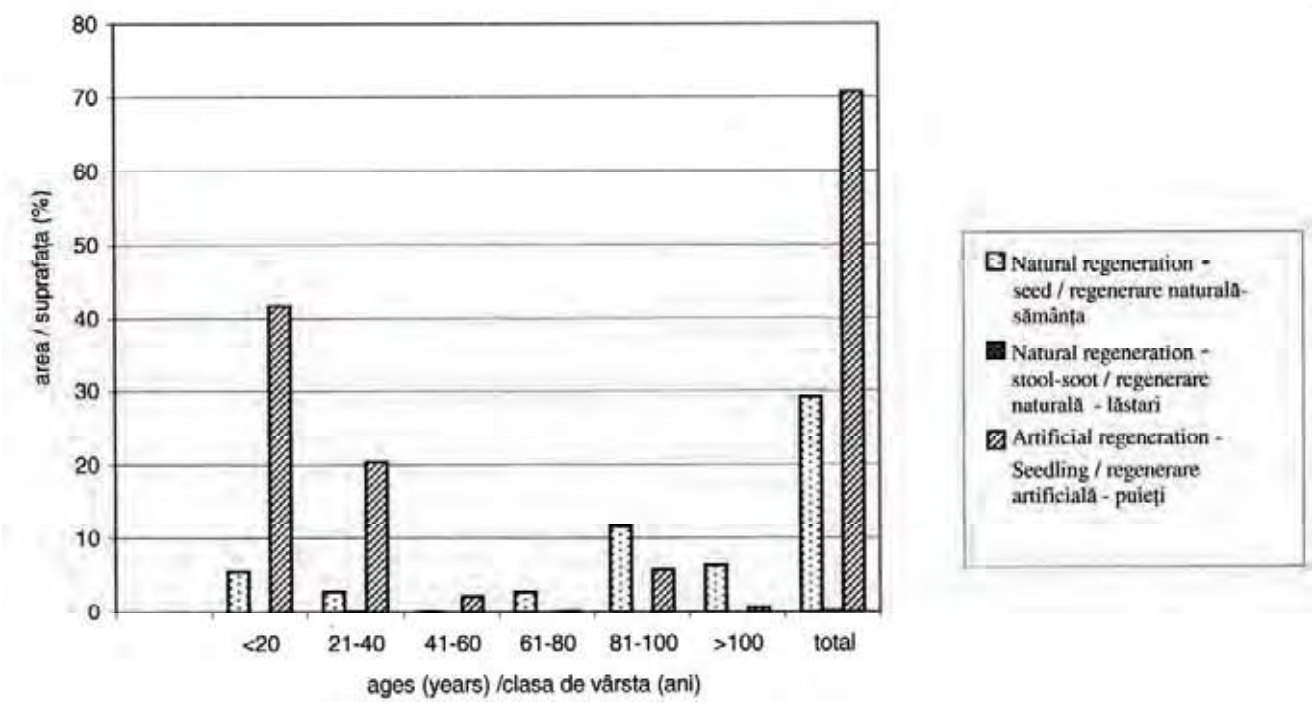


Figure 3. Percent distribution of the areas covered by Sycamore maple on age classes in terms of regeneration way.
Figura 3. Distribuţia procentuală a suprafeţei ocupate de paltinul de munte pe clase de vârstă.

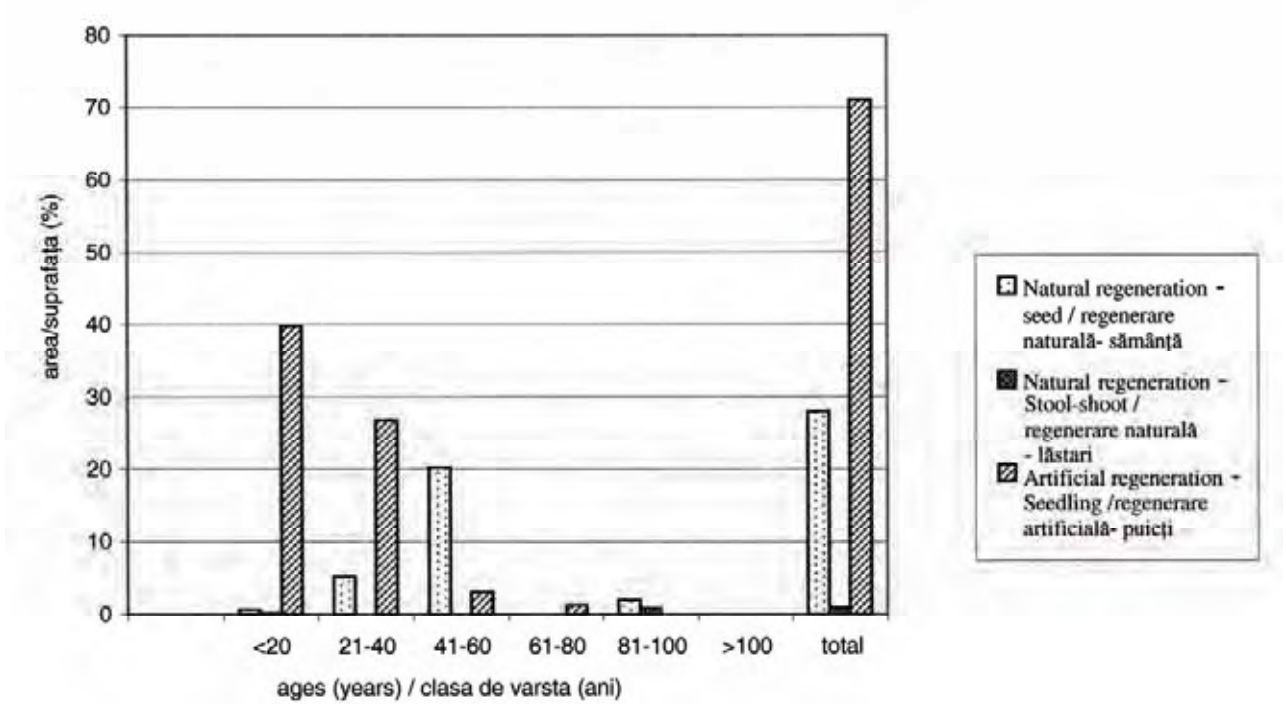
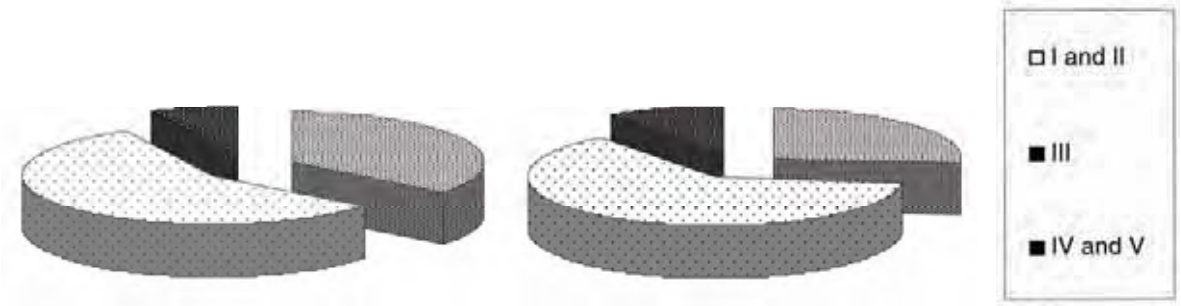


Figure 4. Percent distribution of the areas covered by Norway maple on age classes in terms of regeneration way.
Figura 4. Distribuția procentuală a suprafeței ocupate de paltinul de câmp pe clase de vârstă.

In order to study the maples distribution on site class, three groups was establish:

- superior - I and II site classes;
- middle - III site class;
- Inferior - IV and V site classes.

Research shows that both Sycamore and Norway maples are found in the first two groups, that means superior and inferior site classes (Fig. 5).



Sycamore maple / paltin de munte Norway maple / paltin de camp

Figure 5. Distribution of maples from the national forest resources in terms of site classes.
Figura 5. Distribuția paltinilor din fondul forestier național pe clase de producție.

CONCLUSIONS

Sycamore and Norway maple are mixture species that may appear disseminated or in small clumps without forming pure stands.

In our country the total area occupied by these species is 35,476.5 ha, 29,994.5 ha with Sycamore maple and 5,482.0 with Norway maple.

Both, Sycamore and Norway maple are species with large ecological amplitude. These species are found up in the mountain regions where they may reach the constraints of woody vegetation and down to the plains and forest steppe.

These species are important for their silvicultural value and also for the economic value of timber.

The study shows that in most stands with maples in their composition, regeneration occurred in the generation way, both natural and artificial regeneration undertaken in close proportion.

The way of regeneration in relation to age showed a higher percentage of natural regeneration in higher age classes compared to smaller age classes, classes in which the large share is the artificial regeneration of seedlings.

With regard to the maples distribution on site class, the study showed that the classes of production for maples are higher or medium in most stands.

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a. *Acer campestre*-bark, leaves / ritidom, frunze

b. *Acer monspessulanum*-bark, leaves, fruits / ritidom, frunze, fructe

c. *Acer platanoides*-bark, leaves, fruits / ritidom, frunze, fructe

d. *Acer pseudoplatanus* bark, leaves / ritidom, frunze

e. *Acer saccharinum*-bark, leaves, / ritidom, frunze

f. *Acer negundo*-bark, leaves / ritidom, frunze

Maples species in Romania.
Specii din genul *Acer* în Romania.