

## FOREST REGENERATION - PRIMORDIAL OBJECTIVE IN REDUCING ENVIRONMENTAL RISKS

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**ABSTRACT:** *In this paper are presented the elements of the forest and the ways of regeneration of forests.*

**KEY WORDS:** *forest, regeneration*

### 1. ELEMENTS OF THE FOREST

The forest is a community of plant and animal species that live in close interdependence with environmental factors, with its stable, multifunctional, dynamic, open environment, capable of self-regulation, self-organization and self-regeneration. Through its breadth, complexity and variety, the forest is one of the major components of the biosphere, and with its productive capacity and generating favorable environmental factors, it offers inexhaustible resources and a healthy environment.

The main components of the forest ecosystem are:

- The biotope (the habitat of the forest) is the inorganic medium represented by the climatic, editorial and orographic factors.
- Forest biosynthesis consisting of:
  - forest phytocoenosis (forest vegetation), consisting of a wide variety of woody and grass species, including species of musk, lichens, mushrooms, algae, bacteria, semiparasite and parasitic plants;
  - zoocenosis, represented by numerous wildlife species, birds, reptiles, amphibians, invertebrates, microorganisms.

More than 200 species of wood and over 1000 species of grass species participate in the forests of Romania. The defining

component of the forest is the tree. Trees are large-scale woody plants, which by their density on a certain surface determine the structure, structure and functioning of the forest. Trees are the determinant component of the forest ecosystem, which distinguishes it from other terrestrial ecosystems. The tree is the most imposing representative of the vegetal carpet.

Their vertical distribution within the forest is made according to their dimensions and exigencies to ecological factors, especially to light. In a normally constituted forest a layered layout of these in the vertical section is observed, both in the air space and in the edifical space, which determines the differentiation of several layers of vegetation (Fig. 1)

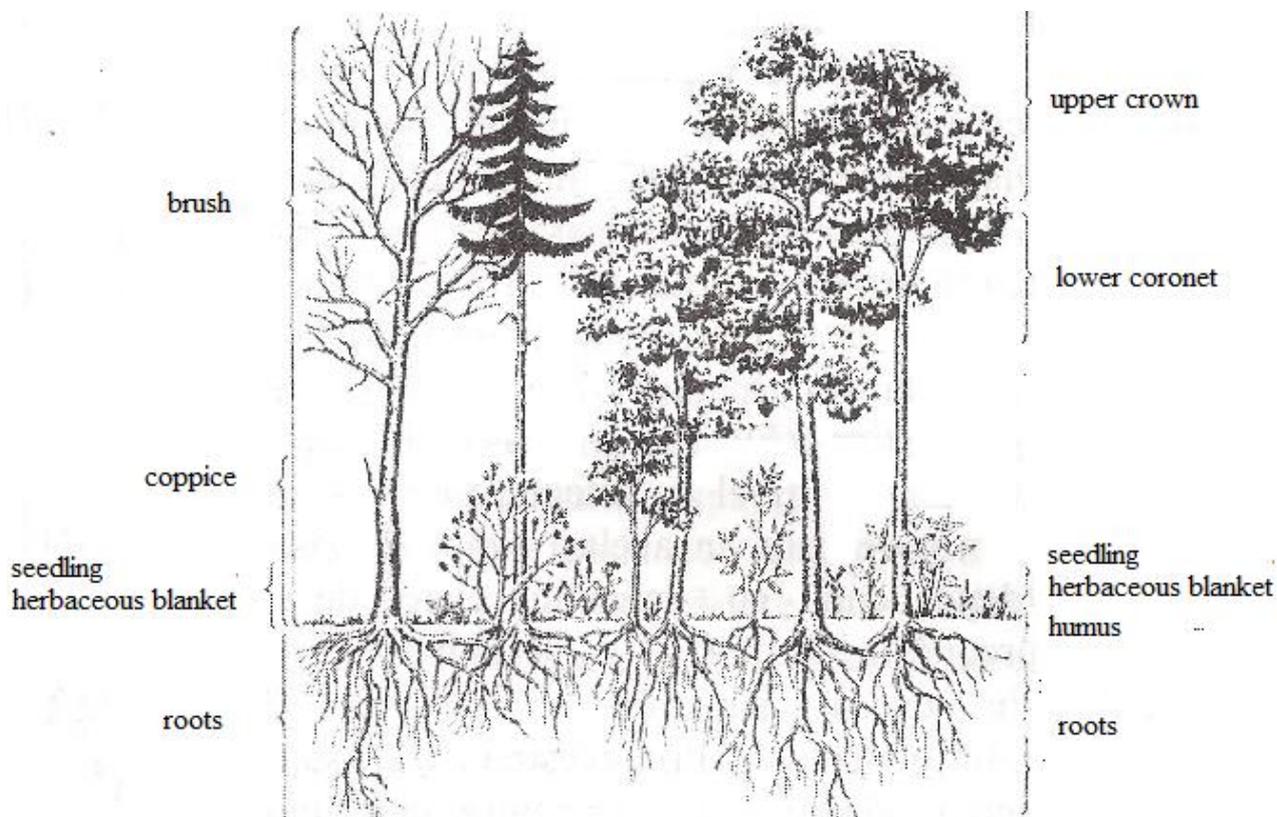
- tree layer (floor);
- layer (floor) of shrubs (sub-tree);
- the layer (floor) of saplings, shoots, etc. (seedling, lobster);
- the layer (the floor) of the herbs (herbaceous patch, veneer blanket).

### 2. REGENERATION OF FORESTS

In the action plan on biodiversity in Romania for the period 2011-2020, the objective of forest management encompasses

actions in relation to the institutions responsible, the type of priority, and in some cases the estimated budget, the sources of and

performance indicators of that action. (Table 1.)



**Figure 1.** The vegetation floors of the forest

**Table 1.** Forest management (2011-2020)

Action	Period	Reporting indicators
Improve the legal and regulatory framework and correlation with the regulations on Biodiversity Conservation	2011	Achieved/ unrealized
Improve the legal framework on how to handle private forests and to grant Compensations	2011-2012	Achieved /Unrealized
Economic assessment of forest protection functions	2011	Achieved /Unrealized
Increase the share of natural regeneration by applying the appropriate intensive trataments	2011-2020	% Natural regenerations
Identification of exploited and unexploited fores-Tiere Land	2011	% identified land
Extension of forest areas and other categories of forest Vegetation, including degraded land, outside forest fund	2011-2020	No ha extended

As the trees grow, the production of abundant fruition, while reducing the level of

the tree, creates the premises for the installation of a new Arboreseent generation,

which under favourable environmental conditions, in a period Time variable, will constitute a new forest instead of the mature one on the path of extinction or in the process of exploitation.

The regeneration process is particularly complex, being influenced by two categories of factors:

- internal factors, represented by hereditary qualities of the trees participating in regeneration;
- External factors – belonging to the forest's own environment, represented by climatic factors, edafics, orographics, biotics and applied silvotechnic measures.

So the regeneration process is different in duration and content, depending on the nature of the species, the structure of the forest, the origin and provenance of the tree, the stationary conditions, the silvotechnical works, etc.

Regeneration can be classified as follows:

- After the way it occurs, there are:
  - Natural regeneration;
  - Artificial regeneration;
  - Mixed regeneration.
- From what is occurring there:
  - generative regeneration (from seed);
  - vegetative regeneration (shoots, cuttings, micropopagation of tissues);
  - mixed regeneration (both from seed and shoots).

After the place where it occurs, natural regeneration may be:

- Under the massive;
- To the edge of the massive.

Artificial regeneration occurs only in the cultivated forest, produced by direct sowing (made by man), or through plantations with seedlings produced from seed or cuttings. Subsequently, the man leads by appropriate methods, the process of regeneration until the realization of the state of mass.

Artificial regeneration is used only in cases where natural regeneration cannot be ensured.

Mixed regeneration is based on combining the two methods of regeneration, natural and artificial, in order to form the state of mass in shorter time, with lower expenses and to diversify the composition of the arborets with valuable mixing species.

### **2.1. Generative natural regeneration (from seed)**

The natural regeneration of the forest seed is based on the capacity of the mature trees to produce seed which, arriving in the forest soil under favorable conditions of germination and sunrise, gives rise to new individuals, able to replace the maternal tree. In their vast majority, the forests of Romania retained their natural character, being in close correlation with the stationary factors that provide optimum vegetation conditions for the ecological requirements of the component species. This state of the forests can be used to ensure natural regeneration, benefiting from favorable ecological conditions, but also for economic considerations, by making regeneration at much lower cost.

Generative natural regeneration is achieved by completing several stages.

The first stage is the fruition of trees. Fruition occurs after trees reach maturity at a certain age, which may vary depending on the species, the position of the trees in the arboret, the pedoclimatic conditions, the forestry measures applied, etc. Although trees have the capacity to fruition, it does not occur regularly every year or with a constant periodicity. After one or two abundant fruition there may be weak fruition, which can not be counted in ensuring natural regeneration from the seed. The level of fruition is influenced by a number of physiological factors, specific to each species, but also by ecological factors.

The age at which the trees reach maturity and the fruition begins differs from species to species, and to the same species from the tree

to the tree, depending on the hereditary particularities, the stationary conditions and the position they occupy in the forest (in the massive, on the of the forest or isolated. (Table 2.)

Table 2. Age at which the fruition and periodicity of the main forest species begins

Species	Start fruition at the age of... years (isolated shafts)	Start fruition at the age of... years (massive trees)	Periodicity of fruition in massive (years)
Acacia	5-10	10-20	Annual
Larice and Pine	10-20	20-40	3-4(5)
Lime	15-25	25-45	2-3(1)
Spruce	20-30	40-50	3-6
Picea	40-50	60-70	3-4
beech	40-60	60-70	4-6
Gamedze	45-55	60-70	4-6
Oak	35-40	50-60	4-8
Hornbeam	20-30	30-40	2-3(1)

Isolated trees benefiting from more light start to fruit at smaller, more abundant and less periodicity. They follow the trees of the legions and then the ones in the massive.

Also, species producing light grains, such as pine, elm, birch, anus, poplar, willow, etc., reach maturity at smaller ages, unlike species with heavier seeds like oak, sky, beech.

Fast-growing species like poplar, willow, acacia, reaching maturity, early fruition, unlike species with slow growth such as the tree, spruce, beech or oak.

The same phenomenon was highlighted in the trees coming from the shoots, which fruition earlier than those from the seed.

The natural regeneration of the seed is influenced and is largely dependent on the years of fruition, the periodicity and intensity of the fruit, the number and position occupied by the seeds trees on the regeneration surface,

the action of some Disrupters that can reduce the amount of seeds, etc.

## 2.2. Vegetative natural regeneration

Vegetative natural regeneration is based on the appropriation of trees to recover or to rejuvenate from certain living parts of the stem or root.

Vegetative natural regeneration occurs only in species that have the ability to produce shoots or drajons.

Regeneration by bark is present in deciduous species and very few species of resins (*Taxus baccata*, *Thuja sp.* *Larix sibirica*).

The capacity of the bark varies depending on the species, age and stationary conditions.

Regeneration from shoots presents a number of advantages:

- The state of mass is carried out in a short time;
- Does not depend on years of fruition, regeneration being safer;
- Shows higher increases in youth;
- Is the only way to regenerate species that cannot multiply by seed;
- In frequently flooded areas is the only way to maintain forest vegetation;
- is more economical.

As disadvantages of mentioning:

- The productivity of the arborets is lower than the seed trees;
- Wood has a lower quality with limited uses.

The natural regeneration of the forest through the drajation is based on the property of deciduous species to produce shoots from existing adventiv buds on the roots of trees.

The formation of drajons varies from species of species, being in close correlation with the age and the conditions of the stationary. The drajons are formed on the roots of small size, which lie towards the surface of the soil and are injured or moved from one cause or another.

Regeneration capacity by drajons decreases with age.

The drajation is carried out on a appreciable surface corresponding to the expansion of the tree's radical system, which can also reach 30 m from the shrub to the white and grey poplar, 10-15m to Acacia.

The method of regeneration by drajation is used in acacia and ash arbors or as a method to improve the proportion of valuable specimens in the trees treated in the grove, by proceeding to the superficial mobilization of the soil around the shars on the surface of the root enlargement.

In qualitative aspect the specimens of the drajons are more valuable than those from shoots. Also, the growth rate is close to those obtained from the seed, are more resistant to rot and are more righteous.

### **2.3. The growth and development of the forest.**

The growth of the forest refers to the gradual and irreversible increase in the size and biomass of living organisms participating in its formation.

The development of the forest is a qualitative change that crosses the forest along the existence of each generation.

The growth of the forest is particularly important for the growth of the tree and trees, with the purpose of the accumulation of woody mass, which is of major economic significance.

The growth of trees is carried out as a result of the photosynthesis process. Growth begins after fertilisation, by the formation of the zygote and the embryo of the seed. If the seed is placed under favorable conditions of temperature and humidity, germination and sunrise occur. In the first year the plant's growth occurs, the primary structure, then the secondary of the stem and the root, is completed, followed by the formation of foliar buds and leaves. The branches are formed in the following years, and later reproductive organs, flowers, fruits and seeds.

Tree growth presents several peculiarities:

- is carried out only through the growth zones located in each of the shaft organs;
- Each tree has its own self-regulating systems of meaning, intensity and duration of growth;
- It is heavily influenced and subordinated to the superior system, overpowerfully self-regulating the forestry ecosystem;
- Has a cyclical nature as action, duration and intensity;
- Occurs differently depending on the geographical area, being activated or stopped by the thermal or precipitation system.

The growth of trees can be diurnal, seasonal, monthly or yearly. All these increases are called current increases and refer to the size, volume or weight of parts of the shaft or whole tree within a day, a year or a specified period.

The growth of the trees is more intense in youth, reaches a maximum of approximately after the passage of 1/3 of the lifetime, is maintained at the same level a relatively short period, after which it decreases and no longer occurs in the old trees.

Growth is different depending on species, age of trees, provenance, position in the Arboret, degree of competition, stationary conditions, ecological factors, etc.

The mode of growth in the height of a species is repeated every season of vegetation, but entirely different in intensity and size. As a rule, each species achieves a maximum of annual current growth in height before starting to fruit.

Each stage is travelled in different rhythms, depending on the species, the state and structure of the forest, the stationary conditions, the hereditary qualities of each species, the way of intervention by silvotechnical works, etc.

The embryonic phase is carried out on the mature trees, begins with the fecundation of the egg and lasts until the maturation of the embryo and the baking of the seed. This stage

may take a single season of vegetation, as in most forest species, or two years as pine, red oak, etc., and even three years as juniper.

The stage of youth begins with the dawn of the plantations and lasts until the fruit of the trees is started.

The stage of maturity begins with the first fruition and ends at the appearance of signs of degradation of the trees (start drying at the top of the crown).

The stage of the old age begins with the emergence of signs of degradation and ends with the drying of the trees. Keeping trees at this stage in the stand is harmful, with negative repercussions on the way of forest management. Trees usually reach this phase only in the natural Virgin arbors of national parks where cuts are forbidden.

### 3. CONCLUSIONS

- The forest is a community of plant and animal species that live in close interdependence with environmental factors, with its stable, multifunctional, dynamic, open environment, capable of self-regulation, self-organization and self-regeneration
- More than 200 species of wood and over 1000 species of grass species participate in the forests of Romania.
- The defining component of the forest is the tree.

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