

## SOME CONSIDERATIONS ON THE SWEET CHESTNUT TREE SPECIES (*Castanea sativa* Mill) IN THE NATIONAL FOREST FUND

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### Abstract

Woody species within national forest fund can be found in various forest formations, constituting a stand with structural and functional complexity.

Although the structure of national forest fund is carried out according to a relatively small number of species or groups of species, having as reference the surface occupied by these and the volume's foot, there are a number of species considered different category or disseminated which have ecological and economic importance.

Sweet chestnut tree (*Castanea sativa* Mill.), although it is island found in the national forestry fund, in some locations, special importance for the forestry sector, the crop of this species can extend both the forestry fund and beyond.

Also, a special interest is the agriculture and forestry systems, within the crop edible chestnut can represent a special interest, having regard to the climate changes of the past decade, regional, continental and planetary aspect that facilitates promotion of the crop of this species on the considerable areas.

Within the forestry sector, the species *Castanea sativa* is given particular attention, within the forestry nurseries producing seedlings for the planting of crops in line with the annual plan of work of regeneration of forest stands, using for this purpose the seeds with a definite origin of the wilderness and forest stands, with certified seed source.

This species shows the importance for its valuable wood, resistant in time, as well as for its fruit with a high nutritional value, represented by edible chestnuts.

**Key words:** edible chestnut, habitat, stand, composition, natural regeneration, biogroupe, simulation, reservation of seeds, stands source of seeds, seeds.

### INTRODUCTION

Genus *Castanea* includes about 10 species, widespread in Southern Europe, Asia, Algeria, Eastern Asia, including Japan, as well as in parts of the South-Eastern part of North America (Stănescu, Șofletea, Popescu, 1997) - fig. 1. The most representative species from this genus are represented by *Castanea crenata*, *Castanea dentata*, *Castanea mollissima*, *Castanea sativa* - fig. 1.

Chestnut species are heat-loving trees, sweet climate, having spearhead leaves, sharp-toothed, obsolete. The flowers are Monoecious-largest agricultural; the male composed of a calyx campanulate with six divisions and 10-20 stamens, borne on long, grouped in erect.

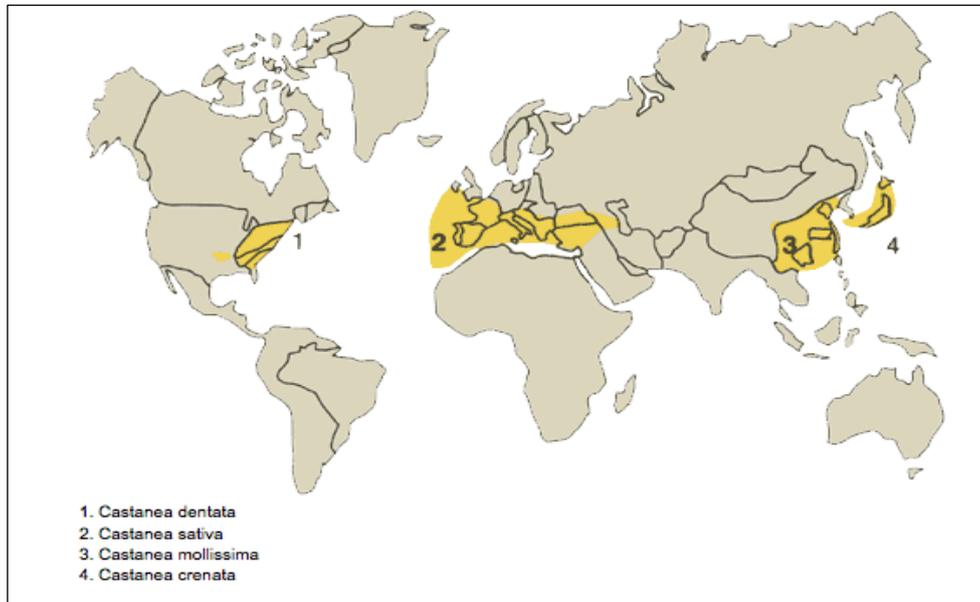


Fig. 1 The genus range *Castanea* (<http://www.marrone.net/index.php?id=1779>)

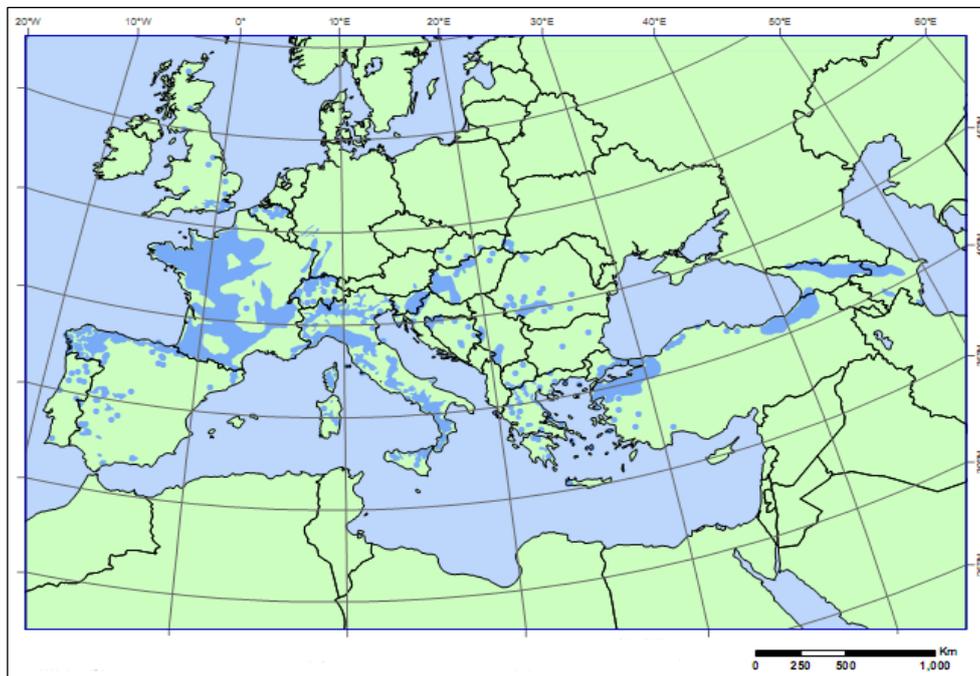


Fig. 2 The european range of species *Castanea sativa* ([http://www.euforgen.org/fileadmin/www.euforgen.org/Documents/Maps/PDF/Castanea\\_sativa.pdf](http://www.euforgen.org/fileadmin/www.euforgen.org/Documents/Maps/PDF/Castanea_sativa.pdf))

Female flowers arranged in dichazii, three in a spiny involucre, sitting at the base of ament males, each flower is composed of six sepals, six stamens and six biovulate lodges ovary. The ovary is narrowed to a short style, with six stigma ramifications (Stănescu, Șofletea, Popescu, 1997).



a) *Castanea crenata* b) *Castanea dentata* c) *Castanea sativa* (original)

(a.) <http://www.pfaf.org/Admin/PlantImages/CastaneaCrenata2.jpg>,

(b) [http://upload.wikimedia.org/wikipedia/commons/thumb/2/2d/Castanea\\_dentata-foilage.jpg/220px-Castanea\\_dentata-foilage.jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/2/2d/Castanea_dentata-foilage.jpg/220px-Castanea_dentata-foilage.jpg)

Photo. 1 The leaves species of the *Castanea* genus

The fruits are achenes, closed 1-3 in a cup almost spherical, with spines, mosquito, being edible. The maturation is annual, the germination being hypogeus, sprouting and sending out suckers.

In Europe and in our country good chestnut *Castanea sativa* vegetate spontaneously.

The sweet chestnut tree is a Mediterranean species, with a range that stretches on the european continent, from Spain to the Balkan Peninsula, Asia and the Caucasus. In Africa presents a narrower area, focused on the Northwest Coast, in Morocco, Algeria and Tunisia (Stănescu, Șofletea, Popescu, 1997) - fig. 2.

To us, it appears in regions with mild climate, especially in the depression of Oltenia - Tismana, Polovragi, Baia de Aramă,-in the north-western part of the country-Baia Mare, Baia Sprie (Stănescu, Șofletea, Popescu, 1997) and in the western part of Dobrești-Bihor and Gurahonț-Arad.

Here there were semnalate isolated specimens that have been reported and in Banat in quercus stands in lowlands and hills.

Its culture was extended in many localities, especially in Transylvania and Walachia (Transylvania and Oltenia).

To the spontaneous presence to sweet chestnut tree in our country and especially in the area of Topești - Tismana were issued a number of assumptions along time.

As a result A. Ionescu considers the presence of sweet chestnut tree as a further from tertiary to present.

Another hypothesis assumes that this species may have been introduced by Roman settlers in the era of colonization of Dacia.

In the end another hypothesis, supported by I. Conea, involves bringing and planting of sweet chestnut tree by monks who came from South of the Danube with the foundation of the Tismana Monastery, rapidly spreading in all directions, resisting only on “the feet of the mountain” formed of calcareous rocks, in the presence of a mild climate, submediteranean (<http://www.ecomagazin.ro/padurea-de-castani-comestibili-de-la-tismana-un-superlativ-national>).

Chestnut, is a typical species of the Mediterranean climate, warm and moist, protected from strong and violent frosts, with high resistance to various types of industrial pollution.

Tolerates shade better than oak, having a temperament closer to the common hornbeam (Stănescu, Șofletea, Popescu, 1997).

Develops well on soils of volcanic rocks, crystalline shale, etc., rich in feldspar, loosening, airy, permeable.

Soils on limestone with high content of carbonate, weakly acidic, shallow and sometimes clay doesn't agree, often being considered calcifug (Stănescu, Șofletea, Popescu, 1997).

It is a tree that can reach heights of often up to 30 m and diameters of approx. 1.5 ... 2 m. In our country, often vegetate isolated or in crop excessive rare, stands the old age stems thick, relatively low height, low, broad crowns developed and rhytidom cracked deep, having a dark brown color (Stănescu, Șofletea, Popescu, 1997).

Annual shoot are vigorous, brown and with white lenticels, glabrous, the leaves being larger, 10-22 cm long and 4-8 cm broad, oblong lanceolate, gradually narrowed to the top, with the edges characteristic pronounced setaceous toothed and prominent venation (Stănescu, Șofletea, Popescu, 1997).

Bred specimens isolated leverages from reduced by about age 20 years or younger, and in massive with 20-30 years later, blossoming occurs through June-July, after the resort. Male flowers, made up of a calyx with six divisions and 10-20 stamens, are grouped in very many cylindrical, borne on long 10-13 cm, erect, yellow in color, with the specific smell (Stănescu, Șofletea, Popescu, 1997).

Female flowers are green and are found at the base of males ament, 2-3 in a spiny involucre, which the fruit turns into a spherical cup, almost woody, covered with spines, although mosquito (Stănescu, Șofletea, Popescu, 1997).

Chestnuts, achene globular or suddenly acuminata peak stigmata debris bearing, have dark-brown (Chestnut), diameter of 2-3 cm and stand 1-3 closed in trees cup, very prickly; this, in baking, through October,

loosen the four valve. Their germination capacity is 50-60%. It has a high nutritional value, containing starch, glucose, sucrose, dextrin, vitamins, in catches. Are used in nutrition, be whole (roasted), either in the form of flour for cakes, bread and for obtaining alcohol, sugar and oil (Stănescu, Șofletea, Popescu, 1997).

In favorable resorts has a great capacity to diseases until age submitted and to send out suckers frequently, being active increases, at the age of 5 years with up to 5 m high. The longevity is very large, and may exceed the age of 500 -1000 years (Atlas forestal de Castilla y Leon, 2007, Tomo I).

The chestnut presents a double importance as a wood producer and, especially, fruits (Serrada, Montero, Reque, 2008). The wood is of superior quality, resistant and durable in wet environment.

Considering that the production of chestnuts is lifted (chestnut harvest can achieve in stands of 70 years several tons per hectare) and the fruit is repeated often (frequency of 2-3 years), its culture for wood and fruit becomes justified in regions with mild climate in our country.

As a forest tree in the strict sense, can be cultivated together with oaks, especially in the resorts with moderate climate in the West of the country. Is also a popular ornamental tree, which can be entered and degraded lands, in polluted areas-Baia Mare (Stănescu, Șofletea, Popescu, 1997).

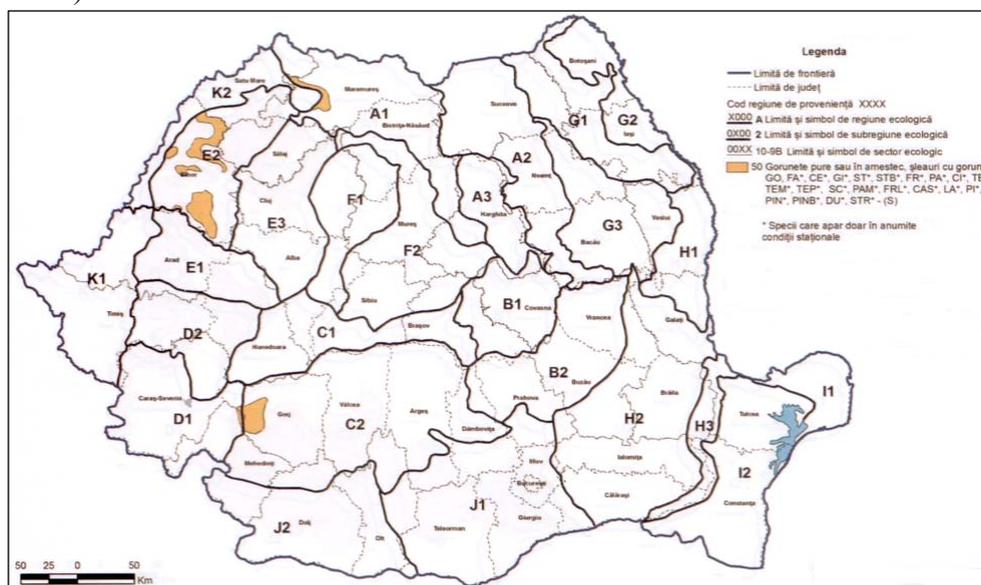


Fig. 3 The map of the regions of origin for the species *Castanea sativa* (Pârnuță et al., 2010)

Reproductive material is obtained, usually from seeds (slowly through the layers) and varieties by grafting. Autumn runs fall, immediately after harvest, the treating seed with miniu lead. If you week them in spring, chestnuts veneering. The layering by ridge gave satisfactory results. Grafting applies only in the case of multiplication of varieties, spring, cleft in the crown or to the package (Stănescu, Șofletea, Popescu, 1997).

Currently, the kernelds are located in forest genetic resources and related species *Castanea sativa* (Pârnuță et al., 2010) - fig. 3, which are made up by stands with definite origin, for harvesting seminologic material in order to obtain seedlings suited for forestry plantations.

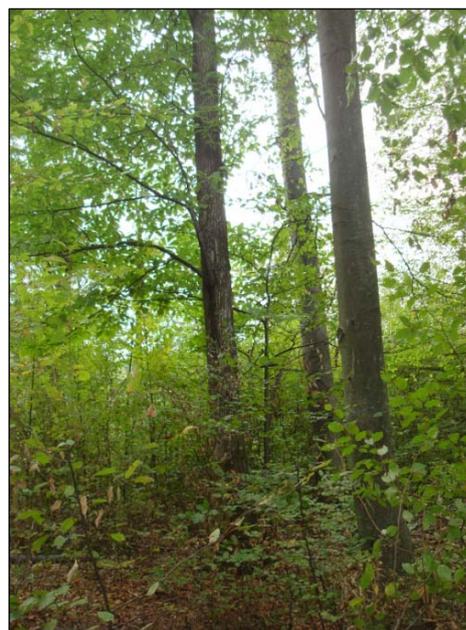
As a result, the species *Castanea sativa* were identified and the stands, 2D, 2K and 2J in the Unit Production (U.P.) V Topești-Bistricioara, Forest District (O.S.) Tismana, Forest Regional Board (D.S.) Gorj and the stands in the u.a. 48E and 49E in the Unit Production (U.P.) V Dobrești, Forest District (O.S.) Dobrești, Forest Regional Board (D.S.) Bihor (Pârnuță, 2011).

#### MATERIAL AND METHOD

The case study was conducted within the Unit Base (U.B.) I Dobrești, the U.P. III Hontîșor, O.S. Gurahonț, D.S. Arad and the U.P. IV Tismana, O.S. Tismana, D.S. Gorj.



a) healthy specimens



b) partially feeble specimens

Photo. 2 Specimens of the species *Castanea sativa* in the stand of u.a. 36 C, U.P. III Hontîșor, O.S. Gurahonț, D.S. Arad (original)

Also have been studied a series of stands where it was rased the presence of the species *Castanea sativa* from the forestry administration structures of particular localities Dobrești-Bihor County and Iacobini-Arad County.



a) healthy specimens

b) dried specimens

Photo. 3 Specimens of the species *Castanea sativa* in the stand of u.a. 37E, U.B. I Dobrești (original)

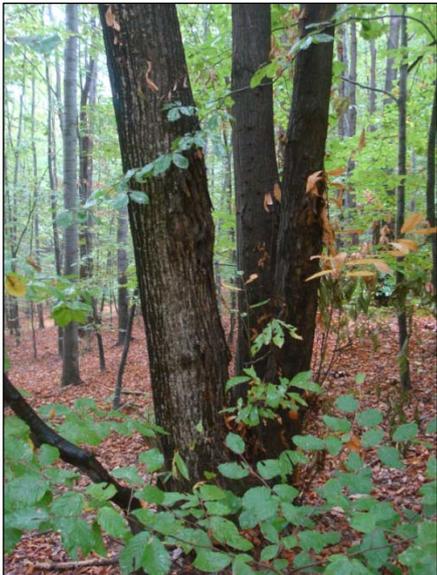


Photo. 4 Specimens of the species *Castanea sativa* in the stand of u.a. 12C, U.P. IV Tismana, O.S. Tismana, D.S. Gorj (original)

As a result have been achieved observations on the itinerary, stationary observations, inventory in stands of different age classes, registration of images on magnetic media (Crainic, 2007) - photo. 2-6, and for the presentation of the stand space and the simulation of the structure has been used the program PROARB 2.1 (Popa, 1999).



Photo. 5 Specimens of the species *Castanea sativa* in the stand of u.a. 1C, U.P. IV Tismana, O.S. Tismana, D.S. Gorj (original)

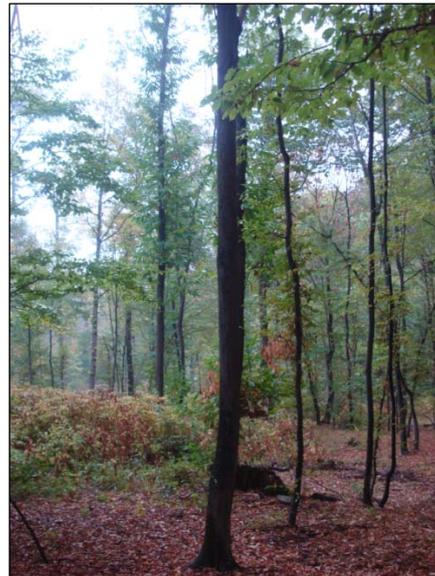


Photo. 6 Specimens of the species *Castanea sativa* in the stand of u.a. 12B, U.P. IV Tismana, O.S. Tismana, D.S. Gorj

For proper implementation of the case study were consulted a number of materials (forest places, maps, the implementation acts etc.) located on the premises of forest district which are administering the stands where chestnut species vegetate

Also were analyzed a series of materials on various websites and specialized treaties existence today.

## RESULTS AND DISSCUSIONS

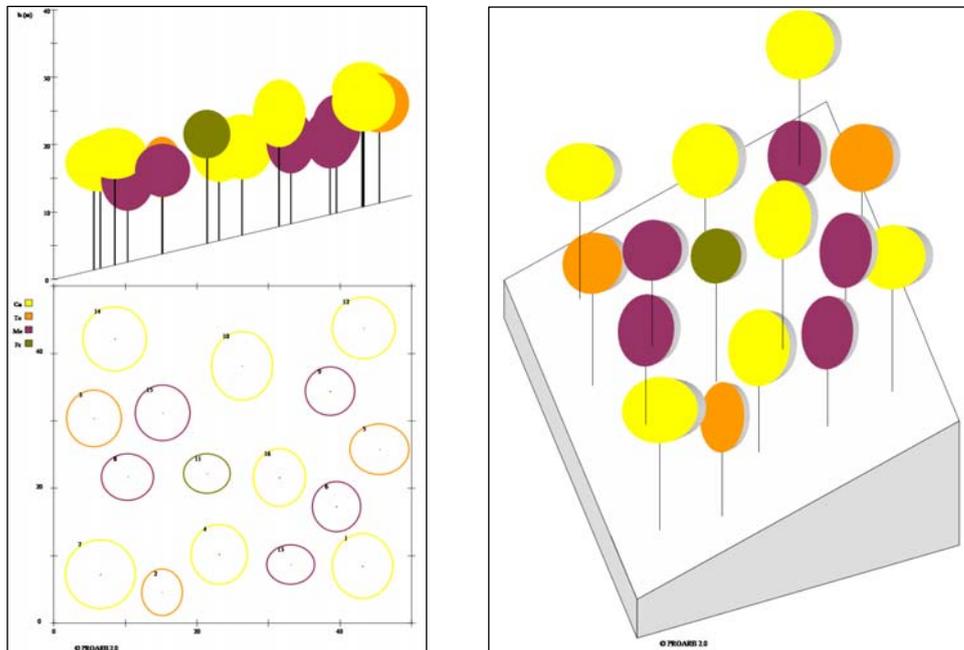
After writing of the case study were obtained a series of results relating to the structural and functional characteristics of forest stands where it was identified the species *Castanea sativa*.

Table 1

Data relating to the Inventory of biogroups spatial structure of chestnut (*Castanea sativa*) what will be done with the program PROARB 2.1, within range of Iacobini, Arad County

No.	X (m)	Y (m)	Dc1 (m)	Dc2 (m)	H (m)	He (m)	Species	Number of trees 16
1	43.12	8.5	8.5	9.6	21.5	13.3	Ca	Slope 14
2	15.1	4.6	5.7	6.9	17.4	8.4	Te	
3	5.6	30.4	7.7	8.4	19.8	11.9	Te	Profile length 50 m
4	23.1	10.2	7.9	8.9	18.4	8.7	Ca	
5	45.5	25.8	8.2	7.5	19.2	10.5	Te	
6	39.5	17.3	6.7	7.4	17.5	7.9	Me	
7	6.5	7.25	9.8	10.2	19.9	11.4	Ca	
8	10.3	21.7	7.3	6.9	16.8	7.6	Me	Profile width 50 m
9	38.6	34.4	6.9	7.2	15.7	6.9	Me	
10	26.3	38.2	8.5	10.2	17.9	8.3	Ca	
11	21.4	22.2	6.5	5.9	19.8	12.7	Fr	
12	43.3	43.8	8.8	9.2	20.1	11.2	Ca	
13	33.1	8.7	6.7	5.8	16.8	7.5	Me	
14	8.5	42.2	8.9	9.5	20.3	12.8	Ca	
15	15.2	31.2	7.6	8.3	16.3	8.5	Me	
16	31.5	21.6	7.3	8.6	21.8	11.8	Ca	

From the simulation of spatial structure of biogroups of trees of the species *Castanea sativa* (yellow) of the Iacobini radius, Arad County, PROARB 2.1 (Popa, 1999) - fig. 4, you can ascertain that the specimens of *Castanea sativa* outside forestry presents some differences in terms of the port and desimea respectively on the surface.



a). horizontal and vertical profile

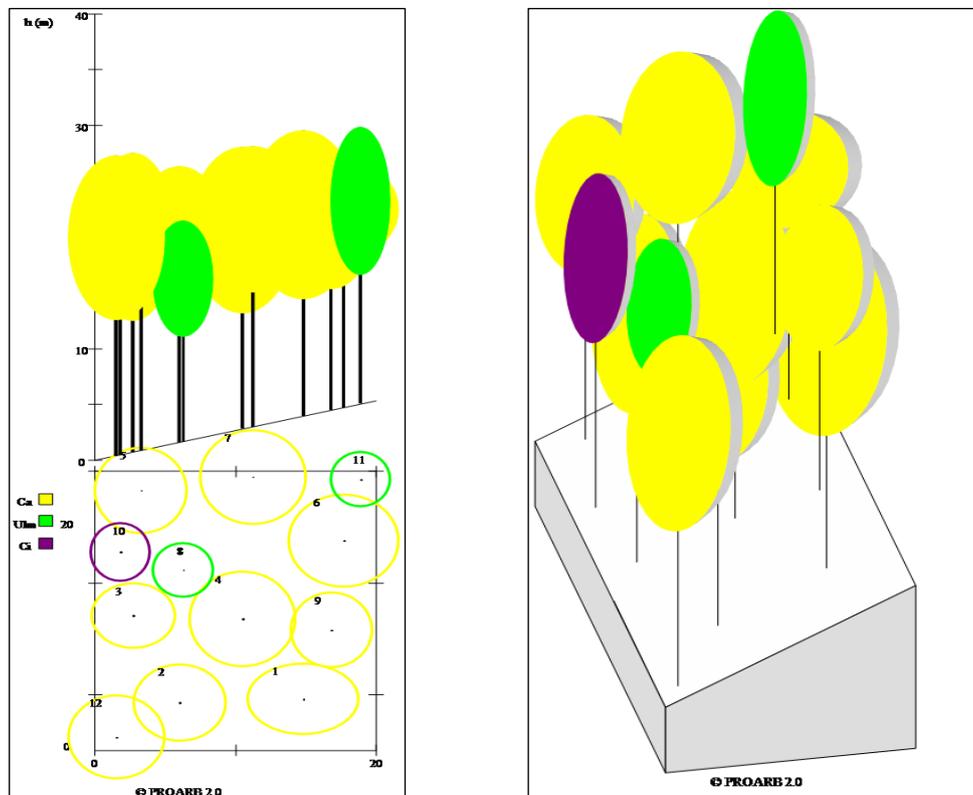
b). three-dimensional profile

Fig. 4 The simulation of spatial structure of chestnut biogroups PROARB 2.1 programme in the Iacobini radius, Arad County

Table 2  
Inventory data for the spatial structure of biogroups of chestnut (*Castanea sativa*) what will be done with the program PROARB 2. in the stand u.a. 36C

No.	X (m)	Y (m)	Dc1 (m)	Dc2 (m)	H (m)	He (m)	Species	Number of trees
1	14.8	4.6	7.9	6.3	25.6	10.5	Ca	12
2	6	4.3	6.5	6.8	24.7	12.6	Ca	Slope 15
3	2.7	12.1	5.9	5.8	26.8	11.8	Ca	
4	10.5	11.8	7.5	8.5	25.2	10.4	Ca	Profile length 20 m
5	3.25	23.3	6.5	7.6	24.9	12.9	Ca	
6	17.7	18.8	7.8	8.2	22.2	13.3	Ca	
7	11.2	24.5	7.5	8.4	25.1	12.1	Ca	
8	6.25	16.2	4.3	4.8	19.8	9.4	Ulm	Profile width 25 m
9	16.8	10.8	5.8	6.7	21.9	10.9	Ca	
10	1.8	17.8	4.2	5.2	25.6	12.9	Ci	
11	18.9	24.3	4.2	4.9	24.8	11.6	Ulm	
12	1.5	1.2	6.8	7.4	26.9	12.2	Ca	

It is found that the biogroups consisting of copies of the species *Castanea sativa* (yellow) in the stand of 36C are relatively spaced - fig. 4, prompted the presence of portions with natural regeneration for this species.



a). horizontal and vertical profil

b). three-dimensional profile

Fig. 5 The simulation of spatial structure of chestnut biogroups PROARB 2.1 programme stand in the u.a. 36C

## CONCLUSIONS

Also sweet chestnut tree though not found in the inventory of species representative of the national forestry fund, thanks to its presence, relatively restricted island of special importance.

The various uses of sweet chestnuts, thanks to high content in various nutrients, vitamins, etc., recommend the culture of sweet chestnut in forest as well as in specialized crops, where there is optimal vegetation conditions for this species.

The wood is resistant to heartwood brown-brown, enjoyable, and can be successfully used in the construction of boats.

To elucidate the presence of this species in our country it is necessary to analyze the genetic structure of DNA chloroplastic by using molecular markers for this purpose.

Although there were localized and it concerned forest genetic resources relating to kernels and species *Castanea sativa*, O.S. Dobrești,

D.S. Bihor and O.S. Tismana, D.S. Gorj, should be considered and some stands where vegetate this species within the O.S. Gurahonț, D.S. Arad and Forest Districts Baia Mare, Baia Sprie and Tăuții Măgherauș, D.S. Maramureș.

## REFERENCES

1. Crainic G.C., 2007, Îndrumar de lucrări practice, Universitatea din Oradea, Facultatea de Protecția Mediului, Catedra de Silvicultură, pp. 1-100;
2. Pârnuță G., 2011, Catalogul național al resurselor genetice forestiere, Editura Silvică, București, pp. 5-522;
3. Pârnuță G., A. Lorent, M. Tudoroiu, M. Petrila, 2010, Regiunile de proveniență pentru materialele de bază din care se obțin materialele forestiere de reproducere din România, Editura Silvică, București, pp. 5-122;
4. Popa I., 1999, Aplicații informatice utile în cercetarea silvică. Programul CAROTA și programul PROARB, Revista pădurilor, nr. 2/1999, București, pp. 41-42;
5. Serrada R., G. Montero, J. A. Reque, 2008, Compendio de Selvicultura Aplicada en Espania, Efca S.A.-Pol. Ind. - Las. Monjas. - Torejon de Ardoz, Madrid, pp. 5-1178;
6. Stănescu V., N. Șofletea, O. Popescu, 1997, Flora forestieră lemnoasă a României, Editura Ceres, București, pp. 172-174;
7. \*\*Atlas forestal de Castilla y Leon, 2007, Tomo I, Edilesa Leon, pp. 13-386;
8. \*\*Amenajamentul U.B. I Dobrești, Primăria Dobrești, Studiul General;
9. \*\*Amenajamentul U.P. III Honțișor, Ocolul Silvic Gurahonț, Direcția Silvică Arad, Studiul General;
10. \*\*Amenajamentul U.P. IV Tismana, Ocolul Silvic Tismana, Direcția Silvică Gorj, Studiul General;
11. \*\*Amenajamentul U.P. V Topești-Bistricioara, Ocolul Silvic Tismana, Direcția Silvică Gorj, Studiul General;
12. <http://www.marrone.net/index.php?id=1779>;
13. [http://www.euforgen.org/fileadmin/www.euforgen.org/Documents/Maps/PDF/Castanea\\_sativa.pdf](http://www.euforgen.org/fileadmin/www.euforgen.org/Documents/Maps/PDF/Castanea_sativa.pdf);
14. <http://www.pfaf.org/Admin/PlantImages/CastaneaCrenata2.jpg>;
15. [http://upload.wikimedia.org/wikipedia/commons/thumb/2/2d/Castanea\\_dentata-foilage.jpg/220px-Castanea\\_dentata-foilage.jpg](http://upload.wikimedia.org/wikipedia/commons/thumb/2/2d/Castanea_dentata-foilage.jpg/220px-Castanea_dentata-foilage.jpg);
16. <http://www.ecomagazin.ro/padurea-de-castani-comestibili-de-la-tismana-un-superlativ-national>.