

**UNIVERSITY OF CRAIOVA  
FACULTY OF HORTICULTURE**

**(ABSTRACT)**

**RESEARCH ON PRODUCTION OF PROPAGATION MATERIAL  
AND INTRODUCTION OF *PAULOWNIA TOMENTOSA* (THUNB.)  
*SIEB. ET ZUCC.* SPECIES IN GREEN AREAS**

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## IMPORTANCE OF THE SPECIES

Lately the *Paulownia tomentosa* plantations have known a great spreading both in China, the country of provenience, and also other countries from Asia and even other continents. This is due both to the valuable wooden mass with numerous uses as well as to the therapeutic action of some chemical components of this tree.

The *Paulownia tomentosa* wood, known and used starting from the antiquity is yellow-whitish towards fading red, granulated, right, shining after processing, light, smell-less. In order to keep its initial qualities long time after processing it is recommended to be cut during autumn or winter in the repose time. It is a type of wood easily to process and the products made of it do not break, do not crack and do not deform. The permeability to water is slower than to other wooden species. As far as the resistance to rotting is concerned on behalf of the observations from ancient writings are concerned, it has been stated to be very big- at the Chinese the coffins made of this wood rotted harder.

This wood has good acoustical features, so that the traditional musical Chinese instruments are made only of Paulownia wood, because of the better sound resonance.

Having a small density, it is not resistant, not being recommended for elements which cannot hold great tensions like in constructions. It is used for the construction of doors, windows, separating walls, for the beams of the roof since they maintain its shape by not curbing. It is also used for the furniture fabrication.

Lately it is more and more used in the construction of airplanes, ships, cars because it is resistant to rotting, light. It is used to the fabrication of toys, in obtaining the plating and the paper.

The population of China, Japan and the countries from the South- East of Asia has a long tradition in the confection of vases, Buddha, wooden fish, fabrication of paint, matches.

Beside the importance offered by the wooden mass, *Paulownia tomentosa* is outlined also through the medicinal properties given by the chemical substances it contains.

The plants which contain ursolic acid have been used in the traditional medicine before knowing the components responsible for the therapeutic effects are. The contemporary studies which led to the identification of the ursolic acid contained by the Paulownia leaves confirmed its therapeutic effects

such as: anti- microbial, anti-viral, anti- hepatic, anti- inflammatory, for the treatment of tumors, of ulcer. Also it is a good stimulant for the hair regeneration, the head's skin irritation and has anti-dandruff effect. It is also used in cosmetics.

The pharmaceutical experiments have shown that the extracts from the Paulownia fruits can ease the cough, the asthma and reduce the blood pressure. The leaves and fruits have a high percentage of nutritive substances so that they can constitute a good fodder.

The big and pubescent Paulownia leaves play an important role in air purification of smoke and dust so that *Paulownia tomentosa* have become the main species for afforesting in numerous areas where the pollution is a problem.

### **THE AIM OF RESEARCH**

By taking into account the small extent in green areas of Paulownia *tomentosa* wood species, and also the fact that it is characterized by special ornamental and useful features, it is justified to produce propagating material by generative *and vegetative* ways.

### **WORKING METHOD**

The main working methods were the experiment and observation, to which the laboratory analyses were added on soil samples and accumulation made in plants during certain vegetation periods.

Experimenting conditions were made in different ways, depending on areas where experiments were placed, and on propagation phase or method.

In order to obtain seedlings from seeds it was used the material research base in the laboratory of Ornamental Arboriculture and Landscape Architecture science in Horticulture Faculty of the University of Craiova, training and research fields in the Botanical Garden of the University of Craiova, the Laboratory of Horticulture Faculty in SEMTEST Craiova, tree nursery of Craiova Public Land Company, and other towns that received seedlings 1-year aged or transplanted in pots and nutritive cubes, in order to fortify them in transplantation areas within own nurseries.

### **CONTRIBUTION ON VEGETATIVE PROPAGATION IN PAULOWNIA *TOMENTOSA STEUD.* (ROYAL PAULOWNIA TREE) SPECIES**

For the method of vegetative multiplication using cuttings of root the same recipes were experimented, as in the case of the generative multiplication, with the difference that the sand

percentage increased by 10% realizing 20% sand and the soil percent decreased by 10% obtaining 20% in each variant.

Recipes for mixtures experimented for obtaining the saplings through cuttings (slips), roots fragments

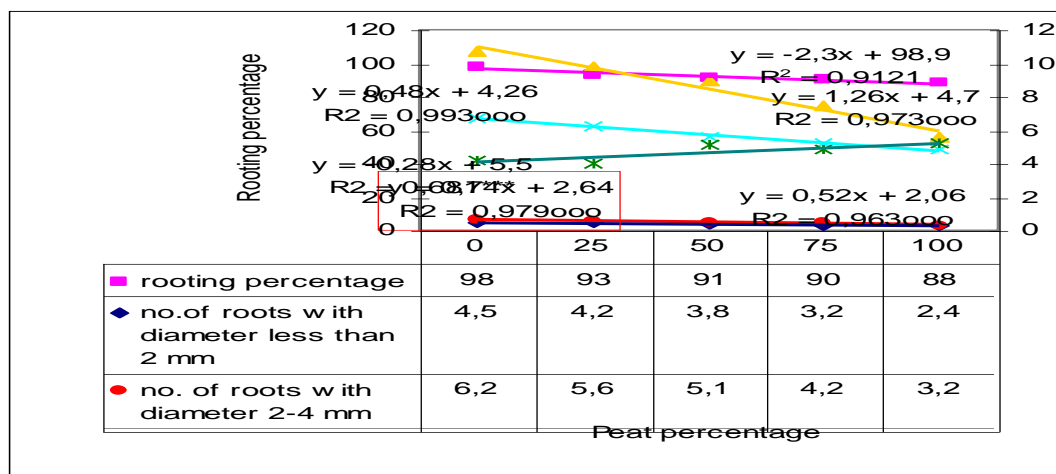
RECIPE (VARIANT)	V0	1	2	3	4	5	6	7
RED PEAT	00	00	10	20	30	40	50	60
MANURE %	00	60	50	40	30	20	10	00
FALLOW LAND %	90	20	20	20	20	20	20	20
SAND %	20	20	20	20	20	20	20	20

Beside the mixtures recipes presented above, other environments of striking roots as: peat and the perlite in different combinations and proportions.

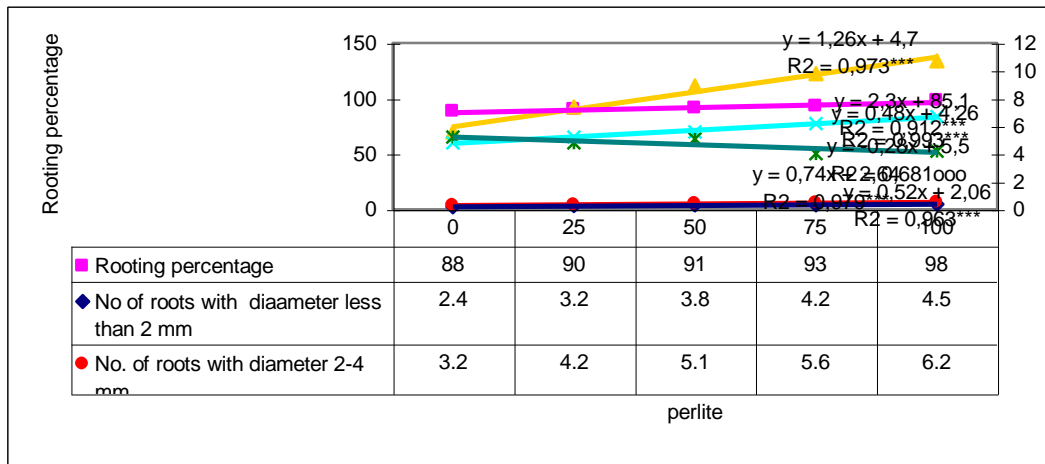
The differences obtained on the percentage of root striking cuttings are obvious. To the striking root of cuttings, no striking root stimulants were used, the percentage of the rooted cuttings being of 60-90%, in the conditions of reaching 20°C temperatures and the covering of planted cuttings with polyethylene sheet or glass.

The roots that the cuttings were made of being 1, 3, 5, 7 and 10 mm long, have been drawn from one year old saplings, which were sorted in accordance to the diameter.

Aspects regarding the material used fro the confection of root cuttings and the results obtained, are presented in the enclosed figures:



Influence of peat percentage in rooting mixture on plants obtained from root cuttings



Influence of perlite percentage in rooting mixture on plants obtained from root cuttings

Optimal length of cuttings has been set at 3 cm; higher values in length are not profitable because of the higher consumption of biologic material. Cuttings with very low diameter are rooting very well, but they very hardly support the transplanting.



Inradacinarea butasilor de radacina in perlit

## CONTRIBUTION TO IMPROVEMENT OF THE PROPAGATION THROUGH SEEDS IN *PAULOWNIA TOMENTOSA* STEUD. (ROYAL PAULOWNIA) TREE SPECIES

The seeds proceeded from young, typical samples from the Botanic Garden of the University of Craiova.

The seeding was executed in technically warmed multiplication spaces, destined to the scientific research activity, with technical air-conditioning possibilities.

The seven mixture recipes have been used for the replication of the plants obtained from seeds, being disinfected thermally and chemically.

In the composition of the experimented nutritive mixtures were used in different proportions the neutral red peat, the manure, the fallow land and the sand. The results were different in

accordance to the report between components, the manner in which the light, humidity and warmth were provided.

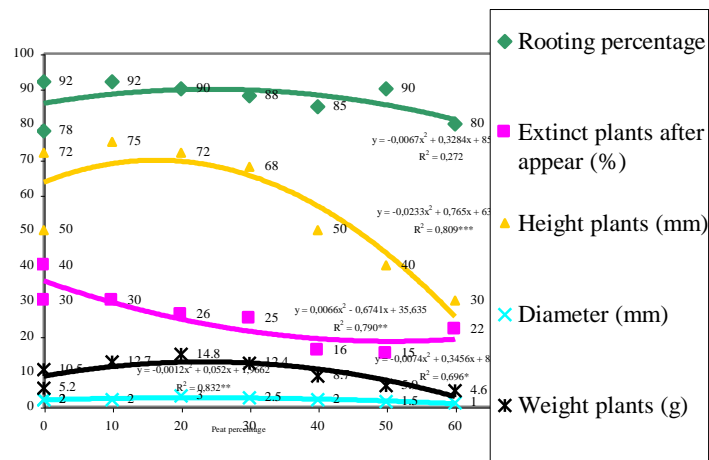
The recipes from-nutritive mixtures experimented in obtaining sapling through seeds

RECIPE (VARIANT) V	0	1	2	3	4	5	6	7
RED PEAT %	00	00	10	20	30	40	50	60
MANURE %	00	60	50	40	30	20	10	00
FALLOW LAND %	90	20	20	20	20	20	20	20
SAND %	20	20	20	20	20	20	20	20

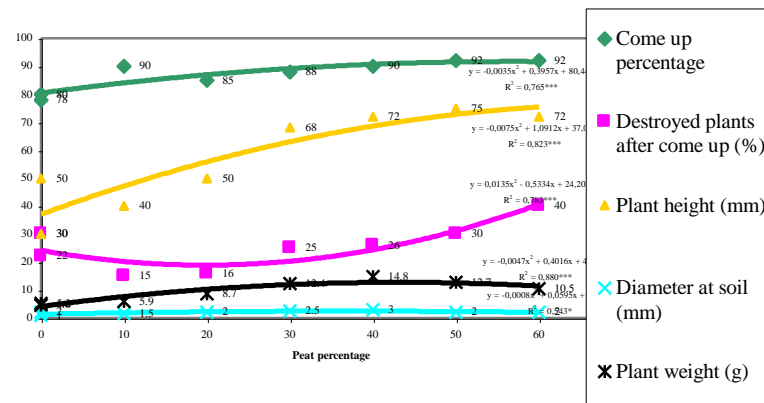
The saplings obtained of seeds, using recipes of nutritive mixtures, comported differently, the growth features of plants and their sensibility to the pathogen agents, being obvious and illustrated in the paper.

By appreciating the chemical composition of the nutritive components from mixtures and their physical characteristics, we can draw the conclusion that the mixtures from variants 3, 4, 5 meet the optimal conditions, the first two variants are weakly supplied, and the last two are not favorable because of the high percent of peat, of the large capacity of holding water, sensitizing the plant to diseases and drought.

The results obtained are illustrated in the enclosed graphics. Variants 3, 4, 5 realized plants with biometrical characteristics corresponding to the planting in the field, namely they have a 5-7 mm diameter at the base and are 10-14 cm high.



Influence of nutritive mixtures on plants during transplanting stage - 100 days after sowing



Influence of peat percentage in mixture at transplanting, on favorableness degree in plants



Images from nursery - set-up of experiment

Variants 3, 4, 5 realized plants with biometrical characteristics corresponding to the planting in the field, namely they have a 5-7 mm diameter at the base and are 10-14 cm high. The best results in seed springing have been noted in the variant with polyethylene sheet cover. Variants 3, 4, 5 are the best ones because the components in the mixture are making a favourable environment to plants germination, growth and development in different stages of vegetation. The use of peat is recommended in amounts of 30-40% sufficient ; higher values lead to getting of bigger plants or to higher growth, that are sensitive to diseases and pests, implicitly causing substantial losses.

## CONCLUSION

*Paulownia tomentosa* is existing in Romania in several areas, the number of trees is very small, depending on ecologic conditions which the species could benefit, and also depending on species and its ornamental value, wood weight, medicine features, merifer characteristics and environmental protection function, these features do justify the extending in culture both in green areas and also possibility to experiment it in forest cultures with business and recreational functions, by using planting system in stripes, or in clearings within recreational forests of weak structure.



Studies and research conducted on behavior of *Paulownia tomentosa* species did outline the typical thermophile (warm loving) feature, but less pronounced than in other wood species such as *Albizia Juribrisin*, *Punica granatum* and others.

Results of research conducted during a long period of time, more than 20 years, have led to working out three technologies of seedlings producing: by generative way, by rooting cuttings, and by tissue cultures, as a preliminary stage to introducing the species in culture.

Generative propagation in *Paulownia tomentosa* is possible in sheltered areas only, with full phytosanitary protection, under conditions of soils well supplied with nutritive matter and a highly water regime.

Seed propagation of the species offers a high rate of seedling propagation, as well as the benefit of embryonic root.

The species propagation by vegetative way through short rooting cuttings is a really valuable production method, on condition that mother plantations should be existing in culture, for root production – a method that was solved by research conducted.

Propagation by stem cuttings is possible, but its lower business results as compared to generative propagation or by root cuttings, is putting a limit to the method's use.

Obtaining seedlings by tissue cultures in *Paulownia tomentosa* is solving in Romania two main problems: fast producing of seedlings and obtaining healthy propagating material; and it also assures prerequisites for obtaining new forms in this species, biological material that is propagated by meristem cultures being much more receptive in mutagenic agents that are used in breeding.

*Paulownia tomentosa* that is experimentally cultivated in tree-nurseries in Romania which are characterized by droughty summers, is getting seedlings with 1.5-2.0 m height and even taller, on strict condition to apply irrigation, and to assure a proper supply with nutritive matter to the soil, and to make transplantation of high quality seedlings in the nursery, that were obtained in heated glass-houses, in pots or other types of receptacles, so that vegetation period in transplant area of the glass-house to be applied during April-October months.

Seedlings of *Paulownia tomentosa* can be obtained in tree-nurseries, with profitable results, thus giving up to producing seedlings in protected areas; in this case the seedlings in the transplant area of tree-nursery, are getting the height between 20-70 cm during period August-October, and they get also a good lignification that guarantee their frost strength.

*Paulownia tomentosa* species can be experimentally introduced in forests with recreational function, in order to study its potential under conditions in Romania, as a forest tree.

## **Recommendations for production.**

Guarantee of success in culture of *Paulownia tomentosa* species can be assured under planting conditions with mild climate and more sheltered areas, with possibility to cautiously extending it in surrounding areas too, by respecting isothermal lines with temperatures as favourable as possible.

The species propagation by tissue cultures is opening opportunities to simultaneously planting higher numbers of seedlings that are characterized by maximal biological uniformity, with complete health, without too high expenses.

Under climate conditions in Romania it is recommended to planting *Paulownia tomentosa* seedlings with soil pack to the root, in planting holes with depth of 70 - 100 cm, and also by using manure.

*Paulownia tomentosa* is suitable to be used within all types of green areas, in plantations of street alignment, or isolated in groups or in massive formation, on condition to be somehow protected from very cold air flow currents, by planting them in associated way or sheltered by buildings.

*Paulownia tomentosa* can open large opportunities to Romania as regards naturist medicine development, through presence of chemical principles of pharmaceutical importance, to be used in respiratory diseases treatment, and also as a meliferous plant.

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