History of Paulownia Tree

The origin of Paulownia tree is China. The earliest documents and chronicles that prove the use of this wonderful tree are dated more than 2500 years ago.

In Japan the tree is used from 200 year AD and somehow represents national tradition. Paulownia Tree is even part of the formal political life of these countries. Japanese, who are admirers of aesthetic and symbolism, has chosen Paulownia as a crest in their Prime Minister’s office. Another explicit fact for the importance of that tree is its place on the Order of the Rising Sun. This is the very first Order of Japan, established in 1875, awarded to individuals with merits to the country. We should also mention the presence of paulownia tree on the Japanese currency- it is depicted on the 500 yen coin.

In China more that 2.5 million hectares are planted with paulownia, 1.3 million of which are of intercropping. Between the trees they grow cotton, corn, tea, etc.

When you look at paulownia pictures probably you remember seeing similar leaves in the local garden or admiring the graceful vivid blossoms in the city park. Indeed you have probably seen paulownia before but you didn’t realize this is not just another tree species but much more. Tree of Wonders – gathered the past of several cultures, but also Tree of Future, whose qualities we are still about to learn.

Paulownia features

Paulownia is not just another exotic tree. It is hard to mention all the areas where different parts of it are used. Wood, leaves, blossoms – each of them have properties we can use.

1. Growth rate- incomparable to other wood species- 1 m³ for 7-8 years. Its fast growing rate is treasure for environmentalists. They have found that thanks to its rapidly developing root system it is extremely suitable for afforesting plots at risk of erosion. This feature of the tree is widely used in some countries- the USA for example, where erosion is a typical issue. Paulownia is also suitable for reforestation of burned forest lands; apart from the obvious advantages, due to the considerable quantity of foliar, it provides natural fertilization of the areas after the fall of the leaves. For its extraordinary features, paulownia has become almost ordinary species for parks and gardens – not only in Asia but also in Europe and the USA. The huge leaves and the big crown, which grow in no time at all, give deep shadow to the places for rest; so a park with paulownia offers coolness in the heat and dust of the big cities. If there really is a tree to call „lungs of the city”- it is paulownia.
2. Beauty of the wood structure- resembling the most expensive and exotic woods, it offers new and unexplored dimensions for furniture vision. Knots in the wood are almost entirely missing.

3. Solidity- soft yet exceptionally resilient and resistant to bending and twisting.

4. Weight- paulownia wood is lighter than the lightest known wood of balsa. It's light but also solid-perfect combination for some purposes. Its average weigh is 208-300 kg/m³. The high ratio strength/weight makes this wood perfect for shipbuilding, aircraft building, surfing decks, campers, etc. The wood is easily processed. Its solidity, smoothness and lack of defects make it ideal for construction, furniture, wainscoting, veneer, toys, packages, etc. Its acoustic features make it perfect for musical instruments, furnishing of concert halls and recording studios.

5. Paulownia tree holds nails and screws tightly without splitting. Splitting rate of yellow poplar and white pine tree, for example, is higher than in paulownia. Flat head screws can be screwed directly in the wood without splitting even at the edge of the wood. The material is perfect for wood-carving.

6. Fire resistance- burning point is twice higher (400°C) compared to pine wood. In ancient times Japan people used paulownia boxes to protect their kimonos from possible fire.

7. Paulownia wood is resistant to invasion of woodworms and termites due to its high tannin content.

8. Paulownia's fibrous structure with billions of air pores makes it perfect material for warm and noise insulation, incomparable to other wood. This feature of the wood is appreciated when choosing material for sauna, prefabricated wood houses, flooring and paneling.

9. Moisture resistance- the wood does not absorb water making it perfect for ground coating and polishing. When exposed to harsh weather conditions, the wood does not change its dimensions and warp. This feature makes the wood proof against putrefaction.
10. Leaf mass- commonly used for fodder of stock (cows, sheep, goats, etc.). Its nutrition features are close to alfalfa. Protein content is 20 % when green and around 12 % after the fall. Leaves are rich in microelements and digestibility is 60 %. The leaves are up to 75 cm in diameter and are the best “factories” for oxygen. One paulownia tree absorbs approximately 22 kg of carbon dioxide and release 6 kg oxygen per year thus clearing hundreds of thousands cubic metres air. This feature has high environmental value. In China paulownia leaves are used for production of medicines against abdominal typhus, liver diseases and bronchitis, etc. Since paulownia leaves are considerably large, they provide deep shadow and preserve soil moisture thus forming favorable microclimate for other plants that grow around. The leaf foliage fertilizes the soil, enriching it with nitrogen and improves its structure. This feature makes the soil more acceptable for the species jointly grown with paulownia and boosts produce (if foliage is not collected for fodder).

11. Blossoms- their beautiful shape, color and aroma are appreciated by bees. The honey of paulownia is light and its quality is even higher than acacia honey. Especially useful for treatment of respiratory diseases, lung problems and digestive system. Teas and syrups of paulownia blossoms positively affect liver gull and spleen problems, as well as bronchitis. Paulownia blossoms are recently largely used in cosmetics industry for production of perfumes, creams and many more.

12. Paulownia as energy source- paulownia is used in energy sector for production of pellets (solid fuel for boilers and stoves with full automation feeding and burning process) and other alternative sustainable biofuel. Paulownia stems, branches and leaves are used for this purpose. Pellets can be used for small individual caldrons for heating houses and apartments or large facilities and electric stations. Paulownia can also be used for production of bioethanol. US scientist has developed new technology based on combination of termo-chemical and biotechnological methods by which one tone of dry wood can produce 511 litre of ethanol. This is the reason why we call paulownia an "oil well".

The advantages of paulownia as biofuel are numerous:
- Paulownia can grow in poor and sandy soil thus not taking fertile soil used for food needs.
- Plantations of paulownia do not require much care and costs.
- The tree does not require replanting. After each cut the tree regenerates. Its root life is approximately 70 years and can pass between 4 and 8-9 cycles of eight years each.
- Its stem can be cut during the whole year and is not affected by season or short harvesting period.
Personal observations

We want to express our great satisfaction of growing paulownia. The more you care for them, the better they grow. It is a pleasure to watch how a young paulownia tree grows as high column just for several months.

In summer, under favorable growth conditions, the tree can reach up to 6 feet tall, and sometimes even more depending on the type of paulownia. The tree can reach its fully mature phase in just 8-10 years and give up to 1 m3 wood for this period.

High drought tolerance of trees older than 2 years, its unpretentiousness to the composition of soils and wide temperature range for some species (-25°C to +45°C) makes paulownia much in demand on the world market.

Building plantations

The basic you need to observe before building paulownia plantations:

**Soil.** The tree is not pretentious to the type of soil as long as it is permeable, not loam and able to drain freely. The thickness of the soil has to be 1.5 m at least. Stones, even big ones, are not a problem, as long as there is not a rock plate on a higher level under the tree. This might stop its growing. Paulownia does not tolerate acidic soils; pH must be 5.5 and higher.

**Water.** Paulownia does not tolerate high underground waters. Their level must be 1.5 m most. You have to provide adequate irrigation to the young plant.

1. Ground preparation

   After choosing the suitable terrain, it is good to prepare it by plowing up. In cases of using drill 60 cm in diameter and 60-100 cm in dept, it is permissible not to plow.

2. Planting plans

   When planning plantation, take into account the size of the work equipment (tractors, mowers, tanks). The plan for the sapling planting depends on the purpose they are planted for. When planting paulownia for wood and the area is not very large, but you want to get the maximum from the terrain for higher return, the proper plan is 3x3 m or 4x3 m. This makes respectively about 105 trees on decare. If you use this plan, it is mandatory in the forth year to cut the trees in one as a chessboard, because when grow, they hinder each other. Another four years later half of the trees in your forest shall be 8-years old and the other half will be 4-years old (these, which have been cut off, would regenerate). Then you cut the 8-years old trees and etc. Thus you harvest 8-years old trees in 4 years. Disadvantage of this plan is – when cutting the trees in one you have to be careful not to break neighboring trees, which slows their harvest.

   Other popular planting plans are 4x4 m - 63 saplings per decare; 5x4 m - 50 saplings per decare or 5x5 m - 40 saplings per decare. Each of these plans requires cutting the entire tree between the 8th and the 10th year.

   When planting for biomass in 2x0,5 m or 1x1 m, 1000 saplings are planted on decare.
3. Planting
The proper time for planting saplings is from November to the end of April. Paulownia seedlings must be planted from the end of April to the first days of August.

The next step is marking and digging holes with machine, equipped with drill 60 cm in diameter. The depth can reach 1 m. This does not mean that the seedling have to be placed at the entire depth. Half of the removed soil, mixed with fertilizer, returns to the hole till its depth becomes 30-40 cm, and then the seedling is laid. Thus a pad of soft and rich of nutritious soil is provided which leads to fast grow of the young roots.

4. Irrigation
The water is of big importance for the young trees planting in the first and the second year of their growth. Then the root system is already strongly developed and reaches aquifer, so the need of irrigation declines. The easiest way to water the trees is through drip irrigation system. One young tree needs about 50 l of water, provided by 1 - 2 irrigations a week. If you use hydro-gel, the need of irrigation is twice less.

In the beginning the fight against weeds is the biggest issue. It is up to your decision whether to fight those using herbicides, machinery or by hand.

You feel real pleasure when you find that the needs of fertilizing and watering decline as the tree grows during the years.

During spring and early summer some insects, especially caterpillars, can infest paulownia trees. This is not a great problem. You can obtain advice on how to fight these insects in every agricultural pharmacy.

When trees are growing for production of wood you can achieve an upright stem by snapping the side branches. Be careful not to snap green leaves since it makes wounds in the stem.

Observing those important rules correctly shall make you a proud owner of high upright trees. Obviously the more efforts you put in the first year, the better results you will achieve next years.
**Weight**

Its average weight is from 208 to 282 kg/m³. Paulownia wood is almost four times lighter than oak wood (850 kg/m³) and twice lighter than pine wood (480 kg/m³).

**Solidity**

Paulownia tree has one of the highest ratios solidity/weight among all wood species.

Tearing module of paulownia MOR is 843 kg/cm².

**Stability**

Drying time in the open air is at least 30 days. Boards can be dried in ovens in high temperatures for at least 24 hours until levels of moisture become 10-12 %. After drying the wood is not expected to twist. Shrinking level from green to dry state is 2.2 % across and 4 % longwise.

**Value**

In the world market one cubic meter of paulownia wood cost between 200 and 800 USD depending on the degree of processing. We expect the prices of the raw material to be not lower than the price of the pine wood.

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### Emission of harmful gases in kg gas/1000 tones of dry substance*

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<th>Harmful gases</th>
<th>Paulownia</th>
<th>Coal</th>
<th>Petrol</th>
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<tr>
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<tr>
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<td>0</td>
<td>1550</td>
<td>5250</td>
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<td>775</td>
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<tr>
<td>Other harmful substances</td>
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<td>140</td>
<td>2800</td>
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</table>

* according to data provided by NREL and USDOE
We think that in the near future paulownia tree shall set new trends in wood and furniture industry and shall be the core in all programs for sustainable energy sources.

**LET IT BE GREEN!**

**BE PIONEERS!**

**BE WITH US!**

**IT’S EASY**

We saw, tried and found the undoubted benefits of PAULOWNIA- THE TREE OF FUTURE