

**E R G O F I T O   I N   A C T I O N**

Give Nature What Nature Wants

## Paulownia Trees



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## **PAULOWNIA TREE:**

Paulownia is a genus of from 6 to 17 species (depending on taxonomic authority) of plants in the family Paulowniaceae, related to and sometimes included in the Scrophulariaceae. They are native to much of China, south to northern Laos and Vietnam, and long cultivated elsewhere in eastern Asia, notably in Japan and Korea. They are deciduous trees 12–15m (40–50ft.) tall, with large, heart-shaped leaves 15–40 cm across, arranged in opposite pairs on the stem. The flowers are produced in early spring on panicles 10–30 cm long, with a tubular purple corolla resembling a foxglove flower. The fruit is a dry capsule, containing thousands of minute seeds.

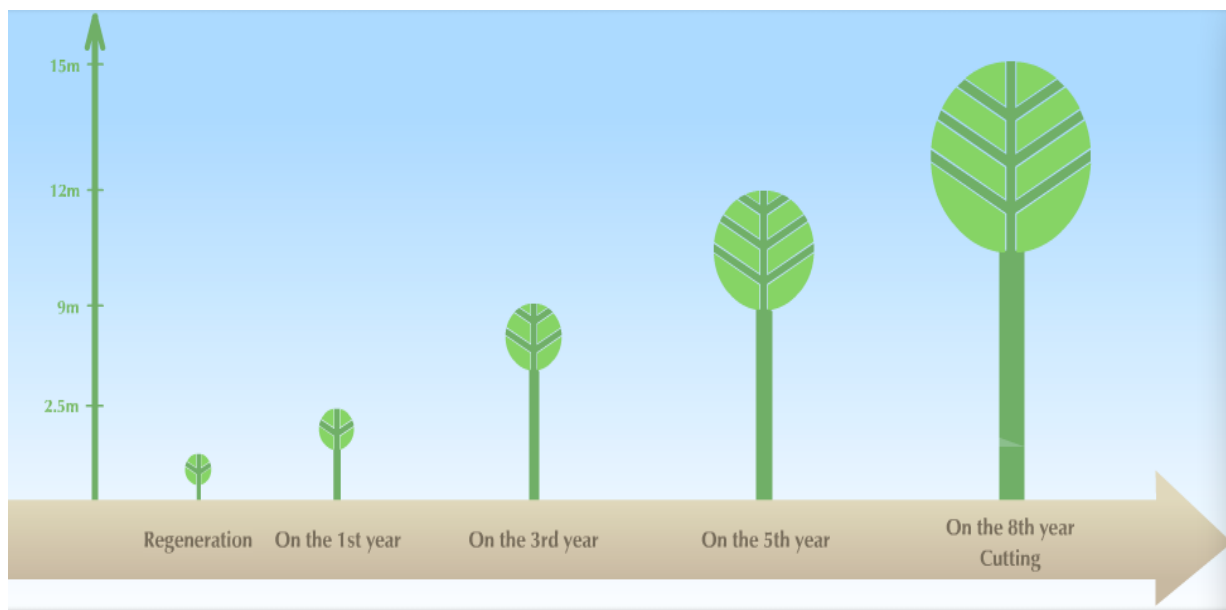
The genus, originally *Pavlovia* but now usually spelled *Paulownia*, was named in honour of Anna Paulowna queen consort of The Netherlands (1795–1865), daughter of Tsar Paul I of Russia. It is also called "princess tree" for the same reason.

## **NATURAL GROWTH:**

### **CLIMATIC CONDITIONS FOR GROWING PAULOWNIA**

#### **Temperature and altitude**

Paulownia can adapt to a wide range of temperatures. Generally Paulownia species grow up to 2000m. The development starts in the spring, when the soil temperature reaches 15-16°C. Intensive cultivation of Paulownia is optimal up to 700-800m and the optimal temperatures suitable for maximal growth are in the range of 24-33°C.



#### **Soils**

Paulownia is highly adaptive species and grows well on many types of soils. Most appropriate and recommended are light, well drained and sandy soils with or without slopes. Most recommended are deep well drained soils with pH from 5.0 to 8.9. Avoid clay, rocky and soaked soils. Soils that are consisted from over 25% of clay and porosity under 50% are not recommended for Paulownia. Paulownia does not

tolerate salinity over 1%. Young Paulownia plants develop well, when the soil depth is at least 1.5-2 meters.

## **Rainfall**

Soil and air humidity are very important for Paulownia growing. Additional watering is necessary if the annual rainfall drop under 100mm per month. In comparison 10mm of rain delivers 10 liters of water. Watering is needed in the following years if the monthly rainfall is under 50mm. Insufficient watering slows the growth but does not kill the plant. For optimal growth during the first months of development is crucially important to water them with 20L per plant weekly. The quantity is good to be divided in two equal times and added by drip irrigation system. The establishment of drip irrigation is recommended technology when develop commercial plantation for Paulownia.

## **Wind**

Plantation is good to be planted at areas without strong winds reaching over 28km/h. When there are stronger winds at the place of planting stabilizing post has to be put during the first year of development until they form strong wooden stem. The speed of the wind is dangerous for the young plants over 45km/h and such areas have to be avoided.

## **COMMON CONDITIONS FOR ESTABLISHMENT OF PAULOWNIA PLANTATION**

### **Site preparation**

Usually Paulownia is planted during spring and mid-summer in dependence of the development stage of the planting material /one year old saplings or young planting material/ and prefers horizontal or south orientated slopes. As all young trees, Paulownia plants should be well protected from herbivorous animals. Site preparation operations will depend on the roughness and vegetation of the planting site. Old fields and meadows typically require herbicide treatment to control weeds and brush. When the weeds are strong early in spring an herbicide treatment has to be applied carefully to avoid contact with the tree stem.

### **Machinery cultivation prior planting**

If the fields are not explored for agriculture and the soil is not cultivated it is absolutely necessary to plough it deeply (minimum 40-60cm). The purpose is to fragment it in small pieces and to uproot the old grasses and bushes. If the soil is heavier and with clay you have to plough deeply up to 80cm. After plough the land have to be leveled up with harrow. After that operation the land is considered ready for furrow and marking and making of holes for planting. In dependence of the soil quality defined from the preliminary soil analyses at the place of planting the soil is enriched with organic matter and Ergostartbio as well as the required fertilization.

## **PLANTING SCHEMES AND DENSITY**

### **Paulownia for timber production**

When creating a plantation for timber we recommend the planting scheme with 4x4, 5x5 meters or 5x4 m between the trees which means 500 or 600 trees per hectare. Larger density leads to competition for area between the trees and slower their growth after the first 3-4 years. Lower density leads to faster initial growth which lowers the timber quality. Higher density does not lead to commercial effect, the necessity of elimination of plants is connected with expenses for eradication and herbicide treatment to stop the regeneration from the roots and in the end the 3-4 years old stems does not possess enough volume to be used for timber.

### **Paulownia for biomass**

For effective yields we recommend the trees to be planted with higher density than the one used for timber production. The density should be between 3500 and 10 000 plants per hectare, which depends on the rotation cycles of for the biomass collection strongly linked with the purposes of the biomass (pellets, chips, bioethanol, fodder) and the harvest machines.

## **KEY FACTORS**

- Soil analyses to define the clay content and microelements and to evaluate how suitable it is for growing Paulownia and how to be cultivated to establish highly effective plantation;
- Land cultivation is critical for adaptation of the saplings at the site and to ensure sufficient growth;
- Weed control is the most important aspect from the preparation of the land for planting;
- Irrigation is an advantage if summer rainfalls are insufficient
- The application of Ergofito as per recommended table will spur the growth by 25%, while improving the wood density and general tree health.

## **GROWING TREES:**

Growing trees will benefit from a balanced rhizosphere with the correct beneficial microbial activity.

### **Yearly application:**

Apply once a year on the ground around the tree, in the diameter of the canopy the following:

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Bio Agent	Quantity	Area
Ergostart Bio	125Kg	Per Hectare

The above is applied with sufficient water, generally diluted 1:50, (1 Kg of product to 50 liters of water). **Ergostart Bio** will immediately start decomposing all inert organic matter into plant food. More important it will de-mineralize any accumulation in the rhizosphere. It will start by converting all of the above into humus, thus rejuvenating tired soils and allow normal and healthy roots development.

Bio Agent	Quantity	Area
Ergofito Universal Plus	30Kg	Per Hectare

The above application will ensure a superior growth and a strong preventive defense against plant sicknesses and parasitic attacks.

Soil exhaustion is the main culprit of low yields in tree plantations.

### Soil Exhaustion

Plants send out explorer roots to identify nourishing soil. They use a capillary element (a root hair), which explores a very small space (micro- habitat) and samples the nutrients available. If there is only enough 'food' for one root hair the plant deposits toxins along the exterior surface of this space to stop the occupied area from being explored by other capillary elements.

When the food is finished the plant makes the microhabitat toxic and sheds off its root hair. This prevents other root hairs from exploring soil that has been exhausted. Through chemical fertilization you can replenish the nutrients in the spaces but if there is not sufficient bacterial activity to detoxify the soil, these areas will still be avoided by new roots. This is why it is possible for the efficiency (nutrients absorbed by plant nutrients applied to land) of chemical fertilizers to be below 15%.

ERGOFITO contains the enzymes and bacteria that destroy these toxins and they actually transform the poison back into food for plants. This emulates the properties of non- agricultural land that is full of organic material, high in microbiological activity and does not get affected by soil tiredness. The same applies to any soil rich in humus. Soil exhaustion does not occur where humus is present.



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