

## ***Paulownia in Kazakhstan***

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**Abstract:** Every year in Kazakhstan, the number of industries is growing, respectively, and environmental pollution, and especially air pollution. The government cannot refuse and close the industry, as well as the citizens themselves in economic terms, so let's look at one of the best trees that can help us cope with this difficult task. Paulownia is a genus of trees in the Paulownia family. It grows in Southeast Asia (especially in China), where it has been grown for decorative, cultural and medicinal purposes for more than 2000 years. It is also known as the princess tree, the royal tree, the Kiri tree, the Empress tree and the phoenix tree, and its Chinese name is 泡桐 (pāotóng). It is believed that the genus Paulownia includes from 6 to 17 species, depending on the taxonomic classification. Of these, *P. tomentosa*, *P. elongata*, *P. Fortune* and *P. catalpifolia* are considered the most popular.

**Keywords:** Paulownia, *P. tomentosa*, Shan-Tong, Pao Tong Z07, Carbon dioxide, Oxygen, Seeds, Polluted air, Saplings, Seedlings.

### **1. INTRODUCTION**

Currently, paulownia trees are planted in Asia, Europe, North America and Australia for commercial, medical and decorative purposes. Due to their rapid growth rate and adaptability, they are considered invasive species in some countries. However, most of the risks can be reduced by planting hybrids that produce infertile seeds (for example, an in vitro 112 clone). Paulownia can adapt to various environmental conditions, has a fast growth rate and exceptional regenerative abilities; a cut tree trunk can grow up to 2-4 m per year. In fact, it is one of the fastest growing trees in the world, capable of producing several times more biomass per year than some slow-growing species. These properties have led to increased interest in creating a paulownia plantation for the purpose of biomass production (Sławińska et al., 2023).

Recently, the growing interest in paulownia has led to the development of various hybrids, the most famous of which are Clone in vitro 112, Shan Tong, Sundsu 11 and Cotevisa 2. Paulownia Clone in vitro 112 is an artificially created hybrid of two species of paulownia.

In which regions of Kazakhstan does Paulownia grow: in Turkestan and South Kazakhstan regions. Most often it can be found in Almaty and Shymkent. According to the latest data from 2018-2019, Entrepreneurs: Baltabai Kurbanbayev planted 50 thousand seedlings on two hectares of land in the Turkestan region, and Dauren Baltabayuly – 37 thousand seedlings on a similar plot of land in the South Kazakhstan region. Currently, it is very easy to find Paulownia seedlings in the Internet sites of Kazakhstan and they are even used for landscaping the city in Southern Kazakhstan (Anonymous, 2023a). This shows that Paulownia has a good future in Kazakhstan

Why do some consider Paulownia the "tree of the future" and openly believe that there are no other alternatives to it?! Let's stop at its uniqueness and features, which have earned good fame in many areas, such as landscape design, medicine, forestry, cattle breeding, economics and of course ecology:

- Large paulownia leaves absorb 32 times more CO<sub>2</sub> and emit 10 times more oxygen than ordinary trees. Absorbs 22 kg of carbon dioxide and gives out 6 kg of oxygen (Anonymous, 2018).
- Bloom for 2 months
- The increase per year is 3-5 meters, which is why they give a thick shadow.

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- Flower nectar is a source of high-quality honey
  - The leaves have a high protein content (about 20%) and can be used to make high-quality and cheap animal feed (Boyarshinova, 2018)
  - Paulownia wood is also used in construction, paper pulp production, furniture and musical instruments.
  - Has the ability to withstand high concentrations of heavy metals (for example, Mn, Pb or Zn) can be used for rejuvenation of polluted soil and reforestation
  - The possibility of using paulownia as a bioenergy crop, i.e. for the production of biofuels and CO<sub>2</sub> capture, is also being considered
  - Fast and good adaptation
  - Paulownia after cutting down does not require re-planting, as it has a high regenerative capacity and can be restored during cultivation for 70 years

In Kazakhstan, you can find frost-resistant varieties of technical paulownia (these are hybrids): 9501, 9502, 9503, Shan-Tong, Pao Tong Z07 (Imanberdieva & Sanzharbekova, 2023). The last variety was grown in a greenhouse by entrepreneurs in the city of Almaty, their activity in this city lasted 4-5 years, later they moved to Shymkent, as Paulownia began to grow poorly from seeds. In the south, experts believe that Paulownia will make their region the greenest in Kazakhstan. We recommend planting paulownia en masse in cities with polluted air to improve the ecology. Based on the results of monitoring conducted in 2022, experts identified eight Kazakhstani cities with high levels of air pollution. These included Astana, Almaty, Karaganda, Temirtau, Atyrau, Aktobe, Balkhash and Ust-Kamenogorsk (Anonymous, 2023b).

Firstly, as the experience with the greenhouse in Almaty shows, it is rather necessary to plant adult saplings, not seedlings, so that they are strong enough to adapt and fight the polluted atmosphere. Secondly, there are cities in the list of cities that are covered not with soil, but with sand. This is a serious problem for paulownia, even if it is not whimsical. Thirdly, since interest in paulownia is increasing to this day, hybrids and new varieties are being created, we hope that a variety for arid areas will also be released soon.

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