



NON TIMBER USES FOR PAULOWNIA

BIOMASS.

Climate change and fossil fuel supply insecurity has led to increasing realisation of the real value in pursuing sustainable biomass production systems.

Paulownia biomass could be used in various ways including fibre board, insulation, ethanol production, or compression into blocks or pellets for combustion to generate electricity. The calorific value of Paulownia biomass is little over half that of coal (as is other forest biomass) but the lower content of pollutants such as sulphur (lower in Paulownia than most other biomass) and the fact that Paulownia is a readily renewable resource clearly points to its environmental benefit.

CARBON SEQUESTRATION.

Under the right conditions Paulownia is surely one of the most rapidly growing plants. Their highly efficient photosynthesis results in effective carbon fixation, particularly under high light and temperature. Paulownia may be left un-harvested to store carbon within a large trunk and extensive branch system with a long life span. However, even if harvested soil carbon levels increase within a Paulownia plantation from accumulation of organic matter such as leaf drop, and the extensive root systems also play an important function in ongoing carbon sequestration. Paulownia may be cropped from the same root system at least 4 - 5 times (many more under good conditions) and their growth improves the soil, setting them apart as truly sustainable compared with other biomass systems.

FODDER.

The leaves and flowers of Paulownia trees make good animal feed. They are high in nutrients, contain sugar, fat and up to 20% crude protein with 60% digestibility. Pruned branches can be used or the leaves can be collected when they fall in autumn. A ten year old tree can supply about 100kg fresh matter, which is about 28kg dried. There is potential in regions with dry autumns to rake up the leaves to be pelletised, baled or used for silage. If Paulownia are to be grown for fodder only, they can be coppiced and allowed to grow multiple trunks which can then be pruned at a convenient height and continuously harvested as required.

HONEY.

Paulownia begin to blossom early in the spring and flower for at least a month. If different species are planted in the same area they flower in the following order: *P. fortunei*, *P. taiwaniana*, *P. australis*, *P. elongata*, *P. fargesii*, *P. kawakamii* and *P. tomentosa*. The flowering period of *P. fortunei* finishes as the buds on *P. kawakamii* and *P. tomentosa* begin to open. By planting *P. fortunei* and *P. tomentosa* together, flowering can continue for more than two months. Bees kept in a Paulownia forest during flowering produce large quantities of light honey. While delicious in its own right, being light, it is also well suited to blending with other strains.

MEDICINE.

In China medicines in both tablet and injectable form are made from the leaves, fruits (seed pods) and wood for treatment of bronchitis, in particular cough relief and reduction of phlegm. Analysis has shown Paulownia tomentosa leaves contain ursolic acid, $C_{30}H_{48}O_3$ and matteucinol, $C_{18}H_{18}O_5$. A compound named Paulownin, $C_{20}H_{18}O_7 \cdot CH_3OH$, and d-Sesamin were isolated from the xylem. Syringin, $C_{17}H_{24}O_9 \cdot H_2O$ and Catalpinoside were found



in the bark. Paulownia fruits contain acid, fatty oil, flavanone and alkaloid. A solution made from the leaves and wood is used to relieve swollen feet, while one made from the leaves and fruit dissolved in water is reputed to promote healthy hair. Preparations from the fruit are also used to reduce blood pressure.

AIR POLLUTION CONTROL.

Paulownia, with their large, hair covered leaves, can be very effective air purifiers. Chengdou, Szechuan province in China has a serious dust and smoke pollution problem. The Sulphur Dioxide content of the air has been measured at 1.41%. Where Paulownia have been extensively planted Sulphur Dioxide levels have fallen to 0.169%. The Paulownia are growing normally where other trees shed their leaves or completely cease growth due to the highly polluted conditions.

WASTEWATER REUSE.

Paulownia have the ability to rapidly convert vast amounts of water and nutrients into growth and ultimately, valuable products. This makes them very well suited to the utilisation of wastewater and effluent, including sewage treatment plant, meat works and farm wastes.



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PROBLEMS, QUERIES, COMMENTS, SUGGESTIONS.

Telephone (03) 5983 5688 [international +61 3 5983 5688] preferably between 8:30am and 5:30pm Australian Eastern Standard Time, Monday to Friday, or any time any day send facsimile (03) 5983 1999 [international +61 3 5983 1999] or email help@toadgully.com.au Visit our web site at <http://toadgully.com.au> or <http://paulownia.com.au>

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