



KIRI JADE EMPRESS TREE SELECTED *PAULOWNIA* CLONES

At the global scale there is an urgent need for commercial reforestation programs to replace a rapidly diminishing hardwood supply and reduce pressure on natural forest environments. Kiri Forestry Enterprises (KFE) is well placed to meet this need, as it has an exclusive range of elite quality Paulownia genotypes (the Kiri Jade Empress Tree clones) together with the technology to produce large numbers of clones for planting around the world. These trees offer an advantage of superior growth, high quality timber and consistent tree shape and form, and are backed by KFE's world-class technical, management, and business expertise.

What is Paulownia ?

The Paulownia, or Kiri, is a tree with some extraordinary and unique characteristics. It has leaves larger than a dinner plate, sheds these in winter to provide soil mulch and sunlight penetration for inter-cropping, produces beautiful flowers in spring, can shoot up to six metres tall in just one year, and is able to provide high quality hardwood timber in a fraction of the time needed by most tree crops.

Paulownia tomentosa, *P.fortunei*, *P.kawakami*, *P.fargesii*, *P.elongata* (all from the plant Family Scrophulariaceae) have a natural occurrence on well-drained soils in summer rainfall zones of China, and are cultivated on the "four sides" (ie house-, village-, road- and water- sides), over a range of latitude from approximately 20-45° N. The lightweight straw-coloured timber has a centuries-old history and tradition of utilisation.

Location of growing areas

Site requirements for Kiri trees are more specific than for commonly grown pines and eucalypts. KFE clones have been successfully grown in eastern Australia, south-eastern USA, southern China, and central and south Africa, and appropriate clone/site matching and suitable management will make it possible to grow Kiri in a range of climatic zones and regions. Natural rainfall should exceed 1000mm (40") per annum for non-irrigated commercial production.

Best results will be attained in flood free areas with deep, well-aerated soils, absence of unseasonal frosts, and a warm wet growing season with plenty of sunshine. Heavy water-logged clays or impermeable subsoils are unsuitable. In the tropics, elevated areas are likely to prove more suitable than coastal lowlands. Shelter from strong prevailing winds is desirable, and irrigation will be required where early summer rainfall is unreliable.

Infrastructure and socioeconomic factors such as labour availability, roading, and access to markets should also be considered in choosing plantation sites.

Tree supply (exports)

Kiri trees can be provided as disease-free rooted soil-less dormant root cuttings, or plantlets 10-15cm high, packed in sterile inorganic material, and air-freighted to countries around the world. Live plantlets in this form are acceptable for most countries quarantine requirements. A price schedule and licence information can be provided on request.

The optimum time to obtain stocks starts from early Spring, as Kiri plantlets will require a 3-5 week re-potting and hardening period before being ready for field planting. As trees are not an "off-the-shelf" product, up to 6 months lead-time is required for new orders. A prescription for management is supplied when deposit is paid on orders.



Forestry management

Kiri management is often site-specific in detail, though needs are broadly similar to other tree crops. Inputs will be intensive in the early years to take maximum advantage of the fast growth potential, and information provided by KFE has been developed and proven under commercial broadacre plantation management. Kiri trees can provide early returns in an otherwise long-term forestry plantation industry, are agroforestry compatible (livestock and inter-cropping), and require only low inputs after establishment years ; an ideal crop for absentee-landowners.

Between 200 and 500 trees per hectare, depending on the growers market objectives, are planted in Spring or at the start of the rainy season, on pre-cultivated beds. This is followed by fertiliser and weed control to promote healthy growth of young trees, and branch-pruning is later undertaken to produce the highest value knot-free butt log. With appropriate genotype, management and site factors, it is possible to grow trees to more than 50cm diameter in less than 15 years.

Protection from grazing , including wildlife browsing in some areas, is essential for at least the first growing season. In their native environment of China the trees are on occasion troubled by mistletoes, leaf-eating insect pests, a mycoplasma "witches broom" disease, and rust-type leaf fungi in very humid climates. Good cultural management and correctly sited plantations will help prevent serious problems arising from these pathogens. KFE's tissue culture stocks or plantlets are disease-free when supplied, and this is a major advantage when new plantations are being considered. No disease or pest has caused problems in KFE's clonal plantations established to date.

Fire is likely to kill even mature stems, although a replacement tree may grow if the roots are undamaged. Plantation layout and maintenance should include firebreaks.

Paulownia seeds require light, moisture and fertility to become successfully established, and newly germinated plants will die if shaded, grazed or trampled in their first few weeks of growth. The seeds are tiny, short-lived, and are not eaten or dispersed by birds. Natural regeneration of Paulownia occurs almost exclusively on bare or eroded areas.

Environmental benefits

Kiri has multi-purpose capability, and fast-growth is a feature. Even unmanaged trees growing on mining spoil have attained several metres in height within 2 seasons, and a 20 cm trunk diameter in 5 years.

Kiri trees are deciduous and deep-rooted, which means they can be grown in combination with a wide range of pastures and crops such as winter grains, herbs, fruit and flowers, without great disruption to current farming practices or cash-flows. Development of full summer canopy cover in plantations just a few years old can help lower salt-laden water tables through leaf transpiration of subsoil moisture, while surface profiles remain moist because of reduced direct evaporation. The foliage from summer prunings can provide high quality livestock fodder, and autumn leaf drop adds organic matter to the soil while recycling leached fertilisers and essential mineral nutrients from the subsoil.

Studies in China have shown that the large leaves help humidify the atmosphere and buffer the micro-climate, and can reduce dust and smog in urban areas. Kiri has prolific and beautiful mauve-white jacaranda-like flowers in spring, which attract bees and add aesthetic quality and perfumed scents to the landscape, and parts of the Paulownia tree are used for medicinal purposes in China.

While growing native and other tree species will continue to fill specific needs, Kiri is a useful and versatile addition to the options available for forestry and tree-growing projects.



Valuable hardwood

Paulownia trees can produce high quality timber in a short period of time, and the KFE clones have been specially bred from parent trees showing outstanding growth and timber characteristics. The Kiri Jade Empress Tree clones have undergone a further round of selection, by 6 years of comparative field trials against a wide range of other commercially available genestocks. Consistent and superior performance has been demonstrated on a number of sites.

Usable size logs for sawn timber can be produced from Kiri plantation thinnings within 7 years, although trees will continue to increase in value well beyond that age. The optimum final harvest age for Kiri after progressive thinning is likely to be between 12 to 18 years when diameters reach 50 to 70 cm, depending on genetic quality of the planting stock, site and management inputs. Merchantable log net volume production, including thinnings, can be 200-300m³ per hectare over a 12-18 year growing period, and net pre-tax financial returns on investment in the order of 13-20% per annum are possible. Shorter growing cycles with no intermediate harvests (thinnings), for example 6-8 years, are also feasible, though may not yield as high a return.

These outcomes may vary from site to site, and as with all forestry and horticulture investments, there are risks to the grower from market and climate factors. A substantial part of the risk can be eliminated by using quality planting material and following experienced professional advice.

Paulownia timber is light-weight, and of a light straw colour with distinct growth rings and beautiful sheen and grain. It veneers and slices well for plywood manufacture, and can be sawn and dressed for use in a wide range of internal moulding and decorative applications. KFE has obtained enthusiastic and favourable responses from the forest products industry, based on the particular characteristics of Kiri wood and its potential commercial applications.

In international markets, there appears to be enormous scope for expansion of hardwood timber production. As supplies from traditional rainforest sources dwindle over the next decade, and the forests themselves become more valuable for conservation purposes, plantation timbers will become keenly sought. Large diameter hardwood logs will attract high premiums.

Expertise available

KFE has available a detailed report on likely future market and price scenarios, and has developed a forest growth model which provides a comprehensive and consistent basis for predicting productivity under various management regimes. This detailed information is the basis for the projections provided to customers, and will be used to support management recommendations in a dynamic market setting.

Kiri Forestry Enterprises Pty Ltd is ready to assist international and Australian clients in developing a Kiri Jade Empress Tree clonal Paulownia plantation project to suit their specific needs. Information packages, client support, and clonal trees are available under license at different scales of need, from Research trials to Industrial plantation.