Agroforestry Facts

Teak

Botanical Name	***Tectona grandis*** L.f.
Name in English	Teak
Name in Kannada	Thega
Family	Lamiaceae
Seeds Collection	Generally teak starts flowering 6 years after planting, but profuse flowering occurs after 15 years. Flowering occurs from June - September and fruits can be collected from November - January. Though teak produces profuse flowering the fruit set is very poor (1 to 2%), probably the coincidence of south west monsoon with flowering which affects pollination. The fruits are yellowish - brownish and the number of fruits varies from 1150 to 2800 per kg. A 40-year-old tree produces an average about 3 kg fruits. Teak fruit contains 4 seeds, but mostly 1 or 2 matures properly. After collection, the fruits are cleaned and then sun dried for 2-3 days and stored in bags. Teak seeds can be stored for up to two years around 12% moisture content in airtight containers. It's better to collect seeds from 30–50 trees for the best genetic diversity from superior trees.
Seeds Processing & Treatment	Choose only healthy seeds from ripe fruit. Lay the seed out in the sun over a flat area to dry. Dry the seeds for 1–2 days in sunny weather. This will produce seeds with a water content of about 12%. Clean the dried seeds by peeling off

	the seed coat and removing any dirt or litter mixed in the seed. Store dried seeds in a sealed container. Seeds can be stored for up to 2 years. Treatment: Soak the seeds in a concentrated solution of sulphuric acid (H2 SO4) for 15 minutes, then wash them with water, and dry for 1 night. Soak the seeds in cold water for 2 nights, then sun dry for 1 day. Soak the seeds for 3 days in a container of cold water, but change the water daily. Allow them to dry for 2 days.
Nursery	Germination of teak is often poor due to dormancy. Pre-treatment of the seeds by alternate wetting and drying of the seed for a week is required to break the dormancy before sowing. The seeds were kept in a gunny bag and dock the bag in water, preferably in a running stream, for 12 hours, then spread the seed in the sunlight to dry for 12 hours. This has to be repeated for one week. Further grading of fruits according to size help in improving germination. Germination increases with increase in size of fruits. The germination percentage varies from 30 to 50% in moist teak and 5 to 10% in dry teak. The seeds were sown in the raised nursery beds (10 x 1 x 0.3 m) prepared with soil and sand mixture. The nursery beds have to be watered regularly and covered with coconut leaf or paddy straw. Germination starts 10 to 15 days after sowing and continues up to 35 to 45 days. The paddy straw may be removed once the seed started germinating. The seedlings can be transplanted to polythene bags or it can be maintained in the nursery beds for 10 to 12 months for preparation of stumps. Generally, stumps or seedlings are used as planting material. For stump preparation, the seedlings have to be maintained in the nursery for about one year. Then the seedlings are uprooted, all the leaves and secondary roots are removed and stumps (4 to 6 cm shoot with 15 to 20 cm tap root portion) were prepared. Stump planting is generally preferred and it is easy for transport. For seedling plantation, young seedlings are shifted to polythene bags containing soil mixture and maintained in the nursery for 3 to 6 months Sand is preferred sowing media because it drains well but also retains water. The sand should not be too coarse or too fine, as sifted sand for stucco wall construction, and should not include organic material or soil. Sterilise the sowing medium by sun drying and treat it with a nematicide to kill parasitic nematodes. Water the sowing medium evenly. Place the treated seeds into the sowing medium, with the micropyle facing down. Plant the seeds as deep as the seed diameter, and then sprinkle sand over the seeds to cover them with a top layer of about 1–2 cm. Cover the medium with straw. This prevents the seeds from being displaced

	during watering. Water the medium. Cover the sowing bed with a plastic cover, but during periods of high temperature, such as sunny weather in the dry season, remove the cover. The sowing bed must be weeded and watered daily to avoid competition and to keep the medium moist. Five to 7 days after sowing the seeds should begin to germinate. Normally germination does not occur uniformly. Some seeds may not germinate until 100 days after sowing. The germination rate and percentage are determined by the age of the seed, the way the seed is treated with drying and soaking, and conditions in the sowing bed. Transplanting the germinant: Prepare a nursery medium using topsoil and compost at a ratio of 2 parts topsoil to 1-part compost. Two other ratios also work. Combine 2 parts manure with 3 parts topsoil, or 2 parts compost with 1-part topsoil and 1-part rice husks. Mix the components to a uniform consistency. Add a fungicide at prescribed rates to create a sterile environment for the germinants: place the medium in polybags. The germinants can be transplanted 3–5 days after germination or after a pair of leaves have formed but are not yet fully open. Transfer the germinants to polybags in the morning before 10:00 or in the afternoon after 15:00 when temperatures are low. To remove the germinants from the sowing bed, first lift the medium around the germinants' roots using a flat-shaped twig or bamboo. Lift the germinant by gently holding its leaf or the seed. Transplant germinants immediately after lifting to avoid root desiccation. Only a few germinants, about 10, should be lifted and exposed to desiccation at any one time. When many germinants are to be transplanted; wrap the germinants in moist newspaper or cloth, or store them in a water-filled container between lifting and transplanting. After transplanting, water the medium and seedlings evenly. Seedlings can be raised from cuttings. Shoot cutting materials can be obtained from coppices, seedlings or a hedge orchard. The cuttings should originate from the best quality trees or selected clones. How to plant cuttings: Prepare a planting medium containing a mixture of 2 parts sand, 3 parts compost and 1-part topsoil, then place it into a 10×15 cm polybag. Use polybags that are of transparent plastic so you can identify when roots have grown. Place the polybags in a flat and well-drained seed bed which is in a shady area or under a shading net. Make a planting hole in the mixture using a stick to avoid damaging the base of the cutting. Plant the shoot cuttings that have been dipped in the IBA solution in the hole. Water the cutting. Good weather for rooting teak cuttings is when the humidity is above 80% and the air temperature is between

	24 °C and 32 °C. Teak seedlings are also raised using tissue culture.
Plantation Management	Teak grows well in alluvial soils, fairly moist, warm, tropical climate with pH ranges from 6.5 to 7.5. Teak showed poor growth and form on dry sandy soil, shallow or hard pan soil, acidic, laterite, black cotton and waterlogged soils. It is a light demanding species relatively high light intensity, i.e., between 75 and 100% of sunlight for better growth and development. It occurs from sea level to an altitude of about 1200 m with 800-2500 mm rainfall regime and also grows in very moist areas with the annual rainfall of over 3,500 mm. Teak also grows in dry areas of Tamil Nadu, Rajasthan, Madhya Pradesh, Andhra Pradesh and Maharashtra. In the Indian Peninsula, teak experiences maximum temperatures up to 48 ^{o}C and minimum about 2 ^{o}C in the dry zone of Central India while in the moist parts of the Southern India (west coast), the maximum and minimum temperatures of teak distribution ranges from 43 ^{o}C and 13 ^{o}C respectively. Several planting systems are appropriate for teak including monoculture (single species), mixed species and agroforestry. Consider land conditions and land use before choosing the best planting system for teak. Apply an agroforestry system on fertile soil because the benefits from land use can be maximized. Besides selling the timber produced, farmers can also sell or use the agricultural products. Apply a monoculture or mixed species system on infertile soil, rocky soil or rocky terrain to improve soil quality and to prevent landslides or erosion. Apply mixed species or agroforestry to increase diversity of products for short, medium and long-term revenue. If the land is far from the landowner's home, or the landowner does not have enough labour to conduct routine maintenance activities, monoculture or mixed species systems are more appropriate than agroforestry.
Model/Spacing	6m x 4m,5m x 5m are ideal but 8m x 8m will be the best
Pests, diseases and Management	Teak defoliator, *Hyblaeapuera* and leaf skeletonizer, *Eutectona machaeralis* are considered to be the major pests in teak. These insects are known to occur on seedlings in nurseries and also in grown up trees in plantations. *H. puera* feeds on tender foliages during the early part of the growth season and *E. machaeralis* feeds on older foliage towards the end of the season. Making regular pest surveillance in nurseries and young plantations, particularly during rainy season when there is a new flush formation to detect the occurrence of the pest and removal and destruction 5 of larvae if the population is less. Management: If the pest attack is severe, it can be controlled by spraying of the foliage

	with the chemicals like monocrotophos or endosulfan 0.05-0.075% or neem-based formulations (Neem azal 1%) at 10-12 days intervals can give good control.
Plant Rotation	Teak can be adopted as medium rotation cultivation tree in most situations
Yield	15-20 years old tree fetches 12-18 cubic feet
Uses	Ships and boatbuilding. Exterior construction. Exterior and interior flooring. Exterior and interior panelling. Turnings. Carving. Various small wooden objects. Durable outdoor furniture. Cutting boards. Countertops. Veneer. Indoor furnishings. Door and window frames. Indoor structural beams and columns.
Buyers /Industries	Wood Industries. Saw mills. Furniture industry. Local Buyers (Carpenters)
Harvesting	It takes 15-20 years for optimum growth
Economic Returns	Rs.47,000 – 90,000/- per tree
Current Market Rate	Rs. 3,800 - 4500/- per cubic feet