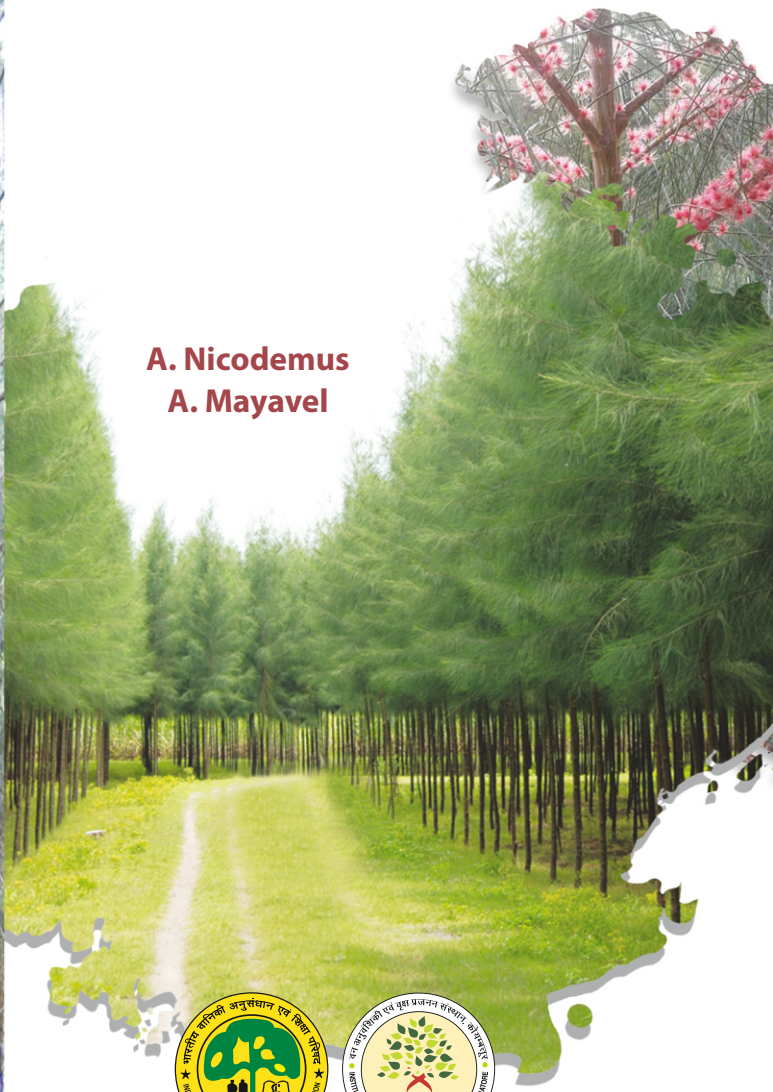
Money Spinning Trees - 1

Cashing on Casuarina

High-yielding Varieties and New Cultivation Techniques



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Foreword

The ICFRE-Institute of Forest Genetics and Tree Breeding is mandated with increasing productivity of natural and planted forests. Casuarinas being multipupose trees meeting socio-economic, livelihood and environmental needs were given high priority for tree improvement. Consistent research and development initiatives have resulted in the release of high-yielding seed and clonal varieties. They have been planted in large areas by farmers and paper industries throughout the country. Harvesting of such plantations resulted in substantially increased pulpwood production and higher profits to farmers. The outlook for casuarina cultivation in the next decade seems promising both for the farmers and the industries. However, the experience gained through working with farmers and industries prompted the Institute to review the performance of the varieties and cultivation methods followed and develop a standard package of practices. These practices help the farmers to optimize the input costs, sustain the soil fertility and maximize the wood production. Valuable information on sources of superior planting material, assessing wood yield through mobile application and marketing the wood are also provided. I appreciate the authors and technical staff who have brought out this farmer-friendly cultivation guide for Casuarina. I also earnestly hope that the farmers, forest departments and fibre-based industries, by adopting the practices given in this book will make Casuarina cultivation profitable and sustainable to all stakeholders.

Dr. R. Yasodha
Director
ICFRE-Institute of Forest Genetics and Tree Breeding

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Casuarina : A Multipurpose Tree

Casuarina is a widely cultivated short-term tree crop in South India. It grows in all soil types including those low in fertility. It is capable of fixing atmospheric nitrogen in the soil through association with a microorganism called Frankia. This capacity and the return of nutrients to soil through litter fall improve the soil fertility where Casuarina is grown. The major uses of Casuarina wood are pulpwood for papermaking, poles and fuel wood. It is highly preferred for establishing shelterbelts and windbreaks. Simple cultivation method, minimal requirement of human labour, low threat from insects and diseases, a stable market and profitable price make Casuarina cultivation attractive among farmers. Currently it is planted in around eight lakh hectares mainly in the States of Andhra Pradesh, Gujarat, Karnataka, Odisha, Puducherry, Tamil Nadu and Telangana.

Species of Casuarina

The genus *Casuarina* has 17 species naturally occurring in a wide geographic area covering Australia, South East Asia, Melanesia and Polynesia. A few

of them are extensively cultivated throughout the tropics for various end uses and services. The details of species and varieties that are widely planted in India are given below.

Casuarina equisetifolia

This species was originally introduced in India during nineteenth century to meet the wood demand for steam locomotives. It is also the most extensively planted species of Casuarina throughout the world. In India, it has been cultivated for more than 150 years and gradually evolved into a reliable species for farm forestry. In the beginning, Casuarina wood was used as poles and fuel wood only. When the paper industries started using it as pulpwood raw material, its value further increased and made its cultivation dependable and profitable.

Salient features of *C. equisetifolia*

- Ability to grow in close proximity with sea shore and withstanding salt-laden winds
- Suitable for growing in sandy soils with high water table
- Straight stems and smooth bark making high quality poles
- Easy propagation through seeds and bare-root seedlings

Casuarina junghuhniana

A new species of *Casuarina*, *C. junghuhniana* was introduced by IFGTB in 1996. This species naturally occurs in different islands of Indonesia and East Timor. It is well-adapted to Indian conditions and has many unique characters not present in *C. equisetifolia*.

Salient features of *C. junghuhniana*

- Faster growth than *C. equisetifolia*
- Suitable for cultivation in coastal as well as inland areas
- Tolerant to drought, pest and diseases
- Coppicing ability, amenable for clonal propagation

New Varieties of Casuarina

Casuarina plantations raised with locally available seeds of *C. equisetifolia* are generally low in productivity. Farmers usually plant this variety at close spacing (up to 4,000 trees per acre). Such plantations show large variation in survival and growth of trees leading to a low yield of 30 to 40 tonnes of wood at the age of five to six years. In order to increase the wood production and to improve the quality of poles and pulp yield, the Coimbatore based ICFRE-Institute of Forest Genetics and Tree Breeding carried out research for over 30 years and developed high-yielding varieties and new cultivation techniques. They have substantially increased the wood production from Casuarina plantations. They can be easily adopted by both traditional Casuarina farmers and also those who are new to tree cultivation for high productivity and farm income.

Genetically improved seeds

Germplasm of the two Casuarina species was collected from around 20 countries and tested in different agro-climatic conditions of our country. The most adaptable and fast-growing accessions were

planted as seed orchards and the genetically improved seeds collected from them were supplied to raise plantations. Plantations raised with such high quality seeds showed more uniform and faster growth of trees than trees grown from unimproved seed sources. These plantations yielded 40 to 60 tonnes of wood per acre in four to five years.

High-yielding clones

The introduction of *C. junghuhniana* possessing coppicing ability presented the opportunity to clonally propagate outstanding trees and use them as clones. When a tree is cut at the base, vigorously growing juvenile shoots are produced which can be easily rooted and grown into propagules for raising plantations. The source plant and those developed by rooting cuttings collected from it are together called a clone. Such vegetatively propagated plants will have uniform growth, stem form and other characters. IFGTB released clone CJ-9 in the year 2014 which became popular among farmers for its fast growth, straight stems and resistance to diseases. It was suitable for both rainfed and irrigated plantations and produced 60-70 tonnes of wood per acre in three to four years.


Clonal plantation - CJ 9

In 2017, IFGTB released five interspecific hybrid clones namely CH1, CH2, CH3, CH4 and CH5. These clones were developed by combining the desirable characters of the two species (*C. equisetifolia* and *C. junghuhniana*) through hybridization. The following are the superior characters of the hybrid clones.

- Faster growth than parent species; ready for harvest from third year.
- Adaptable to grow in all soil types except clayey and waterlogged areas.
- Straight pole, gradual tapering, thin and smooth bark.
- High drought tolerance, high pulp yield and conversion into poles.

The hybrid clones come to harvest in three years under irrigated conditions and four years onwards under rainfed conditions and yield 70 to 80 tonnes of wood per acre. The important characters of different varieties of Casuarina are provided in Table 1.


Straight stems - CH5


Clonal plantation - CH5

Table 1. Adaptability, growth and yield details of Casuarina varieties developed by IFGTB

Species	**Variety and rotation period**	**Salient Features**	**Wood production** (tonnes per acre)
Casuarina equisetifolia	Seed orchard seeds 4-5 years	Low variation in growth among trees; suitable for coastal areas and pole production	40-50
Casuarina junghuhniana	Seed orchard seeds 4-5 years	Uniform growth; drought tolerant; suitable for coastal and inland areas and pulpwood production	50-60
Casuarina junghuhniana	Clone CJ-9 3-4 years	Uniform growth; drought tolerant; grows well in all areas; suitable for poles and pulpwood production	60-70
C. equisetifolia x *C. junghuhniana*	Interspecific hybrid clones: CH-1, CH2 and CH-5 3-4 years	Uniform growth; high conversion of stem into poles; high pulp yield; drought tolerant; grows well in all areas except clayey soils and water logged areas	70-80

Improved Cultivation Practices

If the full potential of the new clones has to be realized in plantations, it is essential that the most suitable cultivation techniques are adopted. During past ten years Scientists and farmers have tested new methods of raising plantations and now variety-specific cultivation practices are available. The methods described below help in achieving high wood production, optimize the input costs and retaining soil fertility.

Spacing between trees

Plantations raised with unimproved seedlings sourced locally are planted at close spacing of 3 x 3 feet accommodating around 4000 trees per acre. It is generally thought that planting more trees will result in higher wood production. But the spacing between the trees should be decided based on the choice of variety and duration of


Narrow spacing


Wide spacing

cultivation. Since the tree-to-tree growth variation is low in plantations developed with seed orchard seeds, it is recommended to plant them at a spacing of 4 x 4 feet to have 2700 trees per acre. Fast growing varieties like clones need adequate space between trees to express their full potential. In general, clones are planted at wider spacing than seedling-derived plantations at a spacing of 5 x 4 feet or 6 x 3 feet (5/6 feet between rows and 3/4 feet between trees within a row). At this spacing one acre can accommodate 2200 to 2400 trees. It is beneficial to align the tree rows in East-West direction so that sunlight falls throughout the day. Very high stocking of trees (>2400 trees per acre) will result in disease incidence and lodging of trees and lead to loss in wood production.

Table 2. Recommended spacing and expected wood production for different varieties of Casuarina

Variety and harvest age	Spacing (feet)	No. of trees per acre	Wood production (tonnes per acre)
Seed orchard seeds - 04 years onwards	4 x4	2700	40 - 60
Clones – 03 years onwards	4.5 x 4.5 5 x 4 6 x 3	2200 - 2400	70 - 80

Planting method

The best time to plant is one or two months before monsoon. The saplings will establish in the soil without much competition from weeds and be ready to receive the rains. In rainfed areas, it is advisable to take up plantations in the beginning of rainy season itself. If irrigation facilities are available, Casuarina can be planted throughout the year. The land must be plowed well and planting positions marked preferably in furrows running East-West. Saplings are planted in pits dug up to a depth of 30 cm and filled with one kg farm manure or neem cake along with 5 g super phosphate as basal dose. Drenching the root portion of the saplings one day before planting with a

solution of biocontrol microrganisms will prevent disease incidences in the early days.

Water management

Casuarina is a drought-tolerant tree. It is generally believed that providing continuous irrigation will boost wood production. But excessive soil moisture will limit root growth and increase the chances of disease incidence. Particularly in clonal plantations adopting the wetting-drying-wetting method of irrigation is recommended. Watering every week during the first six months after planting followed by once in 15 days up to one year and then onwards once in a month should normally take care of the water requirement for the plants. If drip-irrigation method is adopted, providing sufficient water at periodic intervals as mentioned above is better than continuous watering.

Weed management, intercropping

Controlling weeds is necessary to prevent them from competing with Casuarina plants and promote early rapid growth. In about six months, the trees develop adequate canopy to prevent weed growth below them. Till that time periodic weeding has to be taken up to ensure uniform initial growth. Depending on the soil type and moisture availability, removal of weeds may be carried out three or four times roughly after one, three, five and seven months after planting. Retaining a wide space between rows of trees (5 feet and above) will facilitate mechanical weeding using mini tractor or power weeder. As far as possible it is advisable to avoid use of chemical weedicides.

Intercropping is an efficient way of weed control as well as earning an additional income. Traditionally farmers cultivate crops like groundnut, black gram, green gram and water melon. It is better to avoid vegetable crops like tomato, brinjal and chillies since the pathogens that affect these crops also infect Casuarina plants

especially the hybrid clones. Intercropping keeps weed growth under check without additional effort and provides an additional income which usually covers the cost of plantation establishment.

Pruning of branches

Periodic removal of side branches promotes the growth of main stem which is economically important part of the tree. It also facilitates receiving adequate sunlight and air flow inside the plantation and prevent dampness and disease incidence. In clonal plantations, side branches can be removed at 06,12 and 18 months after planting. To start with branches in the lower one third of the trees may be removed and gradually increased up to two thirds of the height during the final pruning. Pruning should be avoided during rainy days and carried out without causing damage to the main stem. The pruned material may be sold as fuel wood or allowed to compost in the plantation itself.

Fertilizer application

Like any agricultural crop, fertilizer recommendation for Casuarina plantations should be based on the soil test results. Since Casuarina trees biologically fix 15 to 20 kg of nitrogen per acre, application of nitrogen fertilizer should be minimum. Phosphorous helps in the growth of root nodules which in turn promote nitrogen fixing. It is recommended to apply fertilizers at six months interval starting from six months after planting and up to 18 months. Fertigation can also be given through drip-irrigation system. In narrow spaced plantations (4 x 4 feet or less) adding fertilizers beyond 18 months may not contribute to tree growth and may increase soil salinity. Since there will be heavy competition for sunlight and trees will not be able to utilize the soil nutrients. A generalized schedule of fertilizer application is provided in Table 3.

Table 3. Fertilizer recommendation for Casuarina plantations (number of trees per acre: 2400)

Fertilizer	Age of trees / (kg per acre)				
	03 months	06 months	12 months	18 months	Total
Urea	6	8	12	14	40
Super phosphate	10	11	14	15	50
Muriate of potash	8	10	12	14	44
Kg per acre	24	29	38	43	134
Gram per tree	10	12	16	18	56

Multi-species plantations

Casuarina trees can be grown in combination with other forestry trees too particularly the timber species. These long-rotation trees are planted at wide spacing (minimum 3 metres apart) to provide space for the future growth. However, this space is not utilized by them during the first few years which can be profitably used for growing a short-rotation tree like Casuarina. Casuarina trees have been

Teak + Casuarina mixed plantation

successfully grown with Teak, Sandalwood, Gmelina, Oil Palm and Coconut trees. The following are the benefits of growing Casuarina in between timber trees.

- An interim income from the long-term plantation venture. One acre of Teak-Casuarina plantation can yield 20-25 tonnes of Casuarina wood in two to three years.
- Initial close spacing reduces weed growth.
- Enrichment of soil with root nodules and litter fall.
- Prolonging axis persistence and increasing clear bole height of timber trees.
- Reducing branch formation in timber trees.

Insect damage

Generally, Casuarina trees grown in farm lands are not affected by insect damage to the extent of causing economic loss. Young saplings may be attacked by grasshoppers and mealy bugs. The major insect

pest of adult trees is the bark-eating caterpillar (*Indarbela quadrinotata*). The larvae of this insect bores tunnels in the main stem and live inside them. They emerge during night time and feed on the bark. Although the trees are not killed by the insect, the bores weaken the main stem and make them prone to breaking by wind. Control measures may be needed only If more than 10% of trees are found to be infested. Spraying pesticides like fenthrocarp or imidacloprid solution (2 ml in one litre of water) controls the insect population.


Insect damage

Disease incidence

In Casuarina plantations, collar rot, bacterial wilt and blister-bark are the major diseases with the potential to cause economic loss. In particular, clonal plantations are prone to these diseases if the recommended cultivation practices are not followed. Taking preventive measures and continuous monitoring are necessary to ensure plantation health.

Collar rot disease

Collar rot disease mainly occurs in hybrid clonal plantations raised under narrow spacing in clayey soils experiencing prolonged waterlogging. This disease is caused by the soil-borne pathogenic fungus, *Diplodia natalensis*. Under high soil moisture and dampness, the pathogen causes rotting of the collar region (the junction between stem and root part on the soil surface). The earliest symptom is leaves turning yellow and then gradually to red. The root system is weakened by the rotting of bark in the collar region and is unable to provide anchorage leading to lodging and subsequent death of trees. Inoculating the plants at the nursery stage with biocontrol agents like *Trichoderma, Pseudomonas* and *Bacillus* species equips the plants to withstand the pathogen attack in the field. These microorganisms also

control the disease in young plantations (up to six months after planting) when applied at early stage of infection, that is when the leaves start turning yellow. In older plantations or if the disease is severe, chemical fungicides like copper oxychloride (0.25% active ingredient) can be applied as soil drenching for controlling the disease.

Following the cultural practices discussed earlier is the best way to avoid collar rot incidence and save cost and efforts on controlling it. In heavily clay soils that are prone to water logging, instead of CH clones other clones like CJ-01 and CJ-09 may be planted. In all plantations, planting rows should be aligned East-West direction to ensure maximum sunlight penetration on the ground. Adopting an alternate wetting and drying method of irrigation will keep soil moisture at minimum level. Regular weeding and pruning of side branches will also help in proper air circulation and maintain the plantation floor dry.

Bacterial wilt disease

In Casuarina plantations, bacterial wilt caused by *Ralstonia solanacearum* is not common but can cause serious damage particularly in young plantations. Browning of leaves of infected plants is the most prominent symptom of the disease. If not treated immediately, the entire foliage will wilt leading to sudden death of the trees. Inoculating Casuarina plants in the nursery with biocontrol agents will help the plants to withstand infection by the bacterium after field planting. Application of biocontrol agents immediately

after spotting the disease symptoms will also help manage the disease and save the uninfected plants. Adopting the cultural practices recommended above for preventing collar rot disease will also help in avoiding bacterial wilt disease. Growing Solanaceous crops like brinjal, tomato and chilli as intercrops should be avoided because these plants may act as host plants for the bacterial pathogen.

Blister-bark disease


Blister - bark

The blister-bark disease is caused by the pathogenic fungus *Trichosporium vesiculosum*. Generally, this disease occurs only in adult trees aged four years and above hence is not causing loss in farm land plantations which are harvested before the age of four years. Leaves of the infected trees turn yellow and then dry up. The fungus grows inside the stem and black spores develop in between the bark and the stem. The developing spores push the bark from inside causing blister like appearance on the main stem. At advanced stages the blisters burst and release a mass of black fungal spores. It is difficult to save the trees infected with this disease especially once the blister formation has taken place. The management measures include removing infected trees and burning them outside the plantation area to reduce the spread of fungal spores causing new infection, when the number of infected individuals is low. For managing the disease at advanced stages, infected stems can be swabbed with freshly-prepared Bordeaux paste (1:1:10 ratio of copper sulphate, quick lime and water). Care has to be taken while pruning side branches to prevent infection through pruning knifes and spread of spores from any infected tree nearby. Seedlings and clones of *Casuarina junghuhniana* including clone CJ-09 possess a thicker bark and are in general not affected by the disease.

Harvest and Marketing

Harvesting the trees at the most appropriate time and proper marketing of the wood are important to realize the maximum farm income. Harvesting age is mainly dependent on the spacing adopted. Since Casuarina plantations are raised with high stocking by adopting narrow spacing between trees, retaining them beyond the recommended period will slow down growth due to competition for sunlight and nutrients. It will also delay commencing the subsequent planting activity. Harvesting well before the monsoon rains is helpful for both logistic reasons and to take up the next plantation at the appropriate time. However, advancing and delaying the harvest by a few months can also be considered based on the prevailing wood prices.

Traditionally, farmers sell Casuarina wood on standing-crop basis to the local traders. Paper mills also directly buy from farmers through their field staff. Farmers are issued a supply order, the crop is harvested by the Company-approved contractors and payment is made on weight-basis. The factory gate price is Rs.7,200/- per tonne (as in January 2025 which includes cost of harvesting, processing and transport). Farmers usually do their own market survey and then decide about whom to sell their produce. A generalized list of events and income-expenditure involved in Casuarina cultivation cost is given in Table 4.

Table 4. Generalized income and expenditure details of Casuarina cultivation

S. No.	Activity	Number	Expenditure (Rs.)	Income (Rs.)
1	Land preparation: disc ploughing	1	3,000	
2	Making furrows, digging pits	1	2,500	
3	Cost of clonal plants	Rs.2.50 x 3,000	7,500	
4	Planting and basal dose of fertilizer	1	2,500	
5	Weeding (three times)	Rs.5,000 x 3	15,000	
6	Fertilizer application (three times)	Rs.2,000 x 3	6,000	
7	Pruning (three times)	Rs.2,000 x 3	6,000	
8	Harvesting	70 tonnes x Rs.750	52,500	
9	Transport	70 tonnes x Rs.1,000	70,000	
10	Total expenditure		1,65,000	
11	Sale of wood (pulpwood and poles)	70 tonnes x Rs.7200		5,04,000
12	Sale of lops and tops, root stumps			50,000
13	Total income			5,54,000
14	Total net income per acre			3,89,000
15	Net income per acre per year			1,29,667
16	Income : expenditure ratio			1:3.33

Wood yield estimation using Mobile App

Farmers can estimate wood yield from their plantations to negotiate sale price with traders who buy on standing crop basis. ICFRE-IFGTB has developed a Mobile app called Wood Yield Calculator. This app can be downloaded from Google Play Store or from IFGTB's online platform *TreeGenie*. If the total area of the plantation is entered in the app, it tells how many trees have to be sampled for yield estimation. Once the girth at breast height of the required number of trees is entered the app calculates the weight of the wood from the standing crop.

Coppice crop

The CH clones are capable of producing coppice crops from the harvested plantations. Raising a coppice plantation substantially reduces the costs involved in establishing new plantations. It also offers scope for higher wood production under shorter rotations than the first crop. Successful coppice plantations can be raised only if the first plantation was planted using the recommended spacing between trees (at least 5 feet between rows). Timing the harvesting of trees just before or soon after rainy season will aid in the sprouting and growth of coppice shoots. Harvesting in peak summer period should be avoided. A sharp cut at 5 to 10 cm at the base of the tree without damaging the bark is necessary. This is best accomplished by harvesting trees with a chain-saw. If sufficient soil moisture is not

Coppice growth

available, irrigation may be necessary. When the coppice shoots are three to four months old, only the dominant two or three shoots are retained and others are pruned. Thereafter the cultivation practices followed for the first crop are repeated to raise the coppice plantation. Since the trees may have more than one main stem in the coppice plantation, there is a possibility of obtaining a higher wood production.

Source of improved planting material

Genetically improved seeds and plants of clones CJ-09, CH-01, CH-02 and CH-05 can be procured from ICFRE-IFGTB, Coimbatore by booking in advance. Since these clones are protected for their intellectual property right through registration under the Protection of Plant Varieties and Farmers Rights Act, 2001, they can be commercially propagated only with prior permission from ICFRE-IFGTB. In order to ensure the availability of clonal plants as close to the planting locations of farmers as possible, licenses have been issued to paper industries and nursery operators in Andhra Pradesh, Karnataka and Tamil Nadu for large-scale production and supply to farmers. Details of these suppliers are given in Table 5 and farmers can also visit the website of ICFRE-IFGTB to verify the claims of any nursery. It is recommended that farmers buy the planting material only from the licensed nurseries. Information on the choice of clone for the planting location, cultivation practices and control measures for insect and disease attacks are also provided by the licensed nurseries.

Quality standard for clonal plants

Farmers should obtain a receipt while purchasing the planting material from the licensed nurseries clearly mentioning the name of the clone supplied. They can also verify whether supplied planting material possess the following minimum quality standards.

- Plants raised in root trainers with a capacity of 60 cc or more
- Plant height should be 30 to 45 cm, collar diameter 0.3 to 0.6 cm
- Plants should be single-stemmed with an actively growing shoot tip
- Presence of nodules in the roots
- Absence of yellow foliage and incidence of disease or insect damage

It is recommended that 10% more than the required number of plants are purchased to discard plants not having the required quality standards and also for casualty replacement after planting.

Table 5. Contact details of ICFRE-IFGTB and its licensed nurseries who supply seeds and planting material of high-yielding clones.

S. No.	Organization	Address	Telephone / Mobile Number
1	ICFRE-Institute of Forest Genetics and Tree Breeding	Forest Campus, R.S. Puram, Coimbatore 641 002	0422-2484100 (info); 2484172 (seeds); 9488450674 (plants)
2	Tamil Nadu Newsprint and Papers Limited	Kagithapuram 639 136 Karur District.	9442591412
3	Seshasayee Paper and Boards Limited	Pallipalayam, Erode 638 007	9443214628
4	Andhra Paper Limited	Rajahmundry 533 105, Andhra Pradesh	9894540187
5	Santhi Clonal Nursery	Vegakollai, Panruti Taluk, Cuddalore District	8825483058
6	Sangeetha Hi-tech Nursery	Chinna Pattanur, Vanur Taluk, Villupuram District	9843500990
7	Mahesh Nursery and Farms	Mithravayal 630 108, Sivagangai District	9943901055
8	Umamaheshwar Rao Nursery	Kollegal, Karnataka	9704847636
9	Pothigai Wood Deccor LLP	Onthampatti 639 110, Inungur Post, Kulithalai Taluk, Karur Dist.	9095094802
10	Anand Clonal Nursery	Siruthondamadevi, Panruti Taluk, Cuddalore District	8072427855
11	Kumar Hi-tech Nursery	Annur, Coimbatore District	9487705596

Casuarina Cultivation Experiences of Progressive Farmers

A. Jayachandran, Veedur, Vanur Taluk, Villupuram District, Tamil Nadu

Casuarina is a major crop in our village and my family has been cultivating it for over 50 years. I have planted varieties like seed orchard seeds and clonal varieties developed by IFGTB for the past 15 years and they always performed better than the local variety. Further they are drought-tolearant and return maximum amount of nutrients to soil through litter fall. I have obtained 70 tonnes of pulpwood from a three-year-old plantation of CH5 clone. Due to its fast growth, this clone is called as 'speed variety' by farmers of our area. Now I have a 10-acre plantation with clone CH5.

S. Bhaskar, Adhiyankuppam, Vandavasi Taluk, Tiruvannamalai District, Tamil Nadu

I am a Casuarina farmer for more than two decades. I planted clone CH5 in 2019 as per the recommendations of IFGTB Scientists. The spacing between trees was 4.5 x 4.5 m which helped using power weeders for mechanical weeding. Irrigation was provided only when needed, usually once in a month. The trees were harvested at 4.5 years age yielding 105 tonnes of wood per acre (49 tonnes of first quality poles, 43 tonnes of debarked pulpwood and 13 tonnes of root stumps). This is the best yield I have obtained so far from my Casuarina plantations. I have planted the same clone again and with the fine-tuning of cultivation methods, I am expecting a yield of 125 tonnes of wood per acre in 4.5 years.

J. Jaganmohan, Agaraputhur, Kattumannarkovil Taluk, Cuddalore District, Tamil Nadu

I have been cultivating Casuarina in eight acres of land for over 25 years. I harvested my third crop of CH5 clone in 2024. Since my land has clayey soil and experiences waterlogging, there were incidences

of trees lodging. Despite that I harvested 88 tonnes of wood per acre at the age of three years in five acres. In an another piece of land, I harvested at the age of 32 months and obtained 65 tonnes of wood per acre. After harvesting the wood, I have allowed this plantation to grow as a coppice plantation which is now 15 months old and the average height of trees is 7 metres. Trees in this plantation showed no lodging even when they faced a severe cyclone due to the well-developed root system.

M. Selvaraj, Kalpadi village, Perambalur District, Tamil Nadu

I normally grow local variety of Casuarina using seedlings. The best yield I got so far was 40 tonnes per acre in three years. Then I planted 1.5 acres with CH5 clone at a spacing of 4 x 4 feet. Since the prevailing price for Casuarina wood was high, I harvested the plantation at the age of 2.5 years itself. I obtained a yield of 127 tonnes of wood from 1.5 acres (84 tonnes per acre).

S. Sangeethkumar, Devakottai, Sivagangai District, Tamil Nadu

My land has highly alkaline soil and the previous crops were not profitable. I then planted clone CH5 and followed all the recommendations provided by IFGTB and TNPL. I could get 50 tonnes of wood in three years. The soil quality has improved considerably by the litter fall and root residues of Casuarina crop and I expect better yield from the next crop.

R. Sathishkumar, Vettamangalam, Karur District,Tamil Nadu

I am new to Casuarina cultivation starting in 2018 with guidance from TNPL field officials. I first planted clone CJ9 which yielded around 80 tonnes of wood per acre in 4.5 years. After that I planted clone CH5 and obtained a yield of 90 tonnes per acre. I could readily sell the wood to TNPL and get the maximum farm income through Casuarina cultivation.

Kotraswamy, M., Uppanayakanahalli, Vijayanagara District, Karnataka

I am new to tree cultivation and mainly interested in long-rotation timber trees like teak and sandalwood. As recommended by Scientists of IFGTB, IWST and College of Forestry, Ponnampet, I planted alternate rows of timber and Casuarina trees (CH clones) at a spacing of 10 feet. When the Casuarina trees were harvested in 2024 at the age of 3.5 years, I obtained around 22 tonnes of wood per acre. This income has taken care of the expenditure incurred on developing the timber plantations. Growing Casuarina trees alongside the timber trees also helped inducing stem straightness and low branching in the timber trees. Casuarina trees were allowed to coppice to produce one more crop in future.

Notes

Notes