# Identification of Suitable Clonal Propagated Hardwood for Higher Pulp Yield, Optimum Chemical Consumption for Pulping and Suitability for Mass Multiplication with Required Advantages

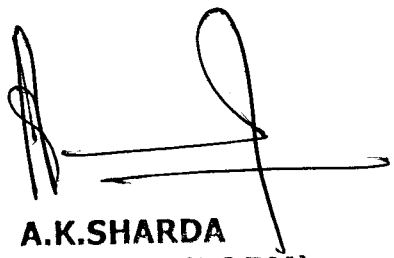
Project funded under Cess Grants by
Development Council for Pulp, Paper & Allied Industries,
Ministry of Commerce & Industry, Government of India
&
Supported by IPMA

JK PAPER LTD.
(FOREST ORGANISATION)
RAYAGADA (ORISSA) 765 001

## DECLARATION

This is to declare that work presented in this report entitled "***Identification of suitable clonal propagated hardwood for higher pulp yield, Optimum chemical consumption for pulping and suitability for mass multiplication with required advantages***" is original and has been carried out in the facilities of JKPL and PAPRI.

Funding for this project was provided by Development Council for Pulp, Paper & Allied Industries, Ministry of Commerce & Industry, Government of India provide under Cess Grants through IPMA.



**A.K.SHARDA**
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**Principal Investigator**

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Our thanks to Indian Paper Manufacturers Association for the unflinching support extended throughout this project. We also thank the Pulp & Paper Research Institute, Jaykaypur for the pulp analysis and technical inputs that enriched the quality of the work done.

We take this opportunities to place on record our gratitude for help provided by State Silviculturist, Forest Department, Govt. of Orissa; State Silviculturist, Andhra Pradesh; Kerala Forest Research Institute, Peechi and Institute of Forest Genetics & Tree Breeding, Coimbatore for providing necessary inputs technical information for carrying out this study.

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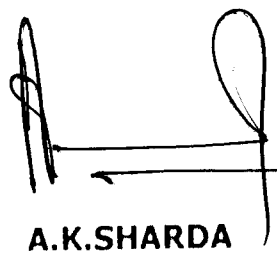

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## CONTENT

## SUMMARY

Pulp and paper industry in on the threshold of raw material resource crunch. Lower inherent productive capacity of un-improved planting stock can be overcome only through the use of genetically improved planting stock (Clones). Improved clonal plantations are to be the only way to meet the shortage of raw material in shortest possible time. Improved clones will help making plantations more remunerative for the farmers and offer an alternative crop system along with other agricultural crops as well as other land uses by the farmers.

In order to give impetus to the pulpwood plantation productivity improvement in India this project was conceived and carried out with the financial support of IPMA-Cess Fund.

Selection of Candidate Plus Trees (CPT) was carried out for *Eucalyptus* hybrid and *Casuarina* equisetifolia from Orissa and Andhra Pradesh. CPT selection was carried out as per the prescribed methodology enunciated in various scientific papers and reports on tree improvement.

As the pulpwood is variable in structure and structural differences in wood is encountered from species to species and even between various clones of the same species. In order to screen clones with all desired pulping properties, pulpwood of selected CPTs of *Eucalyptus* and *Casuarina* was tested at Pulp and Paper Research Institute (PAPRI).

182 Candidate Plus Trees (CPT) of *Eucalyptus* and 57 CPTs of *Casuarina* were selected. It is estimated that in *Eucalyptus* there will be an improvement of 61% and 95% in height and Girth over base population. In case of *Casuarina* expected improvement will be 66% and 102% in height and girth respectively. In case of *Eucalyptus* 129 CPTs were coppiced out of which 85% of the stump (CPTs) responded to coppicing and produced coppice shoots in varying degrees (4 to 50). Rooting capacity of juvenile cuttings in the greenhouse also exhibited high degree of variability

both for *Eucalyptus* (3% to 96% with a average of 52%) and *Casuarina* (33% to 88% with an average of 50%).

Pulping properties of selected CPTs of both Eucalyptus and *Casuarina* varied greatly. Eucalyptus CPTs pulpwood required 16% active alkali, whereas *Casuarina* CPTs pulpwood required 16% to 17% active alkali. Kappa no. of most of the selected CPTs of both *Eucalyptus* and *Casaurina* reported to be in optimum range. Screen yield of 11 CPTs of *Eucalyptus* given above 48% and 10 CPTs of *Casuarina* given yield more than 48%. Screen Rejects percentage in CPTs wood of both the species recorded to be very low. Bleached pulp yield was more than 44% in 2 CPTs of each *Eucalyptus* and *Casuarina*. Brightness value was very high more than 90 in 5 CPTs of each *Eucalyptus* and *Casuarina*. Likewise most of other parameter, which has been work out, has shown high degree of variability and provides the opportunity to select clone with all the desired pulping parameters.

Clones developed from the selected CPTs have been planted in Randomised Block Design to assess the growth performance of the clones of *Eucalyptus* and *Casuarina*. 59 Clones of Eucalyptus and 14 clones of *Casuarina* have been planted. Various growth parameters are being recorded at half yearly interval.

Based on analysis of various parameters 11 clones of Eucalyptus and 3 clones of *Casuarina* have been short listed, which have shown high growth consistently during the period of observation. There is further need to monitor the growth performance of all the clones in multi-locational trial spread in wider agro-climatic conditions.

It will be possible to achieve multi-fold increase in the yield of pulpwood plantation using the fast growing clones developed under this project. Ultimately this will help not only the industry in meeting their raw material requirement but also make the tree cultivation more remunerative for the farmers.

This project needs extension as growth performance needs to be monitored for longer period and also to multiply the clones for trial in wider geographical area.

## INTRODUCTION

For forest based industries like Paper Industry, improvement of pulpwood plantations is of immense importance. Average productivity in the natural seed derived populations is low due to high genetic variability. 80% of productivity is contributed by just about 20% of the plants. It would only be ideal to have only the highly productive members of the plantations to improve the productivity and the land utilization as well. Conventional breeding procedures in forestry species are highly time consuming due to long rotation periods. Prudent approach would be to combine the programmes of genetic improvement along with vegetative propagation of appropriately selected clones from natural populations and integrate them eventually into genetic improvement programmes.

Though vegetative propagation is somewhat slow, time and space consuming process, the advantages it offers to the forest based industries for outweigh the minor disadvantages.

Propagation through clonal technology has been predominant with a few species like *Eucalytpus*. However, there are several other species, which need better focus for selection, standardization and large-scale application for the benefit of the industry.

The Cess-funded project details of which are presented in the following pages deals with selections of *Eucalyptus* species and *Casuarina*. The selected clones have been analysed taking into account their specific suitability for the paper industry, their multiplication potential for multi-location trials and forward integration into plantation programmes of the member industries of IPMA to further augment efficacious sources of raw material generation.

Pulp and paper industry will soon be facing raw material resource crunch. Lower inherent productive capacity of un-improved planting material can be overcome only through the use of genetically improved planting materials (Clones). This appears to be the only way to meet the shortage of raw material. Improved clones will help making plantations more remunerative for the farmers and offer an alternative crop system along with other agricultural crops as well as other land uses by the farmers.

The average productivity of seed route plantation is considerably low due to higher frequency of low productivity trees as compared to high yielding ones. Though there is a

considerable scope to increase productivity of forest trees through various approaches like provenance selection, genetic improvement through selection and hybridisation. But, long-life, large size and complex breeding behaviour, resulting in large number of years required to bring genetic improvement in trees. Fortunately, in trees, there is enormous scope to increase yield through clonal approaches. The aim of such an approach is helpful for achieving gain in traits, which has low heritability such as growth and cellulose yield.

Currently most researched activity in forest plants deals with vegetative propagation. This interest is built upon the faster and greater gains that can be obtained by the use of this particular method. The work of Aracruz Florestal (Brazil) has been catalyst for a new and revolutionary method in forest regeneration and it has been effective throughout the world.

Clonal propagation is an important component of tree improvement programme. This technique is used for mass production of *true to type* planting stock in which all the genetic superiority of the parent tree is retained. The mean annual increment (MAI) of *Eucalyptus grandis* plantations in Brazil before attempting genetic improvement and clonal forestry in 1967 was 15 $m^3ha^{-1}yr^{-1}$. But when selected clones were introduced, the yield increased to 70 $m^3ha^{-1}yr^{-1}$ in industrial plantations. Such clones under intensive management have yielded even up to 100 $m^3ha^{-1}yr^{-1}$ (Zobel, 1993).

Selection of clonal propagated hardwood is based on evaluation of the qualitative and quantitative performance of plants. Traditionally plants multiply by means of seeds (sexual propagation) or organs other than seeds (asexual or vegetative propagation). Though multiplication by seeds is the cheapest method. It suffers from certain disadvantages. Plants raised from seeds may not repeat good performance of mother plants, may take a longer time and many of them do not produce viable seeds or desired quality of seeds, Plants propagated vegetatively do not suffer from these disadvantages. However, vegetative propagation is rather a slow, time and space consuming process. Some plants are also not amenable to vegetative method of propagation.

In order to give impetus to the pulpwood plantation productivity improvement in India this project was conceived and carried out with help of funds obtained from IPMA-Cess Fund.

In India even though work had been done in commercial as well as research institutions which had developed technical competence for clonal propagation of pulpwood species, however, there was a need to develop clones which are particularly suitable for paper industries. Hence, under this project clones of desired characteristics of *Eucalyptus hybrid* and *Casuarina equisetifolia* were selected, since these two species needed urgent attention and mainly used by most of the paper mills as raw material.

## MATERIALS & METHODS

Area of Selection: - In order to have wider genetic base, efforts were made to select candidate plus trees (CPTs) from large area spread over in 14 districts of Orissa and 3 Districts of Andhra Pradesh (Figure 1). The area falls between Latitude of 18°30'N to 19°30'N and Longitude of 81°E to 86°E. Broadly the area has undulating terrain and soil ranging from red lateritic to sandy loam. The annual rainfall varies from 1000 mm to 1590 mm. The temperature varies from minimum 1°C (Koraput) during winter to 48°C during summer in Rayagada

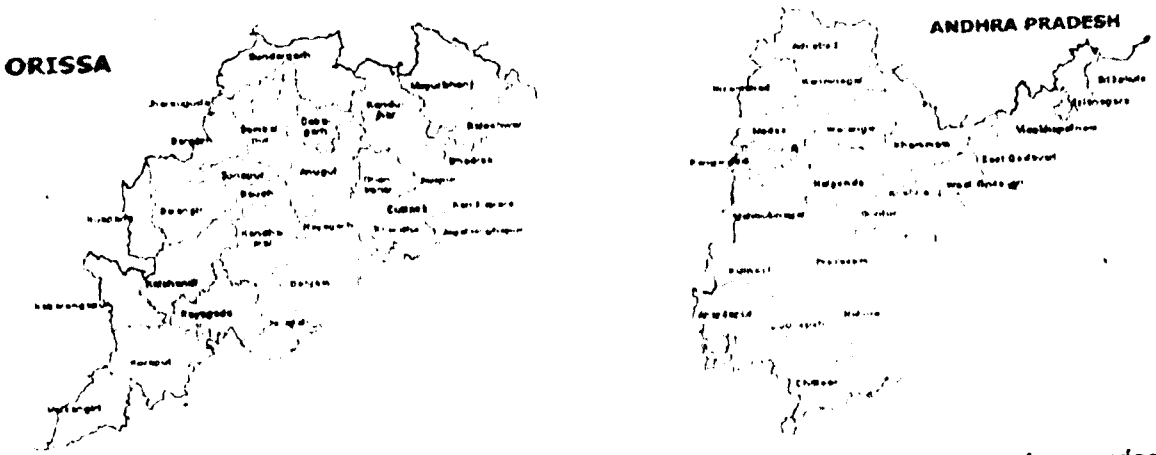



***Figure 1: - Map of Area from where selection of CPTs of Eucalyptus and Casuarina carried out.***

**CPT Selection**: - Selection of trees that have outstanding form, rate of growth and/or wood quality is considered to be the first step in a tree improvement programme. This is followed by cloning (vegetative propagated plants) and testing them in various agro-climatic conditions. Selected CPTs, which had better performance, are propagated

Figure - 2:- View of Seed route *Eucalyptus* plantations used for selection of Candidate Plus Trees (CPT)

View of a 7 year old seed-route plantation of *Eucalyptus* at Dumbaguda (Rayagada district) grown under rainfed conditions.

View of a 6 year old seed-route plantation of *Eucalyptus* at Kakriguma (Koraput District) growing on gentle slope of Eastern Ghats.

6 year old seed-route plantation of Eucalyptus growing under rainfed conditions at Kamthana (Kalahandi district).

Figure - 3:- View of Seed route *Casuarina* plantations used for selection of Candidate Plus Trees (CPT)

4 year old seed-route plantation of *Casuarina* growing under rain fed condition in eastern coast at Gopinagar (Srikakulam district).

View of highly variable 3 year old *Casuarina* Plantation at Bheemili (Visakhapatnam district)

4 year old *Casuarina* plantation at Bondapalli (Vizianagaram district)

Figure - 4:- View of Candidate Plus Trees (CPT)

View of a 5 year old *Eucalyptus* CPT at Dumbaguda (Rayagada)

View of a 6 year old *Eucalyptus* CPT at Biripoda (Kalahandi)

View of a 4 year old *Casuarina* CPT at Dharmavaram (Srikakulam)

Inspection of CPT at Dumbaguda (Rayagada)

Biomass & pulpwood yield analysis and sample collection from CPTs for chemical analysis

vegetatively and the genetically uniform material is used for plantations. Utmost care was taken to select best of the CPTs. Established methodology was followed to select the CPTs as described in *Annexure –1* and photos of plantations and CPTs are presented in Figure – 2 to 4.

Pulpwood is variable in structure. Structural differences in wood are encountered from species to species and even between various clones of the same species. The pulping process separates the wood into its individual components and paper is formed from cellulose matted together.

Paper industry needs pulpwood of uniform quality as an important factor related to the efficiency of process system.

In order to develop clones with desired pulping quality, CPT's wood was tested at Pulp and Paper Research Institute, Jaykaypur, for the following standard pulp and paper making tests: -

1. **Active Alkali**: - Pulping converts wood chips into separate fibres by the chemical reaction between lignin and the active chemicals in the cooking liquor, NaOH and $Na_2S$ (expressed as $Na_2O$). Sulfidity lower than 15% may result in excessive cellulose damage and if it is higher than 35% the rate of delignification becomes too slow. For hardwood ideal percentage is 16-18%.
2. **Kappa Number**: - It is a measure of the lignin content (bleachability) of pulp, hardness and degree of delignification. It is the volume (in ml) on 0.1N Potassium permanganate solution consumed by 1 gm of moisture free pulp. Value of Kappa Number ranging between 17±1 is considered optimum.
3. **Screened Yield**: - This is the percentage of unbleached pulp obtained from moisture-free chips. It is obtained by dividing the weight of dry unbleached pulp (after removing rejects) by the weight of the dry chips and multiplied by 100. Value higher than 45 is desirable for hardwoods.
4. **Rejects**: - This is the uncooked material obtained after cooking the raw material. It is expressed as percentage of dry chips taken for pulping. Lower reject value (<2%) is desirable.

5. **Bleached Yield**: - It is the percentage of dry bleached pulp obtained from dry chips. This is given by weight of the bleached pulp (dry) divided by the weight of the dry chips multiplied by 100. Higher bleached yield values (>42%) are desirable.
6. **Brightness**: - Brightness is a commonly used industrial term for the value of reflectance factor when blue light is used at 457 nm wave length. Brightness values of pulp provide an excellent measure of the maximum whiteness that can be achieved. Brightness more than 88% is desirable.
7. **Shrinkage**: - It is the amount of pulp lost during the bleaching process (O-C/D-EOP-D). It is calculated from the amount of pulp initially taken for bleaching and the final pulp produced. Shrinkage value of 5% and below is desirable.

$$\text{Shrinkage} = \frac{\text{Wt of Final Pulp} - \text{Wt of Initial Pulp taken}}{\text{Wt of Initial Pulp taken}} \times 100$$

8. **Viscosity:** - It gives an indication of the average degree of polymerisation of the cellulose. It also gives a relative indication of the degradation (decrease in cellulose molecular weight) resulting from the pulping and/or bleaching process. Viscosity >6 cp is desirable.
9. **Beating Time**: - It is the time taken to refine the pulp to 40°SR (drainability) in a Valley Beater for making the hand sheets and testing. Value between 30-40 min. is desirable.
10. **Bulk:** - It is a measure of sheet thickness and is calculated by dividing sheet thickness by grammage. A value ranging from 1.3 to 1.5 is desirable. The unit is $cm^3/g$.
11. **Tear Factor**: - This measures the force perpendicular to the plane of paper required to tear multiple sheets of paper through a specified distance after tear has been previously started. It is a measure of tensile strength of paper.
12. **Burst Factor**: - Bursting strength is widely used as a measure of resistance to rupture in paper. The test specimen is held between annular clamps and subjected to an increasing pressure by rubber diaphragm, which is expanded by hydraulic pressure at a controlled rate, until the test specimen ruptures. The pressure reading at that point is recorded as bursting strength. >35 BF value is desirable.

13. **Breaking Length**: - It is a measure of tensile strength of paper. The maximum tensile force per unit width developed in test specimen at rupture or break. Breaking length is calculated from the tensile strength. BL value greater than 5000 m is desirable.

$$BL = \frac{200 \times \text{tensile break load, kg on 915 mm nip}}{3 \times \text{mass per unit area } (g/m^2)}$$

14. **Double Fold**: - Folding endurance test has been used for estimation of the suitability of paper in use to withstand repeated bending and folding.

Hand cut chips were used for above analysis. The chips classification was done and >32 mm and <3 mm fractions were rejected. Cooking was carried out by taking the chip size of acceptable range (3 to 32mm). Unbleached pulp was bleached with the sequence of O/CD/Eop/D as in JK Paper Mills.

Variability study in the selected CPTs: - To understand the phenotypic variability present in the selected CPTs, various types of statistical tools were used to work out estimated yield improvement and variability in the selected CPTs and clones. To ensure that CPTs represent different diversity in populations.

**Clonal Plant Production**: - In order to produce clonal propagules of two species (*Eucalyptus* and *Casuarina*), different strategies were adopted due to varying degrees of juvenility present in the adult trees of these species.

*Eucalyptus hybrid*: - Cuttings obtained from mature trees of *Eucalyptus* are difficult to root. However it is established that cuttings from rejuvenated stumps (Coppiced) are amenable to rooting with suitable hormones (auxins) under controlled environment (Temperature and Relative Humidity). Short listed CPTs of *Eucalyptus* were coppiced 15 cm above the ground level in the month of November-December and juvenile coppice cuttings were collected. Data were collected on coppicing behaviour of CPTs.

*Casuarina equisetifolia*: - Juvenile cladodes (growing tip of small branch with few needles) collected for CPTs were used for production of clonal plants.

Clonal propagation was carried out at the JKPL's Clonal Technology Complex, Jaykaypur. State-of-art Mist chambers (greenhouses) and Hardening chambers were used for clonal multiplication.

***Eucalyptus***: - Juvenile coppice shoots of 45-60 days old were collected from the felled CPTs stumps and prepared into single pair leave cuttings and leaves were half trimmed. Cuttings are treated with fungicides (contact & Systemic) to control fungal or bacterial diseases and finally cuttings were treated with rooting hormones through dip smear method. Treated cuttings were planted in 100cc root trainers filled with horticulture grade vermiculite. Cuttings were placed inside the mist chamber with optimally standardised temperature (35±2°C) and Relative Humidity (80±5%) till the development of proper roots and shoots. Inside the Greenhouse, Relative humidity was maintained with help of intermittent misting of 150 micron size water droplets. Temperature of the Green house is maintained with help of Evaporative cooling (Fan and Celdeck Cellulose Pad). Data were collected for rooting behaviour of the cuttings. Rooted cuttings with sprouts were shifted from Mist chamber to Hardening chamber under the fixed Agro-shade net with 75% shading. Inside the Hardening chamber rooted cuttings were kept for 15 – 20 days followed by shifting to Open Nursery under full sunlight. Manual grading was carried out in the Open Nursery and required inputs like macro and micro nutrients were supplied to obtain healthy saplings (Figures – 5 & 6).

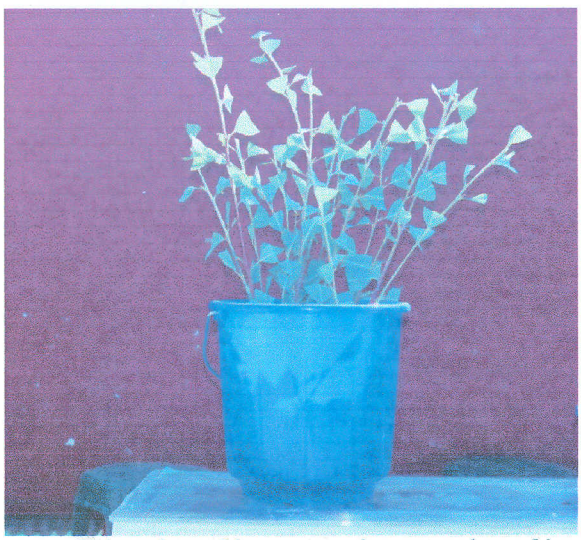
***Casuarina equisetifolia***:- Newly emerging juvenile shoots of selected tree are used for propagation of *Casuarina*. Newly emerging shoots (called – cladodes) were collected from the CPTs and 5-7 cm long cuttings were treated with fungicides and rooting hormones as described earlier. Same procedure for rooting was adopted as in case of eucalypts. Data were collected on rooting behaviour.

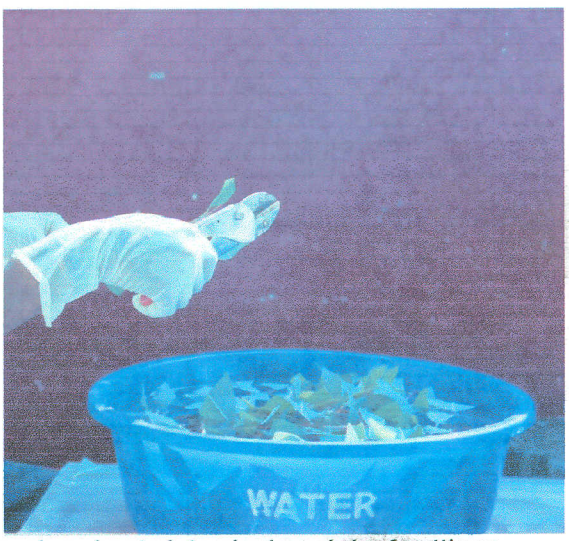
Infrastructure used for propagation of clones, testing and field trials is presented in Figure – 7 & 8.

Figure - 5:- View of juvenile coppice shoot collection and preparation of cuttings for clonal multiplication of *Eucalyptus*


Newly emerging juvenile coppice shoots of CPT

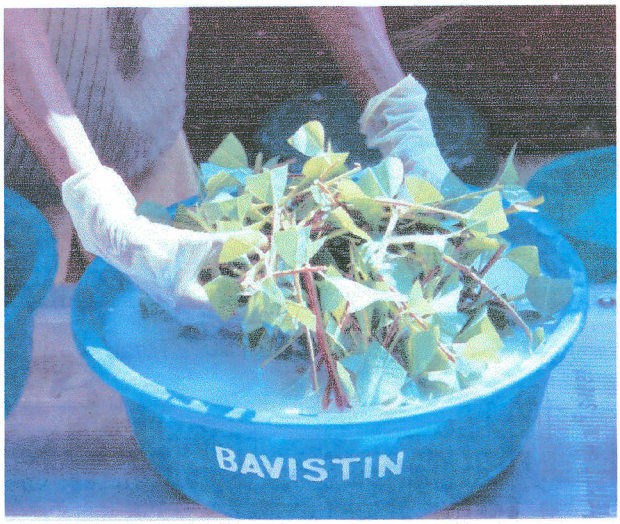
Collection of juvenile coppice shoots from stump of *Eucalyptus* for clonal multiplication






Trimming of leaves and conversion of juvenile coppice shoots into single pair leaf cuttings

Figure - 6:- View of Eucalyptus coppice shoot cutting processing and rooting inside the Greenhouse.


Treatment of *Eucalyptus* cuttings with contact and systemic fungicides to prevent disease inside the Mistchamber

Treatment of cuttings with root promoting hormones through dip-smear method

Placing the cuttings inside the Greenhouse under controlled environment.

Figure – 7:- View of Infrastructure used for development of clones and testing for pulp and paper qualities.

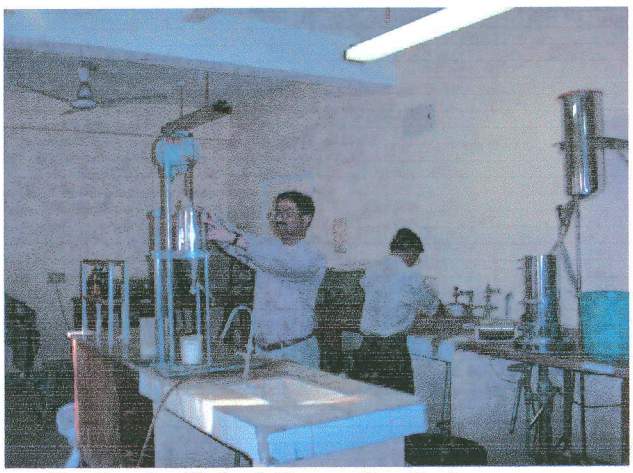

Clonal Technology Complex of JK Paper Limited at Jaykaypur

Inside view of State of Art Greenhouse

Inside view of Hardening Chamber

View of Open Nursery with Hardened Clonal Plants

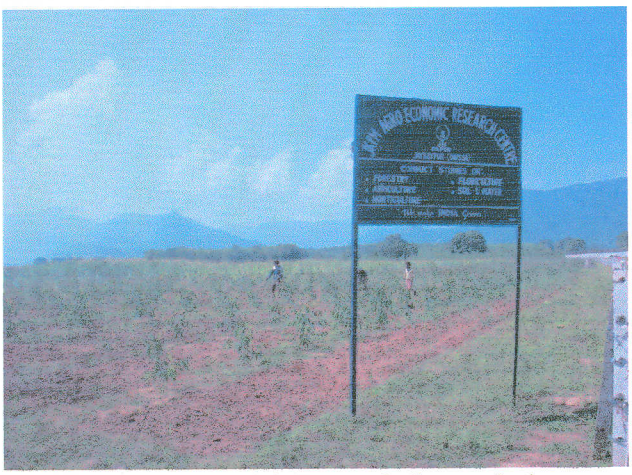
View of Pulp and Paper Research Institute, Jaykaypur



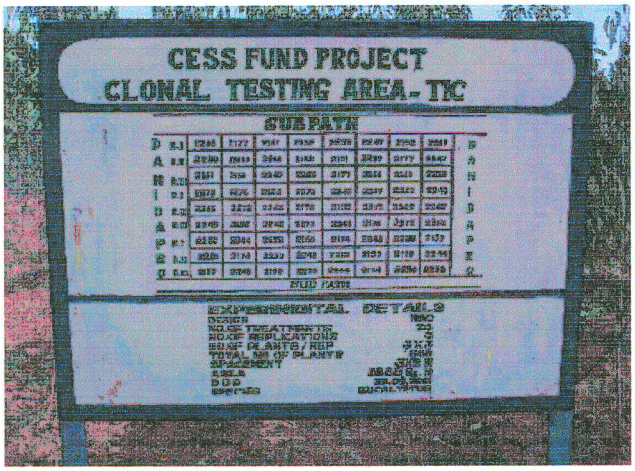
Testing for Pulp & Paper Quality in progress

Figure – 8 :- Views of various CTAs and CMAs planted at Tree Improvement Centre, Jaykaypur and JKPM - Agro-Economic Research Centre, Jaykaypur.


Tree Improvement Centre, Jaykaypur



JKPM – Agro Economic Research Centre, Jaykaypur




View of signboard of layout of CTA-2

2 month old Eucalyptus clones in CTA - 1

Monitoring of growth of Eucalyptus clones

15 day old Casuarina clones in CTA-4

## RESULTS AND DISCUSSION

**Candidate Plus Tree (CPT) Selection and expected improvement**:- As described earlier, trees with all desired phenotypic parameters were selected from Orissa and Andhra Pradesh. In case of *Eucalyptus* total 182 CPTs were selected initially and after short-listing 129 CPTs were coppiced (Table-1). In case of *Casuarina*, 54 CPTs were selected initially and finally 17 CPTs were short-listed for vegetative propagation and development of clones (Table-2). Based on base population growth performance and the performance of CPTs it is estimated that there will be gain of 61% and 95% in height and GBH respectively in *Eucalyptus* (Figure-9); whereas in case of *Casuarina* estimated improvement will be 66% and 102% in height and GBH respectively (Figure-10) is estimated.

**Coppicing and Rooting Behaviour**:- 85% coppiced CPTs produced coppice shoots whereas 15% CPTs did not respond to coppicing in case of *Eucalyptus* (Table-3 & Figure-11).

Juvenile coppice shoots of suitable size were harvested from the stumps of CPTs that responded to coppicing. Average time taken for attaining suitable size ranged from 40 to 70 days with an average of 53 day (Table-3).

Number of coppice shoots harvested varied greatly from 4 to 50 coppice shoots with an average of 25 shoots per stump (Table-3). Predictably production of coppice shoots on the stump is influenced greatly by the size of stump, age, season, physiological status, silvicultural operations and time of harvest.

Number of cuttings prepared from the collected coppice shoots also varied from 10 cuttings to 195 cuttings. Number cuttings per stump depend mainly on the size of coppice shoot at the time of harvest.

Number of days required for cuttings to develop healthy roots and shoots inside the Greenhouse ranged from 37 days to 45 days with an average of 41 days (Table-3).

While in case of Casuarina, number of day required varied from 45 to 50 day (Table-4). Time required for development of root depends on the physiological status of cutting, hormonal treatment, ambient temperature and Relative Humidity in side the greenhouse.

Rooting behaviour of *Eucalyptus* showed high variability ranging from 3% to 96% with and average of 52% (Table-3 & Figure-11a).

In case of Casuarina rooting is varied from 33% to 82% with an average of 50% (Table-4 & Figure-12). Rooting behaviour of *Eucalyptus* cuttings is greatly influenced by the genotype, physiological status of coppice shoot, season, age of coppice shoot, time taken from harvesting of shoots to preparation of cuttings, hormonal treatment and temperature and humidity inside the greenhouse.

TABLE - 1:- DETAILS OF CPTs SELECTED (*EUCALYPTUS*)

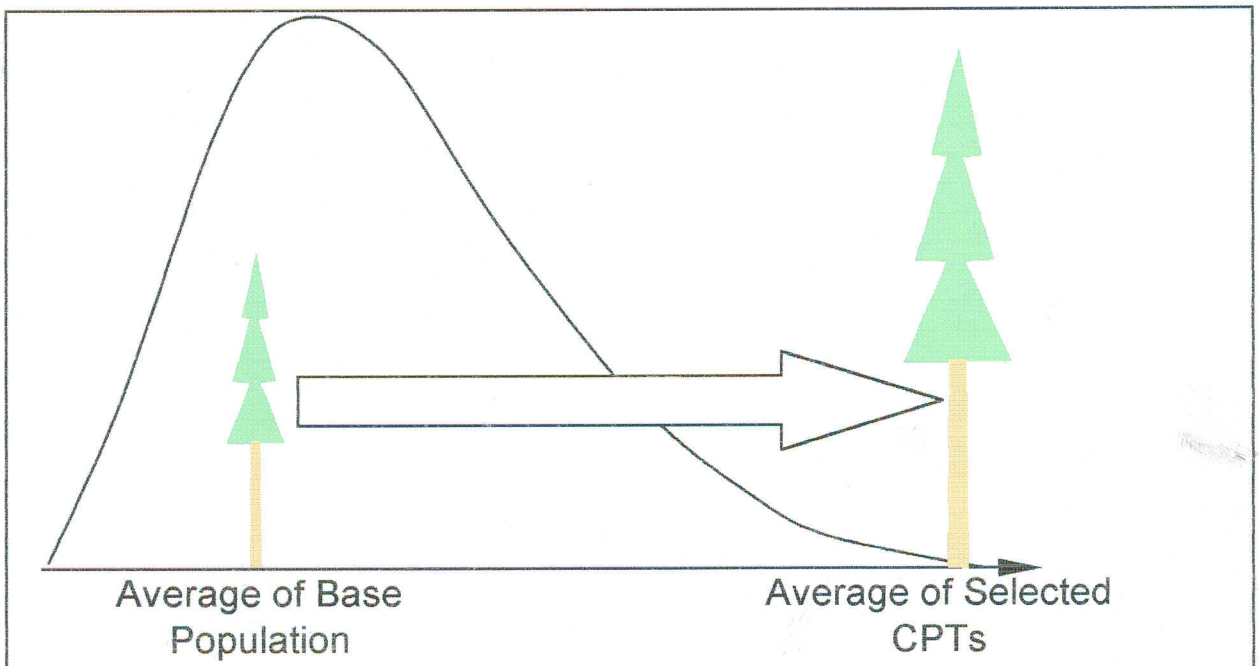
| CPT NO. | FARMER'S NAME | VILLAGE | DISTRICT | AREA (Acres) | SPACING | SEEDLING SOURCE | SOIL TYPE | HT (m) | GBH (cm) | CR.HT (m) | CR.WH (m) | DATE OF FELLING | MAI - Ht (m) | MAI - GBH (cm) | SELECTED FOR COPPICING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2101 | DHARMARAJ BISOI | DUMBAGUDA | RAYAGADA | 40.0 | 3 x 1.5 | JK Corp ▲ | Sandy Loam | 18.9 | 60.0 | 6.0 | 1.7 | 20.05.2000 | 3.2 | 9.5 | ✓ |
| 2102 | DHARMARAJ BISOI | DUMBAGUDA | RAYAGADA | 40.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.4 | 57.0 | 7.4 | 1.5 | 20.05.2000 | 3.6 | 9.5 | ✓ |
| 2103 | DHARMARAJ BISOI | DUMBAGUDA | RAYAGADA | 40.0 | 3 x 1.5 | JK Corp | Sandy Loam | 22.0 | 63.0 | 10.0 | 1.5 | 20.05.2000 | 3.7 | 10.5 | ✓ |
| 2104 | DHARMARAJ BISOI | DUMBAGUDA | RAYAGADA | 40.0 | 3 x 1.5 | JK Corp | Sandy Loam | 23.4 | 64.0 | 8.5 | 1.8 | 20.05.2000 | 3.9 | 10.7 | ✓ |
| 2105 | SARAT CH.PANDA | DANGARAGUDA | KALAHANDI | 1.5 | 3 x 1.5 | JK Corp | Sandy Loam | 22.2 | 72.0 | 7.0 | 2.0 | 21.05.2000 | 3.7 | 12.0 | ✓ |
| 2106 | LOKNATH MAHAKUDA | GANANTHPUR | KALAHANDI | 2.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.4 | 57.5 | 6.5 | 1.8 | 21.05.2000 | 3.6 | 9.6 | ✓ |
| 2107 | RAHAS BIHARI NAIK | GANDAMER | KALAHANDI | 3.5 | 3 x 1.5 | JK Corp | Sandy Loam | 20.0 | 60.0 | 7.0 | 1.6 | 21.05.2000 | 3.3 | 10.0 | ✓ |
| 2108 | SARAT CH RATH | KAMTHANA | KALAHANDI | 1.5 | 3 x 1.5 | JK Corp | Sandy Loam | 20.7 | 62.0 | 5.6 | 2.0 | 21.05.2000 | 3.5 | 10.3 | ✓ |
| 2109 | BASUDEV NAIK | KAMTHANA | KALAHANDI | 3.4 | 3 x 1.5 | JK Corp | Sandy Loam | 23.0 | 63.0 | 8.2 | 1.6 | 22.05.2000 | 3.8 | 10.5 | ✓ |
| 2110 | MANU MAJHI | KAMTHANA | KALAHANDI | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.2 | 68.0 | 7.8 | 2.1 | 22.05.2000 | 3.5 | 11.3 | ✓ |
| 2111 | MOHAN JANI | KAMTHANA | KALAHANDI | 1.2 | 3 x 1.5 | JK Corp | Sandy Loam | 18.3 | 66.0 | 7.4 | 1.8 | 22.05.2000 | 3.1 | 11.0 | ✓ |
| 2112 | KRUTI NAYAK | KAMTHANA | KALAHANDI | 3.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.9 | 53.0 | 5.3 | 1.6 | 22.05.2000 | 3.7 | 8.8 | ✓ |
| 2113 | SABITA DASH | U.N.PUR | KALAHANDI | 5.5 | 3 x 1.5 | JK Corp | Sandy Loam | 23.1 | 58.5 | 6.8 | 1.6 | 23.05.2000 | 3.9 | 9.8 | ✓ |
| 2114 | ANAND CH DASH | U.N.PUR | KALAHANDI | 2.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.5 | 59.0 | 7.8 | 2.0 | 23.05.2000 | 3.6 | 9.8 | ✓ |
| 2115 | LAXMI NARAYN MAHAPATRO | BHAWANIPATNA | KALAHANDI | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 20.4 | 57.5 | 8.1 | 1.8 | 23.05.2000 | 3.4 | 9.6 | ✓ |
| 2116 | BASARI JALANDRAO | B.PANGADI | BOLANGIR | 2.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.0 | 58.0 | 8.3 | 2.1 | 23.05.2000 | 3.5 | 9.7 | ✓ |
| 2117 | KAMAL L. PATRO | BARMAHAL | KALAHANDI | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 22.8 | 65.0 | 7.5 | 1.7 | 27.05.2000 | 3.8 | 10.8 | ✓ |
| 2118 | T BIMBAR | BIRIPODA | KALAHANDI | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.5 | 58.0 | 7.2 | 1.7 | 27.05.2000 | 3.3 | 9.7 | ✓ |
| 2119 | KONDRU SADHUMANI | DURKULINA | KALAHANDI | 7.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.3 | 54.0 | 7.8 | 1.7 | 27.05.2000 | 3.2 | 9.0 | ✓ |
| 2120 | CHARAN PUJARI | G.CHANDRAKUNTI | KALAHANDI | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.1 | 59.5 | 8.2 | 1.8 | 27.05.2000 | 3.5 | 9.9 | ✓ |
| 2121 | K.NARASIMHULU | NAGARPALEM | VISAKHAPATNAM | 3.5 | 3 x 1.5 | JK Corp | Sandy Loam | 20.2 | 54.0 | 7.6 | 1.8 | 27.05.2000 | 3.4 | 9.0 | ✓ |
| 2122 | CH RAMANA | CHIRLAPALEM | VISAKHAPATNAM | 2.5 | 3 x 1.5 | JK Corp | Sandy Loam | 23.1 | 65.0 | 8.1 | 1.7 | 28.05.2000 | 3.9 | 10.8 | ✓ |
| 2123 | S. NOOKA RAJU | KORUKONDAPALEM | VISAKHAPATNAM | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.9 | 61.5 | 8.3 | 1.9 | 28.05.2000 | 3.7 | 10.3 | ✓ |
| 2124 | A PYDI TAJU | AKKIREDDIPALEM | VISAKHAPATNAM | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.4 | 59.0 | 7.9 | 1.8 | 28.05.2000 | 3.6 | 9.8 | ✓ |
| 2125 | V APPALA NARASAYYA | KOTHURU | VISAKHAPATNAM | 5.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.2 | 54.0 | 7.4 | 1.6 | 28.05.2000 | 3.2 | 9.0 | ✓ |
| 2126 | V APPALA NARASAYYA | KOTHURU | VISAKHAPATNAM | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 22.5 | 62.0 | 8.1 | 1.8 | 28.05.2000 | 3.8 | 10.3 | ✓ |
| 2127 | A MURALI | SODAVARAM | SRIKAKULAM | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.9 | 65.0 | 6.4 | 1.7 | 28.05.2000 | 3.3 | 10.8 | ✓ |
| 2128 | A MOHAN RAO | KASIMETLA | SRIKAKULAM | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.3 | 58.0 | 7.8 | 1.7 | 28.05.2000 | 3.6 | 9.7 | ✓ |
| 2129 | A V NARASINGHA RAO | BRUNDAVAN GARDENS | SRIKAKULAM | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.3 | 55.0 | 7.7 | 1.8 | 28.05.2000 | 3.2 | 9.2 | ✓ |
| 2130 | V RAMACHANDRA RAO | CHINANADAPALLI | SRIKAKULAM | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.2 | 58.0 | 7.6 | 2.0 | 28.05.2000 | 3.5 | 9.7 | ✓ |
| 2131 | Y TEMUDHA | VEPADA | VIZIANAGARAM | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 21.0 | 57.5 | 7.6 | 1.7 | 28.05.2000 | 3.5 | 9.6 | ✓ |
| 2132 | K. RAMMURTHY | CHOWDHANTAVALSA | VIZIANAGARAM | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 23.3 | 62.0 | 8.1 | 1.7 | 28.05.2000 | 3.9 | 10.3 | ✓ |
| 2133 | K SIMHACHALAM | PINNIVALASA | VIZIANAGARAM | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 20.7 | 62.0 | 6.4 | 2.0 | 28.05.2000 | 3.5 | 10.3 | ✓ |
| 2134 | BHIKAARI GOMANGO | LOBBA, DOMBOSORA | RAYAGADA | 3.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.3 | 57.0 | 7.4 | 1.9 | 28.05.2000 | 3.6 | 9.5 | ✓ |
| 2135 | RAMA KRUSHNA NAIK | BISWANATHAPUR | KALAHANDI | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 20.2 | 57.0 | 7.9 | 2.0 | 28.05.2000 | 3.4 | 9.5 | ✓ |
| 2136 | MANMOHAN NAIK | BISWANATHAPUR | KALAHANDI | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.8 | 53.5 | 6.2 | 2.3 | 24.05.2000 | 3.4 | 8.9 | ✓ |
| 2137 | PURUSOTHAM PRADHANI | BISWANATHAPUR | KALAHANDI | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.2 | 59.5 | 8.7 | 2.4 | 24.05.2000 | 3.6 | 9.9 | ✓ |
| 2138 | FAKIR PRADHANI | BISWANATHAPUR | KALAHANDI | 4.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.4 | 53.0 | 8.6 | 2.1 | 24.05.2000 | 3.7 | 8.8 | ✓ |
| 2139 | TRINATHA PRADHANI | BISWANATHAPUR | KALAHANDI | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.0 | 54.0 | 8.6 | 2.0 | 24.05.2000 | 3.6 | 9.0 | ✓ |
| 2140 | JITENDRA KHARA | KOLAR | KORAPUT | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.9 | 52.0 | 8.4 | 1.7 | 24.05.2000 | 3.4 | 8.7 | ✓ |
| 2141 | SAHEB BISOI | KAKIRIGUMMA | KORAPUT | 15.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.8 | 50.0 | 7.8 | 1.9 | 25.05.2000 | 3.6 | 8.3 | ✓ |
| 2142 | TRILOCHANA NAYAK | KAKIRIGUMMA | KORAPUT | 12.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.3 | 47.0 | 8.3 | 1.8 | 25.05.2000 | 3.3 | 7.8 | ✓ |
| 2143 | DIBAKAR BISOI | KUSUMGUDA | KORAPUT | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.6 | 63.5 | 8.1 | 1.7 | 25.05.2000 | 3.3 | 10.6 | ✓ |
| 2144 | BHASKARA BISOI | KUSUMGUDA | KORAPUT | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.0 | 43.0 | 8.3 | 1.8 | 25.05.2000 | 3.4 | 7.2 | ✓ |
| 2145 | DIBAKAR BISOI | KUSUMGUDA | KORAPUT | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.6 | 49.5 | 7.1 | 1.6 | 25.05.2000 | 3.5 | 8.3 | ✓ |
| 2146 | K.PUJARI | KASHIPUR | RAYAGADA | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.6 | 53.0 | 8.3 | 2.1 | 26.05.2000 | 3.5 | 8.8 | ✓ |
| 2147 | LAXMI PADALU | AMBADOLA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.3 | 57.0 | 8.2 | 2.1 | 26.05.2000 | 3.5 | 9.5 | ✓ |
| 2148 | GOPINATH SABAT | AMBADOLA | RAYAGADA | 1.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.7 | 62.0 | 8.4 | 1.8 | 26.05.2000 | 3.7 | 10.3 | ✓ |
| 2149 | ARJUNA MANDANGI | GUDARI | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.0 | 59.0 | 7.7 | 1.7 | 26.05.2000 | 3.6 | 9.8 | ✓ |
| 2150 | MANJULA DALAI | CHAKKALIPUT | KORAPUT | 7.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.1 | 53.0 | 7.9 | 1.7 | 26.05.2000 | 3.6 | 8.8 | ✓ |

| CPT NO. | FARMER'S NAME | VILLAGE | DISTRICT | AREA (Acres) | SPACING | SEEDLING SOURCE | SOIL TYPE | HT (m) | GBH (cm) | CR.HT (m) | CR.WH (m) | DATE OF FELLING | MAI - Ht (m) | MAI - GBH (cm) | SELECTED FOR COPPICING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2151 | MANJULA DALAI | CHAKKALIPUT | KORAPUT | 5.5 | 2 x 1.5 | JK Corp | Sandy Loam | 22.5 | 61.5 | 9.0 | 3.5 | 02.01.2001 | 3.8 | 10.3 | ✓ |
| 2152 | CH. APPA RAO | AGURU | RAYAGADA | 6.0 | 2 x 1.5 | JK Corp | Sandy Loam | 23.8 | 70.0 | 8.5 | 3.6 | 02.01.2001 | 4.0 | 11.7 | ✓ |
| 2153 | KRUSHNA CH.NIMALPURI | GUDARI | RAYAGADA | 1.0 | 2 x 1.5 | JK Corp | Sandy Loam | 24.0 | 62.0 | 5.0 | 2.7 | 05.01.2001 | 4.0 | 10.3 | ✓ |
| 2154 | BHUSAN NIMALPURI | GUDARI | RAYAGADA | 2.0 | 2 x 1.5 | JK Corp | Sandy Loam | 20.0 | 57.0 | 8.5 | 3.5 | 05.01.2001 | 3.3 | 9.5 | ✓ |
| 2155 | BHIMSEN GHADEI | CHAMPADEIPUR | KALAHANDI | 6.0 | 2 x 1.5 | JK Corp | Sandy Loam | 23.5 | 60.0 | 6.0 | 3.2 | 05.01.2001 | 3.9 | 10.0 | ✓ |
| 2156 | G.D.CHOWDHRY | KOTHURU | RAYAGADA | 5.5 | 2 x 1.5 | JK Corp | Sandy Loam | 24.6 | 58.0 | 9.0 | 3.5 | 05.01.2001 | 4.1 | 9.7 | ✓ |
| 2157 | GANGA PADHAN | BHARSING | RAYAGADA | 4.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 15.0 | 47.0 | - | - | - | 2.1 | 7.8 | |
| 2158 | SUBBA RAO B | CHAKKAGUDA | RAYAGADA | 2.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 15.0 | 48.0 | - | - | - | 2.1 | 8.0 | |
| 2159 | BHEEMA RAO M | TUMBIGUDA | RAYAGADA | 5.5 | 3 x 1.5 | JK Corp | Sandy Loam | 21.0 | 64.0 | 6.0 | 2.3 | 05.01.2001 | 4.2 | 10.7 | ✓ |
| 2160 | BHEEMA RAO M | TUMBIGUDA | RAYAGADA | 5.5 | 3 x 1.5 | JK Corp | Sandy Loam | 20.3 | 54.0 | 9.3 | 3.0 | 06.01.2001 | 4.1 | 9.0 | ✓ |
| 2161 | HIMIRIKA GOVINDA | BADAKUDING | RAYAGADA | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.8 | 54.0 | 9.0 | 2.4 | 06.01.2001 | 4.0 | 9.0 | ✓ |
| 2162 | HIMIRIKA GOVINDA | BADAKUDING | RAYAGADA | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.9 | 54.5 | 8.0 | 3.0 | 06.01.2001 | 4.0 | 9.1 | ✓ |
| 2163 | VEERA RAJU | GANDHINAGAR | RAYAGADA | 11.0 | 2 x 1.5 | JK Corp | Sandy Loam | 17.0 | 54.5 | - | - | - | - | - | |
| 2164 | VEERA RAJU | GANDHINAGAR | RAYAGADA | 11.0 | 2 x 1.5 | JK Corp | Sandy Loam | 17.0 | 53.0 | - | - | - | - | - | |
| 2165 | VEERA RAJU | GANDHINAGAR | RAYAGADA | 11.0 | 2 x 1.5 | JK Corp | Sandy Loam | 16.0 | 51.0 | - | - | - | - | - | |
| 2166 | VEERA RAJU | GANDHINAGAR | RAYAGADA | 11.0 | 2 x 1.5 | JK Corp | Sandy Loam | 16.0 | 52.0 | - | - | - | - | - | |
| 2167 | VEERA RAJU | GANDHINAGAR | RAYAGADA | 11.0 | 2 x 1.5 | JK Corp | Sandy Loam | 16.0 | 60.0 | - | - | - | - | - | |
| 2168 | ANNA MAJI ULAKA | RAMCHANDRAPUR | RAYAGADA | 3.0 | 1.5 x 1.5 | JK Corp | Sandy | 22.3 | 60.0 | 8.2 | 2.9 | 08.01.2001 | 3.7 | 10.0 | ✓ |
| 2169 | BAGHBANAS BHAGABAN | SARGIGUDA | RAYAGADA | 3.0 | 1.5 x 1.5 | JK Corp | Sandy | 22.8 | 67.0 | 6.6 | 2.6 | 08.01.2001 | 3.8 | 11.2 | ✓ |
| 2170 | BAGHBANAS BHAGABAN | SARGIGUDA | RAYAGADA | 3.0 | 1.5 x 1.5 | JK Corp | Sandy | 24.0 | 79.0 | 10.7 | 4.0 | 08.01.2001 | 4.0 | 13.2 | ✓ |
| 2171 | SRINIVASA RAO M | RANIGUDA FARM | RAYAGADA | 3.5 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 44.5 | - | - | - | 2.3 | 7.4 | |
| 2172 | N MAHESH | BARIJHOLA | RAYAGADA | 12.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 46.0 | - | - | - | 4.0 | 7.7 | |
| 2173 | N MAHESH | BARIJHOLA | RAYAGADA | 12.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 41.5 | 4.7 | 2.0 | 10.01.2001 | 4.0 | 6.9 | ✓ |
| 2174 | N MAHESH | BARIJHOLA | RAYAGADA | 12.0 | 3 x 1.5 | JK Corp | Sandy Loam | 19.3 | 56.0 | 6.9 | 2.7 | 10.01.2001 | 4.8 | 9.3 | ✓ |
| 2175 | N MAHESH | BARIJHOLA | RAYAGADA | 12.0 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 37.0 | - | - | - | 3.5 | 6.2 | |
| 2176 | TUSHAR PATSANI | GIRINDA | KHURDA | 20.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.7 | 45.0 | 6.8 | 2.0 | 10.01.2001 | 4.4 | 7.5 | ✓ |
| 2177 | TUSHAR PATSANI | GIRINDA | KHURDA | 20.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.0 | 54.5 | 5.0 | 2.8 | 10.01.2001 | 4.5 | 9.1 | ✓ |
| 2178 | PURNA CH SENAPATI | KENDUGUDA | RAYAGADA | 10.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 14.0 | 48.5 | - | - | - | 2.0 | 8.1 | |
| 2179 | PURNA CH SENAPATI | KENDUGUDA | RAYAGADA | 10.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 16.0 | 43.5 | - | - | - | 2.3 | 7.3 | |
| 2180 | PURNA CH SENAPATI | KENDUGUDA | RAYAGADA | 10.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 15.0 | 44.0 | - | - | - | 2.1 | 7.3 | |
| 2181 | MALIA KHAMBAR | KALAMA | RAYAGADA | 10.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 14.0 | 35.5 | - | - | - | 2.0 | 5.9 | |
| 2182 | MALIA KHAMBAR | KALAMA | RAYAGADA | 30.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 16.0 | 56.0 | - | - | - | 2.3 | 9.3 | |
| 2183 | MALIA KHAMBAR | KALAMA | RAYAGADA | 30.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 14.0 | 53.5 | - | - | - | 2.0 | 8.9 | |
| 2184 | MALIA KHAMBAR | KALAMA | RAYAGADA | 30.0 | 1.5 x 1.5 | JK Corp | Sandy Loam | 15.0 | 43.0 | - | - | - | 2.1 | 7.2 | |
| 2185 | DINABANDHU BEHERA | B MANJARIGUDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 45.5 | - | - | - | 2.5 | 7.6 | |
| 2186 | DINABANDHU BEHERA | B MANJARIGUDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 56.0 | - | - | - | 2.5 | 9.3 | |
| 2187 | SUDARSAN SENAPATI | AMBABADI | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 51.5 | - | - | - | 2.5 | 8.6 | |
| 2188 | SUDARSAN SENAPATI | AMBABADI | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 53.5 | - | - | - | 2.5 | 8.9 | |
| 2189 | KARKARIA BHADRA | B MANJARIGUDA | RAYAGADA | 1.5 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 58.5 | - | - | - | 2.7 | 9.8 | |
| 2190 | KARKARIA BHADRA | B MANJARIGUDA | RAYAGADA | 1.5 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 49.5 | - | - | - | 2.5 | 8.3 | |
| 2191 | SRIRAMULU G | B MANJARIKUPPA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 10.0 | 27.5 | - | - | - | 1.7 | 4.6 | |
| 2192 | GOPINATH PATRO | RANIPINDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 37.0 | - | - | - | 2.5 | 6.2 | |
| 2193 | GOPINATH PATRO | RANIPINDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 40.0 | - | - | - | 2.5 | 6.7 | |
| 2194 | K.SAYAN PATRO | TELANGAPADAR | RAYAGADA | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 37.0 | - | - | - | 2.3 | 6.2 | |
| 2195 | K.SAYAN PATRO | TELANGAPADAR | RAYAGADA | 6.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 35.0 | - | - | - | 2.7 | 5.8 | |
| 2196 | ANADI PRADHANI | RANIGUDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 11.0 | 33.5 | - | - | - | 1.8 | 5.6 | |
| 2197 | ANADI PRADHANI | RANIGUDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 10.0 | 30.0 | - | - | - | 1.7 | 5.0 | |
| 2198 | ANADI PRADHANI | RANIGUDA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 10.0 | 33.0 | - | - | - | 1.7 | 5.5 | |
| 2199 | MANMATHA PATRO | SARDAPUR | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 11.0 | 35.0 | - | - | - | 1.8 | 5.8 | |
| 2200 | VENKATA RAMANA M | RANIGUDA | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 12.0 | 45.0 | - | - | - | 2.4 | 7.5 | |
| 2201 | VENKATA RAMANA M | RANIGUDA | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 12.0 | 48.0 | - | - | - | 2.4 | 8.0 | |
| 2202 | VENKATA RAMANA M | RANIGUDA | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 12.0 | 42.0 | - | - | - | 2.4 | 7.0 | |

| CPT NO | FARMER'S NAME | VILLAGE | DISTRICT | AREA (Acres) | SPACING | SEEDLING SOURCE | SOIL TYPE | HT (m) | GBH (cm) | CR.HT (m) | CR.WH (m) | DATE OF FELLING | MAI - Ht (m) | MAI - GBH (cm) | SELECTED FOR COPPICING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2203 | VENKATA RAMANA M | RANIGUDA | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 48.5 | - | - | - | 2.8 | 8.1 | |
| 2204 | ARJUNA MANDANGI | ANUGURTHI | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 52.0 | - | - | - | 2.8 | 8.7 | |
| 2205 | ARJUNA MANDANGI | ANUGURTHI | RAYAGADA | 8.0 | 3 x 1.5 | JK Corp | Sandy Loam | 12.0 | 48.0 | - | - | - | 2.4 | 8.0 | |
| 2206 | BALARAM CH | AMATHI | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 10.0 | 35.0 | - | - | - | 1.4 | 5.8 | |
| 2207 | MADALA R CH | BARSINGH | RAYAGADA | 5.0 | 2 x 1.5 | JK Corp | Sandy | 16.0 | 50.0 | - | - | - | 2.3 | 8.3 | |
| 2208 | MADALA R CH | BARSINGH | RAYAGADA | 5.0 | 2 x 1.5 | JK Corp | Sandy | 16.0 | 57.0 | - | - | - | 2.3 | 9.5 | |
| 2209 | PRANO KRUSHNO SAHU | SIBOPADAR | RAYAGADA | 5.0 | 2 x 1.5 | JK Corp | Sandy | 14.0 | 51.0 | - | - | - | 2.0 | 8.5 | |
| 2210 | K SAYAN PATRO | TELANGAPADAR | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 54.0 | - | - | - | 2.1 | 9.0 | |
| 2211 | K SAYAN PATRO | TELANGAPADAR | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 46.0 | - | - | - | 2.3 | 7.7 | |
| 2212 | K NAGESHWAR RAO | RAYAGADA | RAYAGADA | 3.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 51.0 | - | - | - | 2.1 | 8.5 | |
| 2213 | SUBHADRA K | RAYAGADA | RAYAGADA | 2.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 46.0 | - | - | - | 2.3 | 7.7 | |
| 2214 | CHAITHANYA SABAR | LIMAMADA | RAYAGADA | 5.0 | 3 x 1.5 | JK Corp | Sandy Loam | 18.0 | 57.0 | - | - | - | 2.6 | 9.5 | |
| 2215 | CHAITHANYA SABAR | LIMAMADA | RAYAGADA | 5.0 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 44.5 | - | - | - | 2.0 | 7.4 | |
| 2216 | ORIYA GOMANGO | TEMBAGUDA | RAYAGADA | 5.0 | 3 x 1.5 | JK Corp | Sandy Loam | 15.0 | 41.0 | - | - | - | 2.1 | 6.8 | |
| 2217 | NARSIMHA MURTHY K | PALLIGUDA | RAYAGADA | 7.5 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 47.0 | - | - | - | 2.0 | 7.8 | |
| 2218 | G GOURI SHANKAR RAO | BISSAM CUTTACK | RAYAGADA | 7.5 | 3 x 1.5 | JK Corp | Sandy Loam | 14.0 | 53.0 | - | - | - | 2.0 | 8.8 | |
| 2219 | SANYASI KUMBHAR | KALMA | RAYAGADA | 7.0 | 3 x 1.5 | JK Corp | Sandy Loam | 17.0 | 50.0 | - | - | - | 2.4 | 8.3 | |
| 2220 | BASANTI HIKOKA | DEGALABUDUNI | RAYAGADA | 7.0 | 3 x 1.5 | JK Corp | Sandy Loam | 16.0 | 53.0 | - | - | - | 2.3 | 8.8 | |
| 2221 | LK CORP LTD | MUNIGUDA | RAYAGADA | 1.0 | 3.0x1.5 | JK Corp | Red Soil | 17.5 | 50.0 | 7.0 | 2.5 | 12.01.2001 | 2.5 | 9.4 | ✓ |
| 2222 | LK CORP LTD | MUNIGUDA | RAYAGADA | 1.0 | 3.0x1.5 | JK Corp | Red Soil | 18.0 | 48.0 | 7.0 | 2.6 | 12.01.2001 | 2.6 | 11.1 | ✓ |
| 2223 | P K MOHANTY | KORAPUT | KORAPUT | 6.0 | 2.0x2.0 | JK Corp | Red Soil | 18.2 | 58.0 | 6.0 | 2.3 | 14.01.2001 | 2.6 | 9.2 | ✓ |
| 2224 | B C JENA | CHAKARLIPUT | KORAPUT | 7.0 | 1.8x1.8 | JK Corp | Red Soil | 21.2 | 58.0 | 6.8 | 2.6 | 14.01.2001 | 3.0 | 9.2 | ✓ |
| 2225 | B C JENA | CHAKARLIPUT | KORAPUT | 7.0 | 1.8x1.8 | JK Corp | Red Soil | 17.2 | 58.0 | 7.6 | 2.6 | 14.01.2001 | 2.5 | 9.2 | ✓ |
| 2226 | BHASKARA B SOI | KUSUMGUDA | KORAPUT | 7.0 | 1.8x1.8 | JK Corp | Red Soil | 20.4 | 67.0 | 10.0 | 2.8 | 14.01.2001 | 2.9 | 10.6 | ✓ |
| 2227 | TARANI SWAIN | CHAKARLIPUT | KORAPUT | 3.0 | 2.0x2.0 | JK Corp | Red Soil | 20.0 | 57.0 | 5.5 | 2.7 | 14.01.2001 | 2.9 | 10.7 | ✓ |
| 2228 | SATYA BISOI | LAXMIPUR | KORAPUT | 3.0 | 1.8x1.8 | JK Corp | Red Soil | 18.7 | 60.0 | 6.5 | 2.8 | 14.01.2001 | 2.7 | 11.3 | ✓ |
| 2229 | CHITRASEN PRADHAN | KORAPUT | KORAPUT | 3.0 | 1.8x1.8 | JK Corp | Red Soil | 18.2 | 55.0 | 9.2 | 2.4 | 15.01.2001 | 2.6 | 10.3 | ✓ |
| 2230 | CHITRASEN PRADHAN | KORAPUT | KORAPUT | 3.0 | 1.8x1.8 | JK Corp | Red Soil | 20.0 | 59.0 | 7.2 | 2.5 | 15.01.2001 | 2.9 | 11.1 | ✓ |
| 2231 | RAMA CH GOUDA | GOUDA KANTA | KORAPUT | 3.0 | 1.8x1.8 | JK Corp | Red Soil | 18.4 | 56.5 | 9.0 | 3.2 | 15.01.2001 | 2.6 | 10.6 | ✓ |
| 2232 | BENUDHAR PATRA | DASMANTAPUR | KORAPUT | 4.0 | 2.5x1.5 | JK Corp | Red Soil | 20.3 | 57.0 | 7.5 | 2.6 | 15.01.2001 | 2.9 | 9.0 | ✓ |
| 2233 | KATIA MARI GANUDA | GANDA KANTI | KORAPUT | 4.0 | 2.5x1.5 | JK Corp | Red Soil | 19.8 | 58.0 | 7.7 | 2.4 | 15.01.2001 | 2.8 | 9.2 | ✓ |
| 2234 | MOHAN KHARA | KAKIRGUMA | KORAPUT | 4.0 | 2.5x1.5 | JK Corp | Red Soil | 20.9 | 65.0 | 7.5 | 3.5 | 15.01.2001 | 3.0 | 10.3 | ✓ |
| 2235 | GUPTESWAR BISOI | KUSUMGUDA | KORAPUT | 4.0 | 2.5x1.5 | JK Corp | Red Soil | 20.0 | 60.0 | 9.6 | 2.8 | 15.01.2001 | 2.9 | 9.5 | ✓ |
| 2236 | TRILOCHAN SINGH | BHAWANIPATNA | KALAHANDI | 6.0 | 1.5x1.5 | JK Corp | Sandy loam | 18.7 | 52.0 | 7.1 | 2.9 | 17.01.2001 | 2.7 | 8.2 | ✓ |
| 2237 | RAMA KRUSHNA NAIK | BISWANATHAPUR | KALAHANDI | 6.0 | 1.5x1.5 | JK Corp | Sandy loam | 16.7 | 56.0 | 10.0 | 2.4 | 17.01.2001 | 2.4 | 8.8 | ✓ |
| 2238 | RAMA KRUSHNA NAIK | BISWANATHAPUR | KALAHANDI | 6.0 | 1.5x1.5 | JK Corp | Sandy loam | 17.0 | 53.0 | 10.0 | 2.7 | 17.01.2001 | 2.4 | 8.4 | ✓ |
| 2239 | TRILOCHAN SINGH | BHAWANIPATNA | KALAHANDI | 6.0 | 1.5x1.5 | JK Corp | Sandy loam | 18.3 | 58.0 | 8.0 | 3.0 | 17.01.2001 | 2.6 | 9.2 | ✓ |
| 2240 | PURUSOTHAM PRADHANI | BISWANATHAPUR | KALAHANDI | 6.0 | 1.5x1.5 | JK Corp | Sandy loam | 17.9 | 53.0 | 7.7 | 2.8 | 17.01.2001 | 2.6 | 8.4 | ✓ |
| 2241 | PURUSOTHAM PRADHANI | BISWANATHAPUR | KALAHANDI | 10.0 | 1.75x1.75 | JK Corp | Sandy loam | 16.4 | 55.0 | 8.7 | 2.5 | 18.01.2001 | 2.3 | 10.3 | ✓ |
| 2242 | RAJU AGARWAL | BHAWANIPATNA | KALAHANDI | 18.3 | 2.0x1.5 | JK Corp | Sandy loam | 18.3 | 59.0 | 12.4 | 3.6 | 18.01.2001 | 2.6 | 11.1 | ✓ |
| 2243 | FAKIR PRADHANI | BISWANATHAPUR | KALAHANDI | 10.0 | 2.0x1.5 | JK Corp | Sandy loam | 17.2 | 57.0 | 9.4 | 3.3 | 18.01.2001 | 2.5 | 10.7 | ✓ |
| 2244 | KRUSHNA CH GHADDA | BISWANATHAPUR | KALAHANDI | 10.0 | 2.0x1.5 | JK Corp | Sandy loam | 18.0 | 59.0 | 12.0 | 4.0 | 18.01.2001 | 2.6 | 11.1 | ✓ |
| 2245 | KALASA BAG | BAGPUR | KALAHANDI | 10.0 | 3.0x1.5 | JK Corp | Sandy loam | 16.9 | 56.0 | 8.8 | 2.8 | 18.01.2001 | 2.4 | 10.5 | ✓ |
| 2246 | HEMSAGAR MAJHI | BAGPUR | KALAHANDI | 10.0 | 3.0x1.5 | JK Corp | Sandy loam | 18.8 | 56.0 | 11.6 | 4.2 | 18.01.2001 | 2.7 | 10.5 | ✓ |
| 2247 | GANGADHAR KAR | JAGANATHPUR | KALAHANDI | 10.0 | 3.0x1.5 | JK Corp | Sandy loam | 18.5 | 69.0 | 11.6 | 3.7 | 18.01.2001 | 2.6 | 12.9 | ✓ |
| 2248 | KAMAL PANSARI | RADHARANI PADA | BOLANGIR | 5.0 | 2.0x2.0 | Local | Sandy loam | 19.6 | 71.0 | 11.7 | 3.3 | 21.01.2001 | 2.8 | 11.2 | ✓ |
| 2249 | SURESH GAHIR | BELGAON | BOLANGIR | 5.0 | 2.0x2.0 | Local | Sandy loam | 19.5 | 73.5 | 10.3 | 2.3 | 21.01.2001 | 2.8 | 11.6 | ✓ |
| 2250 | G VEERA RAJU | BIRNARAYANPUR | RAYAGADA | 12.0 | 1.5x1.5 | JK Corp | Sandy loam | 23.9 | 57.0 | 12.4 | 2.7 | 03.02.2001 | 3.4 | 9.0 | ✓ |
| 2251 | G VEERA RAJU | BIRNARAYANPUR | RAYAGADA | 12.0 | 1.5x1.6 | JK Corp | Sandy loam | 22.7 | 64.5 | 11.3 | 3.0 | 03.02.2002 | 3.2 | 10.2 | ✓ |
| 2252 | BASARI MUNDA | BADAPANGIDI | KORAPUT | 2.0 | 1.85x1.85 | Local | Red Soil | 18.2 | 50.0 | 8.1 | 2.7 | 14.02.2001 | 2.6 | 9.4 | ✓ |
| 2253 | PUSIKA SIRIMAJHI | BANGANA | KORAPUT | 2.0 | 1.85x1.85 | Local | Red Soil | 17.3 | 53.0 | 8.9 | 2.8 | 14.02.2001 | 2.5 | 9.9 | ✓ |
| 2254 | NETRAMANI SAHOO | PODAGADA | KORAPUT | 2.0 | 1.5x1.5 | Local | Red Soil | 19.5 | 58.5 | 9.2 | 3.1 | 14.02.2001 | 2.8 | 9.2 | ✓ |

| CPT NO | FARMER'S NAME | VILLAGE | DISTRICT | AREA (Acres) | SPACING | SEEDLING SOURCE | SOIL TYPE | HT (m) | GBH (cm) | CR.HT (m) | CR.WH (m) | DATE OF FELLING | MAI - Ht (m) | MAI - GBH (cm) | SELECTED FOR COPPICING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2255 | BALYAKRUSHNA NAYAK | GOUDAGUDA | KORAPUT | 2.0 | 1.5x1.5 | Local | Red Soil | 19.4 | 53.0 | 8.4 | 2.3 | 14.02.2001 | 2.8 | 8.4 | ✓ |
| 2256 | B NARAYAN PANDA | GUDIALI | GANJAM | 1.5 | 1.25x1.25 | Local | Sandy loam | 14.0 | 44.0 | 6.2 | 2.4 | 02.03.2001 | 2.0 | 8.3 | ✓ |
| 2257 | B NARAYAN PANDA | GUDIALI | GANJAM | 1.5 | 1.25x1.25 | Local | Sandy loam | 12.3 | 47.0 | 6.5 | 2.8 | 02.03.2001 | 1.8 | 8.8 | ✓ |
| 2258 | C HIGH SCHOOL | BABANPUR | GANJAM | 12.0 | 3x4 | Local | Sandy | 14.3 | 51.0 | 7.0 | 3.8 | 02.03.2001 | 2.0 | 8.1 | ✓ |
| 2259 | HARIHAR PRADHAN | BIPILING | GANJAM | 12.0 | 3x4 | Local | Sandy | 14.2 | 52.0 | 7.1 | 2.4 | 02.03.2001 | 2.0 | 8.2 | ✓ |
| 2260 | SRINU REDDY | BIPILING | GANJAM | 12.0 | 3x5 | Local | Sandy | 14.9 | 61.5 | 9.1 | 2.7 | 02.03.2001 | 2.1 | 9.7 | ✓ |
| 2261 | NARAYAN PANDA | BIPILING | GANJAM | 2.0 | 1.5x1.5 | Local | Rocky | 11.6 | 35.5 | 6.0 | 2.6 | 03.03.2001 | 1.7 | 6.7 | ✓ |
| 2262 | KASI NATH SWAIN | MALIKESWAR | GANJAM | 2.0 | 1.5x1.5 | Local | Rocky | 12.0 | 37.0 | 6.7 | 2.3 | 03.03.2001 | 1.7 | 6.9 | ✓ |
| 2263 | S MOHAPATRA | BEDHA | GANJAM | 2.0 | 3x2 | Local | Sandy | 16.5 | 52.0 | 9.5 | 2.6 | 03.03.2001 | 2.4 | 8.2 | ✓ |
| 2264 | BHASKAR CHOUDHURY | BIPILING | GANJAM | 2.0 | 3x2 | Local | Sandy | 15.4 | 55.5 | 9.0 | 2.8 | 03.03.2001 | 2.2 | 8.8 | ✓ |
| 2265 | BIKARI CH. PANIGRAHI | BIPILING | GANJAM | 2.0 | 3x2 | Local | Sandy | 13.9 | 53.0 | 8.1 | 2.7 | 03.03.2001 | 2.0 | 8.4 | ✓ |
| 2266 | PADMACHARAN SAHU | MANGALA JODI | KHURDA | 2.0 | 2x1.5 | Local | Sandy loam | 14.0 | 38.0 | 7.5 | 3.5 | 04.03.2001 | 2.0 | 10.6 | ✓ |
| 2267 | CHANDRAMANI PRADHAN | ADIAPADA | KHURDA | 2.0 | 2x1.5 | Local | Sandy loam | 13.0 | 37.0 | 8.2 | 3.1 | 04.03.2001 | 1.9 | 10.3 | ✓ |
| 2268 | LAXMIDHAR JAYSINGH | KERENDA TANGI | NAYAGARH | 2.0 | 2x1.5 | Local | Sandy loam | 12.2 | 30.5 | 4.2 | 1.6 | 04.03.2001 | 1.7 | 8.5 | ✓ |
| 2269 | MADHUSUDAN KHALASINGH | BRUNDABANBIHARIPUR | NAYAGARH | 2.0 | 2x1.5 | Local | Sandy loam | 11.3 | 30.0 | 3.0 | 1.8 | 04.03.2001 | 1.6 | 8.4 | ✓ |
| 2270 | RAMAKANTA PRADHAN | KERANDATANGI | NAYAGARH | 2.0 | 2x1.5 | Local | Sandy loam | 10.7 | 30.0 | 4.5 | 2.5 | 04.03.2001 | 1.5 | 8.4 | ✓ |
| 2271 | PANCHU PRADHAN | KERANDATANGI | NAYAGARH | 2.0 | 2x1.5 | Local | Sandy loam | 10.8 | 32.0 | 4.0 | 1.8 | 04.03.2001 | 1.5 | 8.9 | ✓ |
| 2272 | JK-CFO | RAYAGADA | RAYAGADA | 0.3 | 2x2 | JK Corp | Sandy loam | 21.8 | 65.0 | 7.5 | 3.4 | 09.04.2001 | 3.1 | 8.5 | ✓ |
| 2273 | JK-CFO | RAYAGADA | RAYAGADA | 0.3 | 2x2 | JK Corp | Sandy loam | 24.3 | 87.0 | 10.4 | 4.6 | 09.04.2001 | 3.5 | 11.3 | ✓ |
| 2274 | B SANKAR RAO | SIKARPAI | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 14.3 | 36.0 | 5.8 | 2.6 | 11.04.2001 | 2.0 | 10.0 | ✓ |
| 2275 | JK-TIC | GITIPODA | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 14.4 | 33.5 | 6.1 | 2.3 | 11.04.2001 | 2.1 | 9.3 | ✓ |
| 2276 | JK-TIC | GITIPODA | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 11.7 | 31.5 | 5.0 | 1.8 | 11.04.2001 | 1.7 | 8.8 | ✓ |
| 2277 | GANGU KORIA | BADAGUDA | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 13.6 | 36.0 | 6.7 | 2.6 | 11.04.2001 | 1.9 | 10.0 | ✓ |
| 2278 | K SANJEEV PATNAIK | SIKARIPAI | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 13.2 | 34.0 | 6.7 | 2.3 | 11.04.2001 | 1.9 | 9.5 | ✓ |
| 2279 | KARAKA SUBARI | DUNDULI | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 11.2 | 33.0 | 4.5 | 2.2 | 11.04.2001 | 1.6 | 9.2 | ✓ |
| 2280 | KOCHIA TIRA | SIKARIPAI | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 13.4 | 41.5 | 7.8 | 2.4 | 12.04.2001 | 1.9 | 11.6 | ✓ |
| 2281 | MINAYAKA APPANA | TALASAJA | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 14.0 | 48.0 | 6.6 | 2.9 | 12.04.2001 | 2.0 | 13.4 | ✓ |
| 2282 | I RAMACHANDRA RAO | KALYANSINGHPUR | RAYAGADA | 2.0 | 3x2 | JK Corp | Sandy loam | 14.4 | 45.0 | 7.8 | 2.4 | 12.04.2001 | 2.1 | 12.6 | ✓ |

## FIGURE - 9:- EXPECTED GAINS FROM THE SELECTION OF EUCALYPTUS CPTs

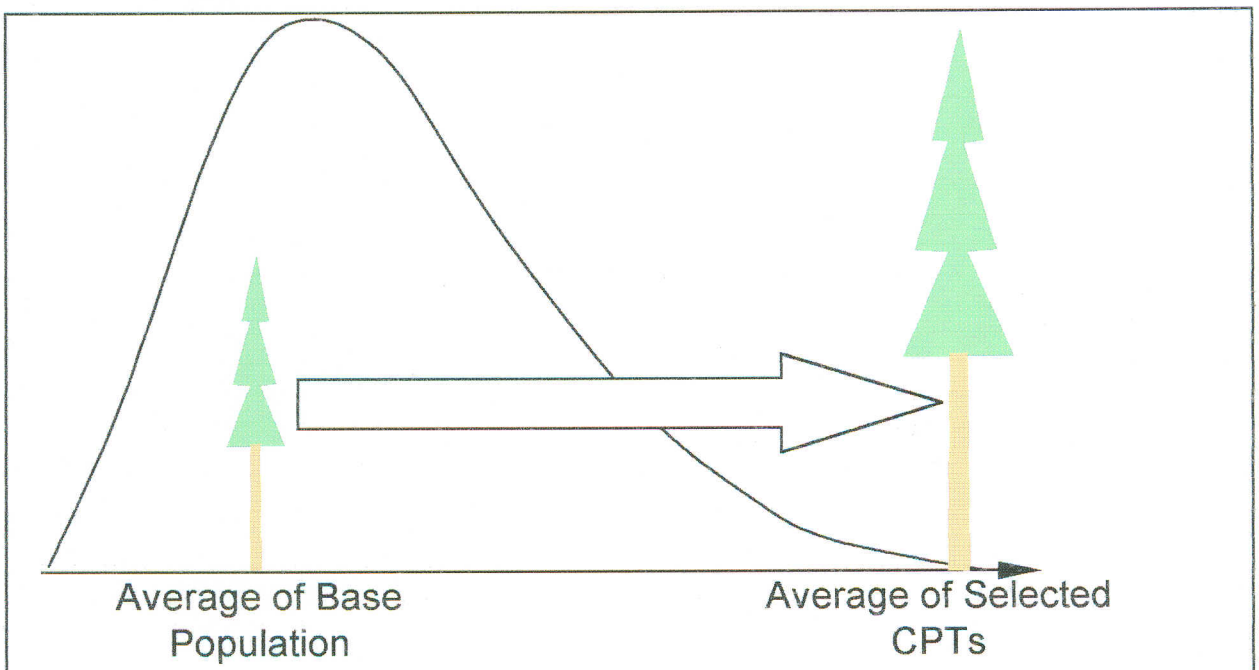



| | Height | GBH |
|---|---|---|
| Base Population Average | 12.2 | 29.4 |
| Established Clones CPTs Average | 19.6 | 57.2 |
| Expected Improvement over Base Population | 61% | 95% |

TABLE - 2:- DETAILS OF CPTs SELECTED (*CASUARINA*)

| CPT NO | FARMER'S NAME | VILLAGE | DISTRICT | AREA (Acres) | SPACING | SEEDLING SOURCE | SOIL TYPE | HT (m) | GBH (cm) | CR.HT (m) | CR.WH (m) | DATE OF FELLING | MAI - Ht (m) | MAI - GBH (cm) | SELECTED FOR ROOTING | NEW CPT NO. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1001 | V AKKAIAH | ETCHERLA | SRIKAKULUM | 1.0 | 1.5X1.5 | Local | Sandy, | 16.0 | 48.0 | 10.0 | 5.0 | | 2.3 | 8.0 | | |
| 1002 | JANAKIRAMA RAJU | DARMAVARAM | SRIKAKULUM | 5.0 | 1.5X1.5 | Local | Sandy | 19.7 | 54.0 | 13.1 | 4.0 | 15.12.2000 | 2.8 | 9.0 | ✓ | 1001 |
| 1003 | D SRINIVASA CHOUDHURY | GOPINAGAR | SRIKAKULUM | 10.0 | 1.5X1.5 | Local | Sandy | 18.0 | 53.0 | 12.0 | 6.0 | | 2.6 | 8.8 | | |
| 1004 | A APPALA RAJU | ALAKA N.PURAM | SRIKAKULUM | 6.0 | 1.5X1.5 | Local | Sandy | 20.9 | 57.0 | 13.7 | 6.5 | 16.12.2000 | 3.0 | 9.5 | ✓ | 1002 |
| 1005 | S SUBBA RAJU | S.SUBBA RAJU | SRIKAKULUM | 12.0 | 1.5X1.5 | Local | Sandy | 19.8 | 66.0 | 11.7 | 5.2 | 15.12.2000 | 2.8 | 11.0 | ✓ | 1003 |
| 1006 | D SURYAM | DHARAPUVANIPETA | SRIKAKULUM | 15.0 | 1.5X1.5 | Local | Sandy | 20.0 | 56.0 | 14.0 | 5.5 | 16.12.2000 | 2.9 | 9.3 | ✓ | 1004 |
| 1007 | D APPALA SURI | DHARAPUVANIPETA | SRIKAKULUM | 20.0 | 1.5X1.5 | Local | Sandy | 19.5 | 58.0 | 12.5 | 5.2 | 16.12.2000 | 2.8 | 9.7 | ✓ | 1005 |
| 1008 | D JOGULU | DHARAPUVANIPETA | SRIKAKULUM | 25.0 | 1.5X1.5 | Local | Sandy | 20.1 | 57.0 | 12.0 | 5.1 | 16.12.2000 | 2.9 | 9.5 | ✓ | 1006 |
| 1009 | D APPANNA | DHARAPUVANIPETA | SRIKAKULUM | 10.0 | 1.5X1.5 | Local | Sandy | 17.0 | 50.0 | 9.0 | 4.0 | | 2.4 | 8.3 | | |
| 1010 | K LAKSHMANA RAO | DOLAVANIPETA | SRIKAKULUM | 10.0 | 1.5X1.5 | Local | Sandy | 15.0 | 46.0 | 10.0 | 5.5 | | 2.1 | 7.7 | | |
| 1011 | IPPILI RAMAPPADU | E.RAVIVALASA | SRIKAKULUM | 10.0 | 1.5X1.5 | Local | Sandy | 15.0 | 46.0 | 11.0 | 6.0 | | 2.1 | 7.7 | | |
| 1012 | K NARAIMHAPPADU | E.RAVIVALASA | SRIKAKULUM | 8.0 | 1.5X1.5 | Local | Sandy | 16.0 | 49.0 | 8.0 | 2.0 | | 2.3 | 8.2 | | |
| 1013 | P RAMAKRISHNA | E.RAVIVALASA | SRIKAKULUM | 9.5 | 1.5X1.5 | Local | Sandy | 17.0 | 51.0 | 6.0 | 3.0 | | 2.4 | 8.5 | | |
| 1014 | K RAMMURTHY | CHOWDHANTAVALSA | VIZIANAGARAM | 3.5 | 1.5X1.5 | Local | Sandy | 17.5 | 52.0 | 11.0 | 4.0 | | 2.5 | 8.7 | | |
| 1015 | K SIMHACHALAM | PINNIVALASA | VIZIANAGARAM | 5.0 | 1.5X1.5 | Local | Sandy | 18.0 | 52.0 | 8.0 | 5.5 | | 2.6 | 8.7 | | |
| 1016 | A VENKATESWARLU | BHOGEPURAM | VIZIANAGARAM | 6.0 | 1.5X1.5 | Local | Sandy | 17.0 | 51.0 | 9.0 | 6.0 | | 2.4 | 8.5 | | |
| 1017 | P VENKETA RAMANA | MANJURU | VIZIANAGARAM | 6.0 | 1.5X1.5 | Local | Sandy | 18.0 | 53.0 | 15.0 | 4.5 | | 2.6 | 8.8 | | |
| 1018 | P RAMBABU | VOLAMGERU | VIZIANAGARAM | 5.5 | 1.5X1.5 | Local | Sandy | 18.0 | 52.0 | 7.0 | 5.5 | | 2.6 | 8.7 | | |
| 1019 | T GURUNAIDU | RALLAVAKA | VIZIANAGARAM | 2.5 | 1.5X1.5 | Local | Sandy | 16.0 | 50.0 | 9.0 | 3.5 | | 2.3 | 8.3 | | |
| 1020 | T SURYANARAYANA | RELLIVAKA | VIZIANAGARAM | 3.5 | 1.5X1.5 | Local | Sandy | 19.0 | 55.0 | 12.0 | 2.0 | | 2.7 | 9.2 | | |
| 1021 | G APPALA NAIDU | ROLLAVAKE | VIZIANAGARAM | 4.5 | 1.5X1.5 | Local | Sandy | 15.0 | 47.0 | 14.0 | 6.0 | | 2.1 | 7.8 | | |
| 1022 | S PAIDITALLI | ROLLAVAKE | VIZIANAGARAM | 5.6 | 1.5X1.5 | Local | Sandy | 16.0 | 51.0 | 13.0 | 4.0 | | 2.3 | 8.5 | | |
| 1023 | N RAMACHANDRA RAO | BONDAPALLI | VIZIANAGARAM | 8.0 | 1.5X1.5 | Local | Sandy | 17.0 | 53.0 | 14.0 | 4.5 | | 2.4 | 8.8 | | |
| 1024 | T ADINARAYANA | BONDAPALLI | VIZIANAGARAM | 10.0 | 1.5X1.5 | Local | Sandy | 12.0 | 45.0 | 16.0 | 5.0 | | 1.7 | 7.5 | | |
| 1025 | T PYDIBABU | ROLLAVAKE | VIZIANAGARAM | 16.0 | 1.5X1.5 | Local | Sandy | 14.0 | 47.0 | 12.0 | 4.5 | | 2.0 | 7.8 | | |
| 1026 | CH NARASIMHA VARMA | ALAKA N PURAM | VIZIANAGARAM | 2.6 | 1.5X1.5 | Local | Sandy | 14.0 | 46.0 | 11.0 | 3.5 | | 2.0 | 7.7 | | |
| 1027 | MVS SAIBABU | BOBBILI | VIZIANAGARAM | 4.5 | 1.5X1.5 | Local | Sandy | 15.0 | 47.0 | 9.0 | 4.5 | | 2.1 | 7.8 | | |
| 1028 | A RAMULU | BOBBILI | VIZIANAGARAM | 5.5 | 1.5X1.5 | Local | Sandy | 15.0 | 47.0 | 8.0 | 5.2 | | 2.1 | 7.8 | | |
| 1029 | A RAMU NAIDU | K.K.VALASA | VIZIANAGARAM | 6.0 | 1.5X1.5 | Local | Sandy | 14.0 | 42.0 | 10.0 | 5.1 | | 2.0 | 7.0 | | |
| 1030 | V RAMI REDDY | KOTHURU | VISAKHAPATNAM | 8.0 | 1.5X1.5 | Local | Sandy | 13.0 | 42.0 | 7.0 | 5.3 | | 1.9 | 7.0 | | |
| 1031 | V APPALANARSAYA | KOTHURU | VISAKHAPATNAM | 13.0 | 1.5X1.5 | Local | Sandy | 19.0 | 55.0 | 6.0 | 5.5 | | 2.7 | 9.2 | | |
| 1032 | K PRASAD RAO | PEDDIPALEM | VISAKHAPATNAM | 10.0 | 1.5X1.5 | Local | Sandy | 19.0 | 58.0 | 9.0 | 6.0 | | 2.7 | 9.7 | | |
| 1033 | BORA YELLAYYAMMA | YELLAKI | VISAKHAPATNAM | 10.0 | 1.5X1.5 | Local | Sandy | 18.0 | 54.0 | 8.0 | 4.8 | | 2.6 | 9.0 | | |
| 1034 | A APPA RAO | BHEEMILI | VISAKHAPATNAM | 8.0 | 1.5X1.5 | Local | Sandy | 22.0 | 60.0 | 12.0 | 4.6 | | 3.1 | 10.0 | | |
| 1035 | SHEK SJAHAR | BHEEMILI | VISAKHAPATNAM | 9.0 | 1.5X1.5 | Local | Sandy | 22.0 | 60.0 | 11.0 | 5.0 | | 3.1 | 10.0 | | |
| 1036 | M D GOVU | BHEEMILI | VISAKHAPATNAM | 18.0 | 1.5X1.5 | Local | Sandy | 25.0 | 70.0 | 8.0 | 5.2 | | 3.6 | 11.7 | | |
| 1037 | B APPA RAO | CHILLARETA | VISAKHAPATNAM | 20.0 | 1.5X1.5 | Local | Sandy | 24.0 | 68.0 | 14.0 | 4.0 | | 3.4 | 11.3 | | |
| 1038 | PALIVADA RAMANA | LINGANARETA | VISAKHAPATNAM | 1.0 | 1.5X1.5 | Local | Sandy | 22.0 | 61.0 | 12.0 | 3.0 | | 3.1 | 10.2 | | |
| 1039 | PALIVADA RAMU | APPALA SWAMY | VISAKHAPATNAM | 10.0 | 1.5X1.5 | Local | Sandy | 25.0 | 71.0 | 15.0 | 5.0 | 19.12.2000 | 3.6 | 11.8 | ✓ | 1007 |
| 1040 | GANTETI RAJI NAIDU | LINGANARETA | VISAKHAPATNAM | 20.0 | 1.5X1.5 | Local | Sandy | 18.7 | 75.0 | 7.9 | 5.9 | 18.12.2000 | 2.7 | 12.5 | ✓ | 1008 |
| 1041 | PINNINTI RAMU | LINGANARETA | VISAKHAPATNAM | 40.0 | 1.5X1.5 | Local | Sandy | 20.0 | 68.0 | 13.0 | 6.0 | | 2.9 | 11.3 | | |
| 1042 | SUNKARI APPALA NAIDU | LINGANARETA | VISAKHAPATNAM | 18.0 | 1.5X1.5 | Local | Sandy | 19.0 | 63.0 | 8.0 | 5.5 | | 2.7 | 10.5 | | |
| 1043 | R.N. APPA RAO | N. NAIDUPETTA | VISAKHAPATNAM | 15.5 | 1.5X1.5 | Local | Sandy | 22.0 | 60.0 | 14.0 | 4.3 | | 3.1 | 10.0 | | |
| 1044 | B NARASIMHULU | CHILLAPETA | VISAKHAPATNAM | 26.0 | 1.5X1.5 | Local | Sandy | 27.0 | 73.0 | 12.0 | 5.0 | 19.12.2000 | 3.9 | 12.2 | ✓ | 1009 |
| 1045 | R.KRISHNA RAO | NAGARAPALEM | VISAKHAPATNAM | 5.5 | 1.5X1.5 | Local | Sandy | 25.2 | 73.0 | 5.2 | 5.2 | 18.12.2000 | 3.6 | 12.2 | ✓ | 1010 |
| 1046 | N.VENKATA RAO | TATITURN | VISAKHAPATNAM | 3.5 | 1.5X1.5 | Local | Sandy | 23.0 | 70.0 | 12.0 | 5.0 | | 3.3 | 11.7 | | |
| 1047 | MEESALA RAJA NAIDU | YAMALAVALASA | VISAKHAPATNAM | 4.0 | 1.5X1.5 | Local | Sandy | 22.0 | 63.0 | 7.0 | 4.0 | | 3.1 | 10.5 | | |
| 1048 | Y.APPALANAIDU | KANAMARI | VISAKHAPATNAM | 5.0 | 1.5X1.0 | Local | sandy loam | 18.0 | 46.0 | 8.1 | 3.0 | 21.12.2000 | 2.6 | 7.7 | ✓ | 1011 |
| 1049 | K.PRASADA RAO | PEDDIPALEM | VISAKHAPATNAM | 9.0 | 1.5X1.0 | Local | sandy loam | 17.6 | 45.0 | 7.6 | 3.3 | 21.12.2000 | 2.5 | 7.5 | ✓ | 1012 |
| 1050 | B YELLAMMA | VELLANKI | VISAKHAPATNAM | 10.0 | 1.5X1.0 | Local | sandy loam | 19.0 | 43.0 | 12.5 | 3.6 | 21.12.2000 | 2.7 | 7.2 | ✓ | 1013 |
| 1051 | B SURYANARAYANA | CHILLAPETA | VISAKHAPATNAM | 6.0 | 1.5X1.0 | Local | sandy loam | 17.0 | 46.0 | 9.0 | 3.5 | 21.12.2000 | 2.4 | 7.7 | ✓ | 1014 |
| 1052 | K KANAKAYYA | CHILLAPETA | VISAKHAPATNAM | 8.0 | 1.5X1.5 | Local | Sandy | 15.5 | 48.0 | 3.5 | 2.5 | 04.06.2001 | 2.2 | 8.0 | ✓ | 1015 |
| 1053 | JK CORP LTD, AGURU | AGURU | RAYAGADA | 1.0 | 1.5X1.5 | Local | sandy loam | 20.2 | 47.5 | 15.0 | 3.0 | 16.06.2001 | 2.9 | 7.9 | ✓ | 1016 |
| 1054 | JK CORP LTD, AGURU | AGURU | RAYAGADA | 1 | 1.5X1.5 | Local | sandy loam | 21.1 | 58 | 14.2 | 3.5 | 16.06.2001 | 3.0 | 9.7 | ✓ | 1017 |

## FIGURE - 10:- EXPECTED GAINS FROM THE SELECTION OF CASUARINA CPTs




| | Height | GBH |
|---|---|---|
| Base Population Average | 11.84 | 28.33 |
| Established Clones CPTs Average | 19.6 | 57.3 |
| Expected Improvement over Base Population | 66% | 102% |

TABLE - 3:- CANDIDATE PLUS TREE - COPPICING & ROOTING BEHAVIOUR EARLY TESTS

| SL NO | CPT NO. | DATE OF COPPICEING | Sprouted/ Not Sprouted | No. of days for coppice harvest | Date | No. of Coppice | No. of cuttings | No. of Plants | No. of day in MC | Rooting % | Established in CTA/CMA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 2101 | 5/20/00 | ✓ | 46 | 7/5/00 | 20 | 95 | 19 | 42 | 20% | |
| 2 | 2102 | 5/20/00 | ✓ | 46 | 7/5/00 | 18 | 75 | 70 | 40 | 93% | ✓ |
| 3 | 2103 | 5/20/00 | × | | | | | | | | |
| 4 | 2104 | 5/20/00 | ✓ | 46 | 7/5/00 | 35 | 180 | 162 | 39 | 90% | ✓ |
| 5 | 2105 | 5/21/00 | ✓ | 45 | 7/5/00 | 20 | 105 | 95 | 39 | 90% | ✓ |
| 6 | 2106 | 5/21/00 | ✓ | 45 | 7/5/00 | 20 | 120 | 50 | 39 | 42% | ✓ |
| 7 | 2107 | 5/21/00 | ✓ | 45 | 7/5/00 | 50 | 190 | 178 | 39 | 94% | ✓ |
| 8 | 2108 | 5/21/00 | ✓ | 45 | 7/5/00 | 10 | 80 | 36 | 39 | 45% | ✓ |
| 9 | 2109 | 5/22/00 | ✓ | 44 | 7/5/00 | 15 | 90 | 75 | 39 | 83% | ✓ |
| 10 | 2110 | 5/22/00 | ✓ | 44 | 7/5/00 | 15 | 75 | 68 | 39 | 91% | ✓ |
| 11 | 2111 | 5/22/00 | ✓ | 44 | 7/5/00 | 35 | 140 | 80 | 39 | 57% | ✓ |
| 12 | 2112 | 5/22/00 | ✓ | 44 | 7/5/00 | 10 | 55 | 11 | 40 | 20% | |
| 13 | 2113 | 5/23/00 | ✓ | 43 | 7/5/00 | 35 | 180 | 118 | 38 | 66% | ✓ |
| 14 | 2114 | 5/23/00 | × | | | | | | | | |
| 15 | 2115 | 5/23/00 | ✓ | 43 | 7/5/00 | 38 | 180 | 165 | 38 | 92% | ✓ |
| 16 | 2116 | 5/23/00 | ✓ | 43 | 7/5/00 | 36 | 150 | 104 | 38 | 69% | ✓ |
| 17 | 2117 | 5/27/00 | ✓ | 39 | 7/5/00 | 10 | 70 | 21 | 40 | 30% | |
| 18 | 2118 | 5/27/00 | ✓ | 44 | 7/10/00 | 28 | 150 | 105 | 37 | 70% | ✓ |
| 19 | 2119 | 5/27/00 | ✓ | 44 | 7/10/00 | 29 | 140 | 75 | 37 | 54% | ✓ |
| 20 | 2120 | 5/27/00 | ✓ | 44 | 7/10/00 | 18 | 150 | 25 | 38 | 17% | |
| 21 | 2121 | 5/27/00 | ✓ | 44 | 7/10/00 | 25 | 75 | 45 | 38 | 60% | ✓ |
| 22 | 2122 | 5/28/00 | ✓ | 43 | 7/10/00 | 10 | 50 | 32 | 38 | 64% | ✓ |
| 23 | 2123 | 5/28/00 | ✓ | 43 | 7/10/00 | 10 | 50 | 35 | 38 | 70% | ✓ |
| 24 | 2124 | 5/28/00 | ✓ | 43 | 7/10/00 | 15 | 125 | 65 | 38 | 52% | ✓ |
| 25 | 2125 | 5/28/00 | ✓ | 43 | 7/10/00 | 30 | 125 | 20 | 40 | 16% | |
| 26 | 2126 | 5/28/00 | ✓ | 43 | 7/10/00 | 16 | 65 | 35 | 37 | 54% | ✓ |
| 27 | 2127 | 5/28/00 | ✓ | 43 | 7/10/00 | 10 | 45 | 12 | 41 | 27% | |
| 28 | 2128 | 5/28/00 | ✓ | 48 | 7/15/00 | 48 | 130 | 20 | 41 | 15% | |
| 29 | 2129 | 5/28/00 | ✓ | 48 | 7/15/00 | 35 | 175 | 125 | 37 | 71% | ✓ |
| 30 | 2130 | 5/28/00 | ✓ | 48 | 7/15/00 | 10 | 60 | 35 | 37 | 58% | ✓ |
| 31 | 2131 | 5/28/00 | ✓ | 48 | 7/15/00 | 8 | 55 | 30 | 37 | 55% | ✓ |
| 32 | 2132 | 5/28/00 | × | | | | | | | | |
| 33 | 2133 | 5/28/00 | ✓ | 48 | 7/15/00 | 16 | 105 | 45 | 38 | 43% | ✓ |
| 34 | 2134 | 5/28/00 | × | | | | | | | | |
| 35 | 2135 | 5/28/00 | × | | | | | | | | |
| 36 | 2136 | 5/24/00 | ✓ | 57 | 7/20/00 | 13 | 70 | 14 | 45 | 20% | |

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| SL NO | CPT NO. | DATE OF COPPICEING | Sprouted/ Not Sprouted | No. of days for coppice harvest | Date | No. of Coppice | No. of cuttings | No. of Plants | No. of day in MC | Rooting % | Established in CTA/CMA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 37 | 2137 | 5/24/00 | ✓ | 57 | 7/20/00 | 12 | 70 | 13 | 45 | 19% | |
| 38 | 2138 | 5/24/00 | ✓ | 57 | 7/20/00 | 14 | 72 | 11 | 45 | 15% | |
| 39 | 2139 | 5/24/00 | × | | | | | | | | |
| 40 | 2140 | 5/24/00 | ✓ | 57 | 7/20/00 | 6 | 93 | 12 | 45 | 13% | |
| 41 | 2141 | 5/25/00 | ✓ | 56 | 7/20/00 | 12 | 95 | 5 | 45 | 5% | |
| 42 | 2142 | 5/25/00 | × | | | | | | | | |
| 43 | 2143 | 5/25/00 | × | | | | | | | | |
| 44 | 2144 | 5/25/00 | ✓ | 56 | 7/20/00 | 30 | 105 | 21 | 45 | 20% | |
| 45 | 2145 | 5/25/00 | ✓ | 56 | 7/20/00 | 15 | 84 | 20 | 45 | 24% | |
| 46 | 2146 | 5/26/00 | ✓ | 53 | 7/18/00 | 18 | 38 | 6 | 45 | 16% | |
| 47 | 2147 | 5/26/00 | × | | | | | | | | |
| 48 | 2148 | 5/26/00 | × | | | | | | | | |
| 49 | 2149 | 5/26/00 | ✓ | 53 | 7/18/00 | 25 | 55 | 10 | 45 | 18% | |
| 50 | 2150 | 5/26/00 | ✓ | 53 | 7/18/00 | 4 | 31 | 5 | 45 | 16% | |
| 51 | 2151 | 1/2/01 | ✓ | 64 | 3/7/01 | 36 | 175 | 145 | 37 | 83% | ✓ |
| 52 | 2152 | 1/2/01 | × | | | | | | | | |
| 53 | 2153 | 1/2/01 | ✓ | 63 | 3/6/01 | 20 | 105 | 20 | 37 | 19% | |
| 54 | 2154 | 1/5/01 | ✓ | 61 | 3/7/01 | 40 | 160 | 84 | 37 | 53% | ✓ |
| 55 | 2155 | 1/5/01 | ✓ | 60 | 3/6/01 | 30 | 105 | 45 | 37 | 43% | ✓ |
| 56 | 2156 | 1/5/01 | ✓ | 60 | 3/6/01 | 40 | 105 | 81 | 37 | 77% | ✓ |
| 57 | 2159 | 1/5/01 | ✓ | 60 | 3/6/01 | 35 | 150 | 125 | 38 | 83% | ✓ |
| 58 | 2160 | 1/5/01 | ✓ | 60 | 3/6/01 | 30 | 150 | 115 | 38 | 77% | ✓ |
| 59 | 2161 | 1/6/01 | ✓ | 59 | 3/6/01 | 30 | 110 | 75 | 38 | 68% | ✓ |
| 60 | 2162 | 1/6/01 | ✓ | 59 | 3/6/01 | 45 | 160 | 105 | 38 | 66% | ✓ |
| 61 | 2168 | 1/8/01 | × | | | | | | | | |
| 62 | 2169 | 1/8/01 | × | | | | | | | | |
| 63 | 2170 | 1/8/01 | ✓ | 65 | 3/14/01 | 40 | 140 | 15 | 45 | 11% | |
| 64 | 2173 | 1/10/01 | × | | | | | | | | |
| 65 | 2174 | 1/10/01 | ✓ | 63 | 3/14/01 | 35 | 160 | 125 | 39 | 78% | ✓ |
| 66 | 2176 | 1/10/01 | ✓ | 63 | 3/14/01 | 25 | 80 | 41 | 39 | 51% | ✓ |
| 67 | 2177 | 1/10/01 | ✓ | 63 | 3/14/01 | 28 | 90 | 73 | 39 | 81% | ✓ |
| 68 | 2221 | 1/12/01 | ✓ | 64 | 3/17/01 | 18 | 96 | 52 | 37 | 54% | ✓ |
| 69 | 2222 | 1/17/01 | ✓ | 59 | 3/17/01 | 35 | 160 | 145 | 38 | 91% | ✓ |
| 70 | 2223 | 1/14/01 | ✓ | 51 | 3/6/01 | 12 | 78 | 53 | 38 | 68% | ✓ |
| 71 | 2224 | 1/14/01 | ✓ | 51 | 3/6/01 | 12 | 56 | 6 | 45 | 11% | |
| 72 | 2225 | 1/14/01 | ✓ | 51 | 3/6/01 | 25 | 70 | 38 | 38 | 54% | ✓ |
| 73 | 2226 | 1/14/01 | ✓ | 51 | 3/6/01 | 18 | 88 | 13 | 45 | 15% | |
| 74 | 2227 | 1/14/01 | ✓ | 51 | 3/6/01 | 15 | 95 | 16 | 45 | 17% | |
| 75 | 2228 | 1/14/01 | ✓ | 51 | 3/6/01 | 10 | 45 | 11 | 45 | 24% | |

| SL NO | CPT NO. | DATE OF COPPICEING | Sprouted/ Not Sprouted | No. of days for coppice harvest | Date | No. of Coppice | No. of cuttings | No. of Plants | No. of day in MC | Rooting % | Established in CTA/CMA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | 2229 | 1/15/01 | ✓ | 50 | 3/6/01 | 10 | 35 | 5 | 45 | 14% | |
| 77 | 2230 | 1/15/01 | ✓ | 50 | 3/6/01 | 14 | 70 | 53 | 38 | 76% | ✓ |
| 78 | 2231 | 1/15/01 | ✓ | 50 | 3/6/01 | 30 | 42 | 5 | 45 | 12% | |
| 79 | 2232 | 1/15/01 | ✓ | 62 | 3/18/01 | 10 | 44 | 3 | 45 | 7% | |
| 80 | 2233 | 1/15/01 | ✓ | 62 | 3/18/01 | 30 | 122 | 18 | 45 | 15% | |
| 81 | 2234 | 1/15/01 | ✓ | 62 | 3/18/01 | 18 | 105 | 55 | 37 | 52% | ✓ |
| 82 | 2235 | 1/15/01 | ✓ | 62 | 3/18/01 | 10 | 50 | 14 | 45 | 28% | |
| 83 | 2236 | 1/17/01 | ✓ | 60 | 3/18/01 | 35 | 120 | 56 | 37 | 47% | ✓ |
| 84 | 2237 | 1/17/01 | ✓ | 60 | 3/18/01 | 30 | 180 | 54 | 45 | 30% | |
| 85 | 2238 | 1/17/01 | × | | | | | | | | |
| 86 | 2239 | 1/17/01 | ✓ | 52 | 3/10/01 | 32 | 105 | 55 | 38 | 52% | ✓ |
| 87 | 2240 | 1/17/01 | ✓ | 52 | 3/10/01 | 30 | 110 | 57 | 38 | 52% | ✓ |
| 88 | 2241 | 1/18/01 | × | | | | | | | | |
| 89 | 2242 | 1/18/01 | ✓ | 51 | 3/10/01 | 35 | 160 | 145 | 37 | 91% | ✓ |
| 90 | 2243 | 1/18/01 | ✓ | 51 | 3/10/01 | 32 | 180 | 150 | 37 | 83% | ✓ |
| 91 | 2244 | 1/18/01 | ✓ | 51 | 3/10/01 | 30 | 180 | 149 | 37 | 83% | ✓ |
| 92 | 2245 | 1/18/01 | ✓ | 51 | 3/10/01 | 15 | 90 | 18 | 45 | 20% | |
| 93 | 2246 | 1/18/01 | ✓ | 51 | 3/10/01 | 40 | 110 | 12 | 45 | 11% | |
| 94 | 2247 | 1/18/01 | ✓ | 51 | 3/10/01 | 20 | 85 | 75 | 38 | 88% | ✓ |
| 95 | 2248 | 1/21/01 | ✓ | 52 | 3/14/01 | 35 | 190 | 180 | 38 | 95% | ✓ |
| 96 | 2249 | 1/21/01 | ✓ | 52 | 3/14/01 | 30 | 190 | 175 | 38 | 92% | ✓ |
| 97 | 2250 | 2/3/01 | ✓ | 49 | 3/24/01 | 30 | 190 | 167 | 38 | 88% | ✓ |
| 98 | 2251 | 2/3/01 | ✓ | 49 | 3/24/01 | 20 | 105 | 16 | 45 | 15% | |
| 99 | 2252 | 2/14/01 | ✓ | 65 | 4/20/01 | 10 | 34 | 12 | 45 | 35% | |
| 100 | 2253 | 2/14/01 | ✓ | 65 | 4/20/01 | 4 | 10 | 2 | 45 | 20% | |
| 101 | 2254 | 2/14/01 | ✓ | 65 | 4/20/01 | 5 | 16 | 4 | 45 | 25% | |
| 102 | 2255 | 2/14/01 | × | | | | | | | | |
| 103 | 2256 | 3/2/01 | ✓ | 49 | 4/20/01 | 35 | 110 | 20 | 45 | 18% | |
| 104 | 2257 | 3/2/01 | ✓ | 49 | 4/20/01 | 10 | 44 | 6 | 45 | 14% | |
| 105 | 2258 | 3/2/01 | ✓ | 49 | 4/20/01 | 40 | 195 | 187 | 37 | 96% | ✓ |
| 106 | 2259 | 3/2/01 | ✓ | 49 | 4/20/01 | 42 | 160 | 17 | 45 | 11% | |
| 107 | 2260 | 3/2/01 | ✓ | 49 | 4/20/01 | 8 | 27 | 11 | 45 | 41% | |
| 108 | 2261 | 3/3/01 | ✓ | 48 | 4/20/01 | 8 | 20 | 6 | 45 | 30% | |
| 109 | 2262 | 3/3/01 | ✓ | 48 | 4/20/01 | 45 | 160 | 99 | 37 | 62% | ✓ |
| 110 | 2263 | 3/3/01 | ✓ | 48 | 4/20/01 | 35 | 150 | 5 | 45 | 3% | |
| 111 | 2264 | 3/3/01 | ✓ | 48 | 4/20/01 | 30 | 110 | 10 | 45 | 9% | |
| 112 | 2265 | 3/3/01 | ✓ | 48 | 4/20/01 | 32 | 105 | 16 | 45 | 15% | |
| 113 | 2266 | 3/4/01 | × | | | | | | | | |
| 114 | 2267 | 3/4/01 | × | | | | | | | | |

| SL NO | CPT NO. | DATE OF COPPICEING | Sprouted/ Not Sprouted | No. of days for coppice harves | Date | No. of Coppice | No. of cuttings | No. of Plants | No. of day in MC | Rooting % | Established in CTA/CMA |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 115 | 2268 | 3/4/01 | ✓ | 59 | 5/2/01 | 37 | 125 | 64 | 38 | 51% | ✓ |
| 116 | 2269 | 3/4/01 | ✓ | 59 | 5/2/01 | 45 | 175 | 157 | 38 | 90% | ✓ |
| 117 | 2270 | 3/4/01 | ✓ | 59 | 5/2/01 | 15 | 90 | 16 | 45 | 18% | |
| 118 | 2271 | 3/4/01 | ✓ | 59 | 5/2/01 | 35 | 160 | 20 | 45 | 13% | |
| 119 | 2272 | 4/9/01 | ✓ | 59 | 6/7/01 | 25 | 160 | 126 | 38 | 79% | ✓ |
| 120 | 2273 | 4/9/01 | ✓ | 59 | 6/7/01 | 26 | 150 | 111 | 38 | 74% | ✓ |
| 121 | 2274 | 4/11/01 | ✓ | 58 | 6/8/01 | 45 | 125 | 21 | 45 | 17% | |
| 122 | 2275 | 4/11/01 | ✓ | 58 | 6/8/01 | 35 | 180 | 140 | 37 | 78% | ✓ |
| 123 | 2276 | 4/11/01 | ✓ | 58 | 6/8/01 | 35 | 160 | 94 | 37 | 59% | ✓ |
| 124 | 2277 | 4/11/01 | ✓ | 58 | 6/8/01 | 15 | 105 | 16 | 45 | 15% | |
| 125 | 2278 | 4/11/01 | ✓ | 58 | 6/8/01 | 31 | 90 | 10 | 45 | 11% | |
| 126 | 2279 | 4/11/01 | ✓ | 58 | 6/8/01 | 32 | 150 | 30 | 45 | 20% | |
| 127 | 2280 | 4/12/01 | ✓ | 57 | 6/8/01 | 6 | 50 | 5 | 45 | 10% | |
| 128 | 2281 | 4/12/01 | ✓ | 57 | 6/8/01 | 33 | 110 | 10 | 45 | 9% | |
| 129 | 2282 | 4/12/01 | ✓ | 57 | 6/8/01 | 48 | 110 | 20 | 45 | 18% | |
| | | Average | 85% | 53 | | 25 | 108 | 6,153 | 41 | 52% | |

## Figure:- 11

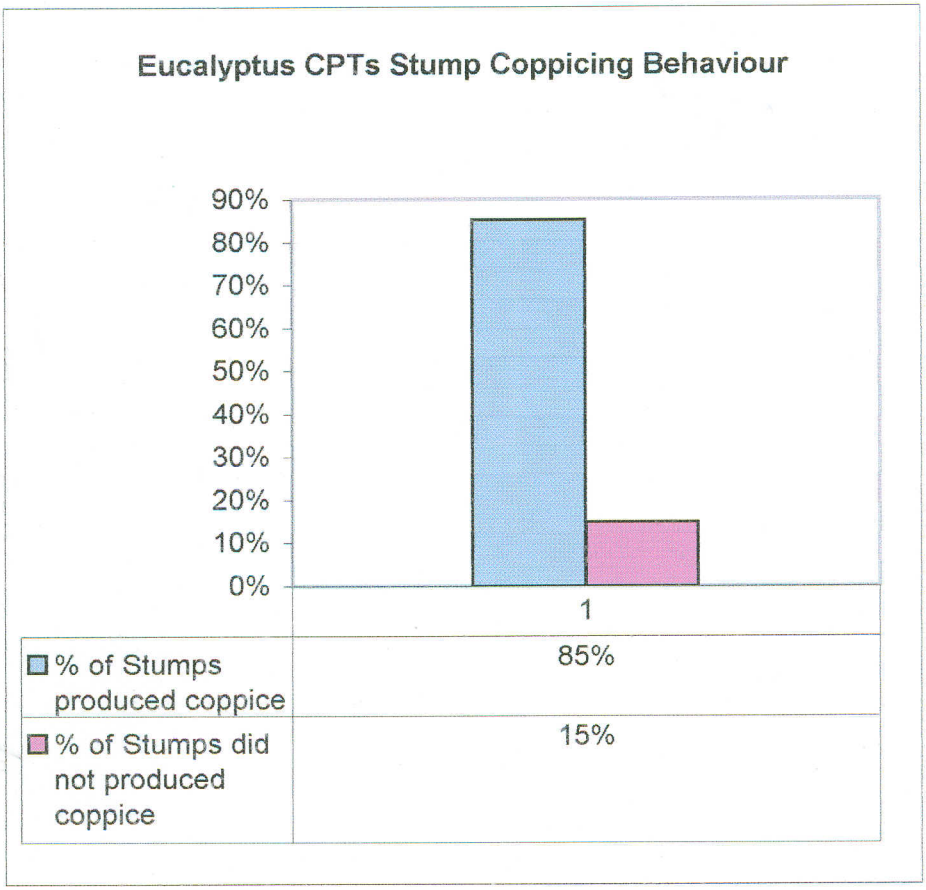
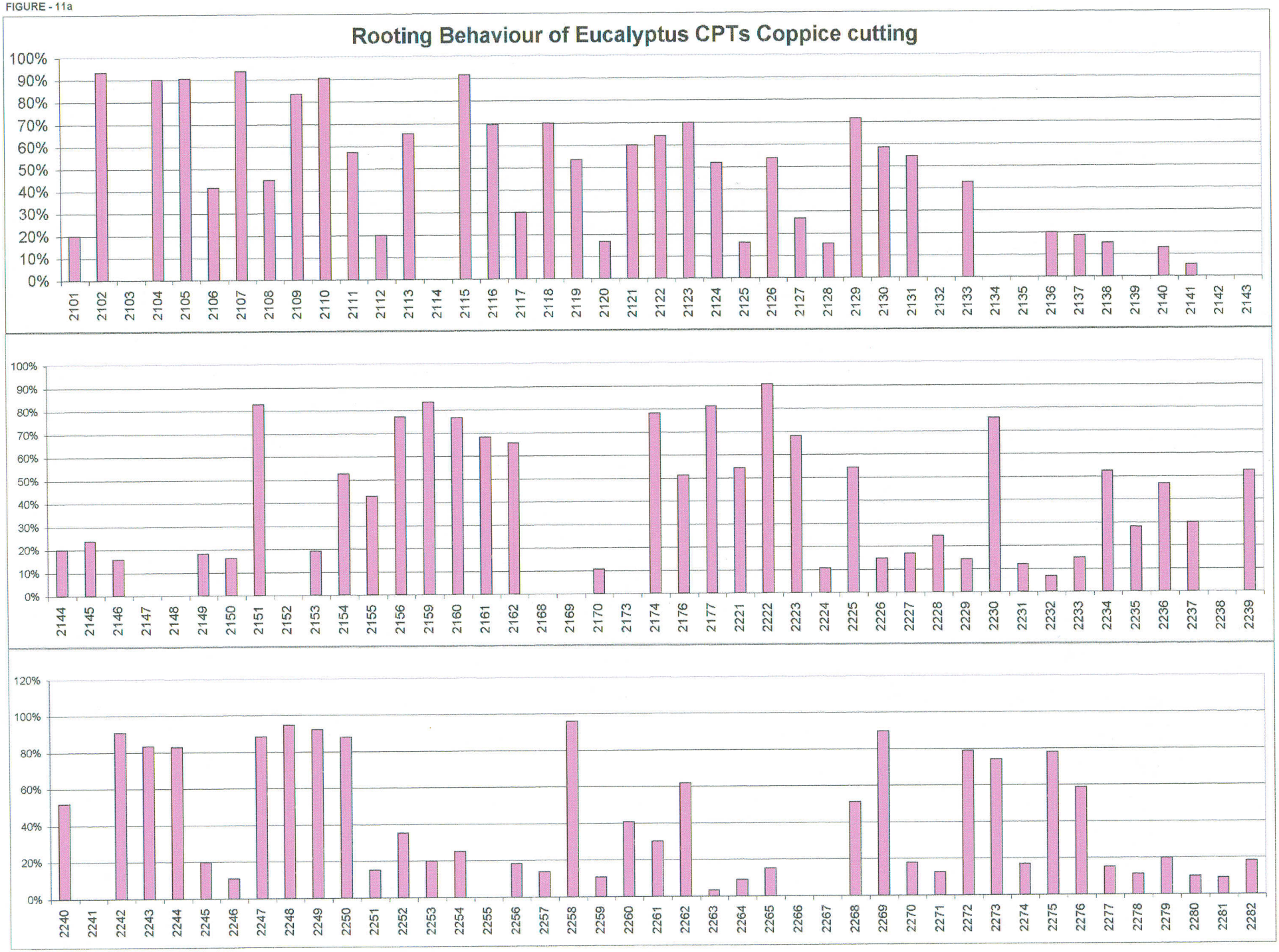

Eucalyptus CPTs Stump Coppicing Behaviour
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
1
% of Stumps produced coppice
85%
% of Stumps did not produced coppice
15%

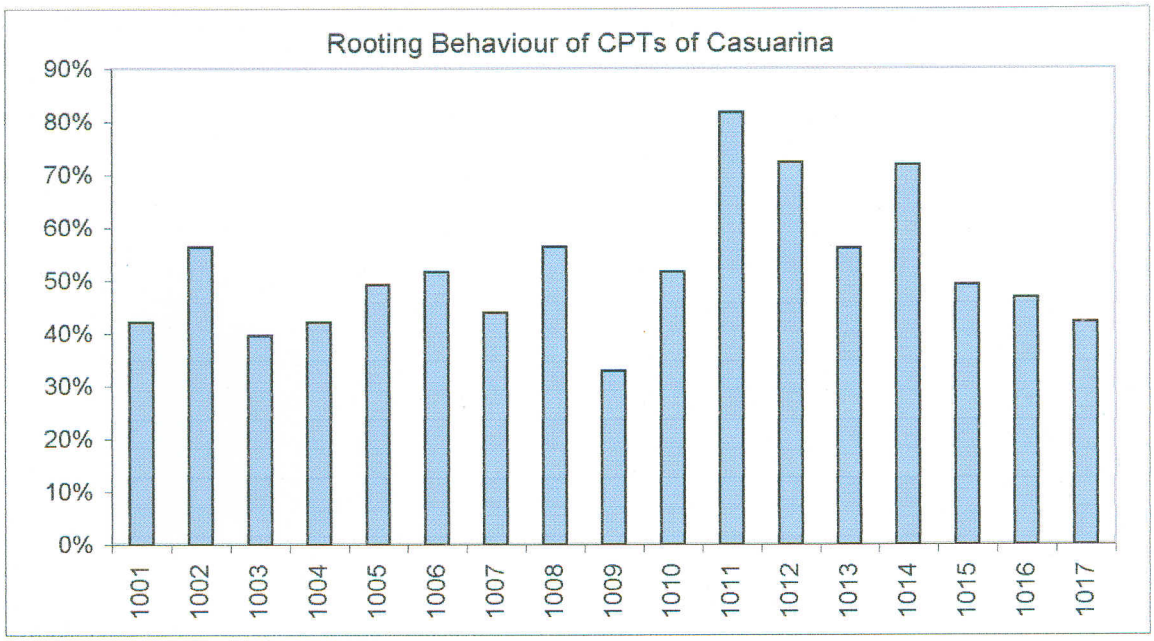
FIGURE - 11a


Rooting Behaviour of Eucalyptus CPTs Coppice cutting
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
2101 2102 2103 2104 2105 2106 2107 2108 2109 2110 2111 2112 2113 2114 2115 2116 2117 2118 2119 2120 2121 2122 2123 2124 2125 2126 2127 2128 2129 2130 2131 2132 2133 2134 2135 2136 2137 2138 2139 2140 2141 2142 2143
2144 2145 2146 2147 2148 2149 2150 2151 2152 2153 2154 2155 2156 2159 2160 2161 2162 2168 2169 2170 2173 2174 2176 2177 2221 2222 2223 2224 2225 2226 2227 2228 2229 2230 2231 2232 2233 2234 2235 2236 2237 2238 2239
120%
100%
80%
60%
40%
20%
0%
2240 2241 2242 2243 2244 2245 2246 2247 2248 2249 2250 2251 2252 2253 2254 2255 2256 2257 2258 2259 2260 2261 2262 2263 2264 2265 2266 2267 2268 2269 2270 2271 2272 2273 2274 2275 2276 2277 2278 2279 2280 2281 2282

## TABLE - 4:- CANDIDATE PLUS TREE - ROOTING BEHAVIOUR - *CASUARINA*

| New CPT NO. | No. of cuttings (Cladodes) | No. of Plants | No. of day in MC | Rooting % | Established in CTA/CMA |
|---|---|---|---|---|---|
| 1001 | 420 | 177 | 45 | 42% | ✓ |
| 1002 | 420 | 237 | 45 | 56% | ✓ |
| 1003 | 630 | 250 | 45 | 40% | ✓ |
| 1004 | 420 | 177 | 45 | 42% | ✓ |
| 1005 | 420 | 207 | 50 | 49% | ✓ |
| 1006 | 420 | 217 | 50 | 52% | ✓ |
| 1007 | 630 | 277 | 50 | 44% | ✓ |
| 1008 | 420 | 237 | 50 | 56% | ✓ |
| 1009 | 630 | 207 | 45 | 33% | ✓ |
| 1010 | 420 | 217 | 45 | 52% | ✓ |
| 1011 | 290 | 237 | 45 | 82% | ✓ |
| 1012 | 245 | 177 | 45 | 72% | ✓ |
| 1013 | 315 | 177 | 45 | 56% | ✓ |
| 1014 | 330 | 237 | 45 | 72% | ✓ |
| 1015 | 420 | 207 | 45 | 49% | ✓ |
| 1016 | 420 | 197 | 45 | 47% | ✓ |
| 1017 | 420 | 177 | 45 | 42% | ✓ |
| | 7270 | 3612 | 46 | 50% | |

FIGURE



**Pulping and Paper Properties analysis of CPTs:-**

As explained earlier to screen clones with required pulpwood properties it was necessary to carry out chemical analysis of wood for various pulping and paper making properties. Wood samples of 1 m length drawn from the middle portion (above 1.3 m height from ground level) were used for analysis. Analysis of results have presented in *Eucalyptus* and Casuarina in Table-5 & Figures-13 to 24 and Table-6 & Figure-25 to 28 respectively.

Active alkali used for Eucalyptus was 16%, whereas, for Casuarina it ranged from 16% to 17%. Use of 16% AA is considered to be economical and optimum for proper digestion.

Kappa number varied from 15.8 to 17.9. Except one CPT (2174) all the CPTs have desired Kappa number required for better pulping properties. In case of Casuarina CPTs values of Kappa No. varied from 16.7 to 17.7 (4 CPTs given values less than 17).

Screen Yield of *Eucalyptus* CPTs varied from 44.9% to 48.8%. Out of 61 CPTs of *Eucalyptus* analysed, 11 CPTs have given Screened pulp yield equal or more than 48%, which is highly desirable characteristic of the pulpwood. The Screen Yield of Casuarina CPTs varied from 46.2% to 50% and 10 CPTs given screen yield more than 48%.

Rejection varied from Nil to 1.6%. 47 numbers of *Eucalyptus* CPTs have shown rejection of less than 1%. *Casuarina* CPTs rejection values range from 0.3% to 2.0% and 10 CPTs indicated rejection less than 1.0%

Bleached pulp yield of *Eucalyptus* CPTs varied from 41.7% to 44.5% and two CPTs have given value more than 44%. Bleached yield in CPTs of Casuarina was recorded between 41.8% to 48.9% with two CPTs given bleached yield more than 44%

Brightness value of *Eucalyptus* CPTs varied from 87.5 to 90.2. Value of Brightness in 5 numbers of CPTs exceeded 90. Brightness values of Casuarina CPTs varied from 87.5 to 90.5 (5 CPTs given brightness more than 90).

Shrinkage value of *Eucalyptus* CPTs varied between 4.25 to 9.0% with eight CPTs giving value of less than 5). In Casuarina CPTs shrinkage value was relatively higher, ranging between 6.2% to 10%.

Beating Time value for *Eucalyptus* CPTs ranged from 50 to 66. For Casuarina, CPTs values varied from 55 to 65.

Viscosity values of *Eucalyptus* CPTs varied from 6.6 to 8.2. In case of Casuarina CPTs viscosity values varied from 6.1 to 7.5.

Bulk Values of *Eucalyptus* CPTs ranged from 1.2 to 1.44. Casuarina CPTs bulk values varied between 1.25 to 1.38.

Breaking length of *Eucalyptus* CPTs pulp varied from 5880 m to 6660 m (4 CPTs pulp have shown figure more than 6600 m). Casuarina CPTs breaking length values varied from 4914 m to 5750 m (7 CPTs have value greater than 5500 m).

Tear Factor value of *Eucalyptus* CPTs pulp varied from 48 to 71 (6 CPTs have values more than 65). TF value of Casuarina CPTs ranged between 55 to 63.

Burst Factor values of *Eucalyptus* CPTs ranged between 39 to 62 (2 CPTs have values more than 50). BF values of *Casuarina* CPTs varied from 37.4 to 43.

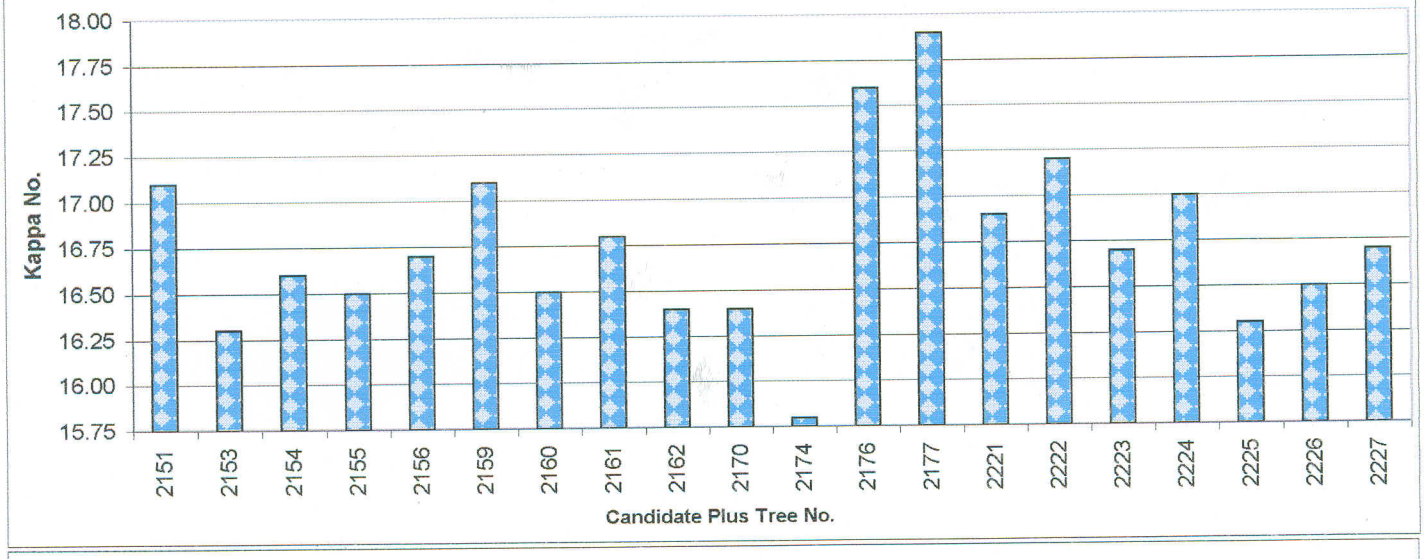
Double Fold values of *Eucalyptus* varied from 32 to 65 and 4 CPTs indicated values more than 60. DF value of *Casuarina* CPTs ranged between 8 to 15.

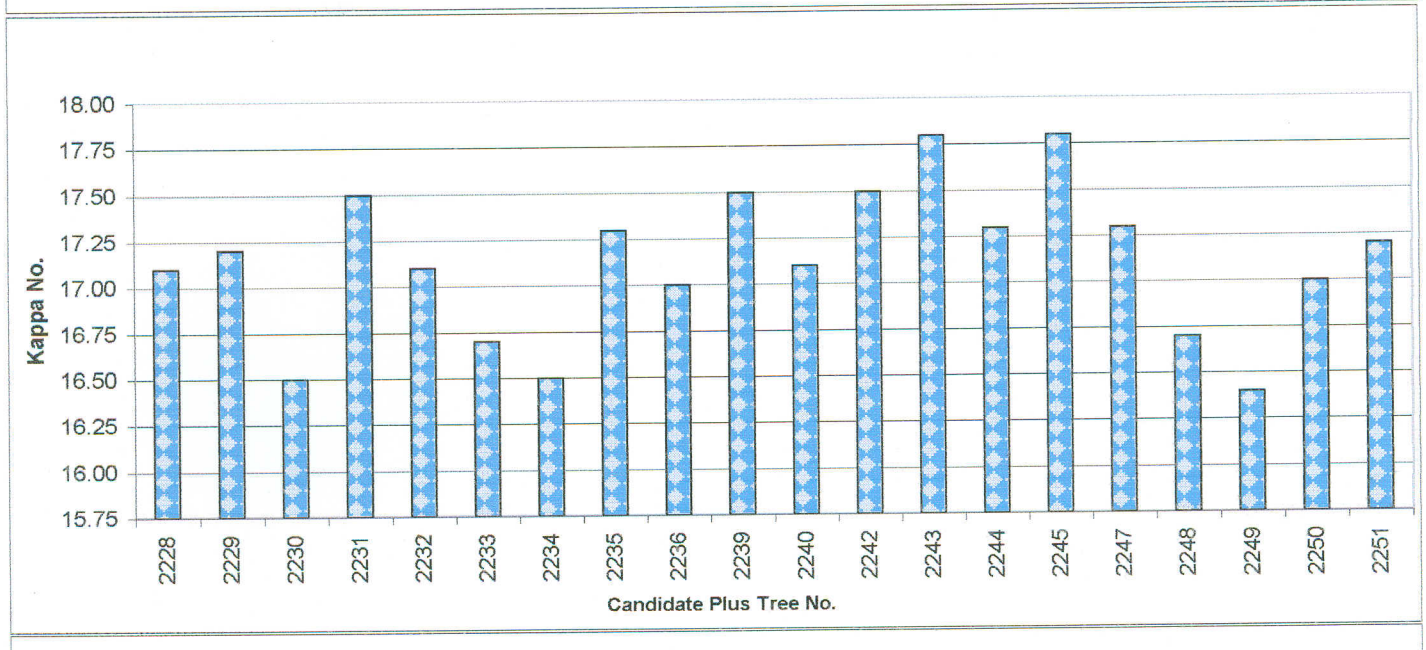
## Table 5. Analysis Report of Eucalyptus CPTs wood sample

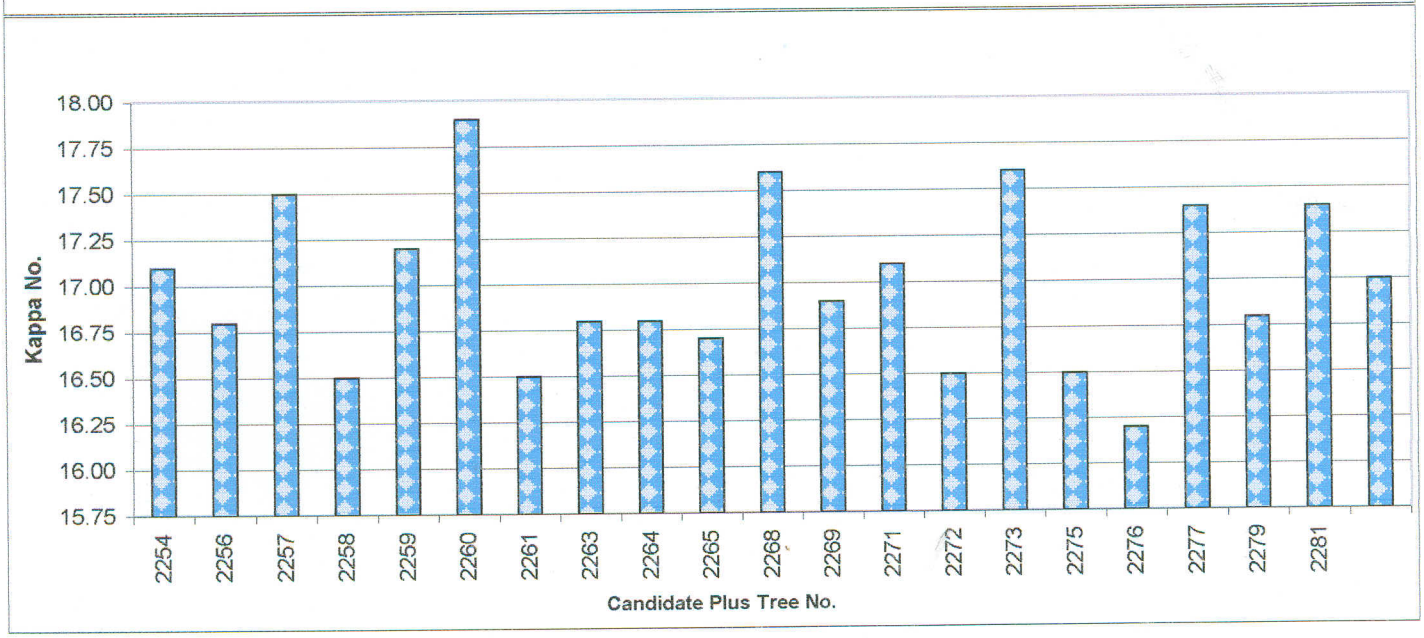
| CPT No. | Active Alkali 1 | Kappa No. 2 | Screened yield 3 | Rejects 4 | Bleached yield 5 | Brightness 6 | Shrinkage 7 | Beating time 9 | Viscosity 8 | Bulk 10 | Breaking length 11 | Tear factor 12 | Burst factor 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2151 | 16 | 17.1 | 48.00 | 0.50 | 42.80 | 89.5 | 8.50 | 55 | 6.80 | 1.35 | 6010 | 60 | 41.80 |
| 2153 | 16 | 16.3 | 45.00 | 0.30 | 43.15 | 88.6 | 4.25 | 66 | 8.10 | 1.31 | 6360 | 57 | 42.90 |
| 2154 | 16 | 16.6 | 47.80 | 1.50 | 43.40 | 87.9 | 7.80 | 60 | 7.20 | 1.38 | 6030 | 54 | 42.50 |
| 2156 | 16 | 16.8 | 46.60 | 0.30 | 44.00 | 88.2 | 4.80 | 60 | 7.20 | 1.33 | 6080 | 58 | 43.00 |
| 2158 | 16 | 16.7 | 47.40 | 0.40 | 43.50 | 90.1 | 5.00 | 60 | 7.80 | 1.30 | 6280 | 61 | 39.90 |
| 2159 | 16 | 17.1 | 48.00 | 0.60 | 42.90 | 89.7 | 6.10 | 58 | 8.00 | 1.40 | 6130 | 67 | 40.60 |
| 2160 | 16 | 16.5 | 46.90 | 0.30 | 42.60 | 88.8 | 5.30 | 55 | 7.80 | 1.30 | 6660 | 65 | 42.80 |
| 2161 | 16 | 16.8 | 46.80 | 0.50 | 43.70 | 89.5 | 5.10 | 60 | 7.90 | 1.40 | 6350 | 60 | 41.80 |
| 2162 | 16 | 16.4 | 45.90 | 0.70 | 42.90 | 88.9 | 6.10 | 58 | 8.10 | 1.30 | 6290 | 58 | 39.70 |
| 2170 | 16 | 16.4 | 47.50 | 0.50 | 41.80 | 88.8 | 8.00 | 60 | 6.90 | 1.33 | 6010 | 60 | 43.80 |
| 2174 | 16 | 15.8 | 46.70 | 0.60 | 42.50 | 89.0 | 7.50 | 55 | 7.20 | 1.30 | 5990 | 56 | 44.40 |
| 2176 | 16 | 17.6 | 46.60 | 1.00 | 42.00 | 87.8 | 8.20 | 60 | 6.60 | 1.35 | 6210 | 63 | 43.80 |
| 2177 | 16 | 17.9 | 47.40 | 0.50 | 42.40 | 88.0 | 7.40 | 65 | 7.40 | 1.30 | 6500 | 62 | 62.00 |
| 2221 | 16 | 16.9 | 45.70 | 0.70 | 43.50 | 88.7 | 7.00 | 61 | 7.10 | 1.40 | 6570 | 69 | 41.50 |
| 2222 | 16 | 17.2 | 47.10 | 0.50 | 43.80 | 90.0 | 6.00 | 59 | 7.50 | 1.30 | 6390 | 57 | 39.50 |
| 2223 | 16 | 16.7 | 48.00 | 0.10 | 43.50 | 90.1 | 7.20 | 65 | 7.30 | 1.30 | 6100 | 59 | 59.00 |
| 2224 | 16 | 17.0 | 47.10 | 0.60 | 42.60 | 89.7 | 6.50 | 62 | 7.80 | 1.40 | 6625 | 67 | 43.10 |
| 2225 | 16 | 16.3 | 46.90 | 0.60 | 43.70 | 89.6 | 5.12 | 59 | 7.50 | 1.41 | 6350 | 61 | 41.60 |
| 2226 | 16 | 16.5 | 46.70 | 0.50 | 43.50 | 90.0 | 4.90 | 58 | 8.00 | 1.33 | 6360 | 57 | 42.70 |
| 2227 | 16 | 16.7 | 45.50 | 0.50 | 43.25 | 90.0 | 4.90 | 65 | 7.70 | 1.33 | 6660 | 59 | 39.90 |
| 2228 | 16 | 17.1 | 45.80 | 0.30 | 43.60 | 88.6 | 4.90 | 65 | 7.40 | 1.40 | 6470 | 58 | 43.10 |
| 2229 | 16 | 17.2 | 47.20 | 0.50 | 42.70 | 90.1 | 6.30 | 63 | 8.00 | 1.37 | 6550 | 63 | 41.40 |
| 2230 | 16 | 16.5 | 46.50 | 0.70 | 43.10 | 89.5 | 5.25 | 59 | 7.90 | 1.32 | 6540 | 56 | 40.50 |
| 2231 | 16 | 17.5 | 44.90 | 0.50 | 43.90 | 88.5 | 5.10 | 60 | 7.10 | 1.30 | 6210 | 61 | 43.00 |
| 2232 | 16 | 17.1 | 47.00 | 0.50 | 43.10 | 88.0 | 6.00 | 55 | 7.60 | 1.35 | 6340 | 63 | 42.60 |
| 2233 | 16 | 16.7 | 46.80 | 0.50 | 43.00 | 88.5 | 5.50 | 60 | 7.50 | 1.30 | 6500 | 58 | 41.80 |
| 2234 | 16 | 16.5 | 47.30 | 0.50 | 43.50 | 88.8 | 5.60 | 55 | 7.20 | 1.30 | 6300 | 61 | 44.00 |
| 2235 | 16 | 17.3 | 47.00 | 0.50 | 42.80 | 88.5 | 6.40 | 60 | 7.50 | 1.35 | 6220 | 58 | 44.50 |
| 2236 | 16 | 17.0 | 46.50 | 1.00 | 43.30 | 88.1 | 6.00 | 55 | 7.10 | 1.30 | 6370 | 60 | 42.50 |
| 2239 | 16 | 17.5 | 47.50 | 0.50 | 43.00 | 88.6 | 6.20 | 60 | 7.20 | 1.33 | 6450 | 48 | 41.00 |
| 2240 | 16 | 17.1 | 48.10 | 0.50 | 44.50 | 88.8 | 6.10 | 60 | 7.30 | 1.30 | 6575 | 61 | 42.00 |
| 2242 | 16 | 17.5 | 47.50 | 0.50 | 43.90 | 88.5 | 6.40 | 65 | 6.90 | 1.20 | 6110 | 65 | 39.00 |
| 2243 | 16 | 17.8 | 47.90 | 0.50 | 44.20 | 88.0 | 5.80 | 55 | 7.40 | 1.35 | 6250 | 55 | 43.00 |
| 2244 | 16 | 17.3 | 47.10 | 0.50 | 42.00 | 88.5 | 7.40 | 65 | 7.40 | 1.33 | 6110 | 61 | 42.00 |
| 2245 | 16 | 17.8 | 48.20 | - | 41.80 | 89.3 | 7.50 | 60 | 6.80 | 1.35 | 6020 | 60 | 43.80 |
| 2247 | 16 | 17.3 | 47.10 | 0.70 | 43.80 | 89.4 | 7.30 | 60 | 8.10 | 1.30 | 6431 | 71 | 41.40 |
| 2248 | 16 | 16.7 | 46.80 | 0.30 | 43.30 | 89.8 | 5.70 | 60 | 7.50 | 1.30 | 6380 | 66 | 40.40 |
| 2249 | 16 | 16.4 | 47.60 | 0.50 | 42.70 | 90.2 | 4.92 | 58 | 7.80 | 1.34 | 6190 | 59 | 39.80 |
| 2250 | 16 | 17.0 | 45.80 | 0.40 | 43.50 | 88.2 | 5.30 | 64 | 8.00 | 1.40 | 6570 | 62 | 41.70 |
| 2251 | 16 | 17.2 | 48.00 | 0.10 | 41.70 | 88.5 | 7.20 | 65 | 7.30 | 1.34 | 6100 | 59 | 41.50 |
| 2253 | 16 | 17.1 | 48.00 | - | 43.50 | 88.0 | 5.80 | 60 | 7.00 | 1.30 | 6400 | 51 | 43.00 |
| 2254 | 16 | 16.8 | 47.00 | 0.50 | 44.00 | 88.5 | 5.50 | 60 | 7.50 | 1.25 | 6350 | 56 | 43.00 |
| 2256 | 16 | 17.5 | 47.60 | 1.50 | 42.80 | 88.0 | 9.00 | 55 | 7.40 | 1.30 | 6225 | 61 | 39.70 |
| 2257 | 16 | 16.5 | 46.40 | 0.40 | 42.90 | 89.9 | 4.70 | 66 | 8.20 | 1.35 | 6635 | 71 | 40.90 |
| 2258 | 16 | 17.2 | 47.50 | 0.60 | 43.70 | 90.1 | 6.00 | 62 | 7.70 | 1.40 | 6550 | 62 | 42.70 |
| 2259 | 16 | 17.9 | 46.90 | 1.20 | 43.90 | 87.5 | 8.00 | 60 | 7.90 | 1.35 | 6400 | 61 | 43.40 |
| 2260 | 16 | 16.5 | 46.90 | 0.40 | 43.30 | 88.8 | 5.50 | 60 | 8.00 | 1.32 | 6370 | 65 | 43.20 |
| 2261 | 16 | 16.8 | 48.00 | 0.30 | 42.90 | 89.2 | 4.90 | 59 | 7.90 | 1.35 | 6130 | 59 | 40.90 |
| 2263 | 16 | 16.8 | 47.30 | 0.40 | 42.80 | 88.8 | 6.00 | 63 | 8.00 | 1.35 | 6490 | 56 | 43.40 |
| 2264 | 16 | 16.7 | 48.80 | 1.00 | 41.90 | 88.8 | 7.00 | 55 | 6.90 | 1.30 | 6005 | 61 | 40.80 |
| 2265 | 16 | 17.6 | 48.50 | 1.60 | 42.80 | 88.5 | 8.50 | 60 | 7.50 | 1.30 | 5990 | 58 | 41.50 |
| 2268 | 16 | 16.9 | 47.40 | 0.50 | 42.80 | 89.0 | 6.80 | 65 | 7.00 | 1.32 | 6252 | 60 | 44.40 |
| 2269 | 16 | 17.1 | 46.90 | 1.00 | 42.60 | 88.8 | 6.20 | 65 | 7.20 | 1.30 | 6500 | 62 | 45.00 |
| 2271 | 16 | 16.5 | 46.50 | 1.00 | 42.40 | 89.5 | 7.00 | 65 | 7.30 | 1.35 | 6200 | 59 | 43.50 |
| 2272 | 16 | 17.6 | 46.60 | 1.40 | 42.50 | 88.1 | 8.00 | 55 | 7.50 | 1.44 | 5950 | 58 | 41.00 |
| 2273 | 16 | 16.5 | 47.50 | 1.50 | 43.80 | 88.0 | 7.20 | 55 | 7.10 | 1.38 | 5885 | 61 | 41.60 |
| 2275 | 16 | 16.2 | 47.80 | 0.80 | 42.70 | 89.0 | 8.80 | 60 | 6.80 | 1.37 | 6100 | 56 | 42.40 |
| 2276 | 16 | 17.4 | 47.50 | 1.00 | 42.80 | 88.8 | 8.80 | 60 | 7.10 | 1.33 | 5995 | 58 | 41.50 |
| 2277 | 16 | 16.8 | 48.10 | 0.80 | 43.50 | 89.1 | 8.00 | 50 | 6.80 | 1.38 | 5880 | 60 | 42.00 |
| 2279 | 16 | 17.4 | 47.80 | 1.00 | 43.40 | 89.1 | 8.00 | 55 | 7.10 | 1.35 | 6010 | 61 | 40.60 |
| 2281 | 16 | 17.0 | 47.50 | 1.50 | 43.20 | 89.1 | 9.00 | 60 | 7.70 | 1.34 | 6250 | 60 | 44.40 |

FIGURE -13

## Chart showing Kappa Number of Eucalyptus CPTs

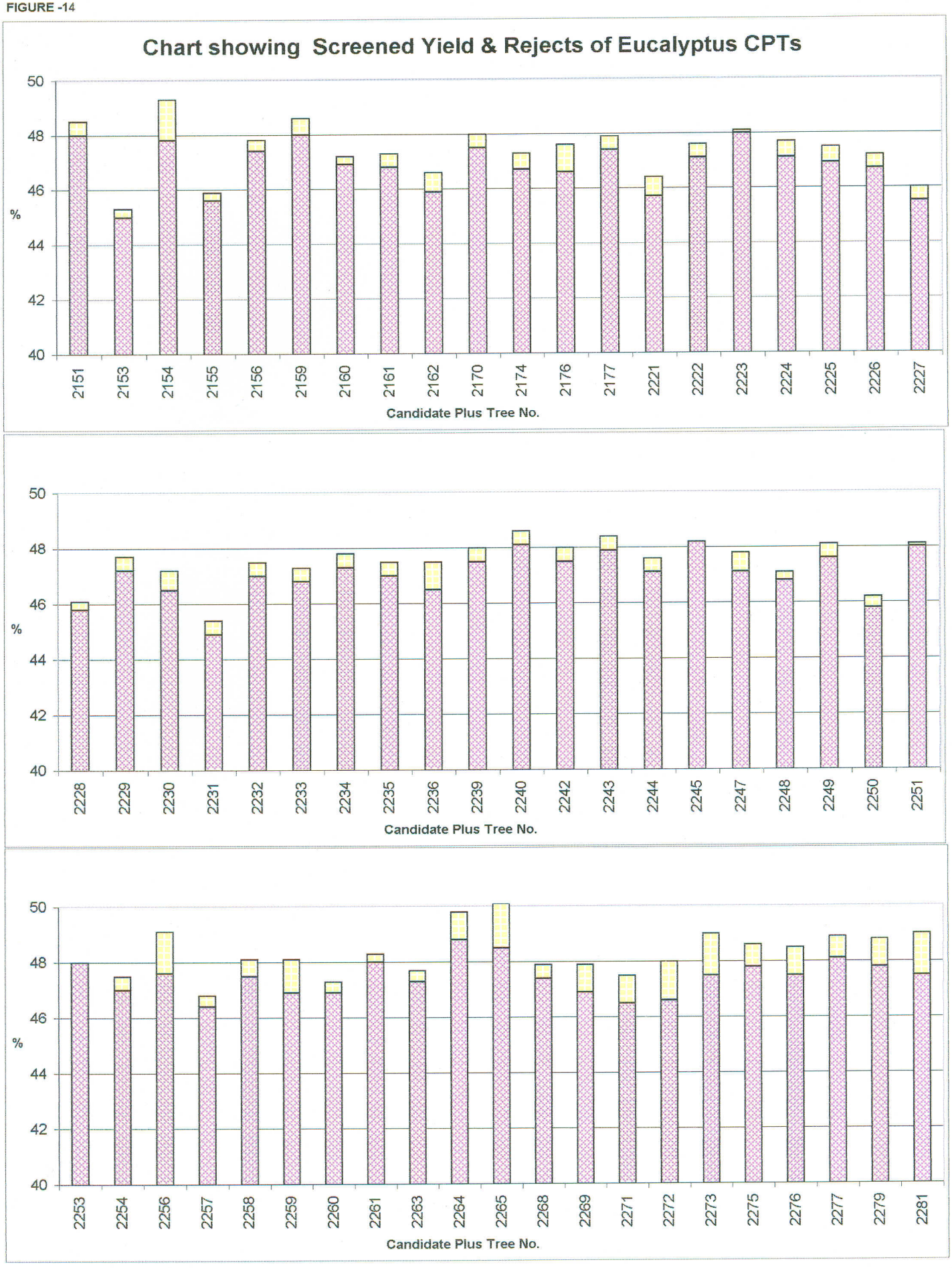



Analysis-Papri1-1/Euc_Kappa

FIGURE -14




Analysis-Papri1-1/Euc-Scr Yield

FIGURE -15

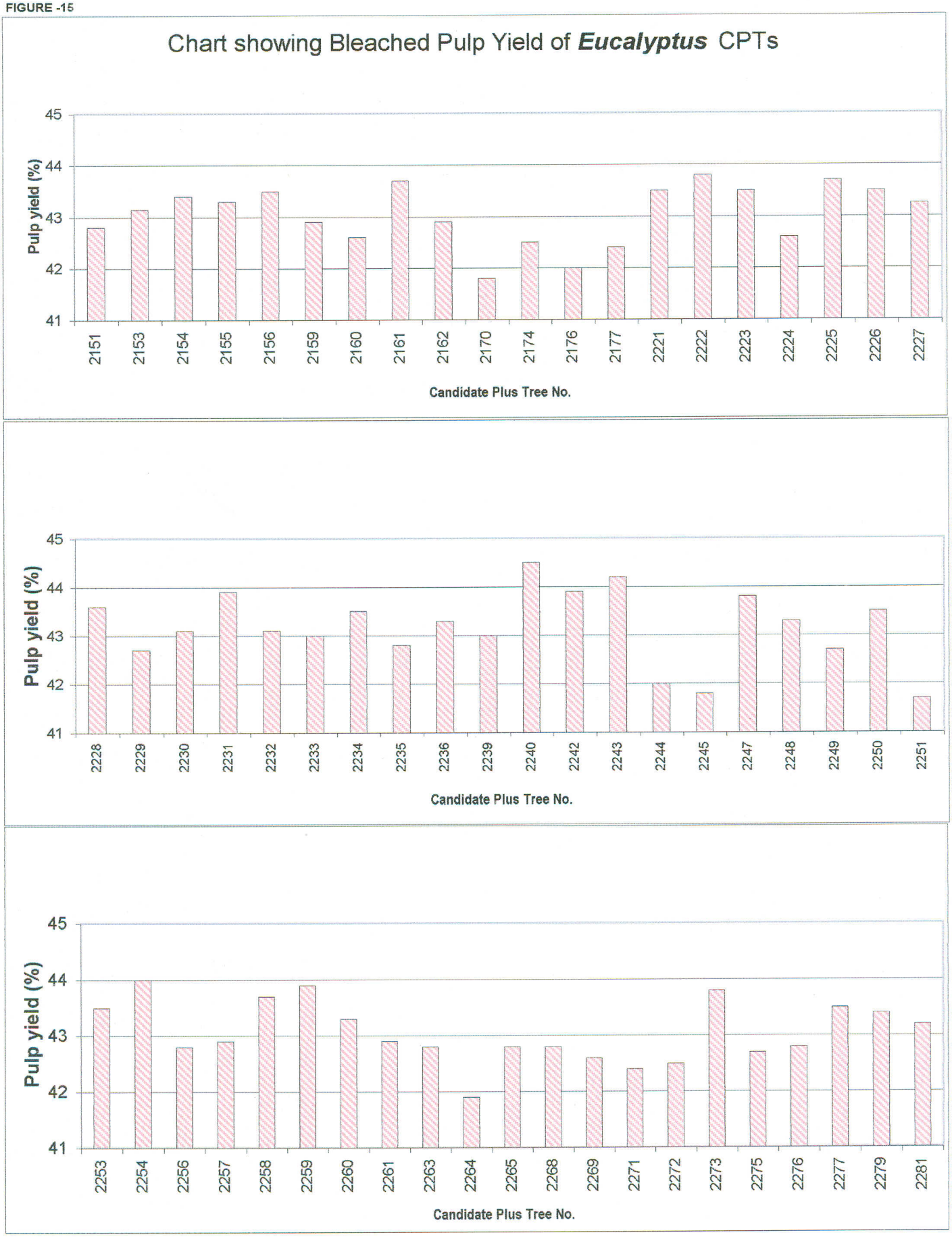
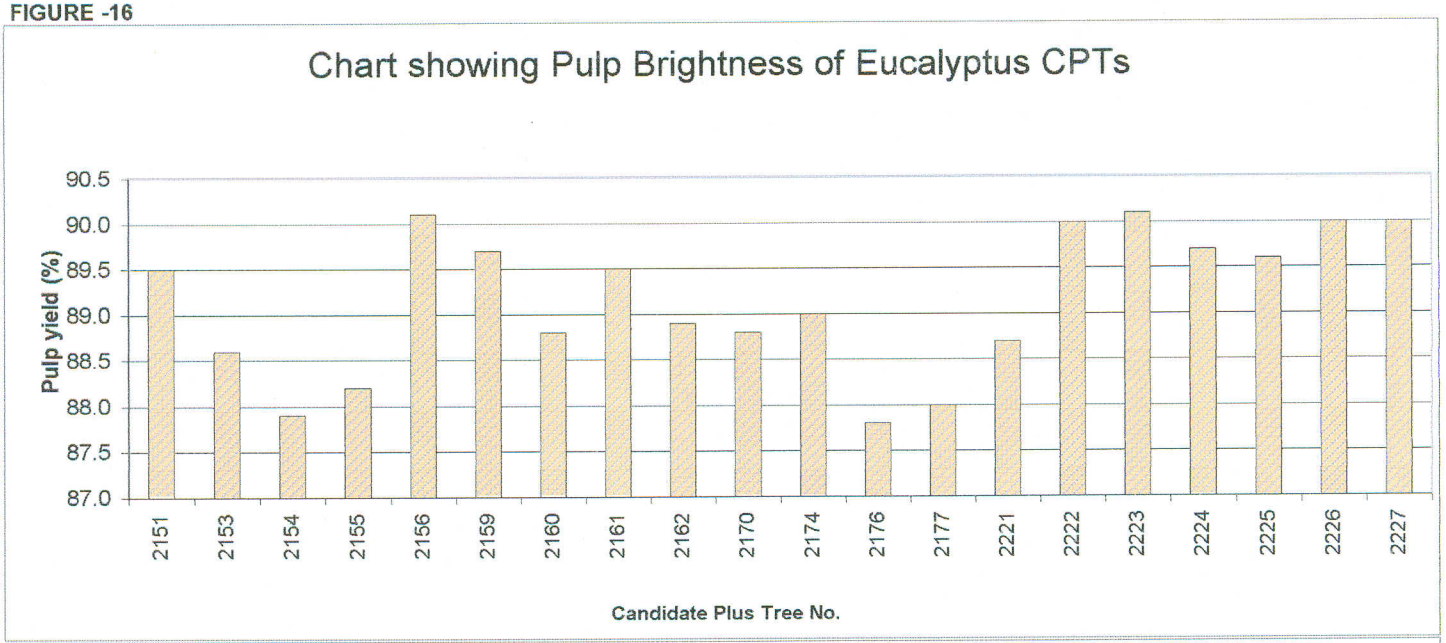
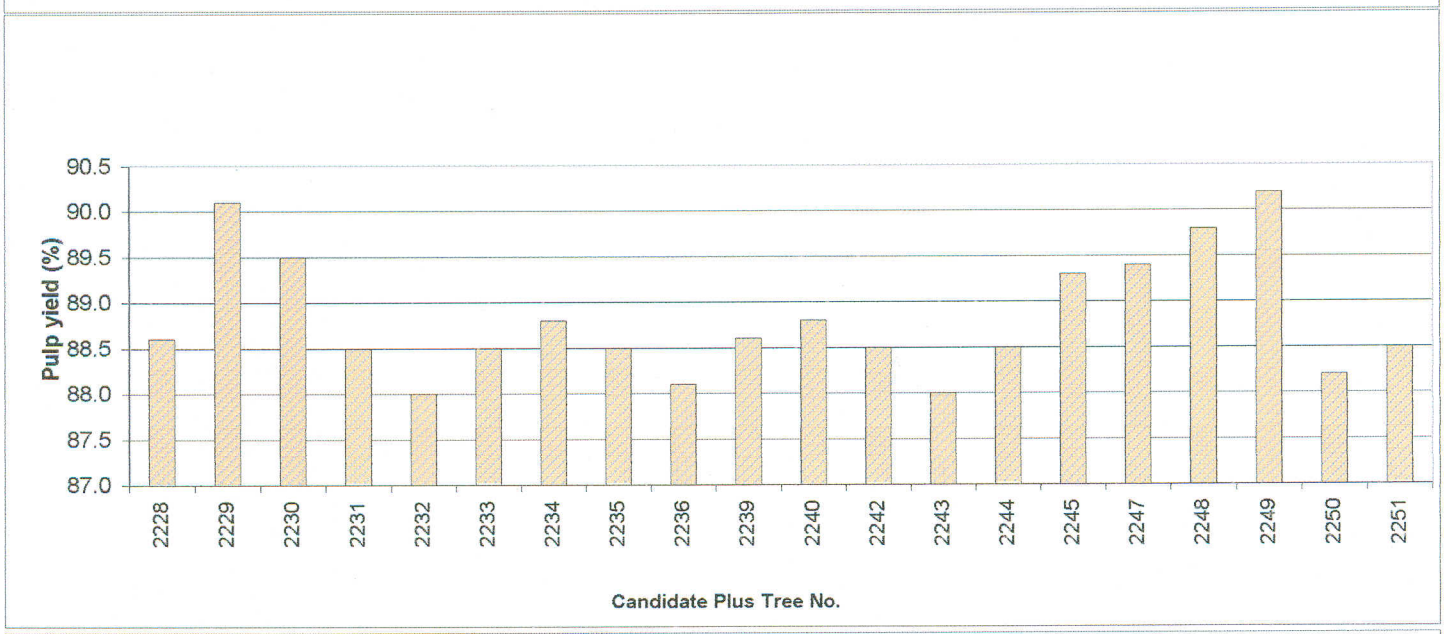
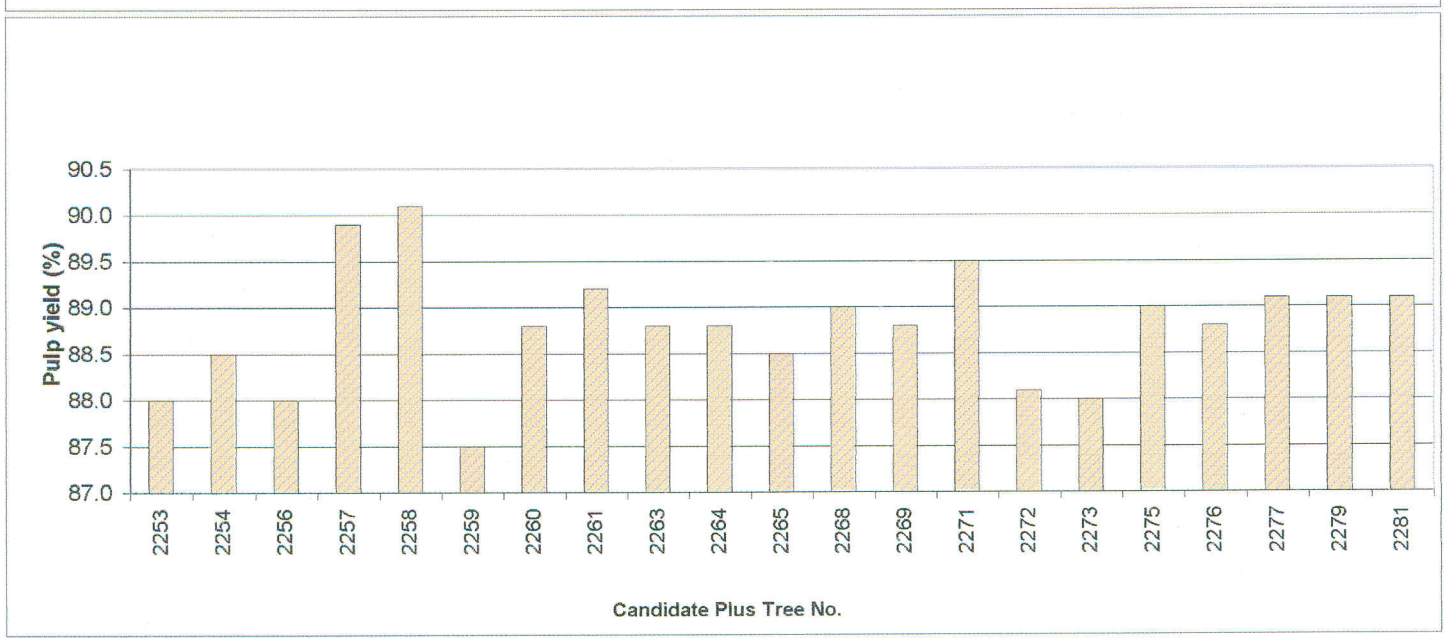


Chart showing Bleached Pulp Yield of *Eucalyptus* CPTs
Pulp yield (%)
45
44
43
42
41
2151
2153
2154
2155
2156
2159
2160
2161
2162
2170
2174
2176
2177
2221
2222
2223
2224
2225
2226
2227
Candidate Plus Tree No.
Pulp yield (%)
45
44
43
42
41
2228
2229
2230
2231
2232
2233
2234
2235
2236
2239
2240
2242
2243
2244
2245
2247
2248
2249
2250
2251
Candidate Plus Tree No.
Pulp yield (%)
45
44
43
42
41
2253
2254
2256
2257
2258
2259
2260
2261
2263
2264
2265
2268
2269
2271
2272
2273
2275
2276
2277
2279
2281
Candidate Plus Tree No.

FIGURE -16

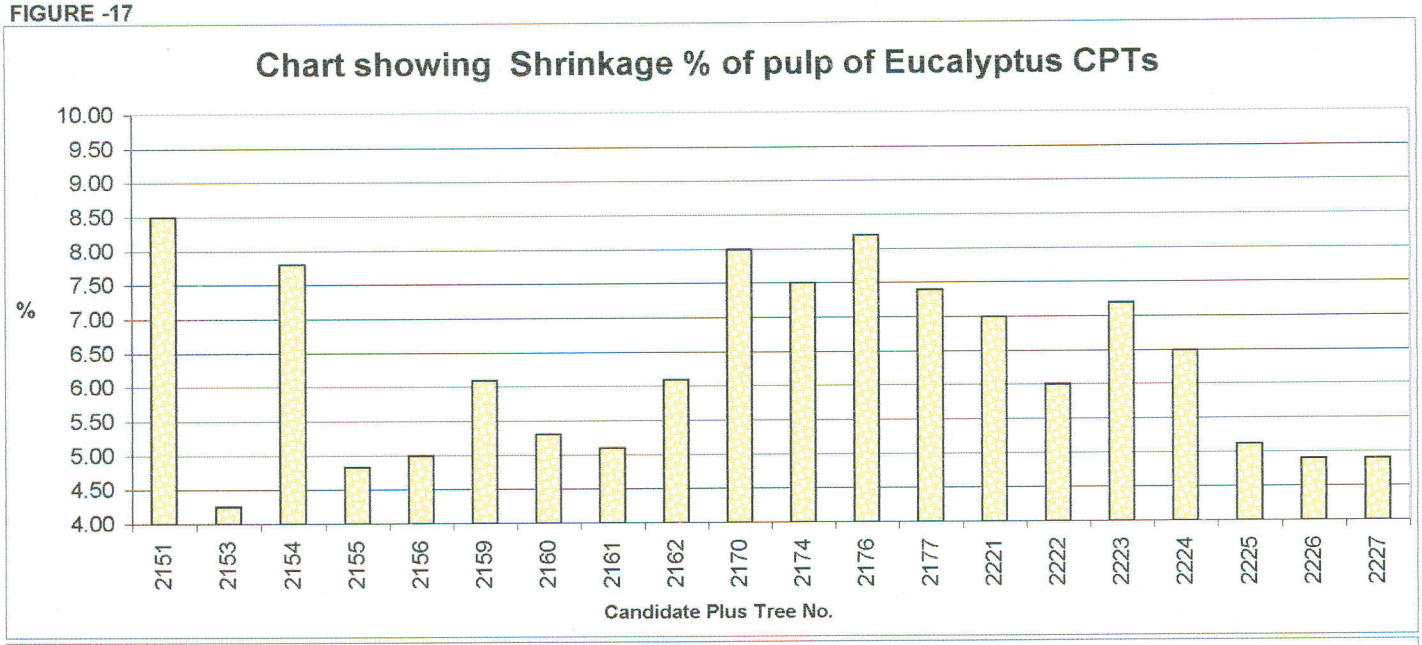


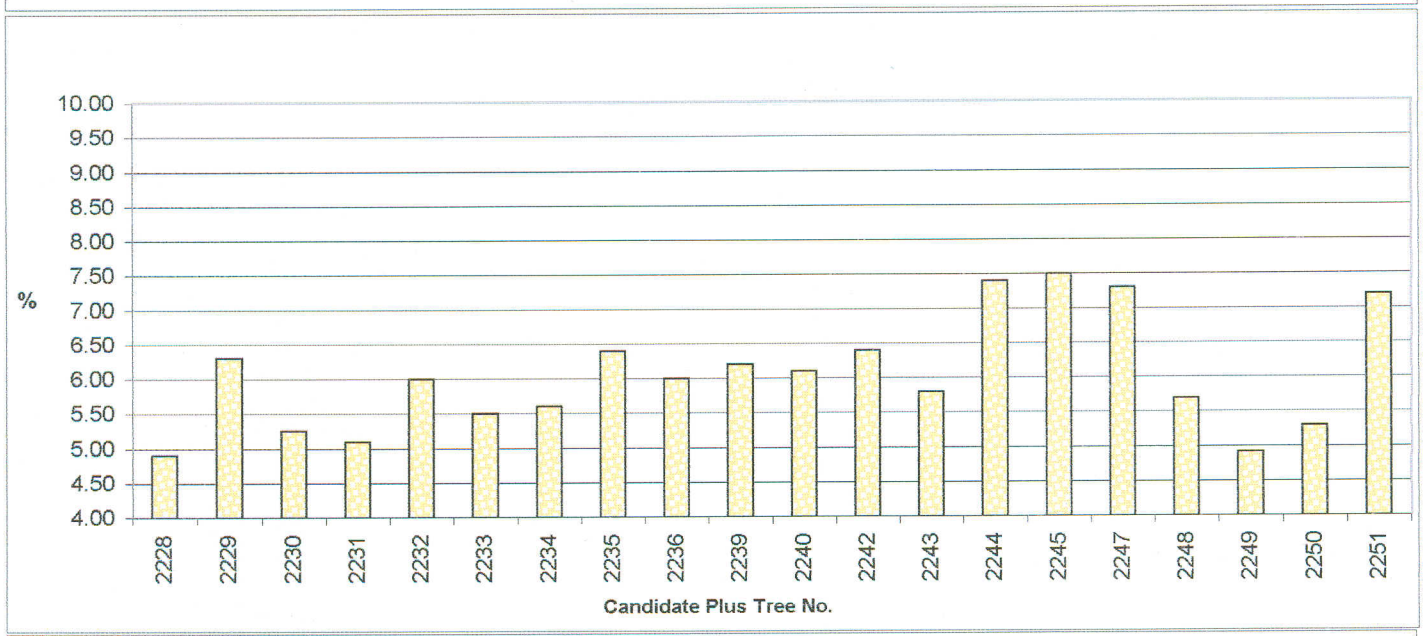



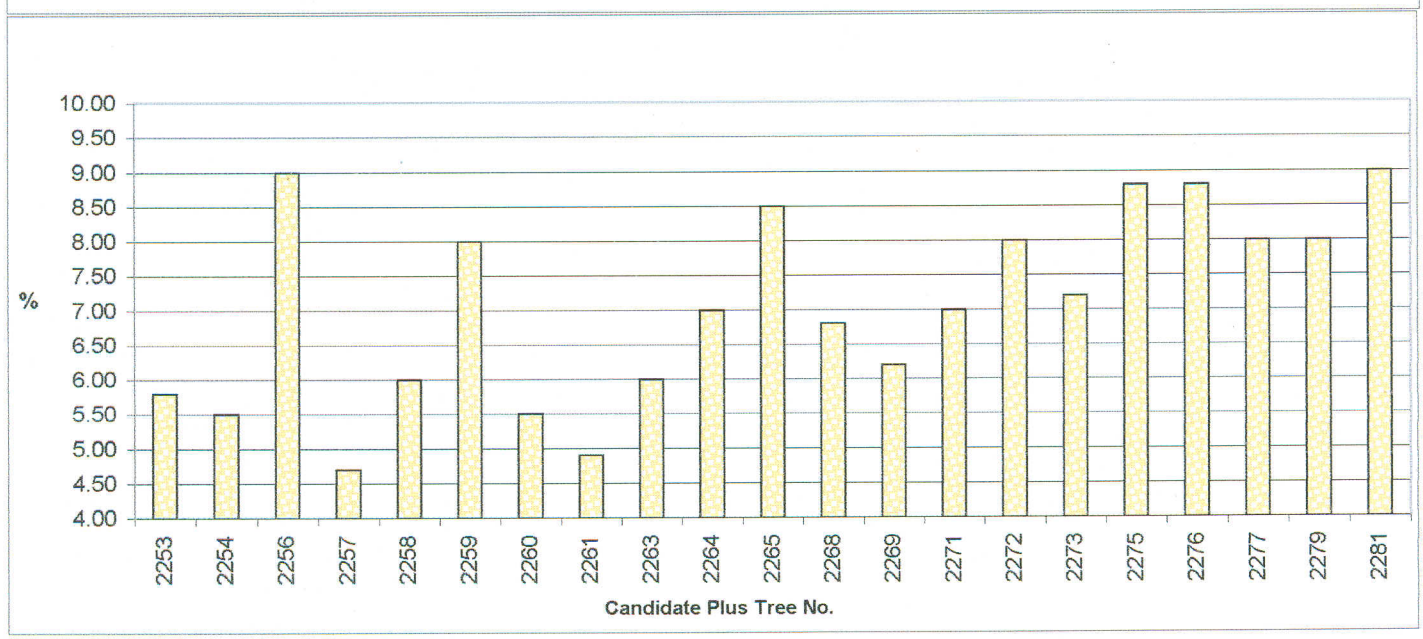




Analysis-Papri1-1/Euc_Brightness

FIGURE -17

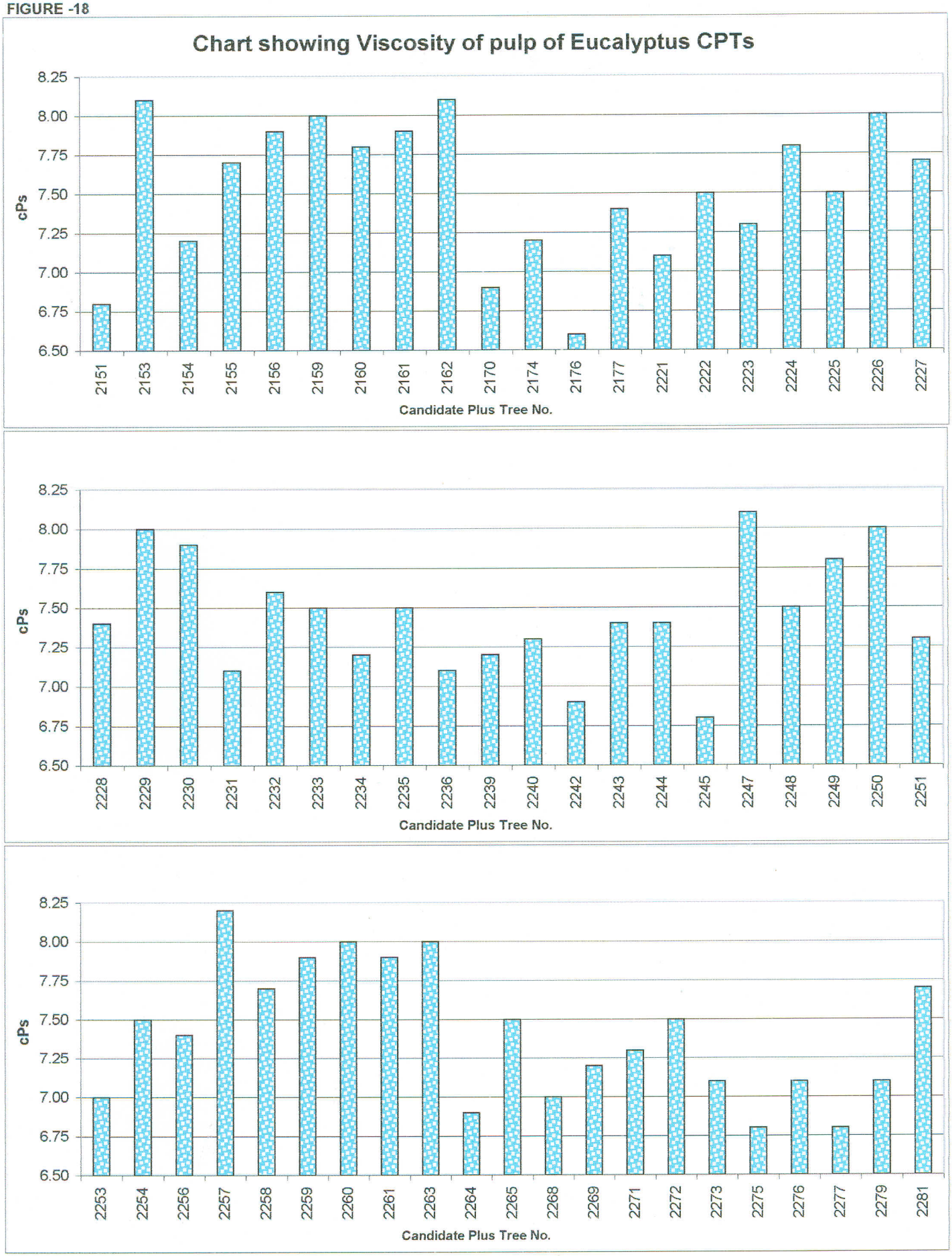


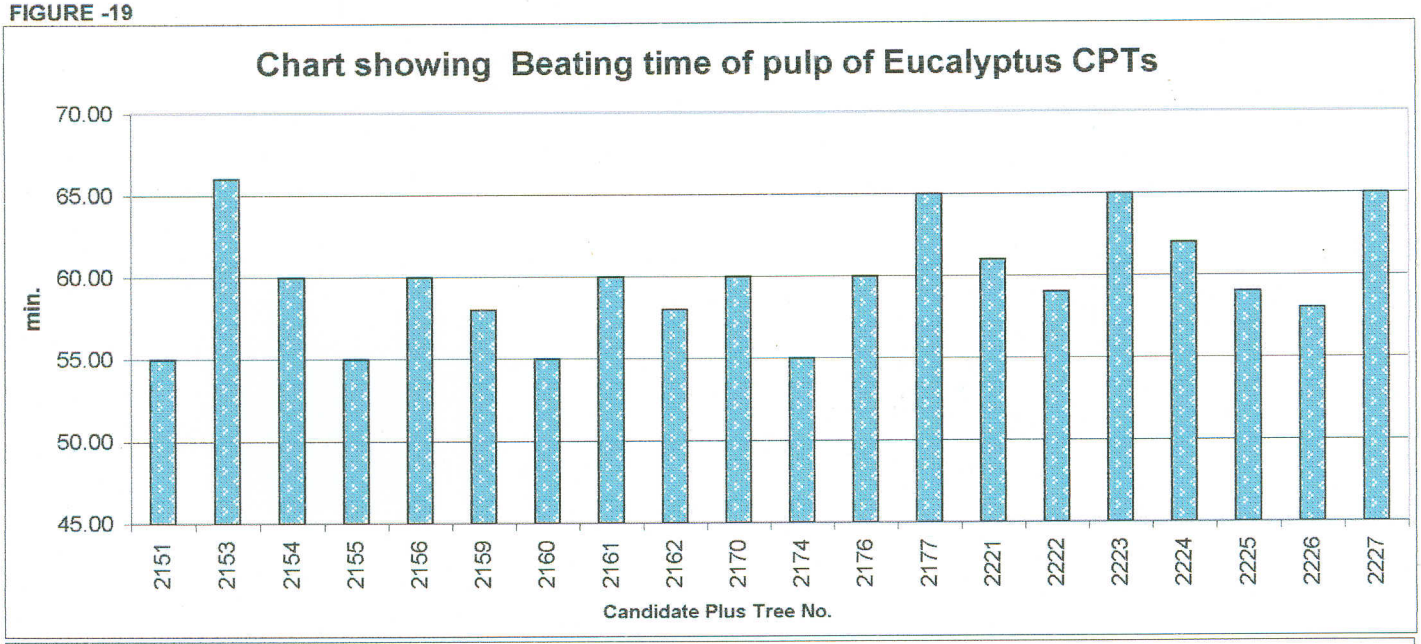

Analysis-Papri1-1/Euc_Srinkage

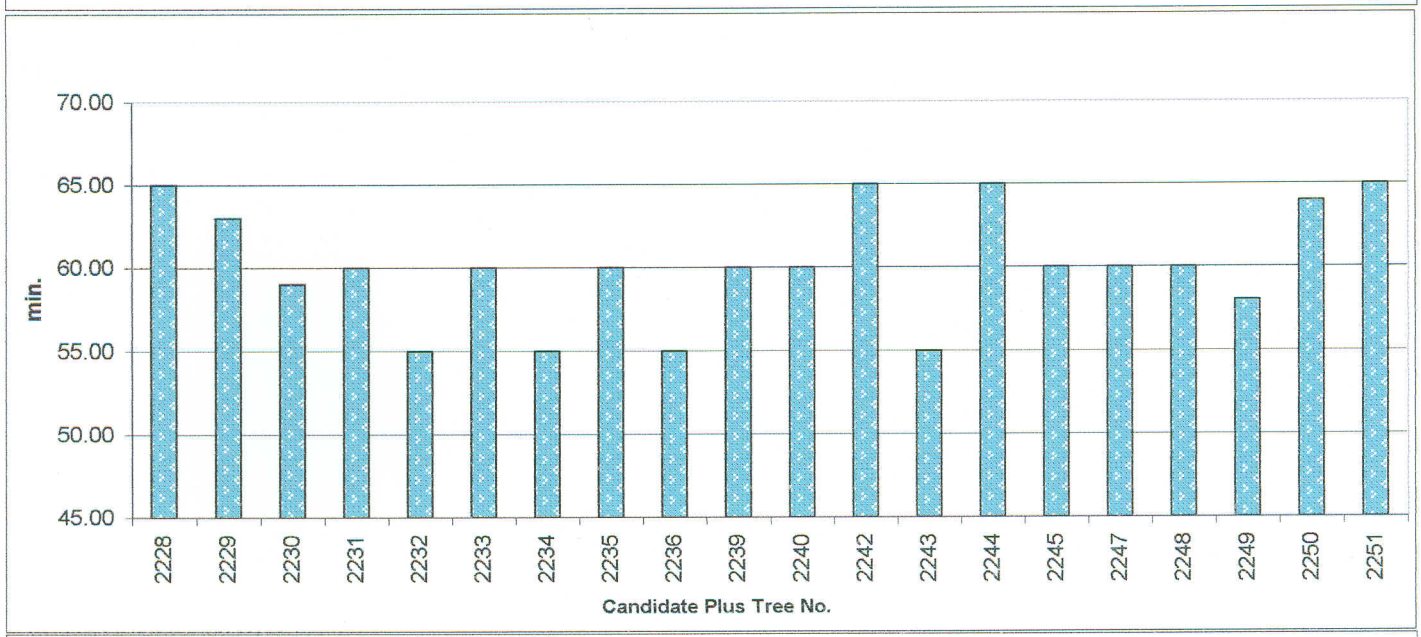
FIGURE -18

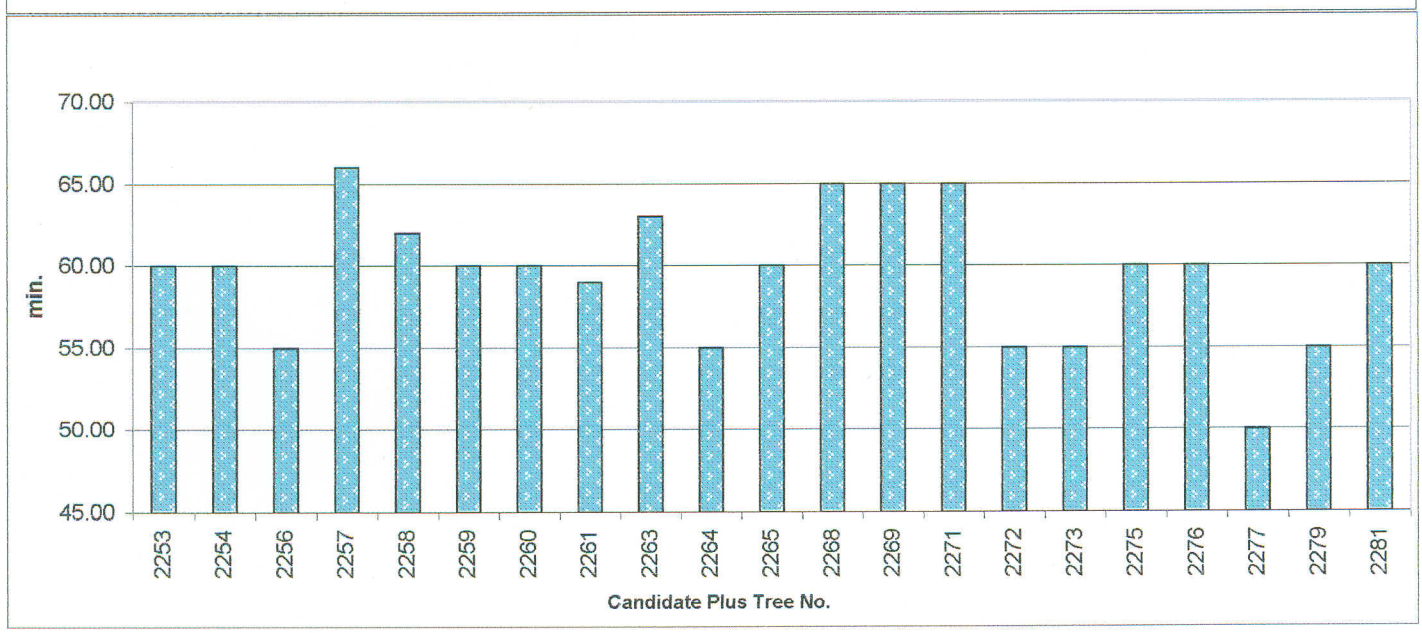



Analysis-Papri1-1/Euc_Visc

FIGURE -19

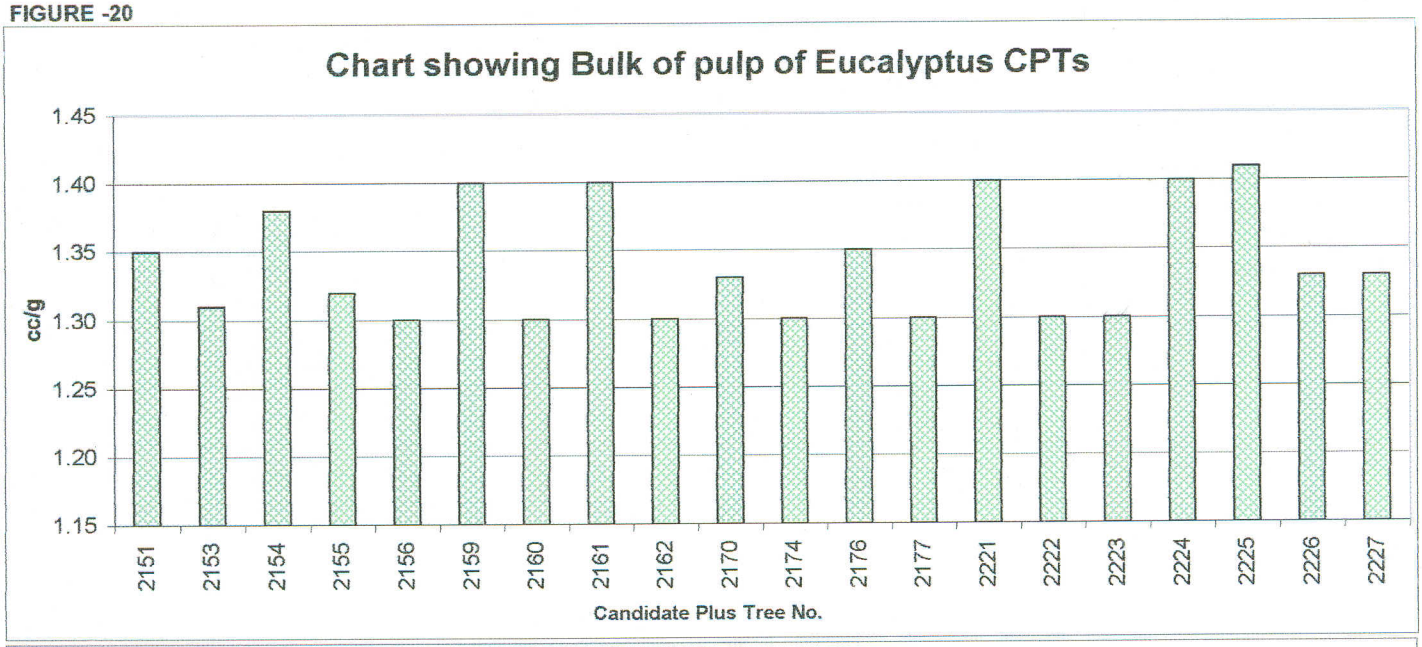


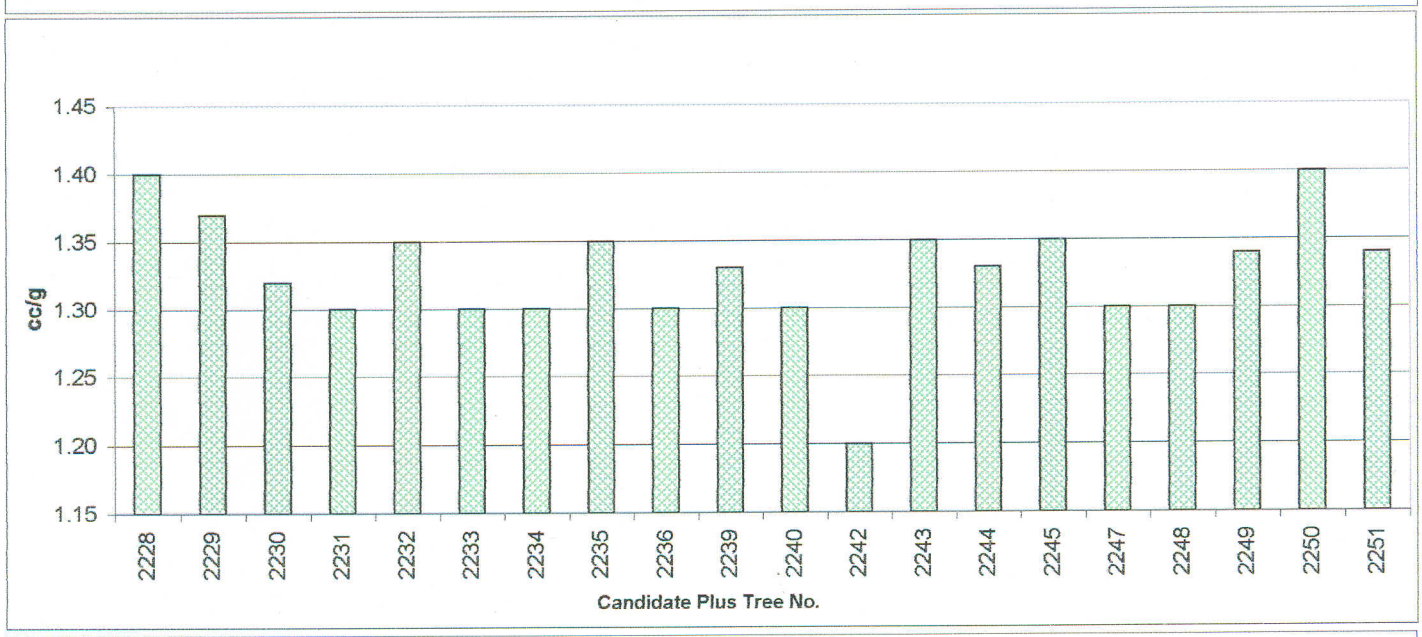



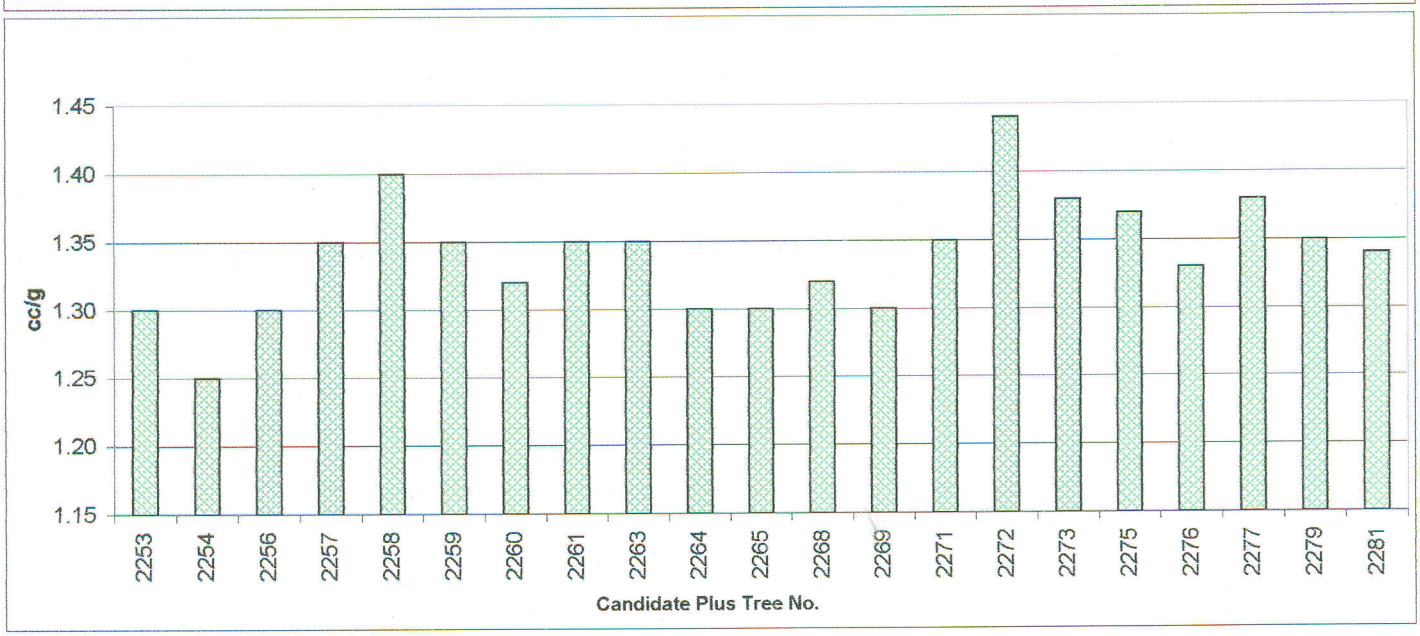




Analysis-Papri1-1/Euc_Beating

FIGURE -20

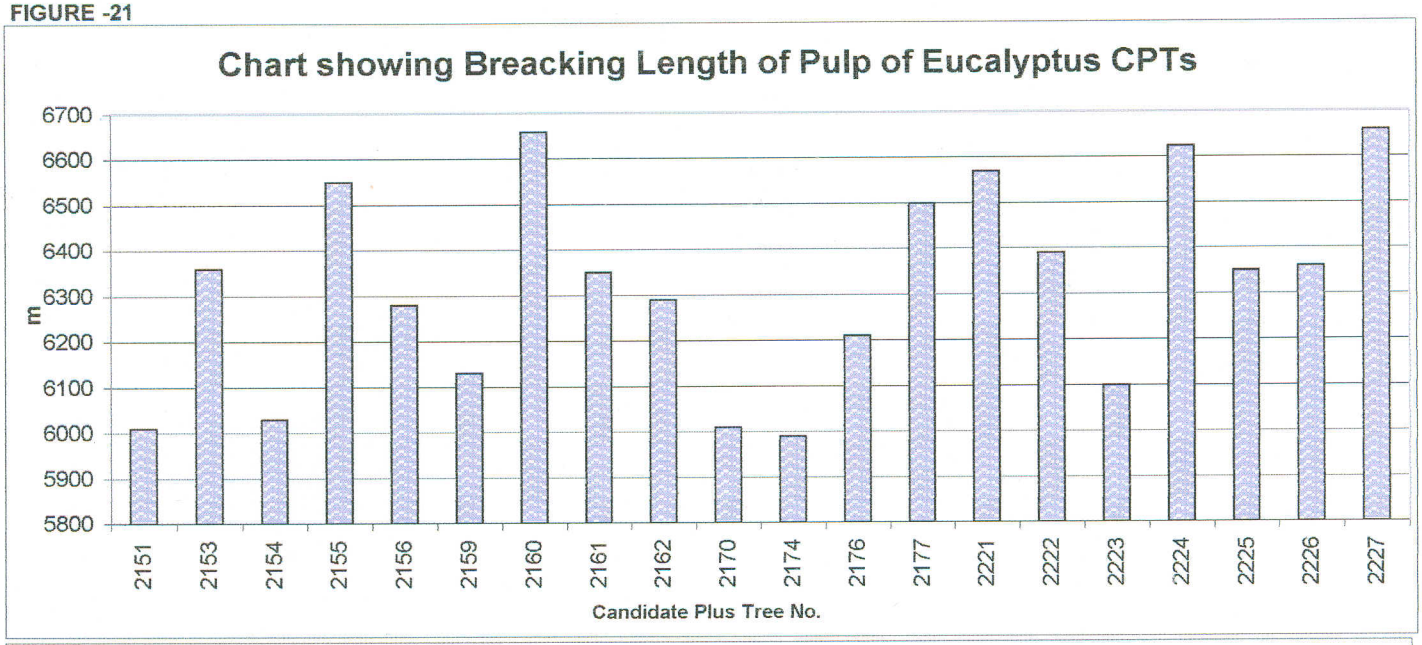


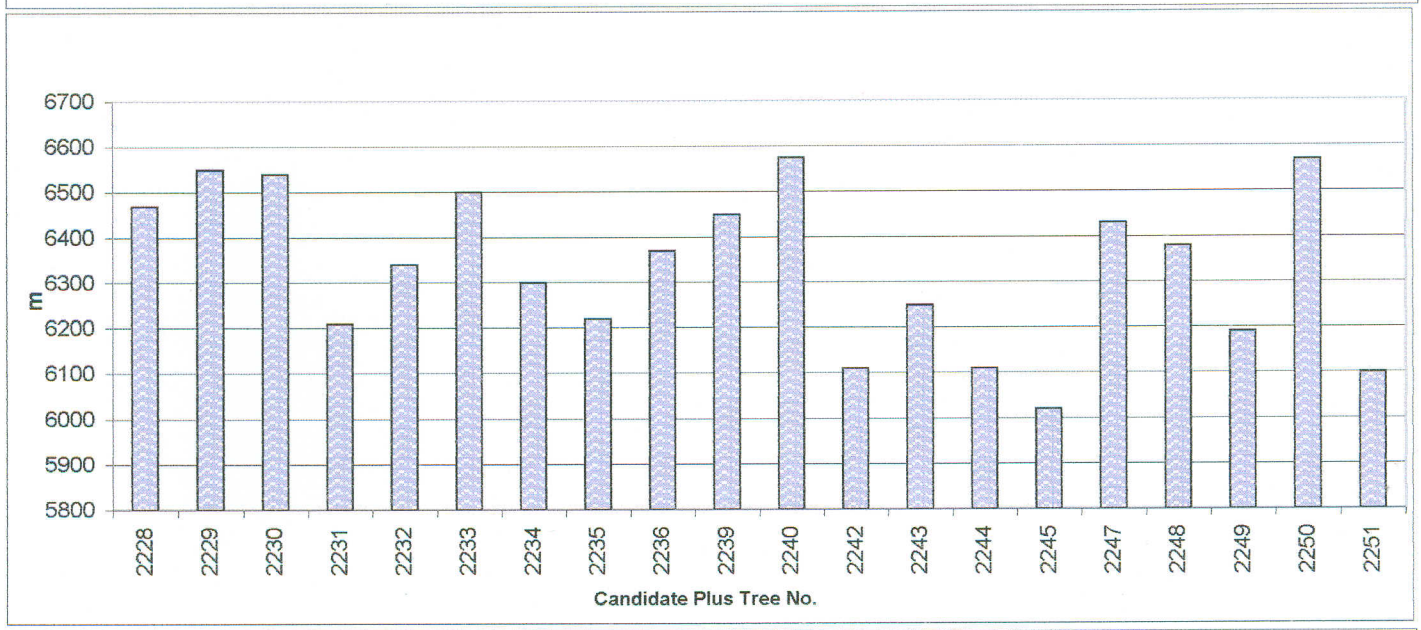



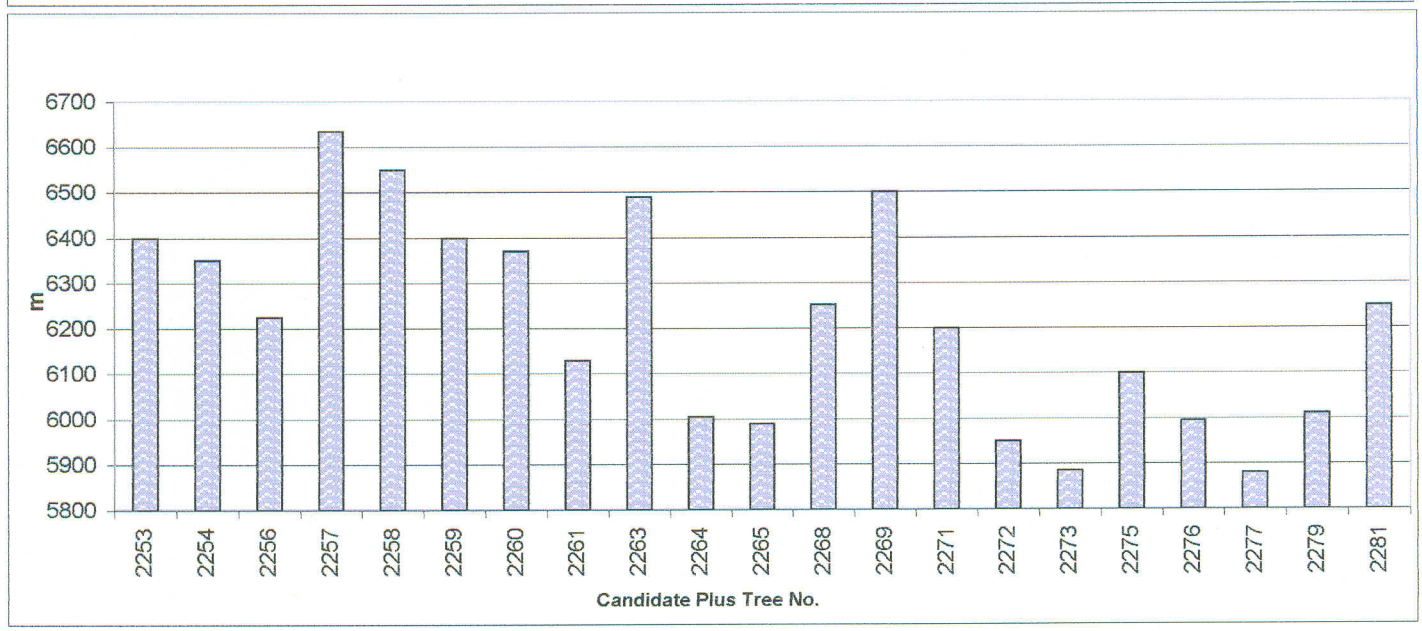




Analysis-Papri1-1/Euc_Blk

FIGURE -21




Analysis-Papri1-1/Euc_BL

FIGURE -22

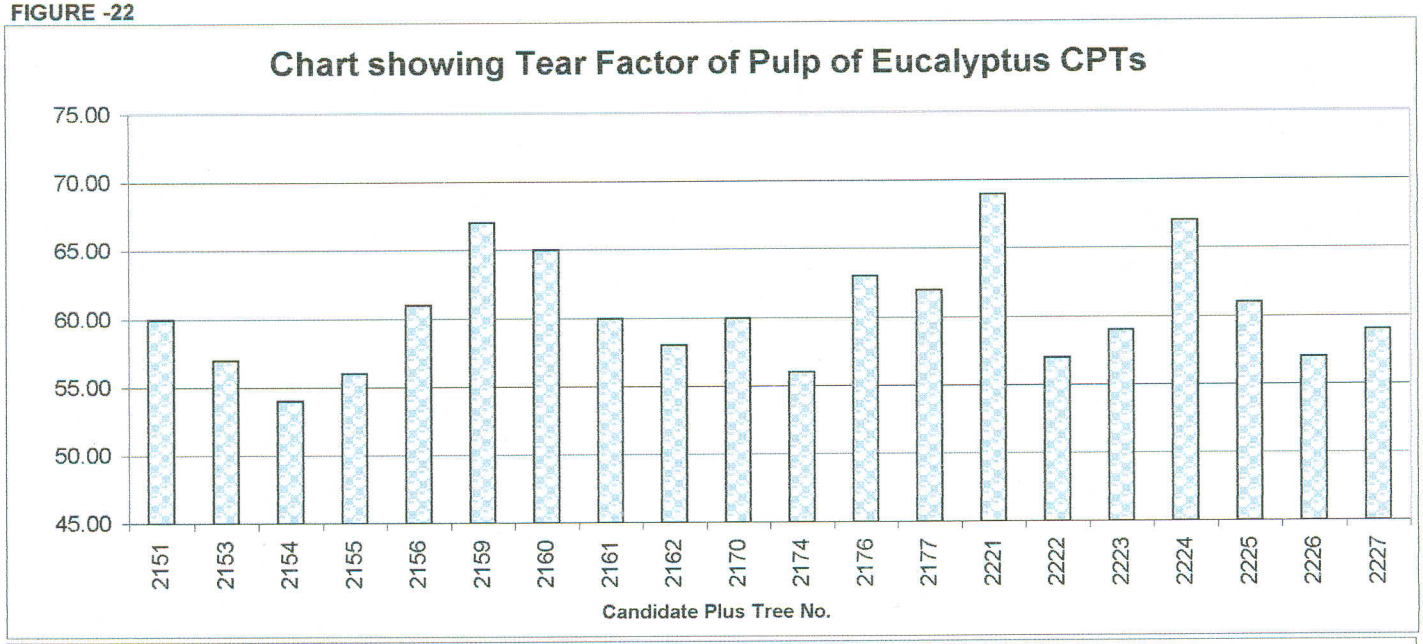
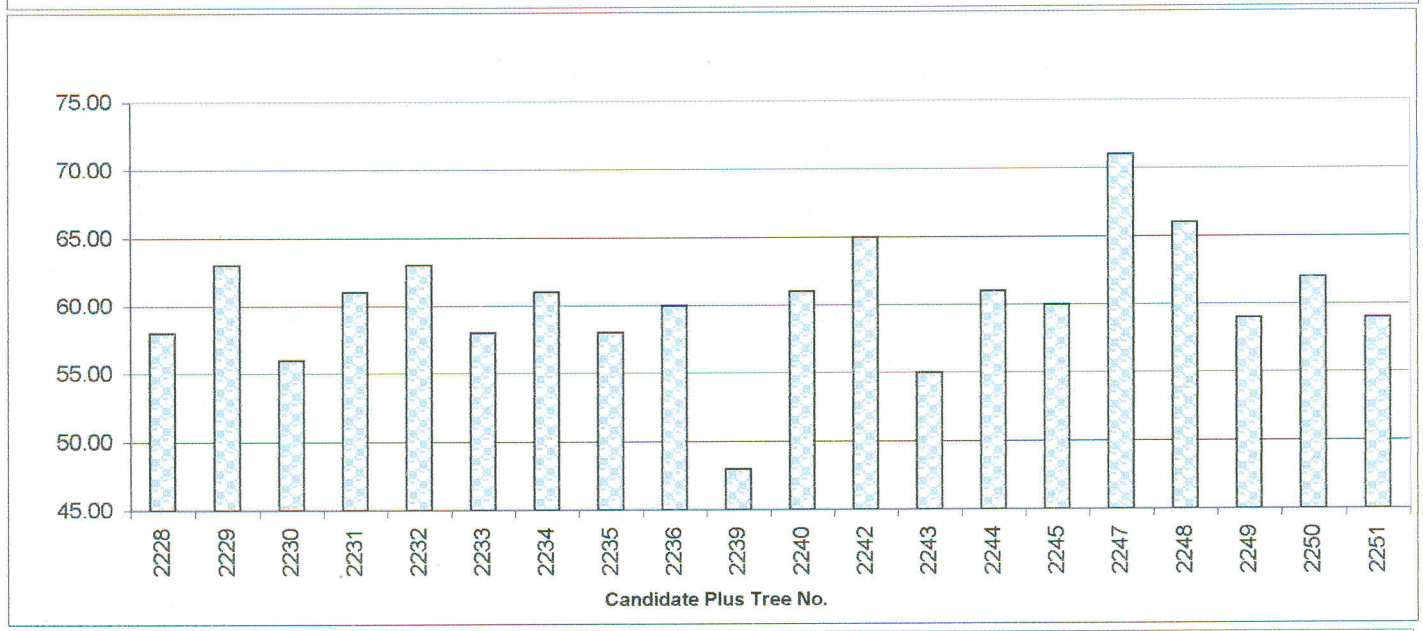


Chart showing Tear Factor of Pulp of Eucalyptus CPTs
75.00
70.00
65.00
60.00
55.00
50.00
45.00
2151
2153
2154
2155
2156
2159
2160
2161
2162
2170
2174
2176
2177
2221
2222
2223
2224
2225
2226
2227
Candidate Plus Tree No.


75.00
70.00
65.00
60.00
55.00
50.00
45.00
2228
2229
2230
2231
2232
2233
2234
2235
2236
2239
2240
2242
2243
2244
2245
2247
2248
2249
2250
2251
Candidate Plus Tree No.

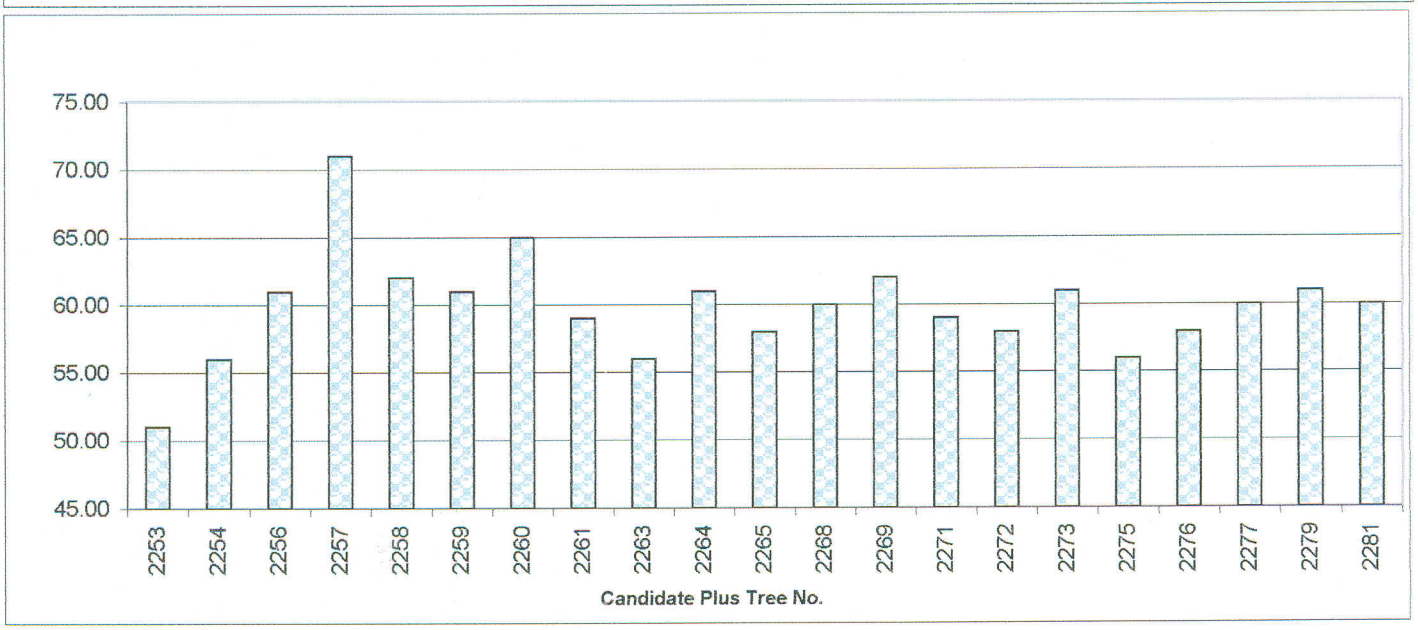
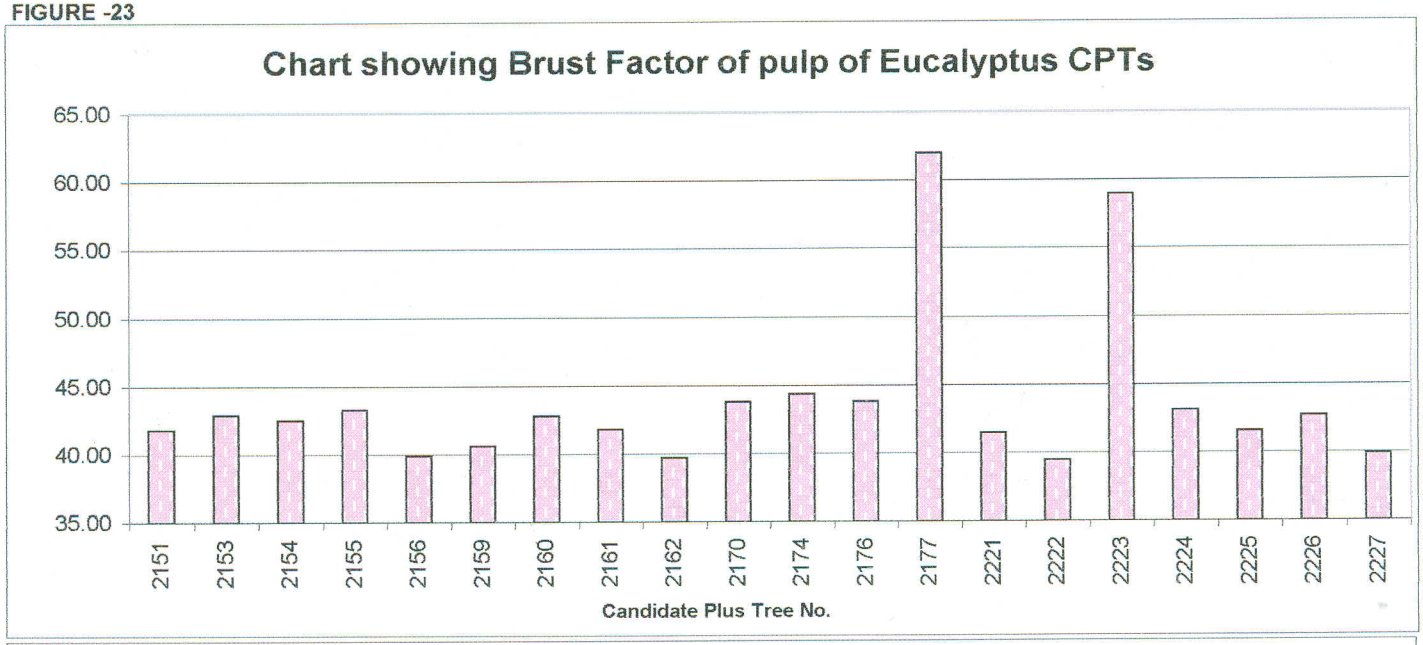
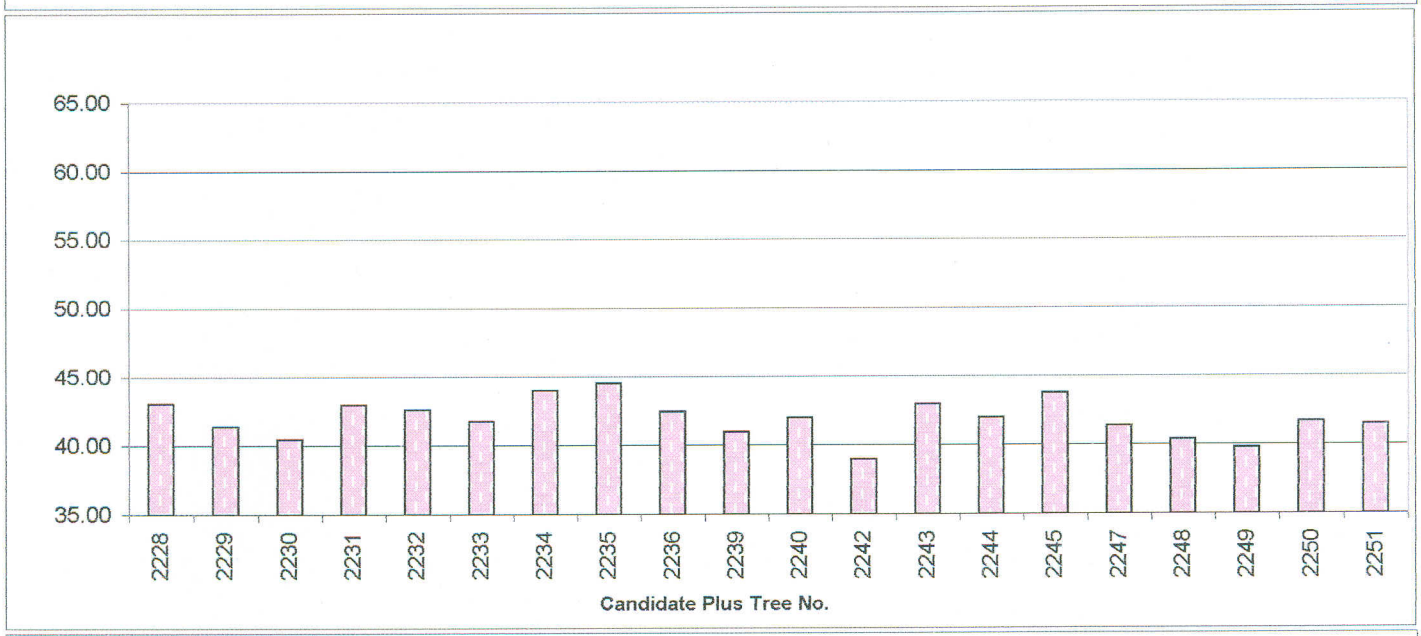
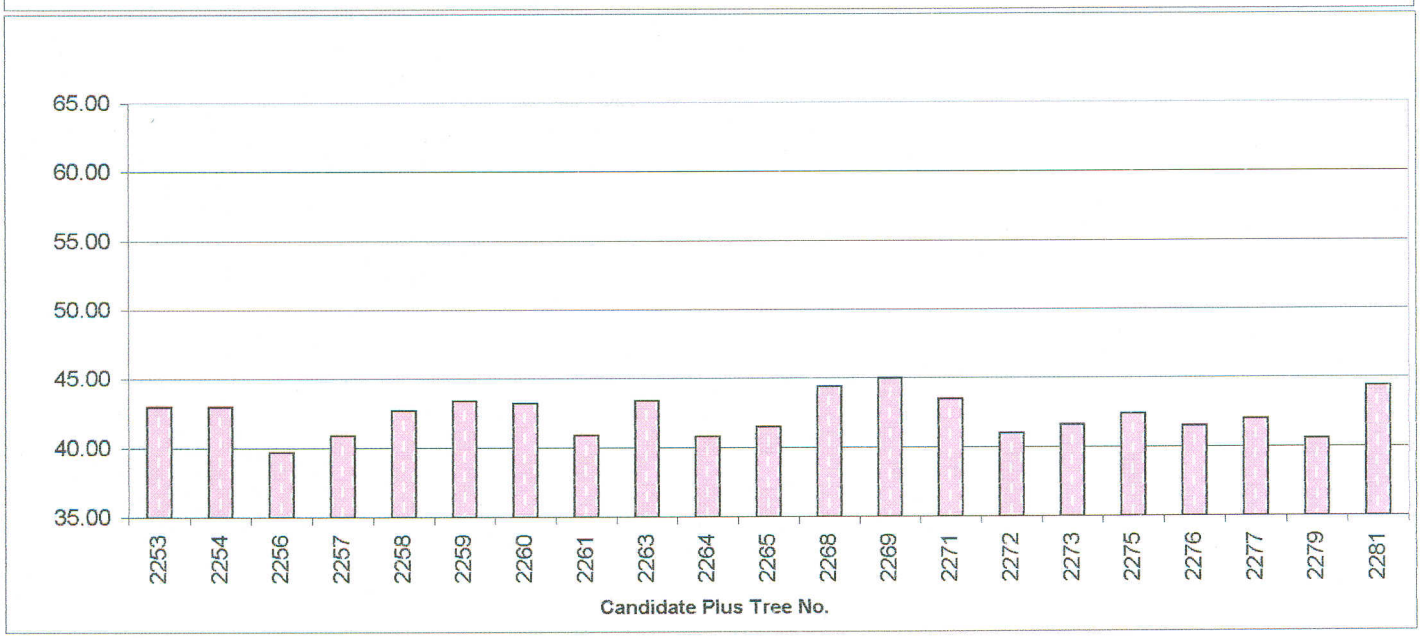

75.00
70.00
65.00
60.00
55.00
50.00
45.00
2253
2254
2256
2257
2258
2259
2260
2261
2263
2264
2265
2268
2269
2271
2272
2273
2275
2276
2277
2279
2281
Candidate Plus Tree No.

FIGURE -23

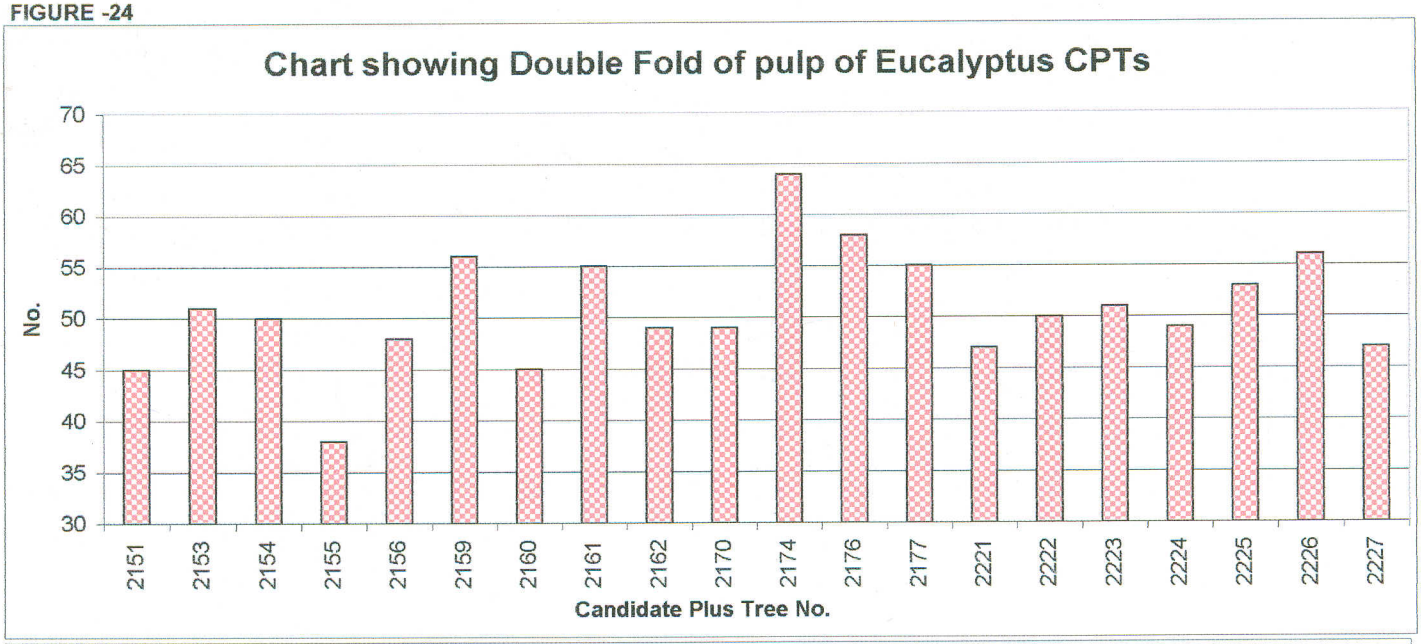


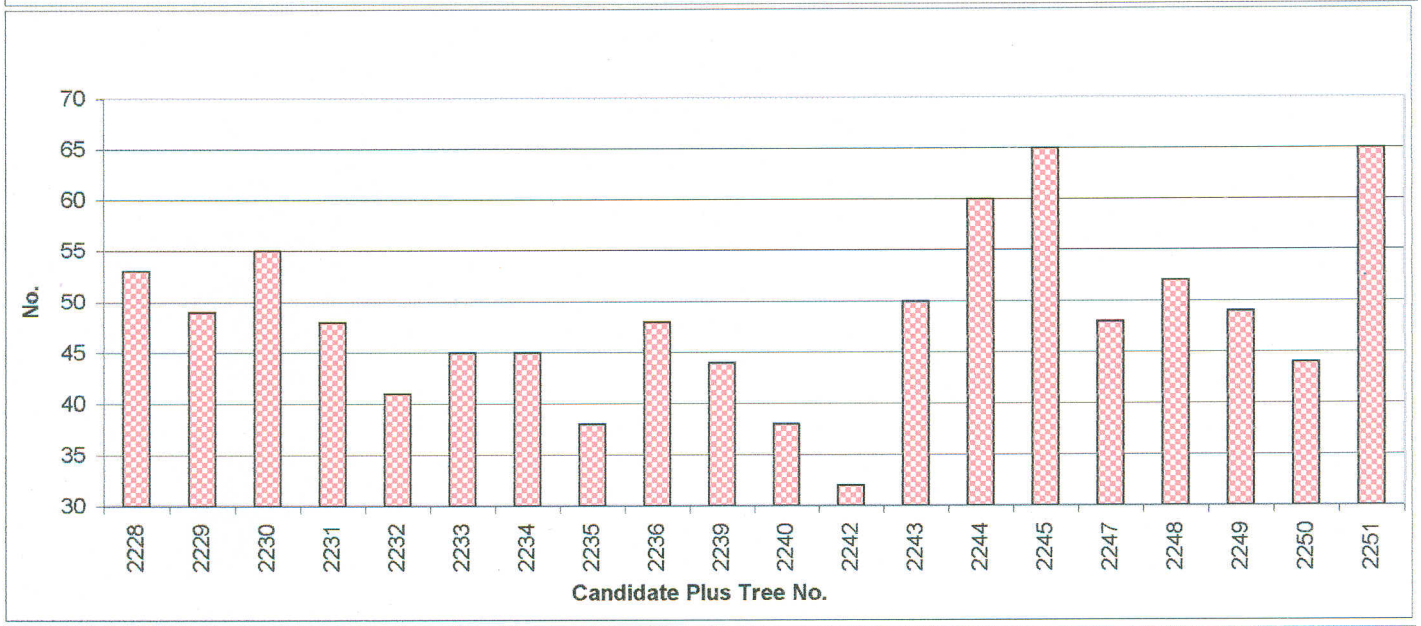



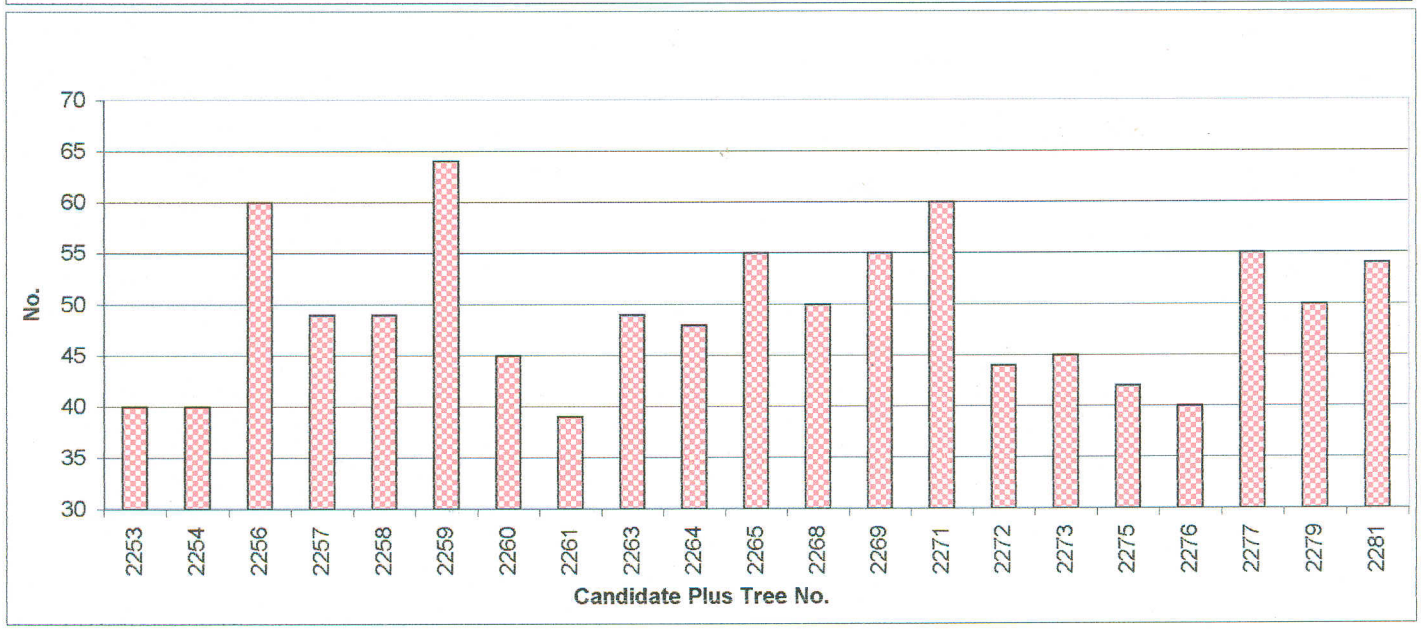




Analysis-Papri1-1/Euc_BF

FIGURE -24




Analysis-Papri1-1/Euc_DF

## Table 6. Analysis Report of *Casuarina* CPTs wood sample

| CPT No | Active Alkali 1 | Kappa No 2 | Screened yield 3 | Rejects 4 | Bleached yield 5 | Brightness 6 | Shrinkage 7 | Beating time 8 | Viscosity 9 | Bulk 10 | Breaking length 11 | Tear factor 12 | Burst factor 13 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1001 | 16 | 17.60 | 46.20 | 0.40 | 41.6 | 87.5 | 10.00 | 60 | 7.00 | 1.38 | 5140 | 57.20 | 37.40 |
| 1002 | 17 | 17.50 | 50.00 | 2.00 | 46.9 | 90.5 | 6.20 | 60 | 6.10 | 1.29 | 4914 | 60.00 | 37.70 |
| 1003 | 17 | 17.00 | 48.05 | 0.30 | 43.2 | 90.0 | 10.00 | 60 | 7.10 | 1.28 | 5223 | 59.70 | 38.50 |
| 1004 | 17 | 16.83 | 47.70 | 0.50 | 42.6 | 89.7 | 8.80 | 55 | 7.50 | 1.35 | 5164 | 60.30 | 38.10 |
| 1005 | 17 | 17.30 | 48.30 | 0.30 | 43.1 | 90.5 | 9.10 | 63 | 6.95 | 1.35 | 5510 | 60.00 | 37.50 |
| 1006 | 17 | 17.40 | 47.50 | 1.30 | 43.6 | 88.6 | 10.00 | 60 | 7.40 | 1.28 | 5555 | 58.00 | 39.10 |
| 1007 | 17 | 17.20 | 48.30 | 0.90 | 42.7 | 90.1 | 7.25 | 61 | 6.70 | 1.37 | 5750 | 63.00 | 38.50 |
| 1008 | 17 | 16.90 | 46.50 | 0.70 | 42.1 | 89.5 | 9.40 | 59 | 6.90 | 1.32 | 5540 | 56.00 | 37.90 |
| 1009 | 17 | 17.20 | 49.50 | 1.50 | 45.6 | 90.0 | 8.00 | 60 | 7.00 | 1.35 | 5320 | 58.00 | 38.30 |
| 1010 | 17 | 16.70 | 47.70 | 0.70 | 43.7 | 89.3 | 9.25 | 58 | 6.20 | 1.27 | 5630 | 59.00 | 39.00 |
| 1011 | 17 | 17.50 | 48.50 | 1.00 | 42.1 | 87.6 | 10.00 | 62 | 6.50 | 1.30 | 5140 | 60.00 | 37.50 |
| 1012 | 17 | 17.00 | 48.30 | 1.30 | 43.8 | 90.3 | 9.50 | 58 | 7.20 | 1.38 | 5750 | 59.00 | 37.70 |
| 1013 | 17 | 16.80 | 48.05 | 0.90 | 42.9 | 90.1 | 8.60 | 62 | 6.90 | 1.35 | 5325 | 60.00 | 39.50 |
| 1014 | 17 | 17.50 | 47.80 | 0.70 | 43.5 | 89.2 | 9.20 | 55 | 7.10 | 1.29 | 5420 | 60.00 | 38.70 |
| 1015 | 17 | 17.70 | 49.10 | 0.50 | 42.8 | 88.8 | 9.10 | 60 | 7.10 | 1.32 | 5280 | 58.00 | 43.00 |
| 1016 | 17 | 17.20 | 48.00 | 1.00 | 42.8 | 90.0 | 8.80 | 55 | 7.00 | 1.30 | 5625 | 55.00 | 38.00 |
| 1017 | 17 | 17.00 | 48.40 | 1.10 | 43.5 | 89.5 | 9.30 | 65 | 7.30 | 1.25 | 5500 | 61.00 | 41.00 |

FIGURE -25

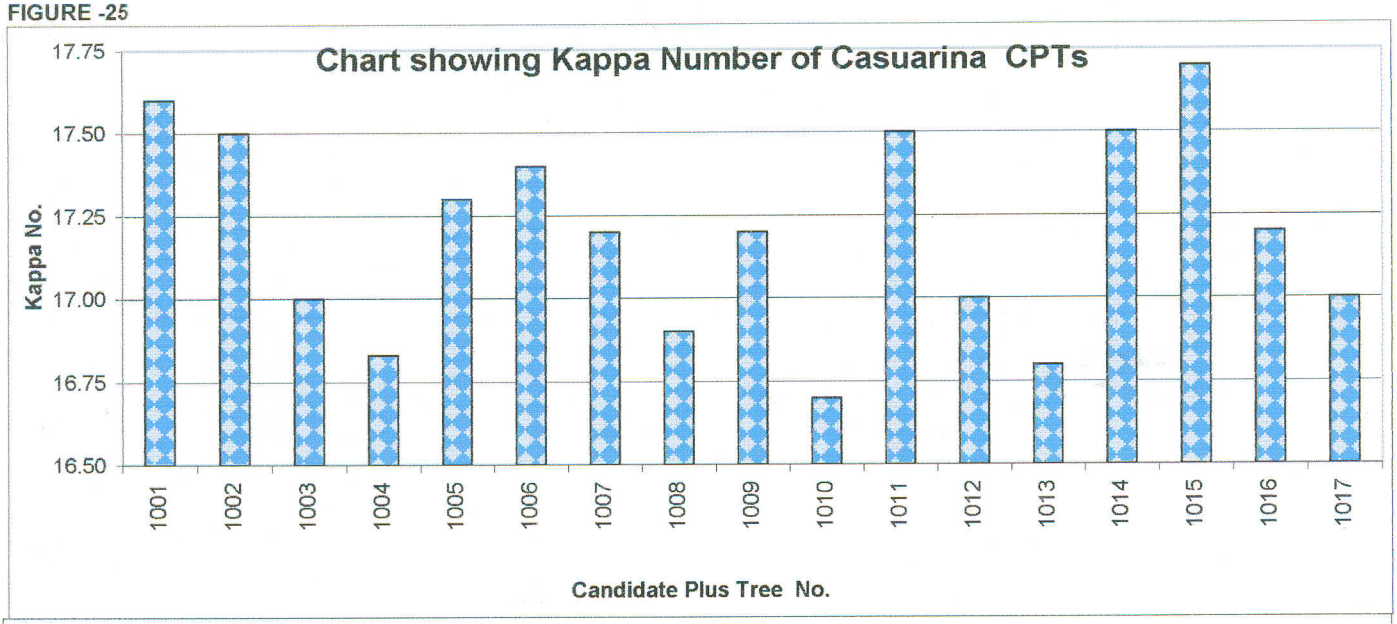


Chart showing Kappa Number of Casuarina CPTs
Kappa No.
17.75
17.50
17.25
17.00
16.75
16.50
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017
Candidate Plus Tree No.

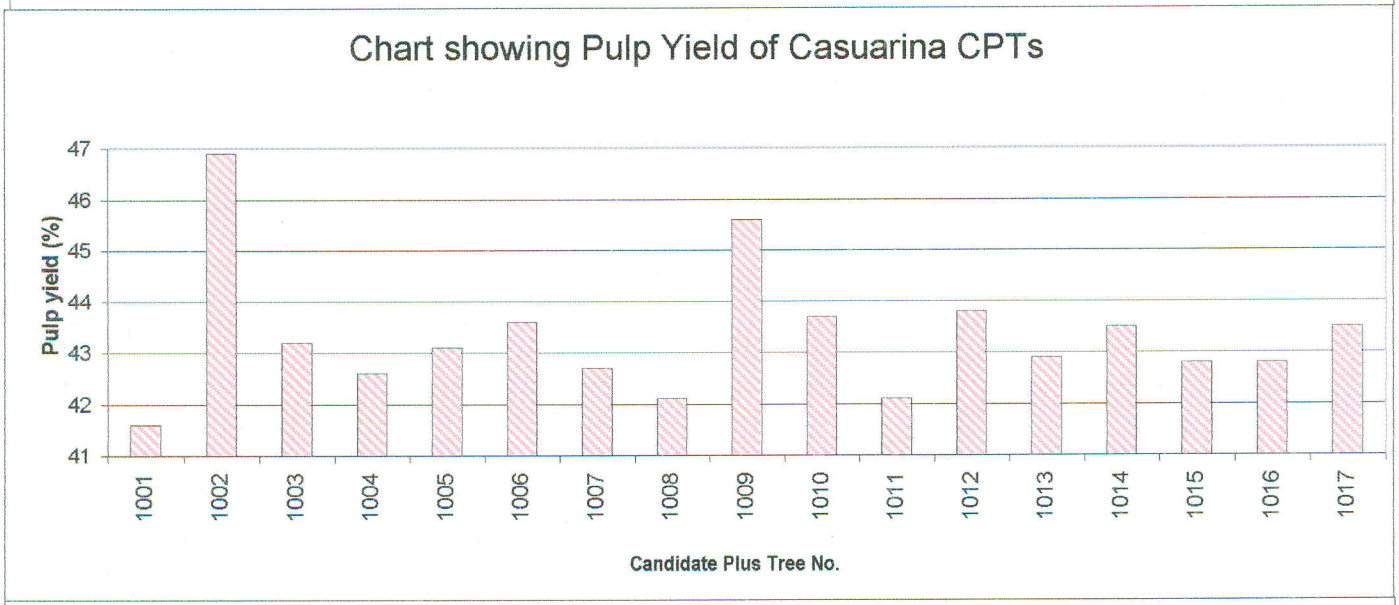


Chart showing Pulp Yield of Casuarina CPTs
Pulp yield (%)
47
46
45
44
43
42
41
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017
Candidate Plus Tree No.

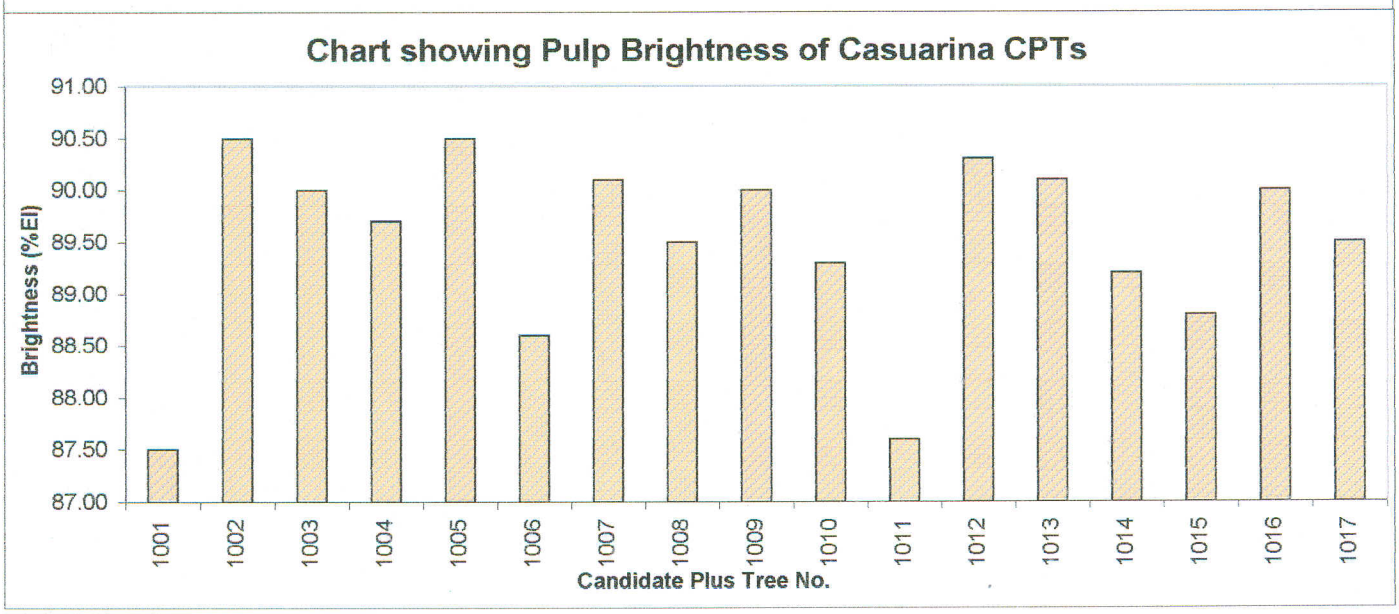
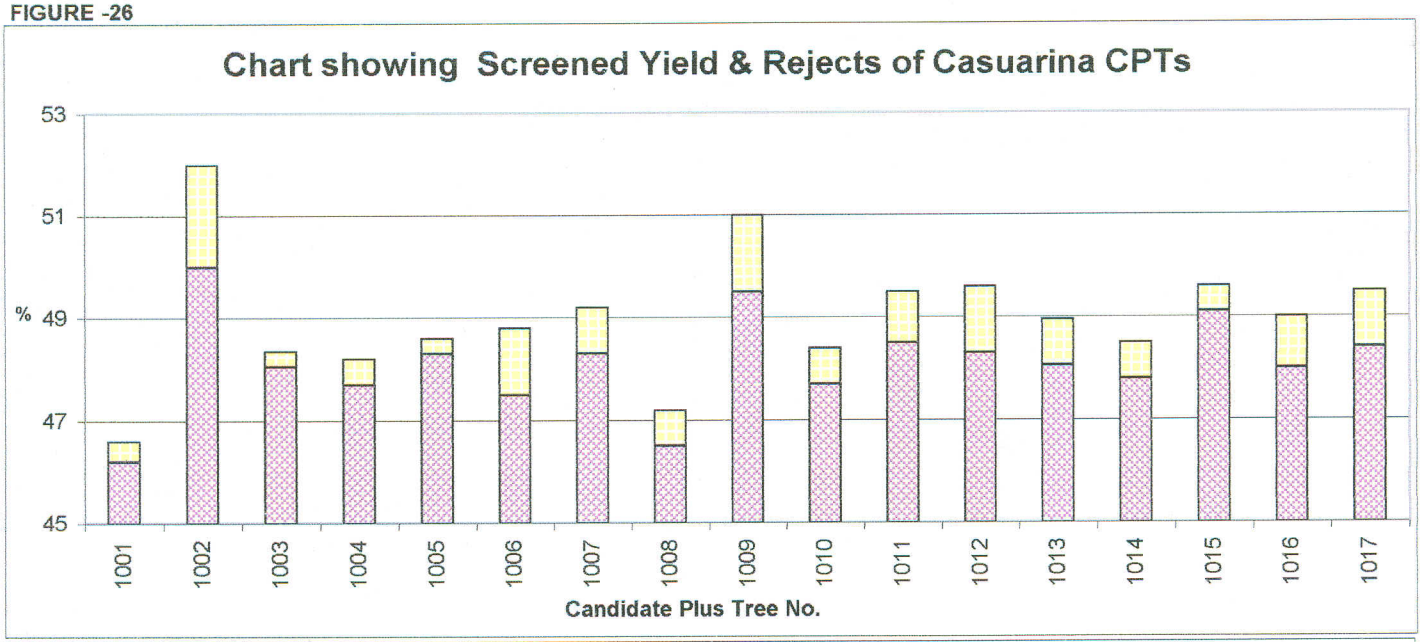
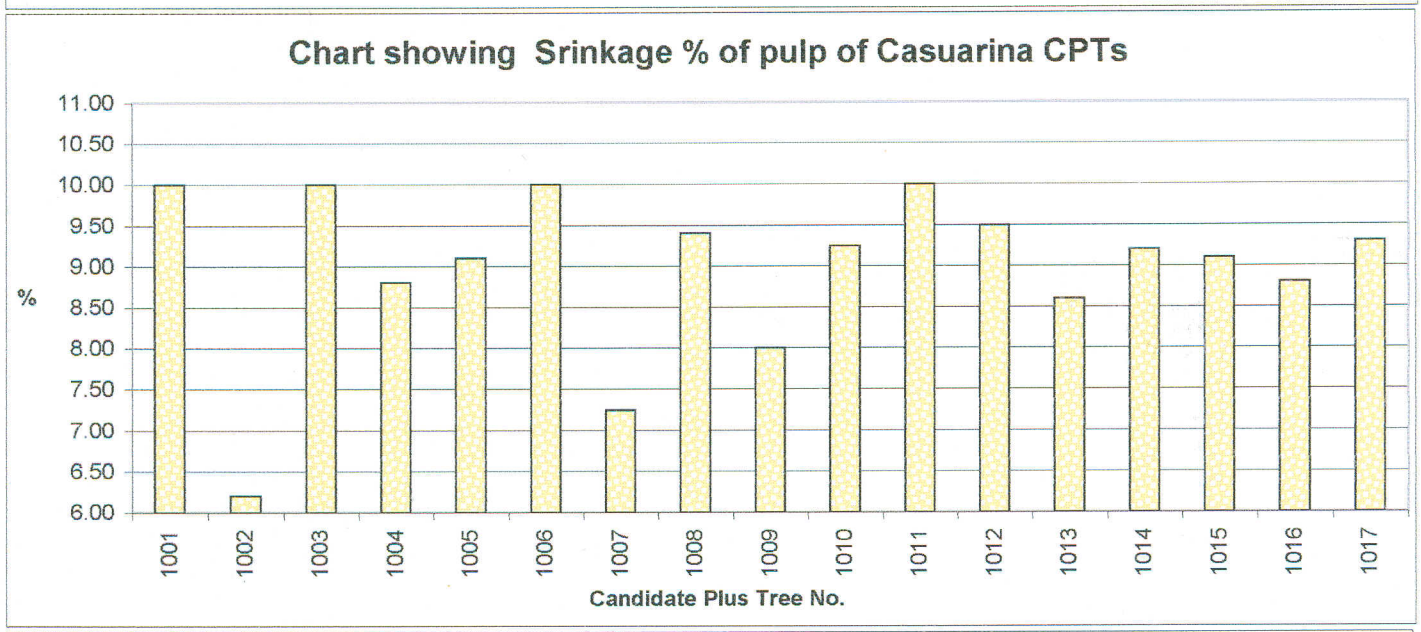
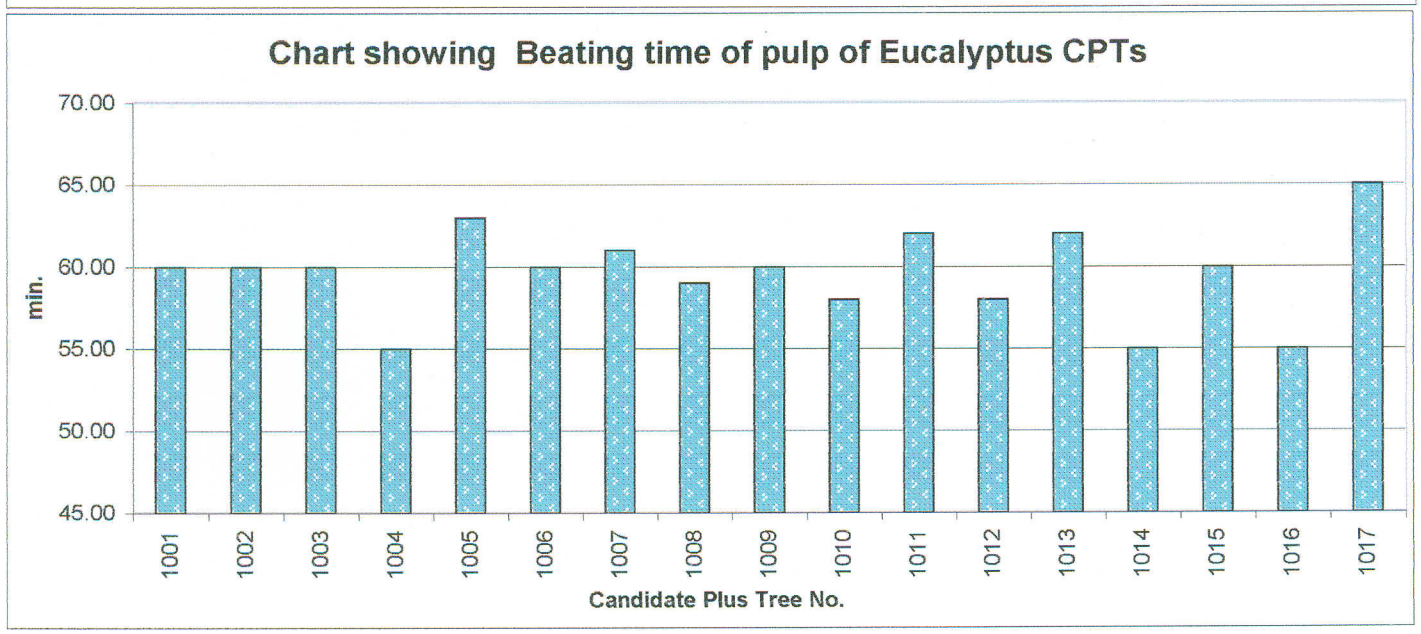


Chart showing Pulp Brightness of Casuarina CPTs
Brightness (%ElI)
91.00
90.50
90.00
89.50
89.00
88.50
88.00
87.50
87.00
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014 1015 1016 1017
Candidate Plus Tree No.

FIGURE -26

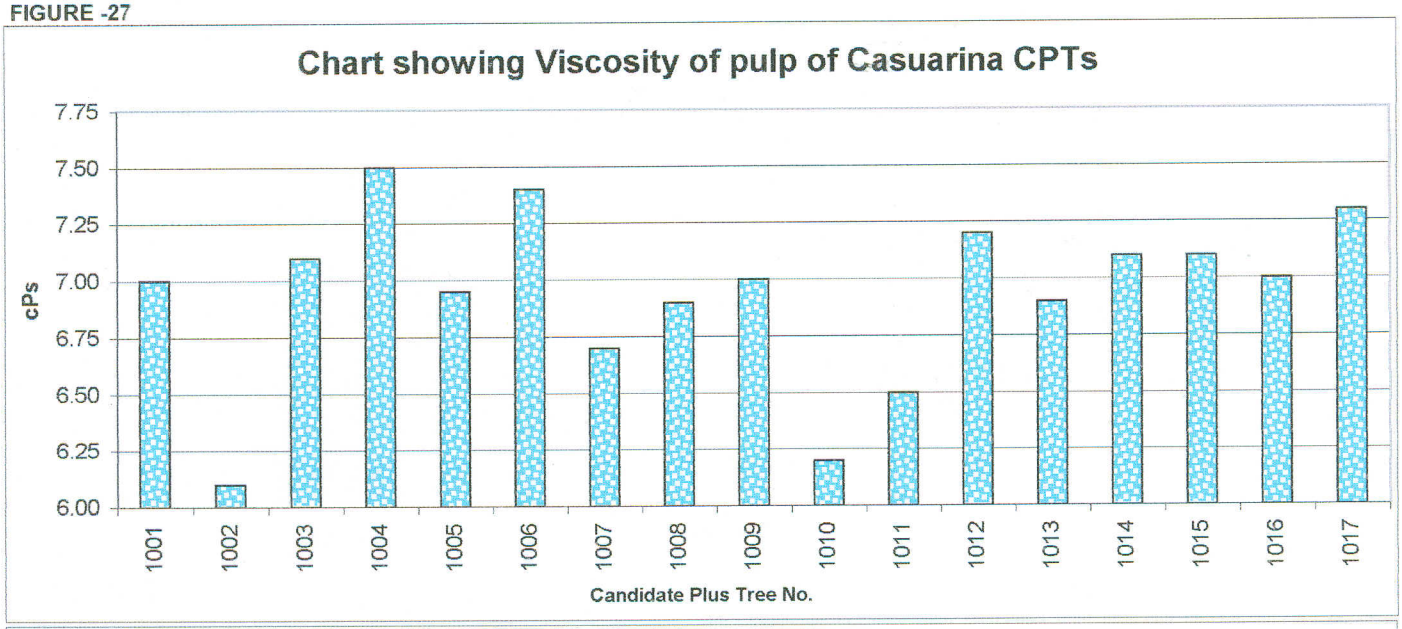


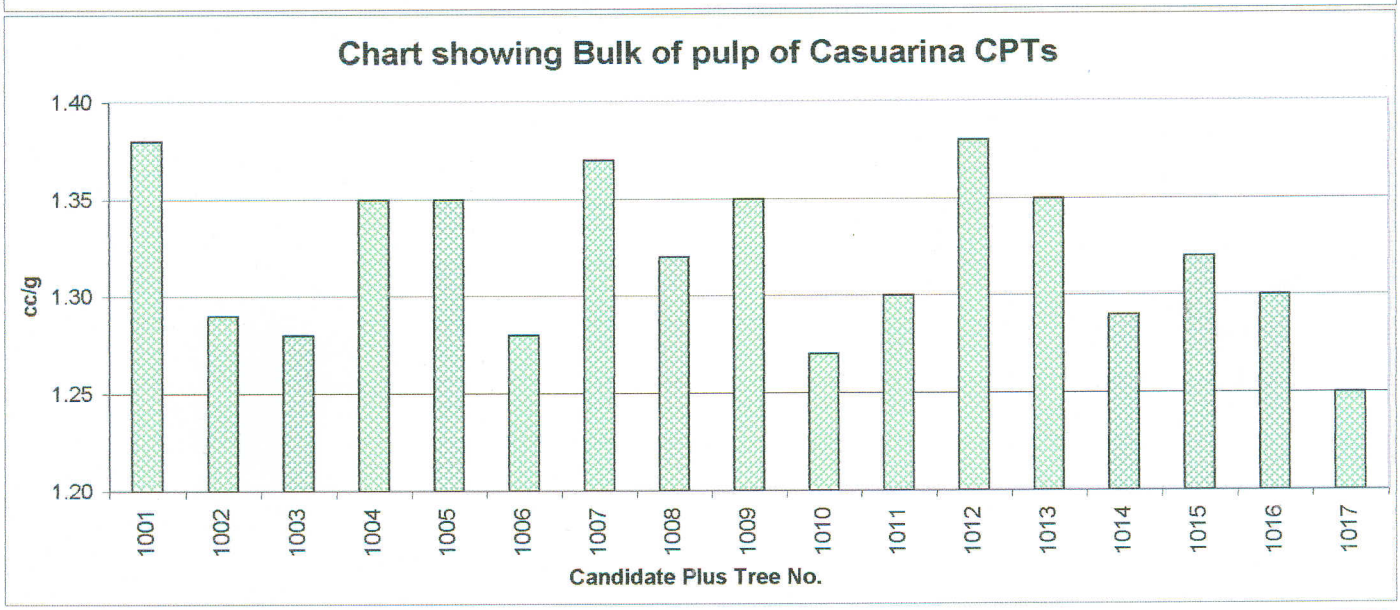



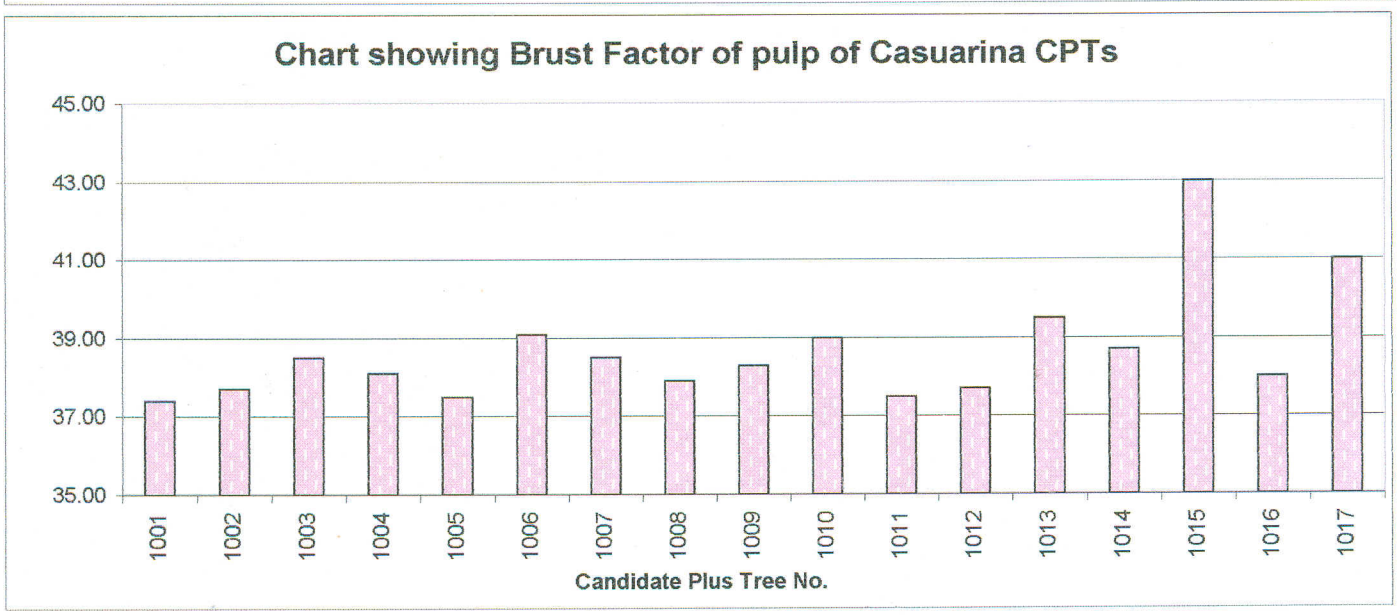




Analysis-Papri1-1/Cas-Scr Yield

FIGURE -27

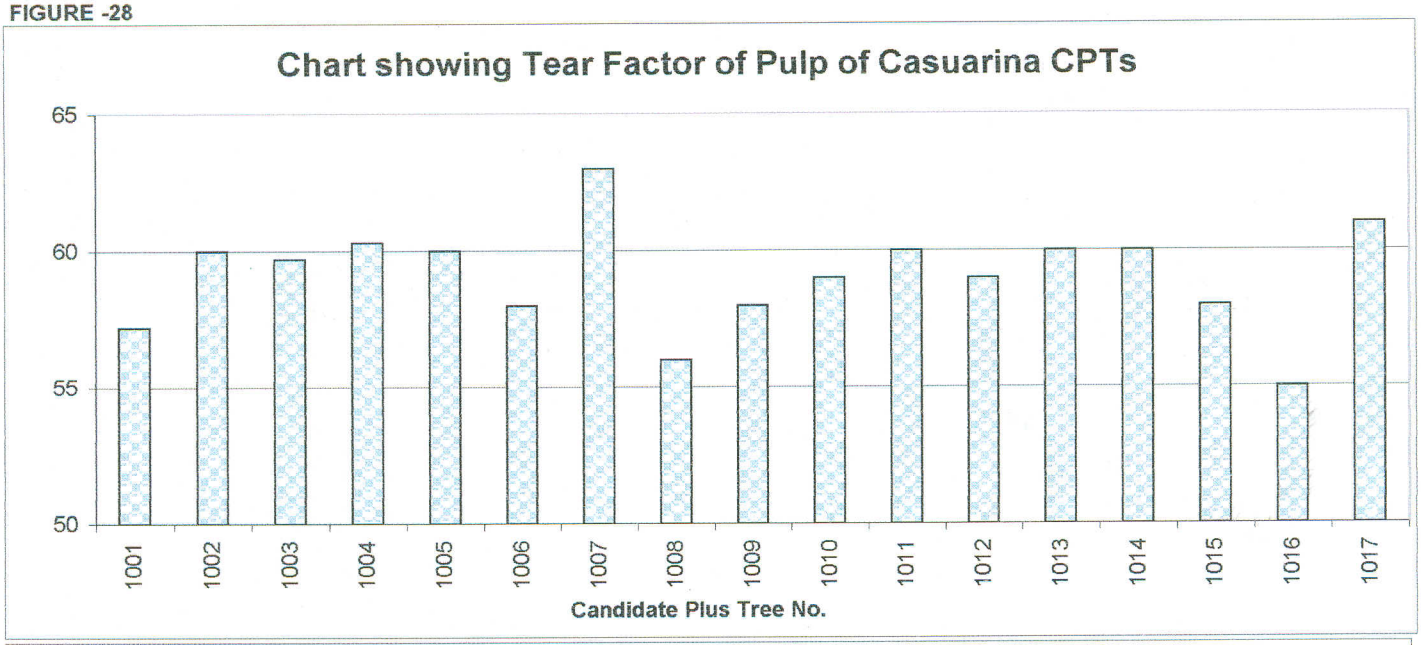


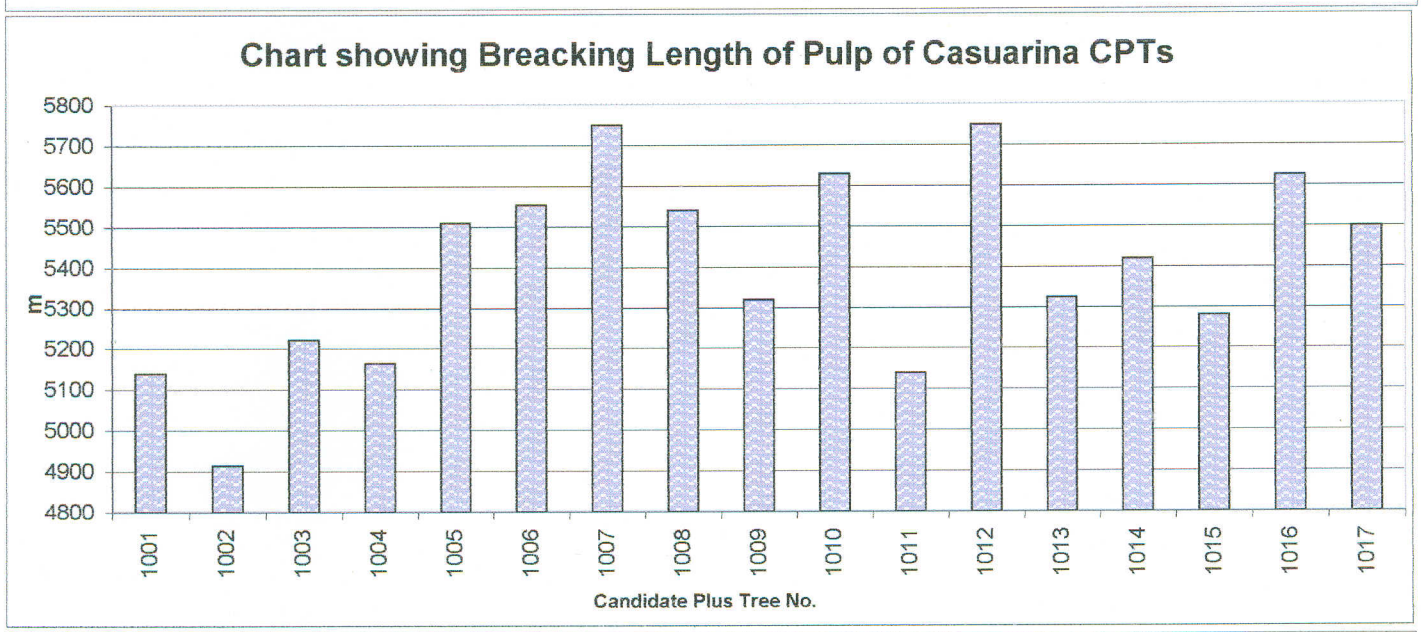



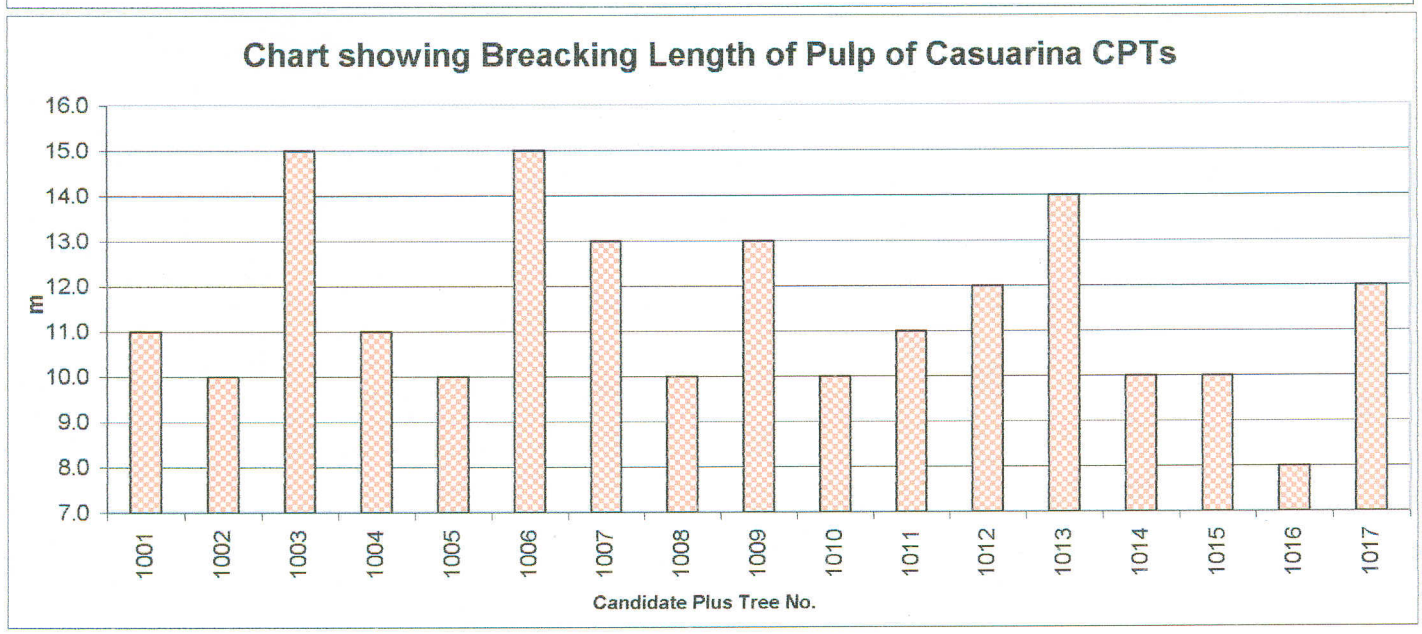




Analysis-Papri1-1/Cas_Visc

FIGURE -28




Analysis-Papri1-1/Cas_TF

**Establishment of Clonal Testing Area (CTA) & Clonal Multiplication Area (CMA):-**

Clones of both *Eucalyptus* and *Casuarina* were planted in Clonal Testing Area (CTA) to assess the growth performance. Clones were planted in Replicated Randomised Block Design (RBD). 9 plants (3 plant x 3 plant) of each clone were replicated in 3 blocks. Espacement of 3 m x 2 m has been used for CTAs.

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 4 | 5 | 6 |
| 7 | 8 | 9 |

Typical Design of a single plot of CTA

59 numbers of Clones of *Eucalyptus* have been planted in 3 CTAs and 14 clones of *Casuarina* have been planted in 1 CTA for growth performance analysis. Layout of each CTA is given in Figure-29 to 32. Periodically, growth data were collected at an interval of 6 month (March and October). In this report, 2½ year (30 months) growth data is being presented. Clonal Multiplication Area has been planted in simple block design. Layout of CMAs is given in the Figure-33.

FIGURE - 29

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## CLONAL TESTING AREA - 1

**SUB PATH**

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | RI | 2102 | 2106 | 2108 | 2110 | 2115 | B | **Index** |
| S | R II | 2110 | 2108 | 2106 | 2115 | 2102 | A | a. 2101 |
| U | R III | 2115 | 2102 | 2110 | 2106 | 2108 | M | b. 2112 |
| B | R I | 2121 | 2122 | 2123 | 2124 | 2151 | B | c. 2117 |
| A | R II | 2124 | 2123 | 2122 | 2151 | 2121 | O | d. 2127 |
| B | R III | 2151 | 2121 | 2124 | 2122 | 2123 | O | e. 2128 |
| O | R I | 2154 | 2156 | 2221 | 2223 | 2276 | | f. 2132 |
| O | R II | 2223 | 2221 | 2156 | 2276 | 2154 | P | g. 2226 |
| L | R III | 2276 | 2154 | 2223 | 2156 | 2221 | L | h. 2227 |
| | R I | 2234 | 2236 | 2240 | 2258 | 2275 | A | I. 2228 |
| | R II | 2258 | 2240 | 2236 | 2275 | 2234 | N | j. 2233 |
| | R III | 2275 | 2234 | 2258 | 2236 | 2240 | T | k. 2235 |
| | | | | | | | | l. 2245 |
| | | (Single line planting) | | | | | | m. 2254 |
| | | a b c d e f g h I j k l m n | | | | | | n. 2277 |

**EXPERIMENTAL DETAILS**

| | | | |
|---|---|---|---|
| DESIGN | RBD | DESIGN | SLP |
| NO OF TREATMENTS | 20 | NO OF TREATMENTS | 14 |
| NO OF REPLICATIONS | 3 | NO OF REPLICATIONS | 1 |
| NO OF PLANTS / REP | 3 X 3 | NO OF PLANTS / REP | 6 |
| TOTAL NO OF PLANT | 540 | TOTAL NO OF PLANT | 84 |
| SPACEMENT | 3 X 2 M | SPACEMENT | 3X2 |
| AREA | 1350 Sq M | AREA | 504 Sq M |
| D O P | 01/09/2001 | D O P | 01/09/2001 |
| SPECIES | EUCALYPTUS | SPECIES | EUCALYPTUS |

FIGURE - 30

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## CLONAL TESTING AREA - 2

### DANIDA PROVENANCE

| | | PATH | | | PATH | | | PATH | | |
|---|---|---|---|---|---|---|---|---|---|---|
| D | R - I | 2222 | 2230 | 2174 | 2244 | 2225 | 2160 | 2248 | 2159 | D |
| A | R - II | 2244 | 2160 | 2159 | 2222 | 2248 | 2230 | 2174 | 2225 | A |
| N | R - III | 2159 | 2225 | 2248 | 2174 | 2160 | 2222 | 2244 | 2230 | N |
| I | R - I | 2262 | 2272 | 2176 | 2243 | 2273 | 2242 | 2155 | 2249 | I |
| D | R - II | 2242 | 2249 | 2273 | 2155 | 2176 | 2243 | 2272 | 2262 | D |
| A | R - III | 2243 | 2262 | 2249 | 2242 | 2273 | 2155 | 2176 | 2272 | A |
| P | R - I | 2239 | 2269 | 2268 | 2177 | 2250 | 2247 | 2162 | 2161 | P |
| R | R - II | 2247 | 2177 | 2239 | 2161 | 2162 | 2268 | 2269 | 2250 | R |
| O. | R - III | 2269 | 2162 | 2247 | 2250 | 2239 | 2161 | 2177 | 2268 | O. |

### APFDC CLONES CMA

**EXPERIMENTAL DETAILS**

| | |
|---|---|
| DESIGN | RBD |
| NO. OF TREATMENTS | 24 |
| NO. OF REPLICATIONS | 3 |
| NO. OF PLANTS / REP | 3 X 3 |
| TOTAL NO OF PLANTS | 648 |
| SPACEMENT | 3 X 2 M |
| AREA | 3888 Sq M |
| D O P | 22 08 2001 |
| SPECIES | EUCALYPTUS |

FIGURE - 31

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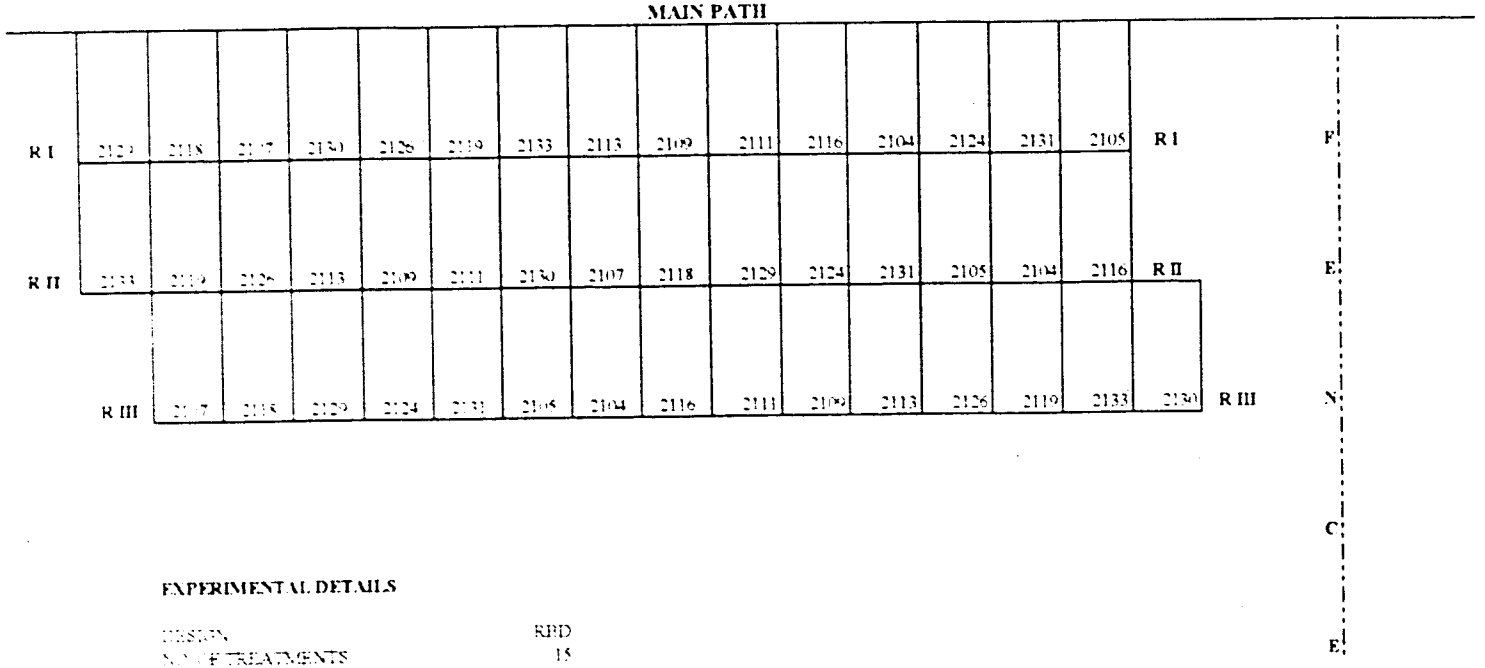
CLONAL TESTING AREA - 3

CSIRO PROVENANCE

MAIN PATH




**EXPERIMENTAL DETAILS**

| | |
|---|---|
| DESIGN | RBD |
| NO OF TREATMENTS | 15 |
| NO OF REPLICATIONS | 3 |
| NO OF PLANTS / REP | 3 X 3 |
| TOTAL NO OF PLANTS | 405 |
| SPACEMENT | 3 X 2 M |
| AREA | 2430 Sq M |
| D O P | 25 08 2001 |
| SPECIES | EUCALYPTUS |

95

# Casuarina

JKPM — PWD ROAD — SINGAPUR ROAD

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | R - I | 1003 | 1012 | 1002 | 1009 | 1005 | 1013 | 1008 | |
| M | R - II | 1008 | 1013 | 1005 | 1003 | 1012 | 1009 | 1002 | C |
| I | R - III | 1003 | 1009 | 1008 | 1012 | 1002 | 1005 | 1013 | M |
| S | R - I | 1010 | 1007 | 1004 | 1001 | 1014 | 1005 | 1011 | A |
| C | R - II | 1001 | 1011 | 1014 | 1005 | 1007 | 1004 | 1010 | |
| | R - III | 1007 | 1004 | 1001 | 1010 | 1011 | 1014 | 1005 | |

D A N I D A

**EXPERIMENTAL DETAILS**

| | |
|---|---|
| DESIGN | RBD |
| NO. OF TREATMENTS | 14 |
| NO. OF REPLICATIONS | 3 |
| NO. OF PLANTS / REP | 3 X 3 |
| TOTAL NO. OF PLANTS | 378 |
| SPACEMENT | 3 X 2 M |
| AREA | 2268 Sq.M |
| D O P | 26.08.2001 |
| SPECIES | CAUSUARINA. |

FIGURE - 33

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## Jaykaypur, Rayagada

### CLONAL MULTIPLICATION AREA - TIC

FENCING

SUB PATH

| |
|---|
| 2151 |
| 2154 |
| 2159 |
| 2160 |
| 2161 |
| 2162 |
| 2174 |
| 2177 |
| 2222 |
| 2225 |
| 2227 |
| 2230 |
| 2234 |
| 2242 |
| 2243 |
| 2244 |
| 2245 |
| 2247 |
| 2248 |
| 2249 |
| 2250 |
| 2258 |
| 2268 |
| 2269 |
| 2272 |
| 2273 |
| 2101 |
| 2104 |
| 2105 |
| 2107 |
| 2109 |
| 2101 |
| 2111 |
| 2113 |
| 2115 |
| 2116 |
| 2118 |
| 2119 |
| 2129 |
| 2130 |

FENCING

APFDC CLONE

EXPERIMENTAL DETAILS

| | |
|---|---|
| DESIGN | SLP |
| NO. OF TREATMENTS | 40 |
| NO. OF REPLICATIONS | 1 |
| NO. OF PLANTS / REP | 17 |
| TOTAL NO. OF PLANT | 1400 |
| SPACEMENT | 1.5X1 |
| AREA | 2100 sq m |
| D.O.P | 15.09.01 |
| SPECIES | EUCALYPTUS |

## GROWTH PERFORMANCE ANALYSIS:-

Half yearly growth data of *Eucalyptus* clones have been presented in the Table-7 to 9 and Figures – 33 to 42. In order to arrive at better conclusion $D^2H$ (Diameter$^2$ x Height) values were calculated for all the clones so that combined impact of height and girth can be captured clearly.

Average of Height and Collar Diameter (CDM) and no. of branches were recorded for first 6 month and thereafter only height and GBH (Girth at breast height – 1.3 m) were recorded.

***Eucalyptus hybrid*:-**

At end of 30$^{th}$ month, it was observed that in CTA-1 the average height of the clones ranged between 5.3 m to 8.1 m with overall average of 6.8 and Co-efficient of Variance of 10.64%. Average GBH of the clone in CTA-1 ranged between 13.5 cm to 21.6 cm with over all average of 17 cm with CV of 14.87%. Based on average height, GBH and Current and Mean Increments of four clones have been short listed out of 20 clones, viz. 2123, 2124, 2151 and 2156 Table-7 and Figures – 33 to 35.

Likewise, in CTA-2 four number of clones were short listed out of 24 clones viz. 2174, 2177, 2248 and 2249 Table-8 and Figures – 36 to 38, and from CTA-3 also 3 number of clones have been short listed out of 15 clones, viz. 2118, 2126 and 2133 Table-9 and Figures – 39 to 41.

Based on the growth study it found that ranking of the clones keeps changing slightly, however the best clones maintain there ranking within top 4 or 5 clones.

***Casuraina equisetifolia*:-**

The average height of *Casuarina* at the end 30$^{th}$ month ranged between 1.1 m to 2.7m with an overall average of 2.0 m and average GBH ranged between 1.1 cm to 2.3 cm with and over all average of 1.7 cm. The CV of height and GBH was 21.69% and 18.66% respectively. Based on various growth parameters three clones have been short listed, viz. 1004, 1007 and 1014, Table-10 and Figures – 43 to 45.

TABLE - 7 **CLONAL TESTING AREA - 1 (*EUCALYPTUS HYBRID*)**

No. of Clones:- 20 No. of Replection:- 3 No. of Plants/Replection:- 9

Height in meters CDM & GBH in cm

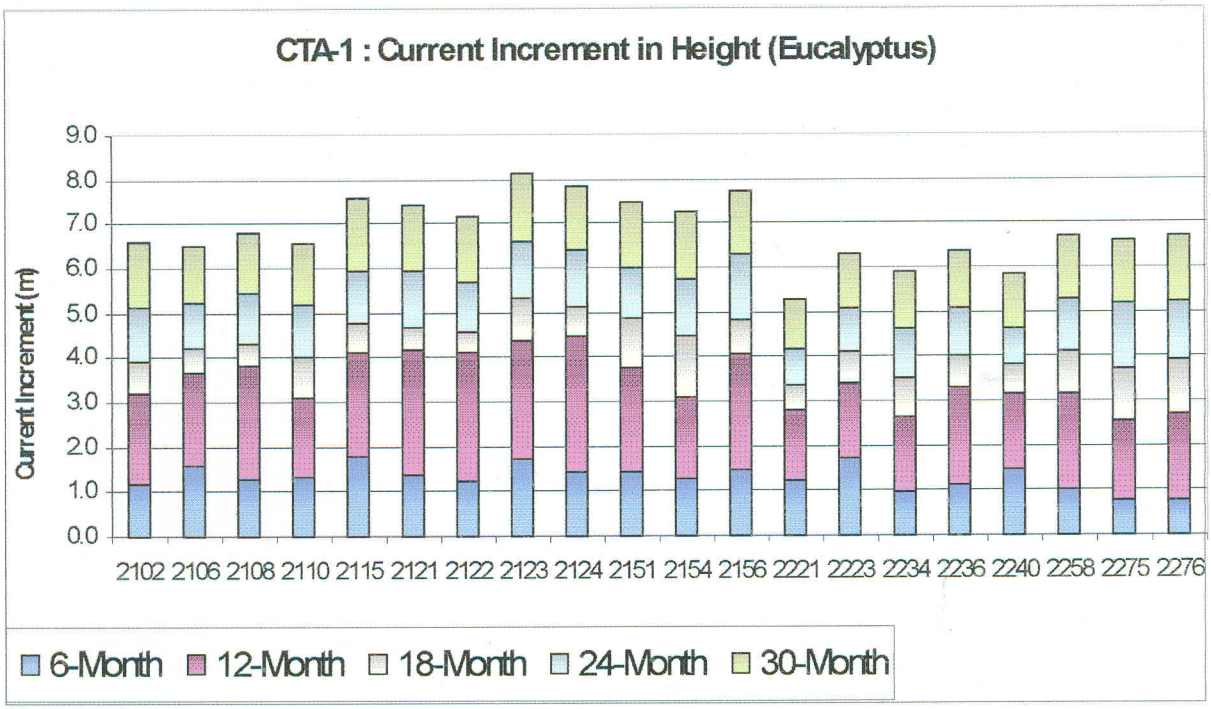
*CI = Current Increment, MI = Mean Increment*

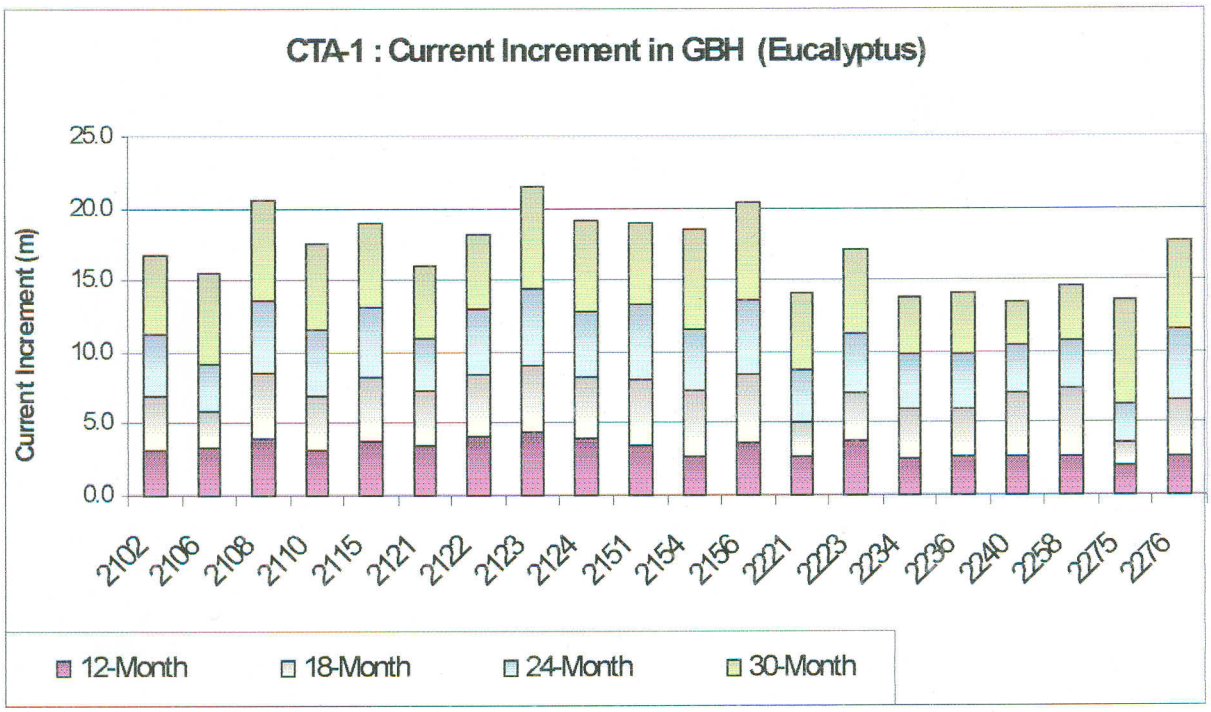
| Clone No | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2102 | R1 | 1.0 | 0.9 | 7.0 | 2.3 | 2.8 | 2.9 | 6.4 | 4.2 | 10.8 | 5.9 | 16.9 |
| | R2 | 1.3 | 1.0 | 9.8 | 3.6 | 3.3 | 4.4 | 7.0 | 5.6 | 11.5 | 6.9 | 16.7 |
| | R3 | 1.2 | 1.0 | 7.1 | 3.7 | 3.4 | 4.5 | 7.4 | 5.7 | 11.6 | 7.1 | 16.7 |
| | *Avg* | 1.2 | 1.0 | 8.0 | 3.2 | 3.2 | 3.9 | 6.9 | 5.2 | 11.3 | 6.6 | 16.7 |
| | *CI* | 1.2 | 1.0 | 8.0 | 2.0 | 3.2 | 0.7 | 3.8 | 1.2 | 4.4 | 1.4 | 5.4 |
| | *MI* | 1.2 | 1.0 | 8.0 | 1.6 | 3.2 | 1.3 | 2.3 | 1.3 | 2.8 | 1.3 | 3.3 |
| 2106 | R1 | 1.1 | 0.8 | 6.0 | 3.9 | 3.5 | 4.1 | 3.8 | 5.0 | 5.4 | 6.0 | 14.4 |
| | R2 | 2.1 | 0.8 | 7.5 | 2.9 | 2.6 | 3.8 | 6.3 | 4.9 | 10.4 | 6.4 | 14.8 |
| | R3 | 1.6 | 1.3 | 10.4 | 4.2 | 3.6 | 4.7 | 7.6 | 5.8 | 11.9 | 7.2 | 17.2 |
| | *Avg* | 1.6 | 1.0 | 8.0 | 3.6 | 3.2 | 4.2 | 5.9 | 5.2 | 9.2 | 6.5 | 15.4 |
| | *CI* | 1.6 | 1.0 | 8.0 | 2.0 | 3.2 | 0.6 | 2.6 | 1.0 | 3.3 | 1.3 | 6.2 |
| | *MI* | 1.2 | 2.2 | 3.2 | 1.8 | 3.2 | 1.4 | 2.0 | 1.3 | 2.3 | 1.3 | 3.1 |
| 2108 | R1 | 1.2 | 1.2 | 13.0 | 3.9 | 3.9 | 4.2 | 8.6 | 5.4 | 14.2 | 6.9 | 23.0 |
| | R2 | 1.3 | 1.5 | 12.4 | 3.8 | 4.2 | 4.4 | 9.0 | 5.7 | 14.4 | 7.2 | 20.0 |
| | R3 | 1.4 | 1.4 | 11.6 | 3.9 | 3.9 | 4.4 | 7.9 | 5.3 | 12.2 | 6.4 | 18.6 |
| | *Avg* | 1.3 | 1.4 | 12.3 | 3.8 | 4.0 | 4.3 | 8.5 | 5.4 | 13.6 | 6.8 | 20.5 |
| | *CI* | 1.3 | 1.4 | 12.3 | 2.5 | 4.0 | 0.5 | 4.5 | 1.1 | 5.1 | 1.4 | 6.9 |
| | *MI* | 1.2 | 2.2 | 3.2 | 1.9 | 4.0 | 1.4 | 2.8 | 1.4 | 3.4 | 1.4 | 4.1 |
| 2110 | R1 | 1.4 | 1.3 | 11.9 | 3.5 | 3.3 | 4.5 | 8.4 | 5.8 | 13.5 | 7.3 | 19.6 |
| | R2 | 1.3 | 1.1 | 11.5 | 3.2 | 3.1 | 3.7 | 5.3 | 4.7 | 9.4 | 5.9 | 16.1 |
| | R3 | 1.2 | 1.1 | 9.4 | 2.8 | 3.1 | 3.9 | 7.1 | 5.1 | 11.5 | 6.5 | 16.9 |
| | *Avg* | 1.3 | 1.2 | 10.9 | 3.1 | 3.2 | 4.0 | 6.9 | 5.2 | 11.5 | 6.6 | 17.6 |
| | *CI* | 1.3 | 1.2 | 10.9 | 1.8 | 3.2 | 0.9 | 3.8 | 1.2 | 4.5 | 1.4 | 6.1 |
| | *MI* | 1.3 | 1.2 | 10.9 | 1.6 | 3.2 | 1.3 | 2.3 | 1.3 | 2.9 | 1.3 | 3.5 |
| 2115 | R1 | 2.0 | 1.6 | 17.7 | 4.7 | 4.7 | 5.3 | 9.9 | 6.3 | 15.1 | 8.1 | 20.7 |
| | R2 | 2.0 | 1.6 | 17.3 | 4.4 | 4.1 | 5.1 | 8.8 | 6.2 | 14.1 | 7.7 | 19.8 |
| | R3 | 1.4 | 1.1 | 10.6 | 3.3 | 2.6 | 4.1 | 6.2 | 5.3 | 10.2 | 6.9 | 16.5 |
| | *Avg* | 1.8 | 1.4 | 15.2 | 4.1 | 3.8 | 4.8 | 8.3 | 6.0 | 13.2 | 7.6 | 19.0 |
| | *CI* | 1.8 | 1.4 | 15.2 | 2.4 | 3.8 | 0.7 | 4.5 | 1.2 | 4.9 | 1.6 | 5.8 |
| | *MI* | 1.8 | 1.4 | 15.2 | 2.1 | 3.8 | 1.6 | 2.8 | 1.5 | 3.3 | 1.5 | 3.8 |
| 2121 | R1 | 1.3 | 1.2 | 13.8 | 4.4 | 3.4 | 5.0 | 7.7 | 6.3 | 11.6 | 7.7 | 17.2 |
| | R2 | 1.4 | 1.5 | 18.3 | 3.7 | 3.4 | 4.1 | 6.5 | 5.3 | 10.1 | 7.1 | 13.9 |
| | R3 | 1.4 | 1.2 | 13.2 | 4.4 | 3.4 | 4.9 | 7.4 | 6.2 | 11.3 | 7.5 | 16.8 |
| | *Avg* | 1.4 | 1.3 | 15.1 | 4.2 | 3.4 | 4.7 | 7.2 | 5.9 | 11.0 | 7.4 | 16.0 |
| | *CI* | 1.4 | 1.3 | 15.1 | 2.8 | 3.4 | 0.5 | 3.8 | 1.3 | 3.7 | 1.5 | 5.0 |
| | *MI* | 1.4 | 1.3 | 15.1 | 2.1 | 3.4 | 1.6 | 2.4 | 1.5 | 2.7 | 1.5 | 3.2 |
| 2122 | R1 | 1.3 | 1.3 | 14.8 | 4.1 | 4.4 | 4.8 | 8.4 | 5.9 | 12.7 | 7.6 | 18.4 |
| | R2 | 1.2 | 1.1 | 15.7 | 4.2 | 4.2 | 4.5 | 8.4 | 5.6 | 13.0 | 7.1 | 18.1 |
| | R3 | 1.1 | 1.1 | 14.9 | 4.1 | 3.8 | 4.4 | 8.4 | 5.6 | 13.2 | 6.9 | 18.2 |
| | *Avg* | 1.2 | 1.2 | 15.1 | 4.1 | 4.1 | 4.6 | 8.4 | 5.7 | 13.0 | 7.2 | 18.2 |
| | *CI* | 1.2 | 1.2 | 15.1 | 2.9 | 4.1 | 0.5 | 4.3 | 1.1 | 4.6 | 1.5 | 5.2 |
| | *MI* | 1.2 | 1.2 | 15.1 | 2.1 | 4.1 | 1.5 | 2.8 | 1.4 | 3.2 | 1.4 | 3.6 |

| Clone No | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2123 | R1 | 1.6 | 2.0 | 19.4 | 5.0 | 5.1 | 5.6 | 10.3 | 6.8 | 15.8 | 8.5 | 23.4 |
| | R2 | 2.2 | 1.6 | 20.6 | 4.6 | 4.5 | 5.5 | 9.9 | 7.0 | 15.6 | 8.4 | 21.9 |
| | R3 | 1.3 | 1.2 | 15.4 | 3.6 | 3.4 | 5.0 | 7.1 | 6.1 | 12.0 | 7.4 | 19.4 |
| | *Avg* | 1.7 | 1.6 | 18.5 | 4.4 | 4.4 | 5.4 | 9.1 | 6.6 | 14.5 | 8.1 | 21.6 |
| | *CI* | 1.7 | 1.6 | 18.5 | 2.7 | 4.4 | 1.0 | 4.7 | 1.3 | 5.4 | 1.5 | 7.1 |
| | *MI* | 1.7 | 1.6 | 18.5 | 2.2 | 4.4 | 1.8 | 3.0 | 1.7 | 3.6 | 1.6 | 4.3 |
| 2124 | R1 | 1.4 | 1.1 | 10.1 | 5.2 | 4.5 | 5.4 | 9.3 | 6.9 | 14.3 | 8.4 | 19.6 |
| | R2 | 1.4 | 1.2 | 11.6 | 3.2 | 2.9 | 4.5 | 6.3 | 6.0 | 10.3 | 7.3 | 17.7 |
| | R3 | 1.6 | 1.5 | 18.7 | 5.0 | 4.6 | 5.4 | 9.0 | 6.4 | 13.8 | 7.8 | 20.3 |
| | *Avg* | 1.4 | 1.3 | 13.4 | 4.5 | 4.0 | 5.1 | 8.2 | 6.4 | 12.8 | 7.8 | 19.2 |
| | *CI* | 1.4 | 1.3 | 13.4 | 3.0 | 4.0 | 0.6 | 4.2 | 1.3 | 4.6 | 1.4 | 6.4 |
| | *MI* | 1.4 | 1.3 | 13.4 | 2.2 | 4.0 | 1.7 | 2.7 | 1.6 | 3.2 | 1.6 | 3.8 |
| 2151 | R1 | 1.5 | 1.3 | 12.4 | 3.2 | 3.3 | 5.1 | 8.8 | 5.9 | 14.3 | 7.5 | 20.0 |
| | R2 | 1.6 | 1.3 | 14.7 | 4.5 | 4.2 | 5.2 | 8.5 | 6.5 | 14.1 | 7.9 | 20.4 |
| | R3 | 1.2 | 1.2 | 11.6 | 3.5 | 3.0 | 4.4 | 6.9 | 5.6 | 11.4 | 7.0 | 16.4 |
| | *Avg* | 1.4 | 1.3 | 12.9 | 3.8 | 3.5 | 4.9 | 8.0 | 6.0 | 13.3 | 7.5 | 18.9 |
| | *CI* | 1.4 | 1.3 | 12.9 | 2.3 | 3.5 | 1.1 | 4.6 | 1.1 | 5.2 | 1.5 | 5.7 |
| | *MI* | 1.4 | 1.3 | 12.9 | 1.9 | 3.5 | 1.6 | 2.7 | 1.5 | 3.3 | 1.5 | 3.8 |
| 2154 | R1 | 1.4 | 1.2 | 16.7 | 3.0 | 2.8 | 4.4 | 6.8 | 5.6 | 11.3 | 7.0 | 17.4 |
| | R2 | 1.2 | 1.2 | 17.0 | 3.3 | 3.0 | 4.6 | 7.2 | 5.7 | 11.9 | 7.5 | 17.7 |
| | R3 | 1.2 | 1.2 | 14.5 | 3.1 | 2.3 | 4.4 | 7.9 | 6.0 | 11.6 | 7.3 | 20.3 |
| | *Avg* | 1.3 | 1.2 | 16.1 | 3.1 | 2.7 | 4.5 | 7.3 | 5.8 | 11.6 | 7.3 | 18.5 |
| | *CI* | 1.3 | 1.2 | 16.1 | 1.9 | 2.7 | 1.3 | 4.6 | 1.3 | 4.3 | 1.5 | 6.9 |
| | *MI* | 1.3 | 1.2 | 16.1 | 1.6 | 2.7 | 1.5 | 2.4 | 1.4 | 2.9 | 1.5 | 3.7 |
| 2156 | R1 | 1.3 | 1.3 | 10.6 | 4.2 | 3.8 | 4.9 | 8.6 | 6.4 | 13.9 | 8.0 | 20.1 |
| | R2 | 1.4 | 1.4 | 14.1 | 4.0 | 3.7 | 5.0 | 9.3 | 6.5 | 15.2 | 8.0 | 21.7 |
| | R3 | 1.6 | 1.4 | 3.6 | 4.0 | 3.4 | 4.7 | 7.2 | 5.9 | 12.0 | 7.2 | 19.2 |
| | *Avg* | 1.5 | 1.4 | 9.4 | 4.1 | 3.7 | 4.8 | 8.4 | 6.3 | 13.7 | 7.7 | 20.3 |
| | *CI* | 1.5 | 1.4 | 9.4 | 2.6 | 3.7 | 0.8 | 4.7 | 1.4 | 5.3 | 1.5 | 6.7 |
| | *MI* | 1.5 | 1.4 | 9.4 | 2.0 | 3.7 | 1.6 | 2.8 | 1.6 | 3.4 | 1.5 | 4.1 |
| 2221 | R1 | 1.5 | 1.1 | 16.4 | 3.7 | 3.3 | 4.0 | 6.3 | 4.9 | 9.7 | 6.0 | 15.7 |
| | R2 | 0.9 | 0.8 | 8.8 | 1.6 | 2.1 | 2.5 | 3.9 | 3.4 | 6.0 | 4.3 | 11.2 |
| | R3 | 1.3 | 1.2 | 3.7 | 3.2 | 2.6 | 3.5 | 5.3 | 4.3 | 10.2 | 5.5 | 15.4 |
| | *Avg* | 1.2 | 1.0 | 9.6 | 2.8 | 2.7 | 3.3 | 5.1 | 4.2 | 8.6 | 5.3 | 14.1 |
| | *CI* | 1.2 | 1.0 | 9.6 | 1.6 | 2.7 | 0.5 | 2.5 | 0.8 | 3.5 | 1.1 | 5.5 |
| | *MI* | 1.2 | 1.0 | 9.6 | 1.4 | 2.7 | 1.1 | 1.7 | 1.0 | 2.2 | 1.1 | 2.8 |
| 2223 | R1 | 1.8 | 1.5 | 17.4 | 2.6 | 4.3 | 3.7 | 7.6 | 4.8 | 12.0 | 6.0 | 16.7 |
| | R2 | 1.7 | 1.6 | 21.5 | 3.7 | 3.5 | 4.4 | 7.7 | 5.3 | 12.1 | 6.6 | 16.7 |
| | R3 | 1.7 | 1.6 | 13.6 | 3.8 | 3.4 | 4.2 | 6.3 | 5.2 | 9.8 | 6.2 | 17.7 |
| | *Avg* | 1.7 | 1.6 | 17.5 | 3.4 | 3.8 | 4.1 | 7.2 | 5.1 | 11.3 | 6.3 | 17.0 |
| | *CI* | 1.7 | 1.6 | 17.5 | 1.7 | 3.8 | 0.7 | 3.4 | 1.0 | 4.1 | 1.2 | 5.7 |
| | *MI* | 1.7 | 1.6 | 17.5 | 1.7 | 3.8 | 1.4 | 2.4 | 1.3 | 2.8 | 1.3 | 3.4 |
| 2234 | R1 | 1.0 | 0.9 | 6.7 | 2.5 | 2.0 | 3.3 | 5.4 | 4.3 | 8.6 | 5.5 | 12.5 |
| | R2 | 1.0 | 1.0 | 9.4 | 2.9 | 2.8 | 3.7 | 6.6 | 4.8 | 10.5 | 6.1 | 14.6 |
| | R3 | 0.9 | 0.9 | 9.2 | 2.6 | 2.6 | 3.5 | 6.2 | 4.8 | 10.1 | 6.2 | 14.3 |
| | *Avg* | 1.0 | 0.9 | 8.4 | 2.6 | 2.5 | 3.5 | 6.1 | 4.6 | 9.8 | 5.9 | 13.8 |
| | *CI* | 1.0 | 0.9 | 8.4 | 1.7 | 2.5 | 0.8 | 3.6 | 1.1 | 3.7 | 1.3 | 4.0 |
| | *MI* | 1.0 | 0.9 | 8.4 | 1.3 | 2.5 | 1.2 | 2.0 | 1.2 | 2.4 | 1.2 | 2.8 |

| Clone No | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2236 | R1 | 1.2 | 1.2 | 5.3 | 3.9 | 3.0 | 4.6 | 7.4 | 5.9 | 12.0 | 7.1 | 17.0 |
| | R2 | 1.0 | 1.0 | 7.8 | 3.3 | 2.8 | 4.0 | 5.8 | 5.1 | 9.2 | 6.6 | 13.6 |
| | R3 | 1.1 | 0.9 | 8.9 | 2.8 | 2.4 | 3.5 | 4.8 | 4.3 | 8.0 | 5.4 | 11.8 |
| | *Avg* | 1.1 | 1.0 | 7.3 | 3.3 | 2.7 | 4.0 | 6.0 | 5.1 | 9.8 | 6.4 | 14.1 |
| | *CI* | 1.1 | 1.0 | 7.3 | 2.2 | 2.7 | 0.7 | 3.3 | 1.1 | 3.8 | 1.3 | 4.4 |
| | *MI* | 1.1 | 1.0 | 7.3 | 1.7 | 2.7 | 1.3 | 2.0 | 1.3 | 2.4 | 1.3 | 2.8 |
| 2240 | R1 | 1.9 | 1.4 | 5.9 | 3.7 | 3.4 | 4.5 | 10.6 | 5.4 | 14.0 | 6.7 | 15.5 |
| | R2 | 1.7 | 1.4 | 10.7 | 3.8 | 3.2 | 4.4 | 7.4 | 5.4 | 11.6 | 6.8 | 16.3 |
| | R3 | 0.9 | 0.7 | 5.2 | 2.0 | 1.7 | 2.6 | 3.5 | 3.2 | 5.6 | 4.1 | 8.8 |
| | *Avg* | 1.5 | 1.2 | 7.2 | 3.2 | 2.8 | 3.8 | 7.1 | 4.7 | 10.4 | 5.9 | 13.5 |
| | *CI* | 1.5 | 1.2 | 7.2 | 1.7 | 2.8 | 0.6 | 4.4 | 0.8 | 3.3 | 1.2 | 3.1 |
| | *MI* | 1.5 | 1.2 | 7.2 | 1.6 | 2.8 | 1.3 | 2.4 | 1.2 | 2.6 | 1.2 | 2.7 |
| 2258 | R1 | 1.0 | 0.9 | 7.1 | 3.3 | 2.9 | 4.5 | 10.3 | 5.5 | 13.2 | 7.1 | 14.8 |
| | R2 | 0.9 | 0.9 | 8.9 | 3.1 | 2.4 | 3.9 | 5.6 | 5.1 | 9.1 | 6.6 | 14.3 |
| | R3 | 1.1 | 1.0 | 11.4 | 3.0 | 2.6 | 4.0 | 6.3 | 5.3 | 10.1 | 6.6 | 14.7 |
| | *Avg* | 1.0 | 0.9 | 9.1 | 3.1 | 2.6 | 4.1 | 7.4 | 5.3 | 10.8 | 6.7 | 14.6 |
| | *CI* | 1.0 | 0.9 | 9.1 | 2.1 | 2.6 | 1.0 | 4.8 | 1.2 | 3.4 | 1.4 | 3.8 |
| | *MI* | 1.0 | 0.9 | 9.1 | 1.6 | 2.6 | 1.4 | 2.5 | 1.3 | 2.7 | 1.3 | 2.9 |
| 2275 | R1 | 0.8 | 0.7 | 6.2 | 2.3 | 2.0 | 3.6 | 3.6 | 5.0 | 6.3 | 6.5 | 15.5 |
| | R2 | 0.8 | 0.7 | 4.0 | 2.1 | 1.8 | 3.0 | 3.7 | 4.3 | 6.3 | 5.5 | 12.7 |
| | R3 | 0.8 | 0.7 | 9.1 | 3.2 | 2.6 | 4.6 | 3.9 | 6.2 | 6.5 | 7.9 | 12.5 |
| | *Avg* | 0.8 | 0.7 | 6.4 | 2.5 | 2.1 | 3.7 | 3.7 | 5.2 | 6.4 | 6.6 | 13.6 |
| | *CI* | 0.8 | 0.7 | 6.4 | 1.8 | 2.1 | 1.2 | 1.6 | 1.4 | 2.7 | 1.5 | 7.2 |
| | *MI* | 0.8 | 0.7 | 6.4 | 1.3 | 2.1 | 1.2 | 1.2 | 1.3 | 1.6 | 1.3 | 2.7 |
| 2276 | R1 | 0.9 | 1.1 | 18.2 | 3.3 | 3.3 | 4.0 | 7.6 | 5.4 | 12.4 | 7.0 | 18.2 |
| | R2 | 0.6 | 1.0 | 1.2 | 1.6 | 1.8 | 3.7 | 4.7 | 4.8 | 10.1 | 6.1 | 17.0 |
| | R3 | 0.8 | 1.1 | 17.8 | 3.3 | 3.3 | 4.1 | 7.5 | 5.5 | 12.2 | 7.0 | 18.0 |
| | *Avg* | 0.8 | 1.0 | 12.4 | 2.7 | 2.8 | 3.9 | 6.6 | 5.2 | 11.6 | 6.7 | 17.7 |
| | *CI* | 0.8 | 1.0 | 12.4 | 2.0 | 2.8 | 1.2 | 3.8 | 1.3 | 5.0 | 1.5 | 6.2 |
| | *MI* | 0.8 | 1.0 | 12.4 | 1.4 | 2.8 | 1.3 | 2.2 | 1.3 | 2.9 | 1.3 | 3.5 |
| **Average** | | **1.3** | **1.2** | **11.6** | **3.5** | **3.2** | **4.3** | **7.1** | **5.5** | **11.4** | **6.8** | **17.0** |
| **SD** | | **0.3** | **0.2** | **3.7** | **0.6** | **0.6** | **0.5** | **1.3** | **0.6** | **2.0** | **0.7** | **2.5** |
| **CV %** | | **22.09** | **19.99** | **31.84** | **17.28** | **19.44** | **12.66** | **18.36** | **11.55** | **17.54** | **10.64** | **14.87** |

FIGURE:- 34


CTA-1 : Current Increment in Height (Eucalyptus)
Current Increment (m)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2102 2106 2108 2110 2115 2121 2122 2123 2124 2151 2154 2156 2221 2223 2234 2236 2240 2258 2275 2276
6-Month
12-Month
18-Month
24-Month
30-Month


CTA-1 : Current Increment in GBH (Eucalyptus)
Current Increment (m)
25.0
20.0
15.0
10.0
5.0
0.0
2102 2106 2108 2110 2115 2121 2122 2123 2124 2151 2154 2156 2221 2223 2234 2236 2240 2258 2275 2276
12-Month
18-Month
24-Month
30-Month

## FIGURE – 35:- Current Increment Graph of Eucalyptus Clone in CTA – 1

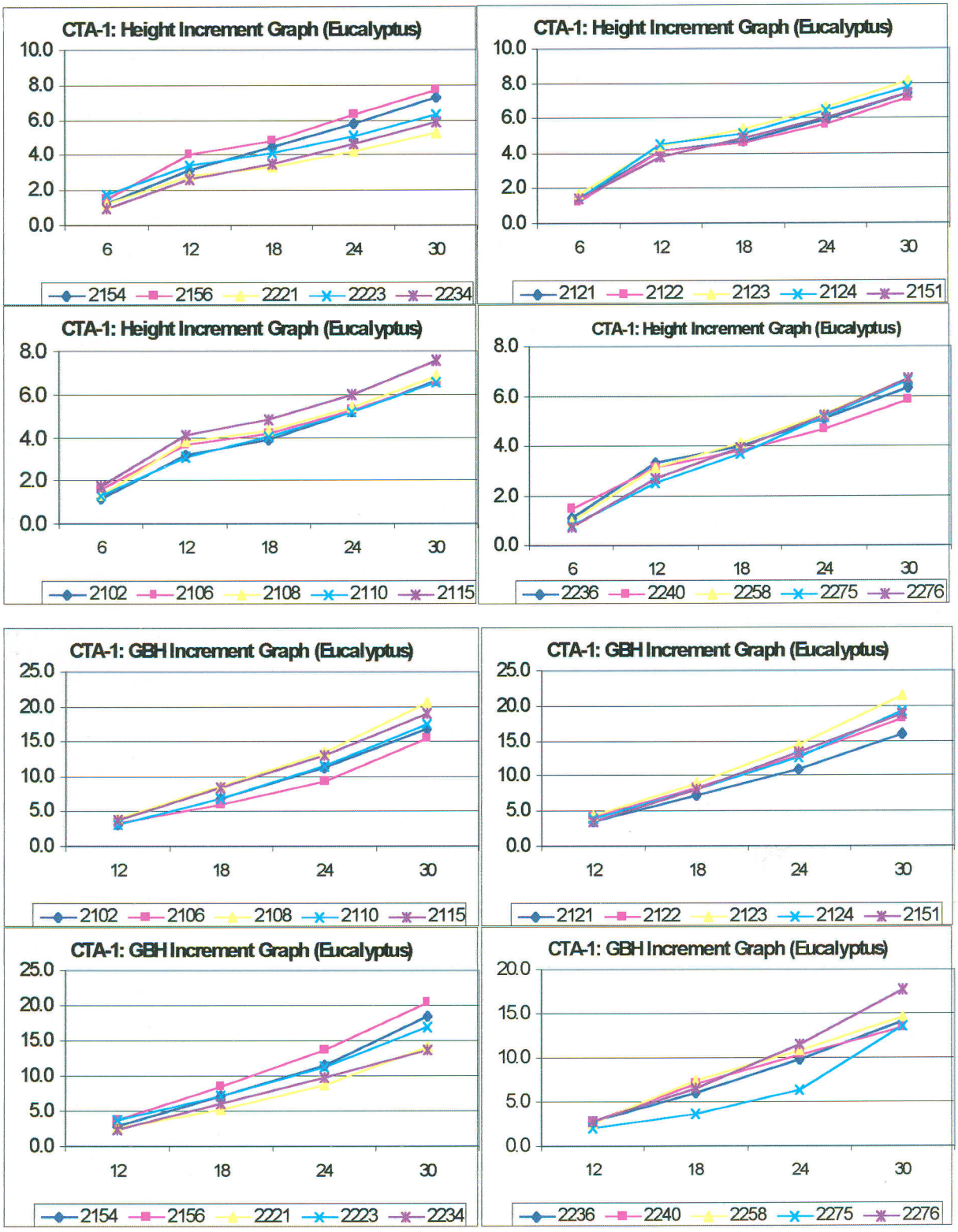
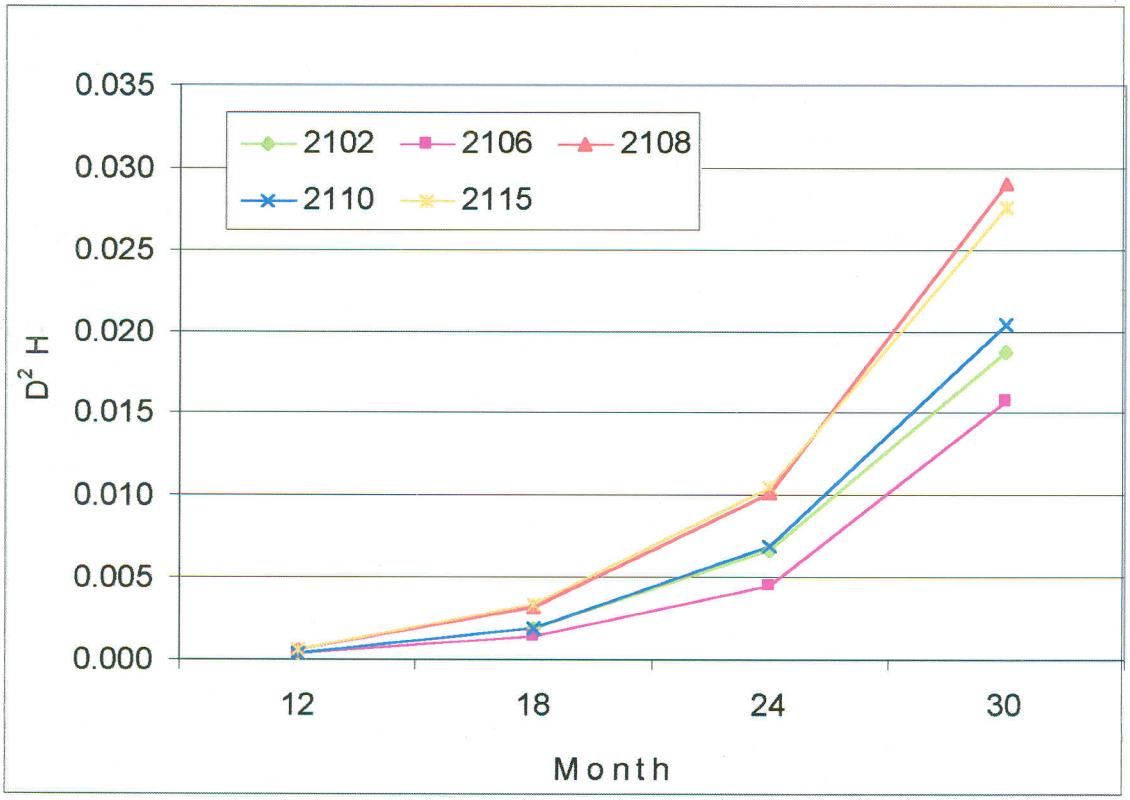


**FIGURE – 36 :- $D^2H$ Analysis of Eucalyptus Clones of CTA - 1**



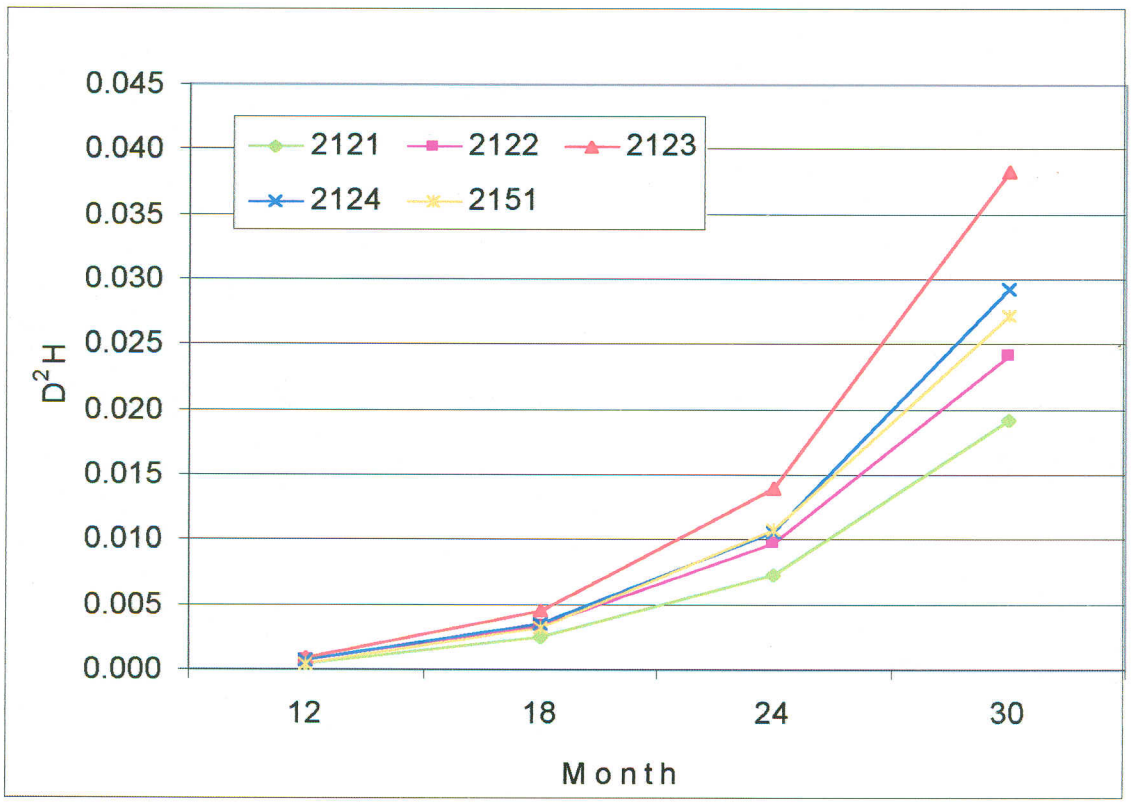
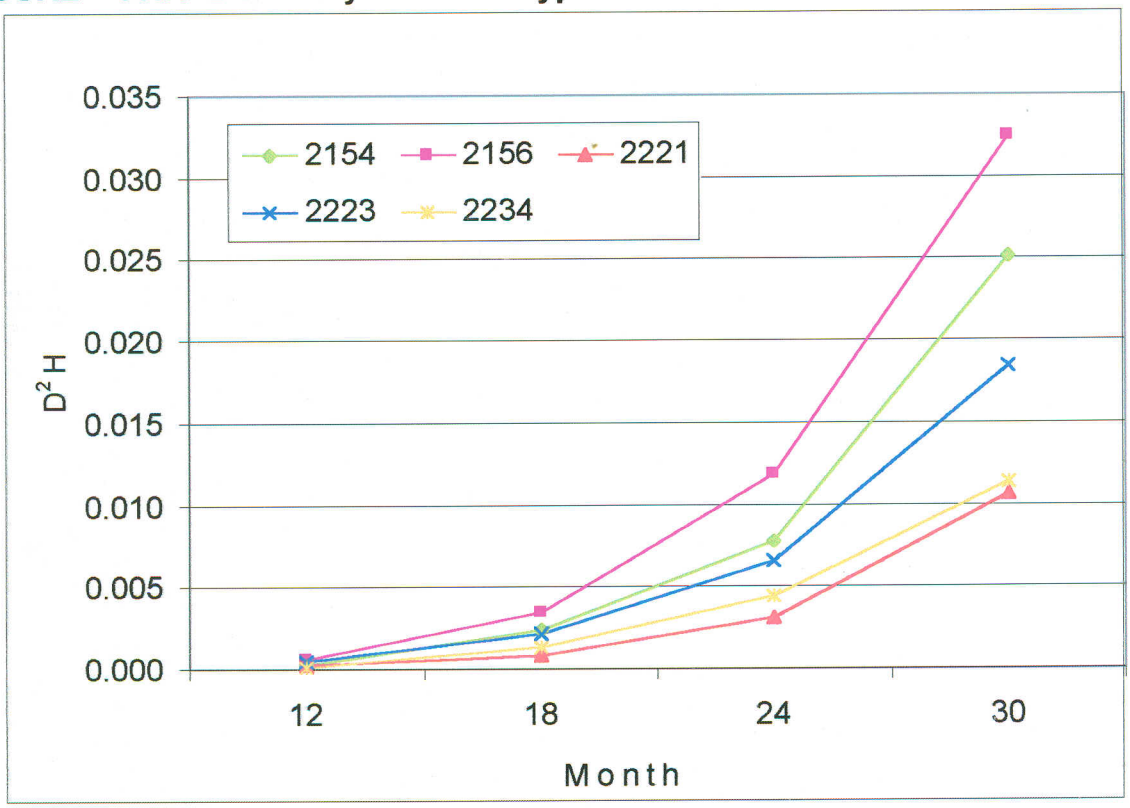



**FIGURE – 36a :- $D^2H$ Analysis of Eucalyptus Clones of CTA - 1**



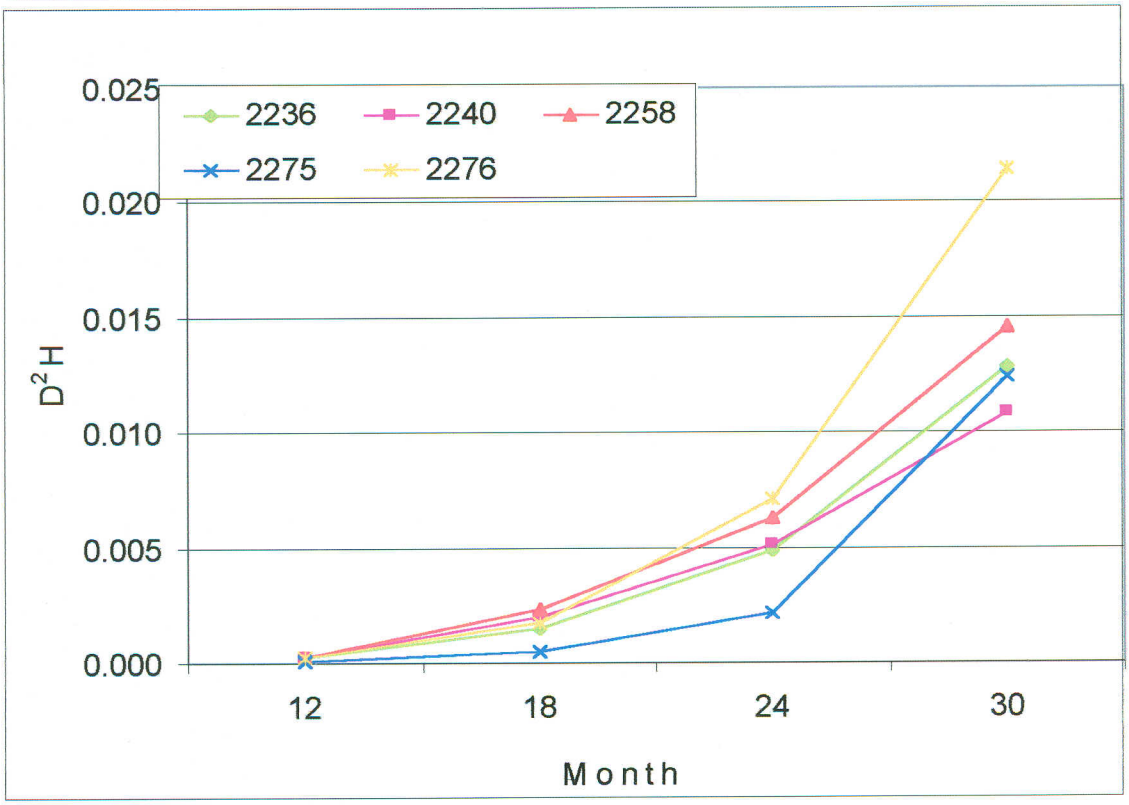



TABLE - 8

## CLONAL TESTING AREA - 2 (*EUCALYPTUS HBRID*)

No. of Clones:- 24 No. of Replection:- 3 No. of Plants/Replection:- 9

Height in meters CDM & GBH in cm

*CI = Current Increment, MI = Mean Increment*

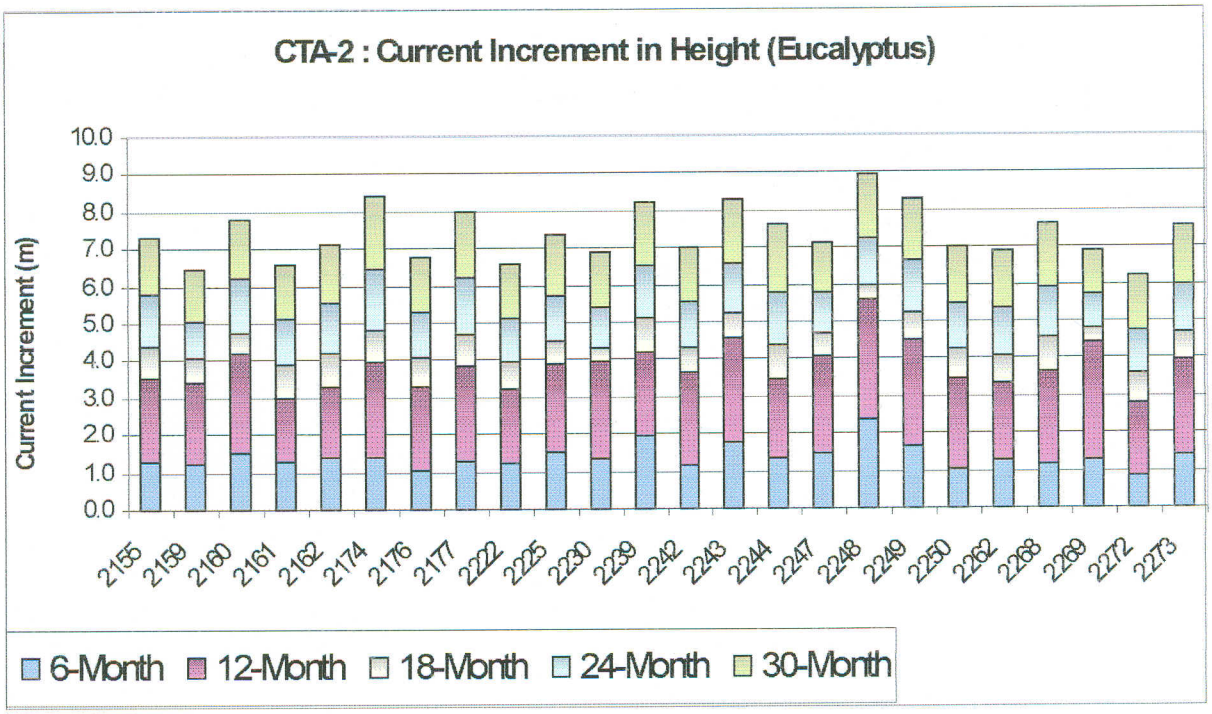
| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2155 | R1 | 1.3 | 1.2 | 13.7 | 3.9 | 3.4 | 4.7 | 7.9 | 6.4 | 13.1 | 7.9 | 19.4 |
| | R2 | 1.2 | 1.1 | 18.6 | 3.4 | 3.2 | 4.2 | 3.6 | 5.4 | 5.3 | 6.9 | 9.2 |
| | R3 | 1.3 | 1.3 | 22.0 | 3.3 | 3.2 | 4.4 | 7.0 | 5.6 | 10.8 | 7.2 | 16.0 |
| | Avg | 1.3 | 1.2 | 18.1 | 3.5 | 3.3 | 4.4 | 6.2 | 5.8 | 9.7 | 7.3 | 14.9 |
| | CI | 1.3 | 1.2 | 18.1 | 2.2 | 3.3 | 0.9 | 2.9 | 1.4 | 3.6 | 1.5 | 5.1 |
| | MI | 1.3 | 1.2 | 18.1 | 1.8 | 3.3 | 1.5 | 2.1 | 1.4 | 2.4 | 1.5 | 3.0 |
| 2159 | R1 | 0.9 | 0.7 | 4.0 | 2.6 | 2.1 | 3.1 | 3.3 | 4.0 | 5.8 | 5.3 | 12.3 |
| | R2 | 1.4 | 1.5 | 14.3 | 4.1 | 4.0 | 4.8 | 9.1 | 6.2 | 13.9 | 8.0 | 19.9 |
| | R3 | 1.4 | 1.5 | 11.1 | 3.5 | 3.5 | 4.3 | 5.5 | 4.9 | 7.6 | 6.1 | 17.4 |
| | Avg | 1.2 | 1.2 | 9.8 | 3.4 | 3.2 | 4.1 | 6.0 | 5.1 | 9.1 | 6.5 | 16.5 |
| | CI | 1.2 | 1.2 | 9.8 | 2.2 | 3.2 | 0.7 | 2.8 | 1.0 | 3.1 | 1.4 | 7.4 |
| | MI | 1.2 | 1.2 | 9.8 | 1.7 | 3.2 | 1.4 | 2.0 | 1.3 | 2.3 | 1.3 | 3.3 |
| 2160 | R1 | 1.4 | 1.3 | 17.2 | 3.8 | 3.4 | 4.4 | 7.2 | 5.8 | 11.3 | 7.4 | 16.4 |
| | R2 | 1.9 | 1.7 | 23.3 | 4.9 | 4.5 | 5.1 | 9.6 | 6.6 | 15.2 | 8.3 | 21.4 |
| | R3 | 1.3 | 1.3 | 10.4 | 4.0 | 3.6 | 4.7 | 8.1 | 6.2 | 13.3 | 7.8 | 19.6 |
| | Avg | 1.5 | 1.4 | 17.0 | 4.2 | 3.8 | 4.8 | 8.3 | 6.2 | 13.3 | 7.8 | 19.1 |
| | CI | 1.5 | 1.4 | 17.0 | 2.7 | 3.8 | 0.5 | 4.5 | 1.4 | 5.0 | 1.6 | 5.9 |
| | MI | 1.5 | 1.4 | 17.0 | 2.1 | 3.8 | 1.6 | 2.8 | 1.5 | 3.3 | 1.6 | 3.8 |
| 2161 | R1 | 1.2 | 1.1 | 10.8 | 3.2 | 3.1 | 3.7 | 4.6 | 4.7 | 7.7 | 5.8 | 16.0 |
| | R2 | 1.3 | 1.4 | 13.8 | 3.0 | 3.6 | 4.3 | 8.3 | 5.8 | 13.3 | 7.7 | 18.7 |
| | R3 | 1.3 | 1.5 | 13.2 | 2.8 | 3.1 | 3.8 | 6.9 | 4.9 | 11.2 | 6.2 | 16.1 |
| | Avg | 1.3 | 1.3 | 12.6 | 3.0 | 3.2 | 3.9 | 6.6 | 5.1 | 10.7 | 6.6 | 16.9 |
| | CI | 1.3 | 1.3 | 12.6 | 1.7 | 3.2 | 0.9 | 3.4 | 1.2 | 4.1 | 1.4 | 6.2 |
| | MI | 1.3 | 1.3 | 12.6 | 1.5 | 3.2 | 1.3 | 2.2 | 1.3 | 2.7 | 1.3 | 3.4 |
| 2162 | R1 | 1.3 | 1.3 | 13.4 | 3.6 | 3.3 | 4.0 | 7.1 | 5.0 | 11.5 | 6.2 | 16.1 |
| | R2 | 1.3 | 1.4 | 14.6 | 3.4 | 3.7 | 4.1 | 8.3 | 5.5 | 13.3 | 7.1 | 18.5 |
| | R3 | 1.6 | 1.8 | 14.1 | 2.8 | 4.1 | 4.4 | 8.8 | 6.1 | 13.3 | 8.1 | 19.7 |
| | Avg | 1.4 | 1.5 | 14.0 | 3.3 | 3.7 | 4.2 | 8.1 | 5.5 | 12.7 | 7.1 | 18.1 |
| | CI | 1.4 | 1.5 | 14.0 | 1.9 | 3.7 | 0.9 | 4.4 | 1.3 | 4.6 | 1.6 | 5.4 |
| | MI | 1.4 | 1.5 | 14.0 | 1.6 | 3.7 | 1.4 | 2.7 | 1.4 | 3.2 | 1.4 | 3.6 |
| 2174 | R1 | 1.3 | 1.2 | 21.4 | 4.0 | 3.9 | 5.1 | 9.3 | 7.0 | 14.8 | 9.2 | 20.7 |
| | R2 | 1.5 | 1.3 | 25.3 | 4.1 | 4.1 | 4.8 | 8.6 | 6.4 | 13.4 | 8.3 | 19.6 |
| | R3 | 1.4 | 1.5 | 17.8 | 3.8 | 3.9 | 4.5 | 8.2 | 5.9 | 12.9 | 7.6 | 19.0 |
| | Avg | 1.4 | 1.4 | 21.5 | 4.0 | 4.0 | 4.8 | 8.7 | 6.4 | 13.7 | 8.4 | 19.8 |
| | CI | 1.4 | 1.4 | 21.5 | 2.6 | 4.0 | 0.8 | 4.7 | 1.6 | 5.0 | 1.9 | 6.1 |
| | MI | 1.4 | 1.4 | 21.5 | 2.0 | 4.0 | 1.6 | 2.9 | 1.6 | 3.4 | 1.7 | 4.0 |
| 2176 | R1 | 1.4 | 1.4 | 19.3 | 4.3 | 3.8 | 5.0 | 8.4 | 6.5 | 13.1 | 8.2 | 18.1 |
| | R2 | 0.9 | 0.9 | 10.3 | 2.9 | 2.8 | 3.7 | 4.6 | 4.8 | 8.6 | 6.1 | 13.9 |
| | R3 | 0.9 | 0.7 | 10.0 | 2.6 | 2.5 | 3.5 | 5.6 | 4.7 | 9.1 | 6.0 | 13.1 |
| | Avg | 1.1 | 1.0 | 13.2 | 3.3 | 3.0 | 4.1 | 6.2 | 5.3 | 10.3 | 6.8 | 15.0 |
| | CI | 1.1 | 1.0 | 13.2 | 2.2 | 3.0 | 0.8 | 3.2 | 1.3 | 4.1 | 1.5 | 4.8 |
| | MI | 1.1 | 1.0 | 13.2 | 1.6 | 3.0 | 1.4 | 2.1 | 1.3 | 2.6 | 1.4 | 3.0 |

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2177 | R1 | 1.2 | 2.7 | 15.7 | 4.0 | 4.4 | 4.8 | 8.7 | 6.4 | 15.0 | 8.2 | 21.9 |
| | R2 | 1.3 | 1.5 | 13.4 | 4.2 | 3.9 | 5.1 | 9.1 | 6.8 | 14.4 | 8.7 | 21.9 |
| | R3 | 1.3 | 1.3 | 12.9 | 3.2 | 3.2 | 4.1 | 7.7 | 5.5 | 12.6 | 7.1 | 19.3 |
| | Avg | 1.3 | 1.8 | 14.0 | 3.8 | 3.8 | 4.7 | 8.5 | 6.2 | 14.0 | 8.0 | 21.0 |
| | CI | 1.3 | 1.8 | 14.0 | 2.6 | 3.8 | 0.9 | 4.7 | 1.6 | 5.5 | 1.8 | 7.0 |
| | MI | 1.3 | 1.8 | 14.0 | 1.9 | 3.8 | 1.6 | 2.8 | 1.6 | 3.5 | 1.6 | 4.2 |
| 2222 | R1 | 1.1 | 0.8 | 7.4 | 2.5 | 1.9 | 3.1 | 2.9 | 3.7 | 4.7 | 4.6 | 13.3 |
| | R2 | 1.2 | 1.2 | 12.3 | 3.5 | 3.0 | 4.4 | 7.1 | 5.8 | 11.5 | 7.6 | 16.3 |
| | R3 | 1.2 | 1.1 | 10.0 | 3.7 | 3.3 | 4.4 | 7.1 | 5.9 | 11.4 | 7.6 | 17.3 |
| | Avg | 1.2 | 1.0 | 9.9 | 3.2 | 2.7 | 4.0 | 5.7 | 5.1 | 9.2 | 6.6 | 15.6 |
| | CI | 1.2 | 1.0 | 9.9 | 2.0 | 2.7 | 0.7 | 3.0 | 1.1 | 3.5 | 1.5 | 6.5 |
| | MI | 1.2 | 1.0 | 9.9 | 1.6 | 2.7 | 1.3 | 1.9 | 1.3 | 2.3 | 1.3 | 3.1 |
| 2225 | R1 | 1.6 | 1.3 | 11.2 | 3.8 | 3.3 | 4.6 | 7.5 | 6.0 | 11.9 | 7.8 | 16.9 |
| | R2 | 1.2 | 1.0 | 7.1 | 3.1 | 2.4 | 3.6 | 5.1 | 4.9 | 7.8 | 6.7 | 13.4 |
| | R3 | 1.8 | 1.4 | 12.2 | 4.7 | 3.4 | 5.4 | 6.8 | 6.3 | 11.4 | 7.5 | 17.2 |
| | Avg | 1.5 | 1.2 | 10.2 | 3.9 | 3.0 | 4.5 | 6.5 | 5.7 | 10.4 | 7.4 | 15.8 |
| | CI | 1.5 | 1.2 | 10.2 | 2.3 | 3.0 | 0.7 | 3.4 | 1.2 | 3.9 | 1.6 | 5.5 |
| | MI | 1.5 | 1.2 | 10.2 | 1.9 | 3.0 | 1.5 | 2.2 | 1.4 | 2.6 | 1.5 | 3.2 |
| 2230 | R1 | 1.7 | 1.3 | 20.6 | 4.4 | 3.5 | 4.7 | 6.0 | 5.8 | 11.6 | 7.3 | 17.5 |
| | R2 | 1.3 | 1.3 | 15.0 | 4.4 | 3.7 | 4.7 | 8.3 | 6.1 | 13.5 | 7.9 | 19.1 |
| | R3 | 1.0 | 0.8 | 9.6 | 3.1 | 2.9 | 3.6 | 5.5 | 4.3 | 8.4 | 5.5 | 12.8 |
| | Avg | 1.3 | 1.2 | 15.0 | 4.0 | 3.4 | 4.3 | 6.6 | 5.4 | 11.2 | 6.9 | 16.5 |
| | CI | 1.3 | 1.2 | 15.0 | 2.6 | 3.4 | 0.4 | 3.2 | 1.1 | 4.6 | 1.5 | 5.3 |
| | MI | 1.3 | 1.2 | 15.0 | 2.0 | 3.4 | 1.4 | 2.2 | 1.4 | 2.8 | 1.4 | 3.3 |
| 2239 | R1 | 1.7 | 1.4 | 23.2 | 4.0 | 3.0 | 4.2 | 5.5 | 5.3 | 8.4 | 6.6 | 13.6 |
| | R2 | 2.2 | 2.1 | 25.2 | 4.1 | 5.1 | 5.8 | 10.0 | 7.9 | 16.4 | 10.3 | 24.1 |
| | R3 | 1.9 | 1.8 | 24.1 | 4.6 | 4.6 | 5.3 | 9.1 | 6.4 | 14.5 | 7.9 | 21.1 |
| | Avg | 1.9 | 1.8 | 24.2 | 4.2 | 4.3 | 5.1 | 8.2 | 6.5 | 13.1 | 8.2 | 19.6 |
| | CI | 1.9 | 1.8 | 24.2 | 2.3 | 4.3 | 0.9 | 4.0 | 1.4 | 4.9 | 1.7 | 6.5 |
| | MI | 1.9 | 1.8 | 24.2 | 2.1 | 4.3 | 1.7 | 2.7 | 1.6 | 3.3 | 1.6 | 3.9 |
| 2242 | R1 | 1.2 | 1.3 | 9.6 | 4.0 | 4.3 | 4.7 | 9.2 | 6.1 | 16.1 | 7.7 | 22.2 |
| | R2 | 1.2 | 1.2 | 12.7 | 3.7 | 3.1 | 4.3 | 7.3 | 5.4 | 11.6 | 6.7 | 18.8 |
| | R3 | 1.1 | 1.1 | 14.3 | 3.3 | 3.6 | 4.0 | 7.8 | 5.2 | 13.2 | 6.7 | 19.6 |
| | Avg | 1.2 | 1.2 | 12.2 | 3.7 | 3.7 | 4.4 | 8.1 | 5.5 | 13.6 | 7.0 | 20.2 |
| | CI | 1.2 | 1.2 | 12.2 | 2.5 | 3.7 | 0.7 | 4.4 | 1.2 | 5.5 | 1.5 | 6.6 |
| | MI | 1.2 | 1.2 | 12.2 | 1.8 | 3.7 | 1.5 | 2.7 | 1.4 | 3.4 | 1.4 | 4.0 |
| 2243 | R1 | 1.8 | 1.6 | 26.0 | 4.9 | 4.0 | 5.4 | 8.0 | 6.8 | 14.1 | 8.5 | 20.5 |
| | R2 | 1.7 | 1.7 | 26.4 | 5.0 | 4.7 | 5.7 | 10.2 | 7.1 | 15.4 | 8.8 | 21.4 |
| | R3 | 1.8 | 1.6 | 29.3 | 3.8 | 3.8 | 4.6 | 7.6 | 5.9 | 11.3 | 7.5 | 16.7 |
| | Avg | 1.8 | 1.6 | 27.2 | 4.6 | 4.2 | 5.2 | 8.6 | 6.6 | 13.6 | 8.3 | 19.5 |
| | CI | 1.8 | 1.6 | 27.2 | 2.8 | 4.2 | 0.6 | 4.4 | 1.4 | 5.0 | 1.7 | 5.9 |
| | MI | 1.8 | 1.6 | 27.2 | 2.3 | 4.2 | 1.7 | 2.9 | 1.6 | 3.4 | 1.7 | 3.9 |
| 2244 | R1 | 1.3 | 1.4 | 12.1 | 3.3 | 5.0 | 4.5 | 6.7 | 5.8 | 12.5 | 7.4 | 19.1 |
| | R2 | 1.4 | 1.4 | 14.6 | 3.4 | 3.2 | 4.1 | 6.2 | 6.0 | 10.8 | 8.2 | 17.7 |
| | R3 | 1.4 | 1.3 | 13.4 | 3.8 | 3.7 | 4.5 | 7.7 | 5.6 | 12.3 | 7.3 | 18.4 |
| | Avg | 1.4 | 1.4 | 13.4 | 3.5 | 3.9 | 4.4 | 6.9 | 5.8 | 11.9 | 7.6 | 18.4 |
| | CI | 1.4 | 1.4 | 13.4 | 2.1 | 3.9 | 0.9 | 2.9 | 1.4 | 5.0 | 1.8 | 6.5 |
| | MI | 1.4 | 1.4 | 13.4 | 1.7 | 3.9 | 1.5 | 2.3 | 1.4 | 3.0 | 1.5 | 3.7 |

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2247 | R1 | 1.3 | 1.4 | 13.9 | 3.6 | 3.7 | 4.3 | 7.7 | 5.5 | 11.9 | 7.0 | 17.3 |
| | R2 | 1.4 | 1.3 | 18.2 | 3.7 | 3.1 | 4.1 | 6.2 | 4.9 | 9.4 | 5.9 | 14.1 |
| | R3 | 1.7 | 1.9 | 19.0 | 5.1 | 4.8 | 5.6 | 10.4 | 7.0 | 16.2 | 8.6 | 22.8 |
| | Avg | 1.5 | 1.5 | 17.0 | 4.1 | 3.9 | 4.7 | 8.1 | 5.8 | 12.5 | 7.1 | 18.1 |
| | CI | 1.5 | 1.5 | 17.0 | 2.6 | 3.9 | 0.6 | 4.2 | 1.1 | 4.4 | 1.3 | 5.6 |
| | MI | 1.5 | 1.5 | 17.0 | 2.1 | 3.9 | 1.6 | 2.7 | 1.5 | 3.1 | 1.4 | 3.6 |
| 2248 | R1 | 2.1 | 1.3 | 17.8 | 5.3 | 4.0 | 5.6 | 8.0 | 7.1 | 13.1 | 8.9 | 18.9 |
| | R2 | 2.6 | 1.7 | 25.8 | 5.8 | 4.5 | 6.3 | 10.2 | 7.5 | 16.1 | 9.3 | 22.3 |
| | R3 | 2.4 | 1.7 | 18.1 | 5.6 | 4.7 | 6.0 | 9.2 | 7.1 | 15.0 | 8.7 | 21.8 |
| | Avg | 2.4 | 1.6 | 20.6 | 5.6 | 4.4 | 6.0 | 9.2 | 7.2 | 14.7 | 8.9 | 21.0 |
| | CI | 2.4 | 1.6 | 20.6 | 3.2 | 4.4 | 0.4 | 4.8 | 1.3 | 5.6 | 1.7 | 6.3 |
| | MI | 2.4 | 1.6 | 20.6 | 2.8 | 4.4 | 2.0 | 3.1 | 1.8 | 3.7 | 1.8 | 4.2 |
| 2249 | R1 | 1.3 | 1.0 | 10.7 | 3.6 | 3.2 | 4.2 | 6.3 | 5.3 | 9.4 | 6.7 | 16.7 |
| | R2 | 1.9 | 1.7 | 29.0 | 4.9 | 4.8 | 5.6 | 9.1 | 6.9 | 14.6 | 8.5 | 21.2 |
| | R3 | 1.9 | 1.8 | 29.8 | 5.0 | 5.3 | 5.9 | 9.9 | 7.7 | 16.1 | 9.6 | 22.7 |
| | Avg | 1.7 | 1.5 | 23.1 | 4.5 | 4.4 | 5.2 | 8.4 | 6.6 | 13.4 | 8.3 | 20.2 |
| | CI | 1.7 | 1.5 | 23.1 | 2.8 | 4.4 | 0.7 | 4.0 | 1.4 | 5.0 | 1.6 | 6.8 |
| | MI | 1.7 | 1.5 | 23.1 | 2.3 | 4.4 | 1.7 | 2.8 | 1.7 | 3.3 | 1.7 | 4.0 |
| 2250 | R1 | 1.1 | 1.2 | 10.2 | 3.8 | 2.8 | 4.4 | 6.5 | 5.6 | 10.5 | 7.1 | 16.1 |
| | R2 | 0.9 | 1.0 | 7.0 | 2.9 | 2.5 | 3.8 | 5.1 | 4.9 | 9.8 | 6.2 | 17.2 |
| | R3 | 1.2 | 1.4 | 9.3 | 3.8 | 3.5 | 4.6 | 8.1 | 6.0 | 13.0 | 7.8 | 19.5 |
| | Avg | 1.1 | 1.2 | 8.9 | 3.5 | 2.9 | 4.3 | 6.6 | 5.5 | 11.1 | 7.0 | 17.6 |
| | CI | 1.1 | 1.2 | 8.9 | 2.4 | 2.9 | 0.8 | 3.7 | 1.2 | 4.5 | 1.5 | 6.5 |
| | MI | 1.1 | 1.2 | 8.9 | 1.7 | 2.9 | 1.4 | 2.2 | 1.4 | 2.8 | 1.4 | 3.5 |
| 2262 | R1 | 1.5 | 1.5 | 16.6 | 3.4 | 3.4 | 4.3 | 7.5 | 5.5 | 11.9 | 7.1 | 18.9 |
| | R2 | 1.1 | 1.1 | 9.9 | 2.7 | 3.1 | 3.5 | 6.4 | 4.7 | 10.0 | 6.1 | 16.2 |
| | R3 | 1.4 | 1.4 | 17.2 | 3.8 | 4.1 | 4.5 | 8.3 | 5.9 | 13.4 | 7.4 | 18.0 |
| | Avg | 1.3 | 1.3 | 14.6 | 3.3 | 3.5 | 4.1 | 7.4 | 5.4 | 11.8 | 6.9 | 17.7 |
| | CI | 1.3 | 1.3 | 14.6 | 2.0 | 3.5 | 0.8 | 3.9 | 1.3 | 4.3 | 1.5 | 5.9 |
| | MI | 1.3 | 1.3 | 14.6 | 1.7 | 3.5 | 1.4 | 2.5 | 1.3 | 2.9 | 1.4 | 3.5 |
| 2268 | R1 | 1.2 | 1.3 | 12.2 | 4.6 | 3.9 | 5.4 | 7.7 | 7.0 | 12.1 | 9.0 | 18.6 |
| | R2 | 1.3 | 1.3 | 12.9 | 3.7 | 3.6 | 4.6 | 7.6 | 6.0 | 11.9 | 7.7 | 16.7 |
| | R3 | 1.0 | 1.0 | 9.0 | 2.8 | 2.9 | 3.6 | 5.6 | 4.7 | 8.7 | 6.2 | 14.9 |
| | Avg | 1.2 | 1.2 | 11.4 | 3.7 | 3.5 | 4.5 | 7.0 | 5.9 | 10.9 | 7.6 | 16.7 |
| | CI | 1.2 | 1.2 | 11.4 | 2.5 | 3.5 | 0.9 | 3.5 | 1.4 | 4.0 | 1.7 | 5.8 |
| | MI | 1.2 | 1.2 | 11.4 | 1.8 | 3.5 | 1.5 | 2.3 | 1.5 | 2.7 | 1.5 | 3.3 |
| 2269 | R1 | 1.6 | 1.6 | 13.6 | 4.4 | 3.7 | 4.9 | 8.2 | 6.1 | 12.0 | 7.4 | 19.1 |
| | R2 | 1.4 | 1.6 | 13.1 | 4.7 | 3.9 | 5.2 | 8.5 | 6.3 | 13.4 | 7.7 | 18.3 |
| | R3 | 0.9 | 0.8 | 9.3 | 4.3 | 2.9 | 4.3 | 3.2 | 4.8 | 4.3 | 5.4 | 15.4 |
| | Avg | 1.3 | 1.3 | 12.0 | 4.5 | 3.5 | 4.8 | 6.6 | 5.7 | 9.9 | 6.9 | 17.6 |
| | CI | 1.3 | 1.3 | 12.0 | 3.1 | 3.5 | 0.3 | 3.1 | 1.0 | 3.3 | 1.1 | 7.7 |
| | MI | 1.3 | 1.3 | 12.0 | 2.2 | 3.5 | 1.6 | 2.2 | 1.4 | 2.5 | 1.4 | 3.5 |
| 2272 | R1 | 1.2 | 1.4 | 14.3 | 3.8 | 3.4 | 4.6 | 7.3 | 5.9 | 12.7 | 7.5 | 18.1 |
| | R2 | 0.9 | 1.0 | 11.3 | 2.7 | 3.0 | 3.5 | 6.0 | 4.7 | 9.4 | 6.0 | 13.9 |
| | R3 | 0.6 | 0.8 | 6.1 | 2.0 | 2.1 | 2.7 | 3.8 | 3.8 | 7.0 | 5.2 | 12.9 |
| | Avg | 0.9 | 1.1 | 10.6 | 2.8 | 2.8 | 3.6 | 5.7 | 4.8 | 9.7 | 6.2 | 15.0 |
| | CI | 0.9 | 1.1 | 10.6 | 2.0 | 2.8 | 0.8 | 2.9 | 1.2 | 4.0 | 1.5 | 5.1 |
| | MI | 0.9 | 1.1 | 10.6 | 1.4 | 2.8 | 1.2 | 1.9 | 1.2 | 2.4 | 1.2 | 3.0 |

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2273 | R1 | 1.3 | 1.2 | 8.8 | 3.2 | 2.5 | 4.0 | 4.2 | 5.3 | 9.2 | 6.8 | 14.3 |
| | R2 | 1.7 | 1.5 | 20.3 | 5.2 | 4.0 | 5.9 | 8.7 | 7.2 | 13.6 | 9.1 | 18.6 |
| | R3 | 1.3 | 1.1 | 12.6 | 3.5 | 3.0 | 4.2 | 7.0 | 5.4 | 10.9 | 6.8 | 15.7 |
| | Avg | 1.4 | 1.3 | 13.9 | 4.0 | 3.2 | 4.7 | 6.6 | 6.0 | 11.2 | 7.6 | 16.2 |
| | CI | 1.4 | 1.3 | 13.9 | 2.5 | 3.2 | 0.7 | 3.4 | 1.3 | 4.6 | 1.6 | 5.0 |
| | MI | 1.4 | 1.3 | 13.9 | 2.0 | 3.2 | 1.6 | 2.2 | 1.5 | 2.8 | 1.5 | 3.2 |
| **Average** | | **1.4** | **1.3** | **15.2** | **3.8** | **3.6** | **4.5** | **7.3** | **5.8** | **11.7** | **7.4** | **17.8** |
| **SD** | | **0.3** | **0.2** | **5.0** | **0.6** | **0.5** | **0.5** | **1.1** | **0.6** | **1.7** | **0.7** | **1.9** |
| **CV %** | | **22.35** | **16.35** | **32.76** | **15.84** | **14.05** | **11.47** | **14.71** | **10.21** | **14.34** | **9.57** | **10.82** |

FIGURE – 37


CTA-2 : Current Increment in Height (Eucalyptus)
Current Increment (m)
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2155 2159 2160 2161 2162 2174 2176 2177 2222 2225 2230 2239 2242 2243 2244 2247 2248 2249 2250 2262 2268 2269 2272 2273
6-Month 12-Month 18-Month 24-Month 30-Month

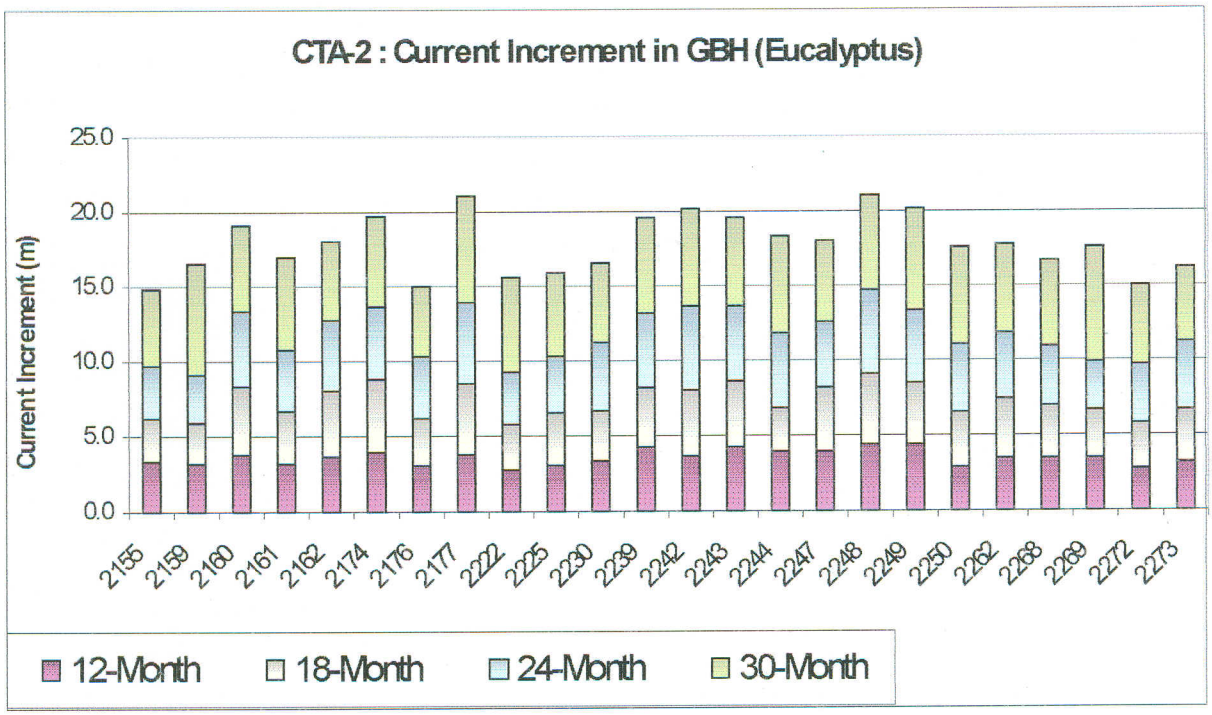

CTA-2 : Current Increment in GBH (Eucalyptus)
Current Increment (m)
25.0
20.0
15.0
10.0
5.0
0.0
2155 2159 2160 2161 2162 2174 2176 2177 2222 2225 2230 2239 2242 2243 2244 2247 2248 2249 2250 2262 2268 2269 2272 2273
12-Month 18-Month 24-Month 30-Month

**FIGURE – 38 :- Current Increment Graph of Eucalyptus clones in CTA – 2**

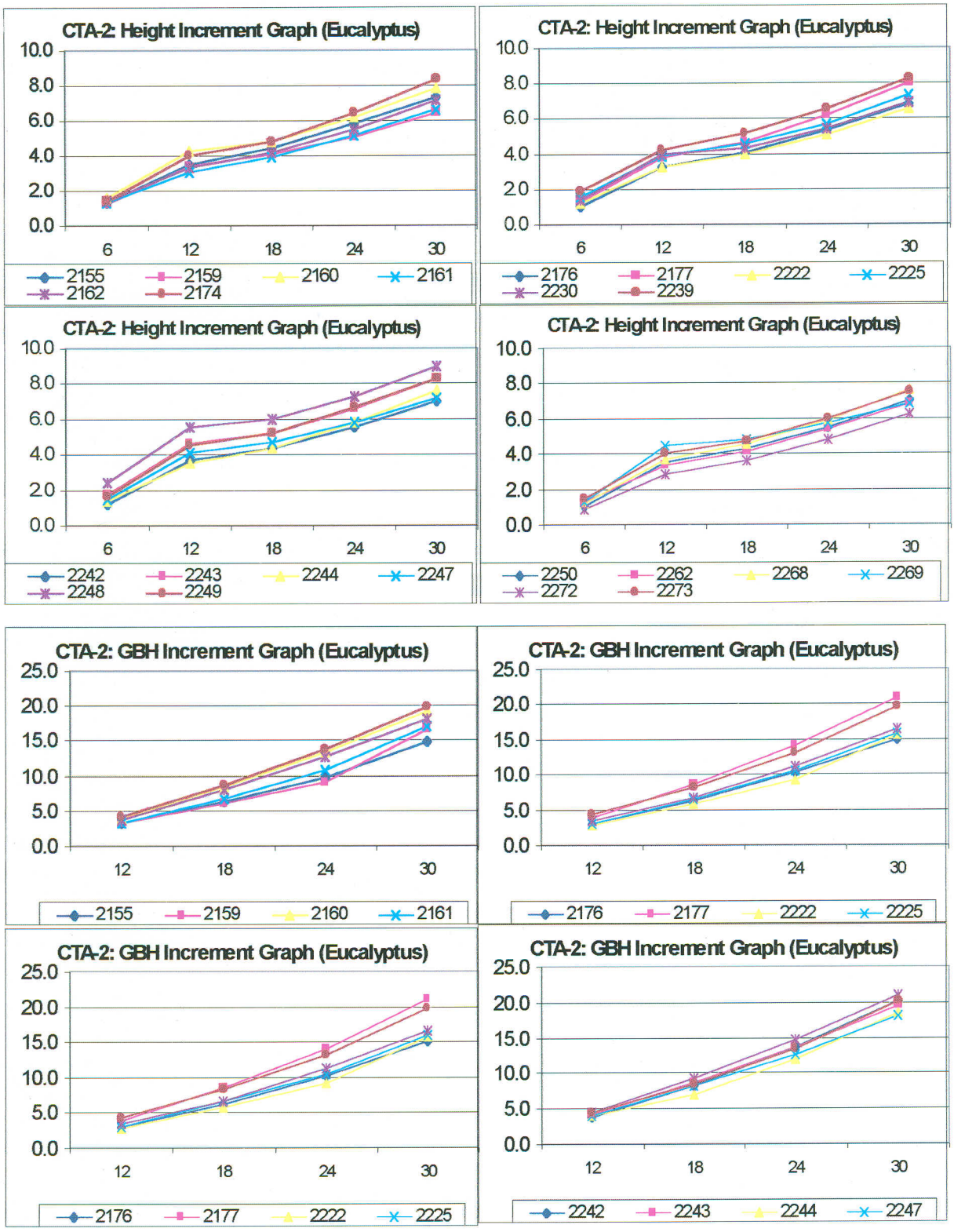
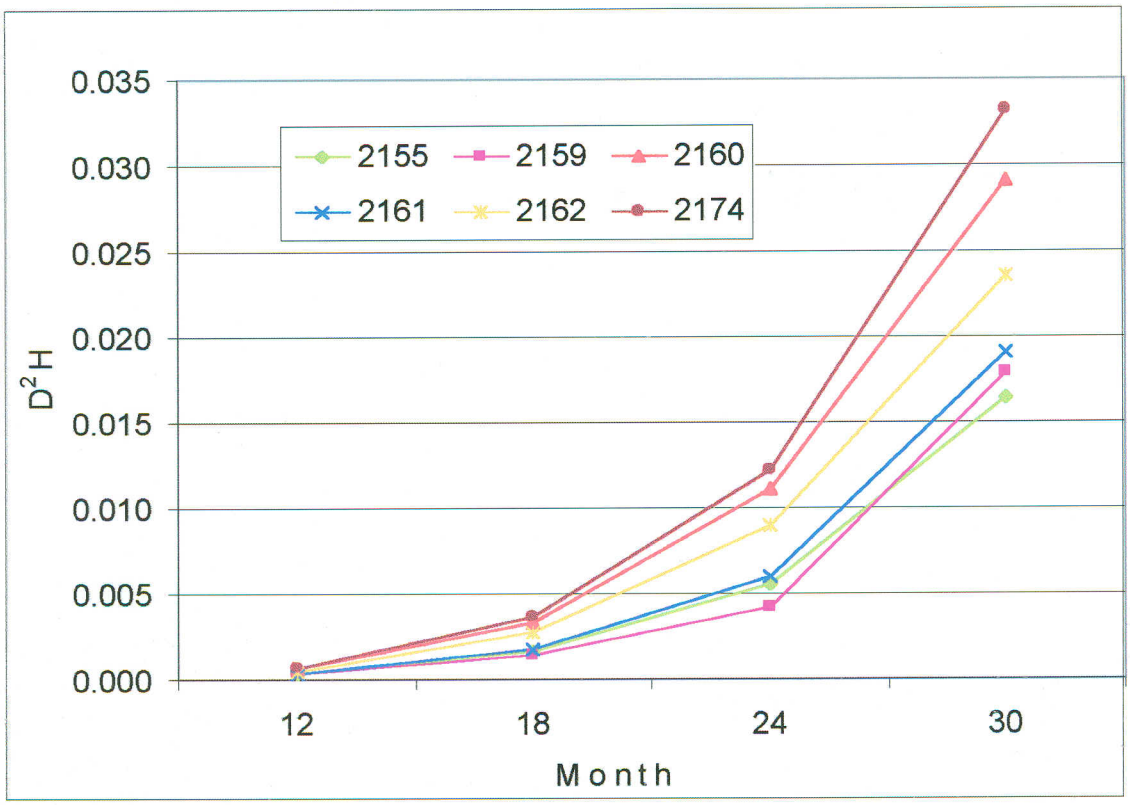


**FIGURE – 39 :- D2H Analysis of Eucalyptus Clones of CTA-2**



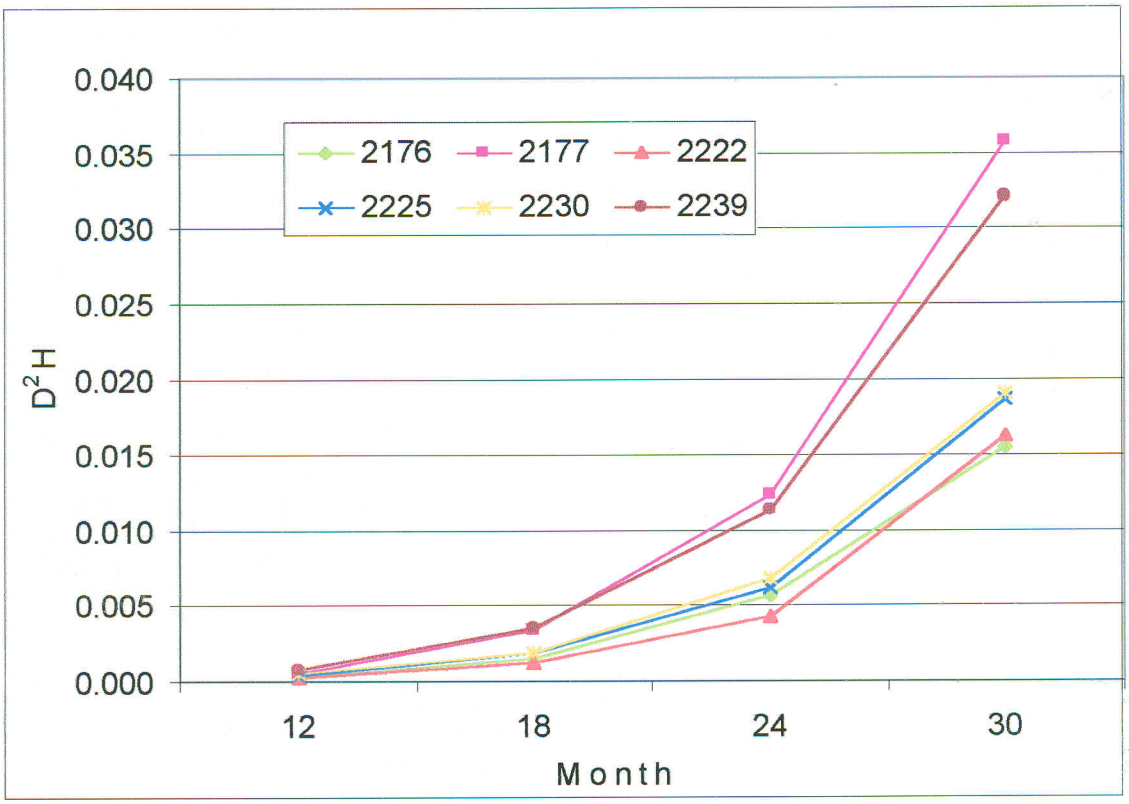
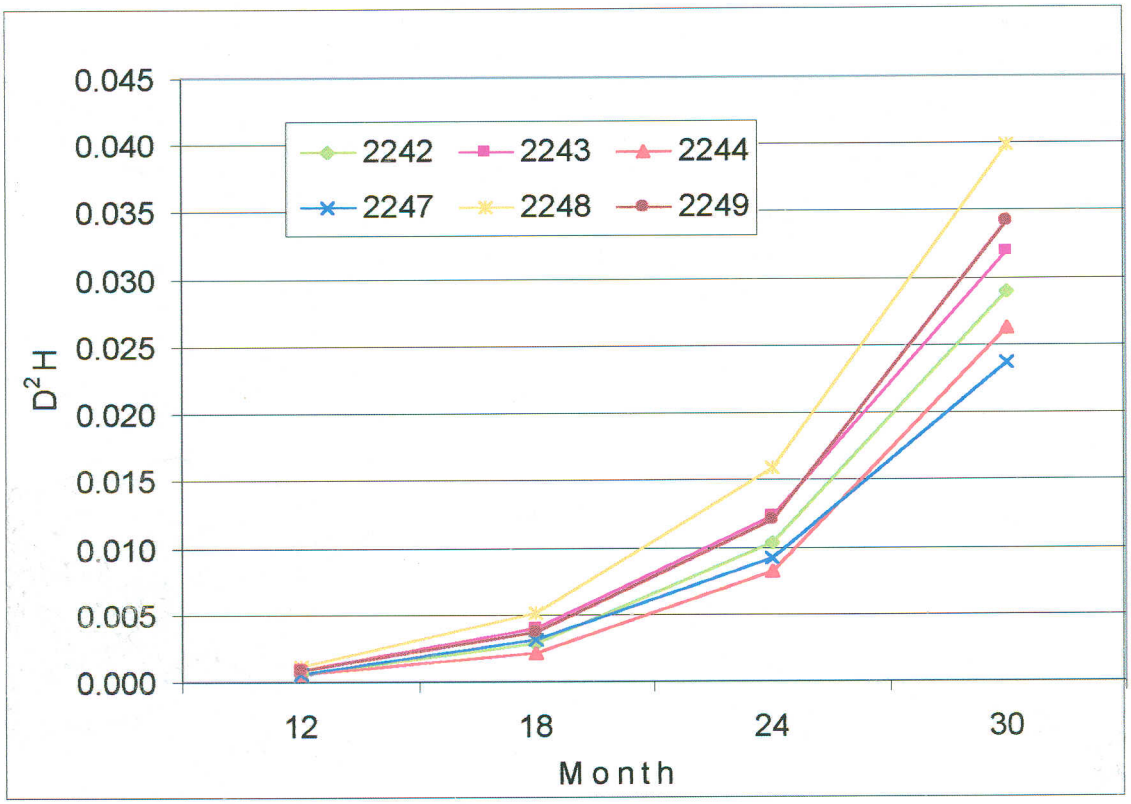



**FIGURE – 39a :- $D^2H$ Analysis of Eucalyptus Clones of CTA-2**



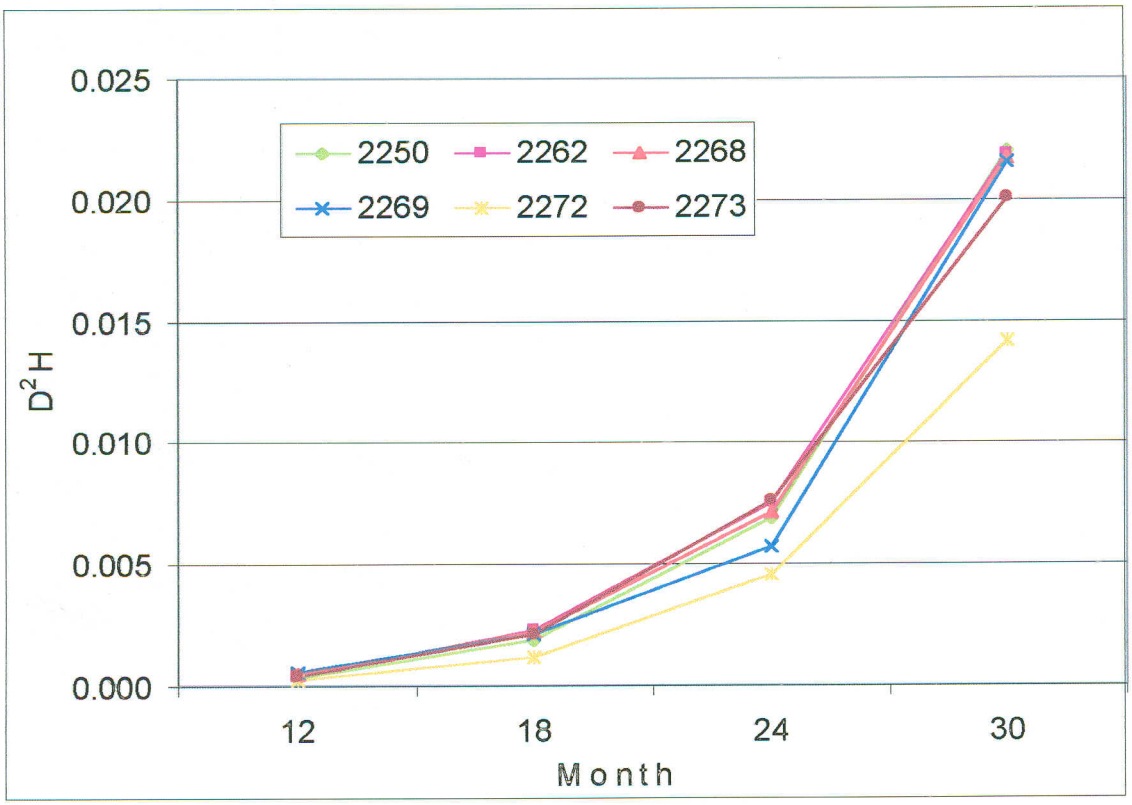



TABLE - 9

# CLONAL TESTING AREA - 3 (*EUCALYPTUS HYBRID*)

No. of Clones:- 15 No. of Replection:- 3 No. of Plants/Replection:- 9

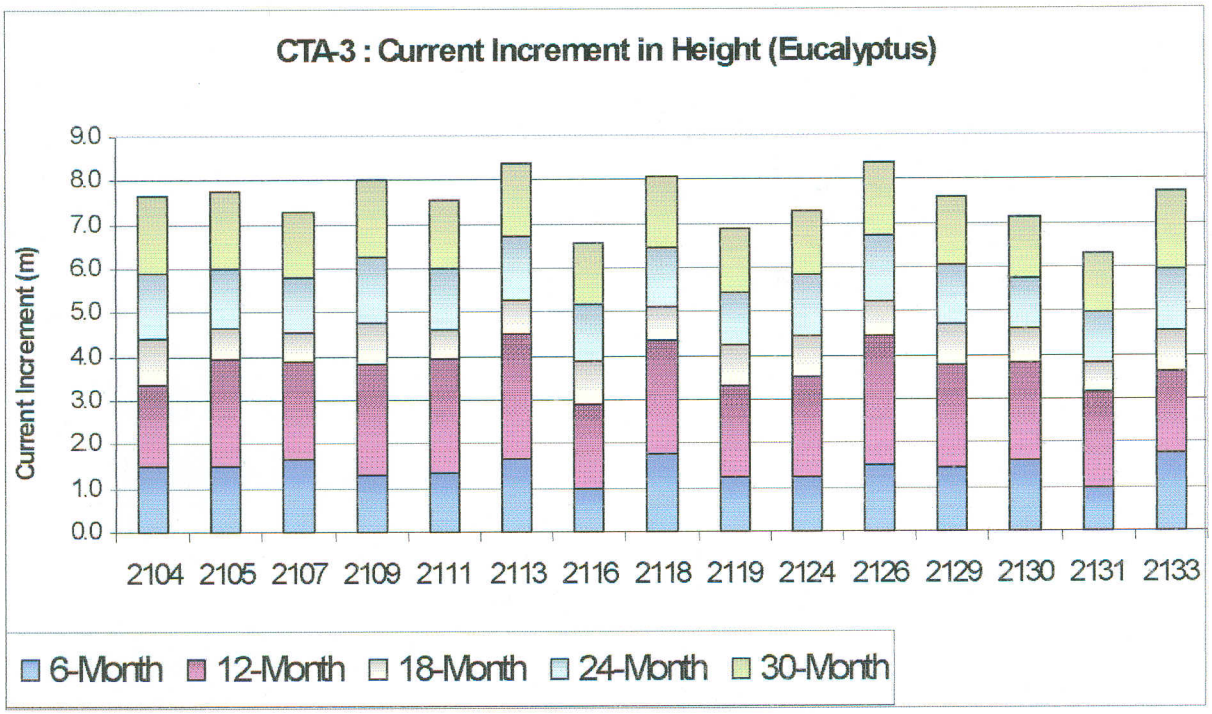
Height in meters, CDM & GBH in cm

*CI = Current Increment, MI = Mean Increment*

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2104 | R1 | 1.6 | 1.3 | 4.2 | 2.7 | 2.6 | 3.9 | 5.2 | 5.1 | 9.3 | 6.7 | 16.5 |
| | R2 | 1.5 | 1.4 | 15.3 | 3.8 | 3.6 | 4.8 | 7.8 | 6.4 | 12.6 | 8.3 | 19.1 |
| | R3 | 1.4 | 1.2 | 9.4 | 3.5 | 3.1 | 4.6 | 6.1 | 6.2 | 10.8 | 7.9 | 17.7 |
| | Avg | 1.5 | 1.3 | 9.7 | 3.3 | 3.1 | 4.4 | 6.4 | 5.9 | 10.9 | 7.6 | 17.8 |
| | CI | 1.5 | 1.3 | 9.7 | 1.8 | 3.1 | 1.1 | 3.3 | 1.5 | 4.5 | 1.7 | 6.9 |
| | MI | 1.5 | 1.3 | 9.7 | 1.7 | 3.1 | 1.5 | 2.1 | 1.5 | 2.7 | 1.5 | 3.6 |
| 2105 | R1 | 1.1 | 0.9 | 10.3 | 3.2 | 2.9 | 3.9 | 5.0 | 5.1 | 8.2 | 7.0 | 16.6 |
| | R2 | 1.7 | 1.5 | 20.3 | 4.1 | 3.7 | 4.9 | 8.2 | 6.1 | 14.0 | 7.9 | 20.0 |
| | R3 | 1.7 | 1.3 | 16.3 | 4.4 | 3.4 | 5.2 | 6.8 | 6.8 | 11.2 | 8.5 | 19.9 |
| | Avg | 1.5 | 1.2 | 15.6 | 3.9 | 3.3 | 4.6 | 6.7 | 6.0 | 11.1 | 7.8 | 18.8 |
| | CI | 1.5 | 1.2 | 15.6 | 2.4 | 3.3 | 0.7 | 3.3 | 1.3 | 4.5 | 1.8 | 7.7 |
| | MI | 1.5 | 1.2 | 15.6 | 2.0 | 3.3 | 1.5 | 2.2 | 1.5 | 2.8 | 1.6 | 3.8 |
| 2107 | R1 | 1.8 | 1.6 | 18.9 | 4.7 | 4.0 | 5.2 | 8.2 | 6.5 | 12.9 | 8.1 | 22.7 |
| | R2 | 1.9 | 1.7 | 23.5 | 4.3 | 3.4 | 4.9 | 7.7 | 6.4 | 12.7 | 7.9 | 19.1 |
| | R3 | 1.2 | 1.6 | 6.7 | 2.6 | 2.0 | 3.6 | 3.9 | 4.5 | 7.2 | 5.8 | 11.0 |
| | Avg | 1.6 | 1.6 | 16.4 | 3.9 | 3.1 | 4.6 | 6.6 | 5.8 | 10.9 | 7.3 | 17.6 |
| | CI | 1.6 | 1.6 | 16.4 | 2.2 | 3.1 | 0.7 | 3.5 | 1.2 | 4.3 | 1.5 | 6.7 |
| | MI | 1.6 | 1.6 | 16.4 | 1.9 | 3.1 | 1.5 | 2.2 | 1.4 | 2.7 | 1.5 | 3.5 |
| 2109 | R1 | 1.3 | 1.1 | 11.3 | 4.0 | 3.1 | 4.6 | 8.2 | 6.1 | 12.5 | 7.8 | 18.3 |
| | R2 | 1.2 | 1.3 | 12.1 | 3.9 | 3.1 | 5.0 | 7.0 | 6.6 | 11.6 | 8.5 | 19.7 |
| | R3 | 1.4 | 1.1 | 8.9 | 3.6 | 3.0 | 4.6 | 6.9 | 6.1 | 11.9 | 7.7 | 17.9 |
| | Avg | 1.3 | 1.2 | 10.8 | 3.8 | 3.1 | 4.8 | 7.4 | 6.3 | 12.0 | 8.0 | 18.6 |
| | CI | 1.3 | 1.2 | 10.8 | 2.5 | 3.1 | 0.9 | 4.3 | 1.5 | 4.6 | 1.7 | 6.6 |
| | MI | 1.3 | 1.2 | 10.8 | 1.9 | 3.1 | 1.6 | 2.5 | 1.6 | 3.0 | 1.6 | 3.7 |
| 2111 | R1 | 1.5 | 1.6 | 17.2 | 4.1 | 4.7 | 4.7 | 8.0 | 6.0 | 13.1 | 7.6 | 19.7 |
| | R2 | 1.4 | 1.6 | 18.9 | 4.3 | 3.8 | 4.8 | 8.2 | 6.2 | 13.2 | 7.7 | 18.6 |
| | R3 | 1.3 | 1.4 | 12.0 | 3.8 | 3.4 | 4.3 | 7.3 | 5.8 | 12.3 | 7.4 | 19.7 |
| | Avg | 1.4 | 1.5 | 16.0 | 3.9 | 4.0 | 4.6 | 7.8 | 6.0 | 12.9 | 7.6 | 19.0 |
| | CI | 1.4 | 1.5 | 16.0 | 2.6 | 4.0 | 0.7 | 3.9 | 1.4 | 5.0 | 1.6 | 6.1 |
| | MI | 1.4 | 1.5 | 16.0 | 2.0 | 4.0 | 1.5 | 2.6 | 1.5 | 3.2 | 1.5 | 3.8 |
| 2113 | R1 | 1.7 | 1.4 | 19.0 | 4.2 | 3.5 | 5.1 | 7.6 | 6.7 | 12.0 | 8.4 | 17.3 |
| | R2 | 1.6 | 1.7 | 28.3 | 5.1 | 3.7 | 5.6 | 8.8 | 7.1 | 14.2 | 8.8 | 19.9 |
| | R3 | 1.5 | 1.3 | 11.8 | 4.2 | 3.4 | 5.0 | 7.2 | 6.4 | 11.7 | 8.0 | 18.6 |
| | Avg | 1.6 | 1.5 | 19.7 | 4.5 | 3.6 | 5.3 | 7.9 | 6.7 | 12.6 | 8.4 | 18.6 |
| | CI | 1.6 | 1.5 | 19.7 | 2.9 | 3.6 | 0.8 | 4.3 | 1.5 | 4.7 | 1.7 | 6.0 |
| | MI | 1.6 | 1.5 | 19.7 | 2.3 | 3.6 | 1.8 | 2.6 | 1.7 | 3.2 | 1.7 | 3.7 |
| 2116 | R1 | 1.3 | 1.1 | 11.2 | 3.3 | 2.5 | 4.3 | 6.3 | 5.5 | 10.0 | 6.8 | 14.3 |
| | R2 | 0.8 | 0.8 | 7.0 | 2.3 | 2.3 | 3.4 | 4.9 | 4.6 | 7.3 | 6.1 | 15.6 |
| | R3 | 0.9 | 0.8 | 5.3 | 3.0 | 2.3 | 4.0 | 5.5 | 5.3 | 8.9 | 6.8 | 15.3 |
| | Avg | 1.0 | 0.9 | 7.9 | 2.9 | 2.4 | 3.9 | 5.6 | 5.1 | 8.7 | 6.6 | 15.1 |
| | CI | 1.0 | 0.9 | 7.9 | 1.9 | 2.4 | 1.0 | 3.2 | 1.3 | 3.1 | 1.4 | 6.4 |
| | MI | 1.0 | 0.9 | 7.9 | 1.4 | 2.4 | 1.3 | 1.9 | 1.3 | 2.2 | 1.3 | 3.0 |
| 2118 | R1 | 1.9 | 2.1 | 19.3 | 4.9 | 5.2 | 5.7 | 8.4 | 7.1 | 14.3 | 9.0 | 22.1 |
| | R2 | 1.4 | 1.3 | 14.9 | 3.5 | 3.4 | 4.2 | 7.1 | 5.5 | 11.9 | 7.0 | 17.9 |
| | R3 | 1.9 | 2.0 | 17.5 | 4.7 | 4.6 | 5.5 | 9.8 | 6.9 | 15.4 | 8.3 | 25.4 |
| | Avg | 1.8 | 1.8 | 17.2 | 4.4 | 4.4 | 5.1 | 8.4 | 6.5 | 13.9 | 8.1 | 21.8 |
| | CI | 1.8 | 1.8 | 17.2 | 2.6 | 4.4 | 0.8 | 4.0 | 1.4 | 5.4 | 1.6 | 7.9 |
| | MI | 1.8 | 1.8 | 17.2 | 2.2 | 4.4 | 1.7 | 2.8 | 1.6 | 3.5 | 1.6 | 4.4 |

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 2119 | R1 | 1.6 | 2.0 | 22.6 | 3.9 | 4.4 | 4.6 | 7.6 | 5.6 | 12.0 | 6.9 | 18.3 |
| | R2 | 1.2 | 1.0 | 19.6 | 3.4 | 3.4 | 4.6 | 7.5 | 6.0 | 12.1 | 7.4 | 17.3 |
| | R3 | 0.9 | 1.2 | 7.0 | 2.6 | 3.1 | 3.6 | 7.2 | 4.8 | 11.5 | 6.3 | 16.4 |
| | Avg | 1.3 | 1.4 | 16.4 | 3.3 | 3.7 | 4.3 | 7.4 | 5.5 | 11.9 | 6.9 | 17.3 |
| | CI | 1.3 | 1.4 | 16.4 | 2.0 | 3.7 | 1.0 | 3.7 | 1.2 | 4.5 | 1.4 | 5.5 |
| | MI | 1.3 | 1.4 | 16.4 | 1.6 | 3.7 | 1.4 | 2.5 | 1.4 | 3.0 | 1.4 | 3.5 |
| 2124 | R1 | 1.3 | 1.2 | 12.7 | 3.6 | 3.0 | 4.3 | 5.7 | 5.2 | 10.6 | 6.4 | 17.9 |
| | R2 | 1.2 | 1.2 | 6.3 | 3.4 | 3.0 | 4.5 | 6.6 | 6.0 | 10.9 | 7.5 | 16.4 |
| | R3 | 1.2 | 1.2 | 12.7 | 3.6 | 2.9 | 4.6 | 6.3 | 6.4 | 11.3 | 7.9 | 19.6 |
| | Avg | 1.3 | 1.2 | 10.6 | 3.5 | 3.0 | 4.4 | 6.2 | 5.9 | 10.9 | 7.3 | 18.0 |
| | CI | 1.3 | 1.2 | 10.6 | 2.3 | 3.0 | 0.9 | 3.2 | 1.4 | 4.7 | 1.4 | 7.1 |
| | MI | 1.3 | 1.2 | 10.6 | 1.8 | 3.0 | 1.5 | 2.1 | 1.5 | 2.7 | 1.5 | 3.6 |
| 2126 | R1 | 2.0 | 2.0 | 23.7 | 5.2 | 5.1 | 5.9 | 10.0 | 7.2 | 15.2 | 9.0 | 23.3 |
| | R2 | 1.4 | 1.3 | 20.8 | 4.6 | 3.6 | 5.2 | 8.8 | 6.8 | 13.9 | 8.4 | 19.7 |
| | R3 | 1.1 | 0.9 | 10.3 | 3.6 | 3.2 | 4.6 | 8.0 | 6.2 | 13.3 | 7.8 | 18.8 |
| | Avg | 1.5 | 1.4 | 18.3 | 4.5 | 4.0 | 5.2 | 8.9 | 6.7 | 14.1 | 8.4 | 20.6 |
| | CI | 1.5 | 1.4 | 18.3 | 3.0 | 4.0 | 0.7 | 5.0 | 1.5 | 5.2 | 1.7 | 6.5 |
| | MI | 1.5 | 1.4 | 18.3 | 2.2 | 4.0 | 1.7 | 3.0 | 1.7 | 3.5 | 1.7 | 4.1 |
| 2129 | R1 | 1.6 | 1.4 | 15.2 | 4.2 | 4.2 | 5.3 | 7.8 | 6.7 | 13.5 | 8.2 | 22.1 |
| | R2 | 1.1 | 1.2 | 7.8 | 3.1 | 3.1 | 4.0 | 6.9 | 5.4 | 11.2 | 6.8 | 16.1 |
| | R3 | 1.5 | 1.3 | 12.0 | 3.9 | 3.5 | 4.7 | 7.6 | 6.1 | 12.2 | 7.8 | 19.2 |
| | Avg | 1.4 | 1.3 | 11.7 | 3.8 | 3.6 | 4.7 | 7.4 | 6.0 | 12.3 | 7.6 | 19.1 |
| | CI | 1.4 | 1.3 | 11.7 | 2.3 | 3.6 | 0.9 | 3.8 | 1.4 | 4.9 | 1.6 | 6.8 |
| | MI | 1.4 | 1.3 | 11.7 | 1.9 | 3.6 | 1.6 | 2.5 | 1.5 | 3.1 | 1.5 | 3.8 |
| [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] | [illegible] |
| | R2 | 1.0 | 1.5 | 13.3 | 4.2 | 3.2 | 4.9 | 7.6 | 6.2 | 12.7 | 7.7 | 18.1 |
| | R3 | 1.0 | 0.9 | 4.6 | 2.1 | 1.7 | 3.2 | 4.0 | 4.2 | 5.8 | 5.4 | 11.0 |
| | Avg | 1.6 | 1.5 | 12.7 | 3.8 | 3.2 | 4.6 | 6.9 | 5.7 | 10.9 | 7.1 | 16.7 |
| | CI | 1.6 | 1.5 | 12.7 | 2.2 | 3.2 | 0.8 | 3.8 | 1.1 | 3.9 | 1.4 | 5.9 |
| | MI | 1.6 | 1.5 | 12.7 | 1.9 | 3.2 | 1.5 | 2.3 | 1.4 | 2.7 | 1.4 | 3.3 |
| 2131 | R1 | 0.9 | 1.0 | 7.3 | 2.9 | 2.0 | 3.5 | 3.8 | 4.3 | 6.1 | 5.3 | 11.9 |
| | R2 | 1.0 | 1.1 | 8.9 | 3.2 | 2.7 | 3.8 | 5.8 | 5.1 | 9.2 | 6.6 | 13.9 |
| | R3 | 1.1 | 0.9 | 8.2 | 3.3 | 2.1 | 4.1 | 5.6 | 5.4 | 9.5 | 7.0 | 14.7 |
| | Avg | 1.0 | 1.0 | 8.1 | 3.1 | 2.3 | 3.8 | 5.1 | 5.0 | 8.2 | 6.3 | 13.5 |
| | CI | 1.0 | 1.0 | 8.1 | 2.1 | 2.3 | 0.7 | 2.8 | 1.1 | 3.2 | 1.4 | 5.3 |
| | MI | 1.0 | 1.0 | 8.1 | 1.6 | 2.3 | 1.3 | 1.7 | 1.2 | 2.1 | 1.3 | 2.7 |
| 2133 | R1 | 1.9 | 1.9 | 21.9 | 4.5 | 4.7 | 5.2 | 9.7 | 6.6 | 14.9 | 8.3 | 22.6 |
| | R2 | 2.2 | 2.1 | 25.6 | 4.1 | 5.0 | 5.0 | 10.4 | 6.7 | 17.6 | 9.0 | 25.1 |
| | R3 | 1.2 | 1.1 | 8.0 | 2.3 | 2.2 | 3.5 | 5.6 | 4.6 | 9.8 | 5.9 | 18.2 |
| | Avg | 1.8 | 1.7 | 18.5 | 3.6 | 4.0 | 4.6 | 8.6 | 6.0 | 14.1 | 7.7 | 22.0 |
| | CI | 1.8 | 1.7 | 18.5 | 1.9 | 4.0 | 0.9 | 4.6 | 1.4 | 5.6 | 1.8 | 7.8 |
| | MI | 1.8 | 1.7 | 18.5 | 1.8 | 4.0 | 1.5 | 2.9 | 1.5 | 3.5 | 1.5 | 4.4 |
| Average | | 1.4 | 1.4 | 14.0 | 3.8 | 3.4 | 4.6 | 7.2 | 5.9 | 11.7 | 7.5 | 18.3 |
| SD | | 0.2 | 0.2 | 4.0 | 0.5 | 0.6 | 0.4 | 1.1 | 0.5 | 1.7 | 0.6 | 2.2 |
| CV % | | 16.59 | 18.34 | 28.36 | 12.58 | 17.79 | 9.09 | 15.32 | 8.54 | 14.92 | 8.15 | 12.23 |

**FIGURE - 40**


CTA-3 : Current Increment in Height (Eucalyptus)
Current Increment (m)
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
2104 2105 2107 2109 2111 2113 2116 2118 2119 2124 2126 2129 2130 2131 2133
6-Month 12-Month 18-Month 24-Month 30-Month

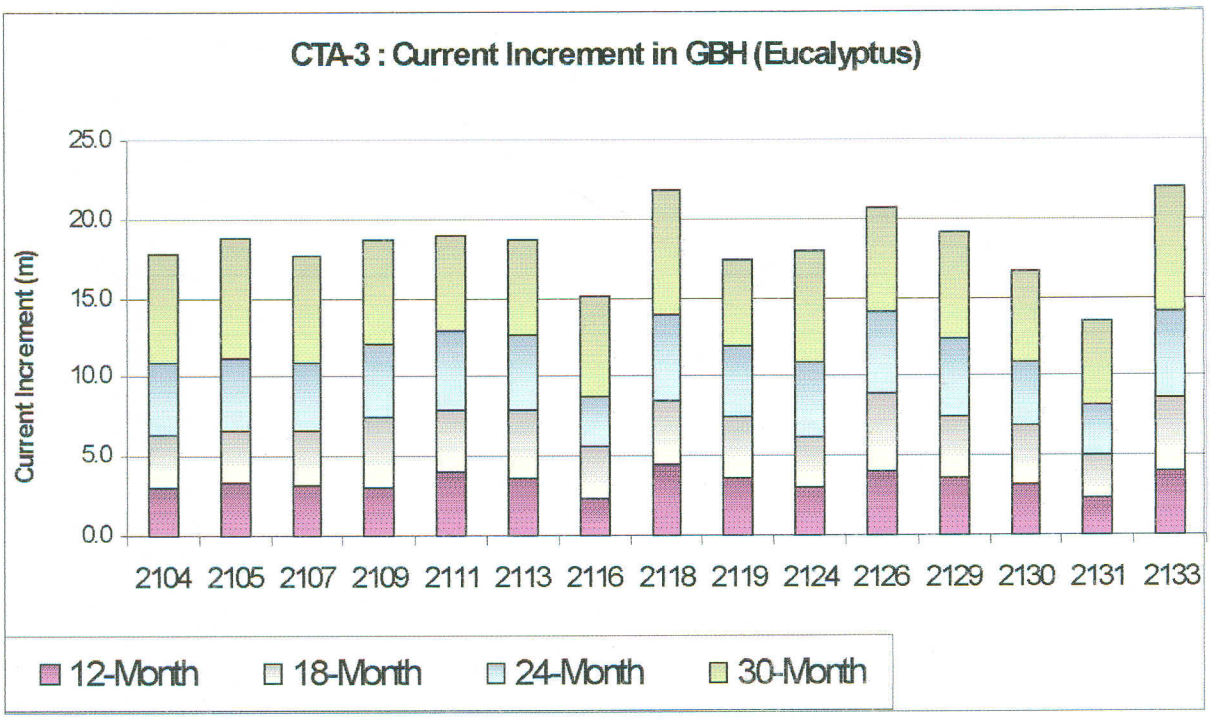
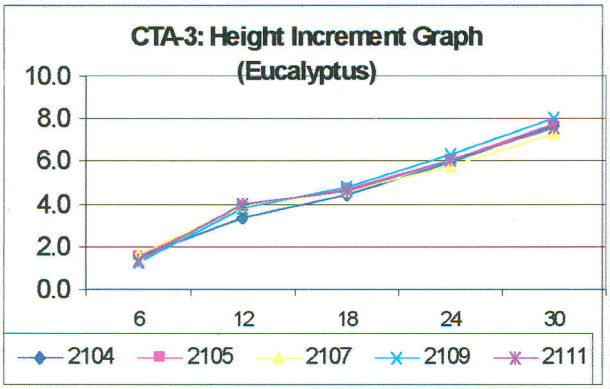
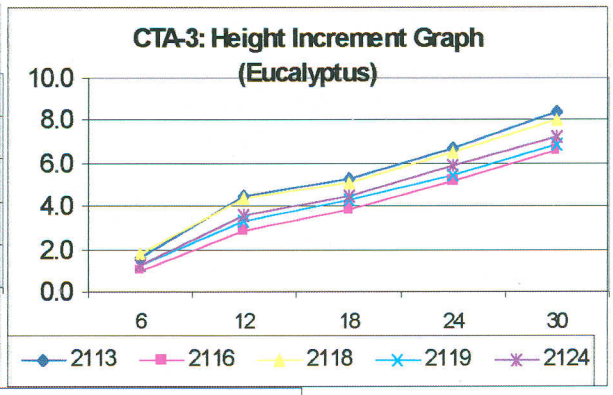
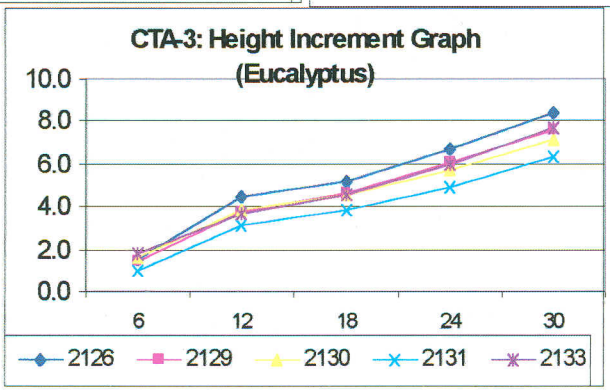
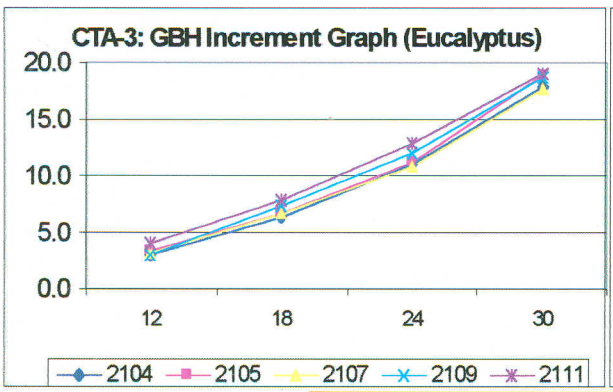

CTA-3 : Current Increment in GBH (Eucalyptus)
Current Increment (m)
25.0
20.0
15.0
10.0
5.0
0.0
2104 2105 2107 2109 2111 2113 2116 2118 2119 2124 2126 2129 2130 2131 2133
12-Month 18-Month 24-Month 30-Month

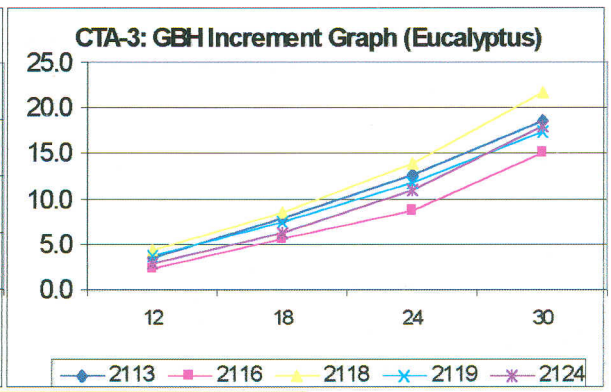
**FIGURE – 41:- Current Increment Graph of Eucalyptus clone in CTA – 3**



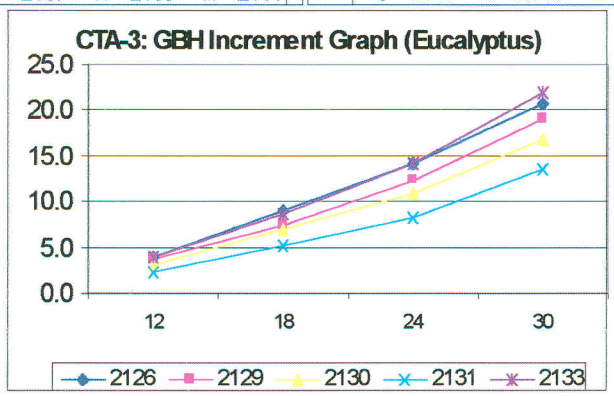
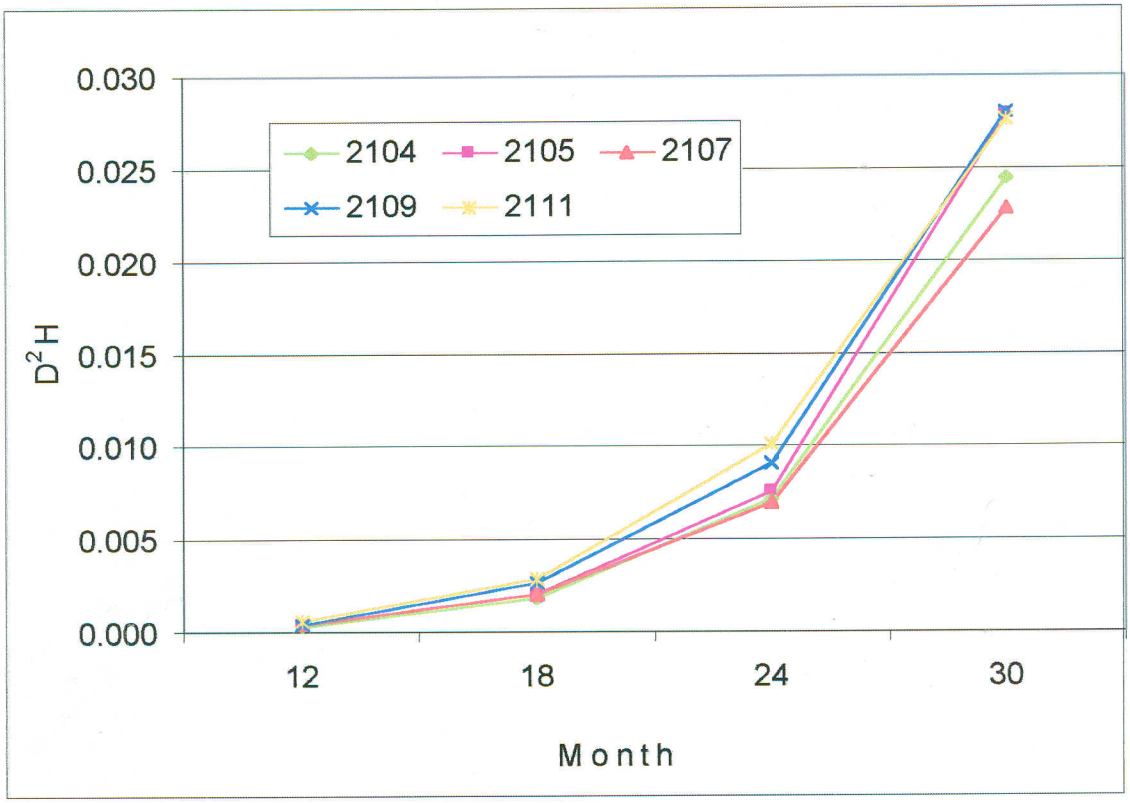



**FIGURE – 42 :- $D^2H$ Analysis of Eucalyptus Clones of CTA – 3**



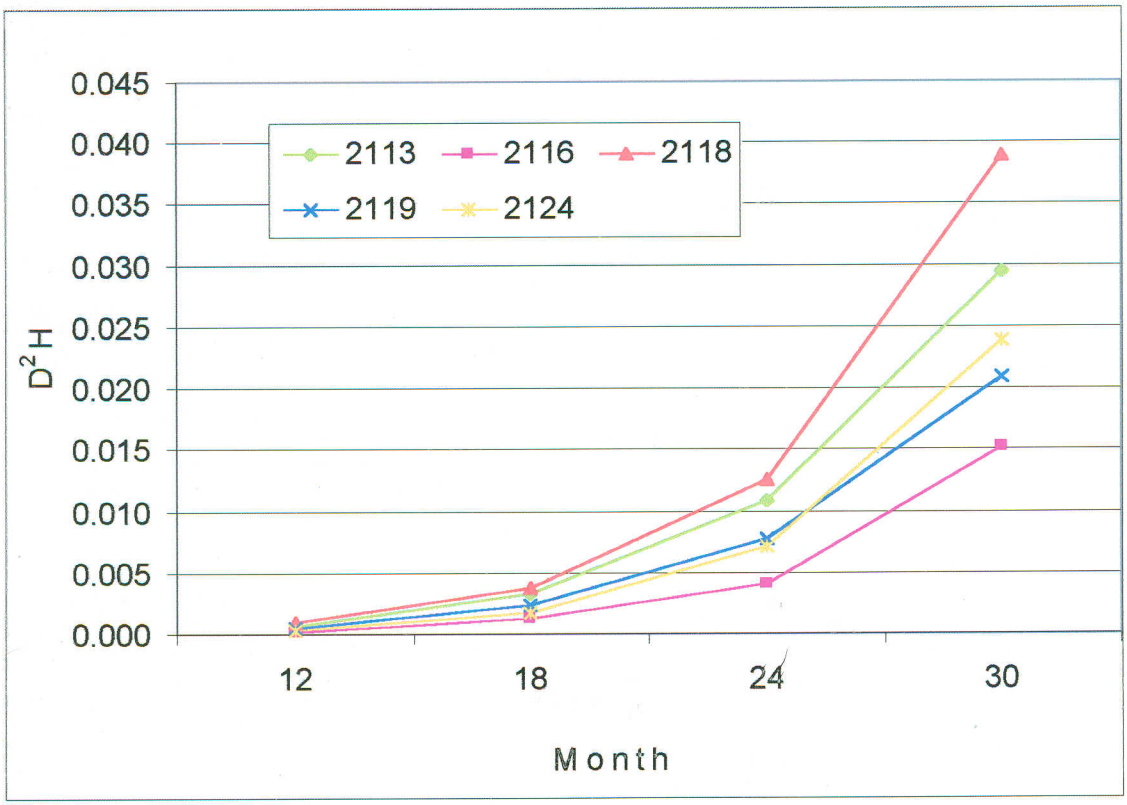



**FIGURE – 42a :- $D^2H$ Analysis of Eucalyptus Clones of CTA – 3**

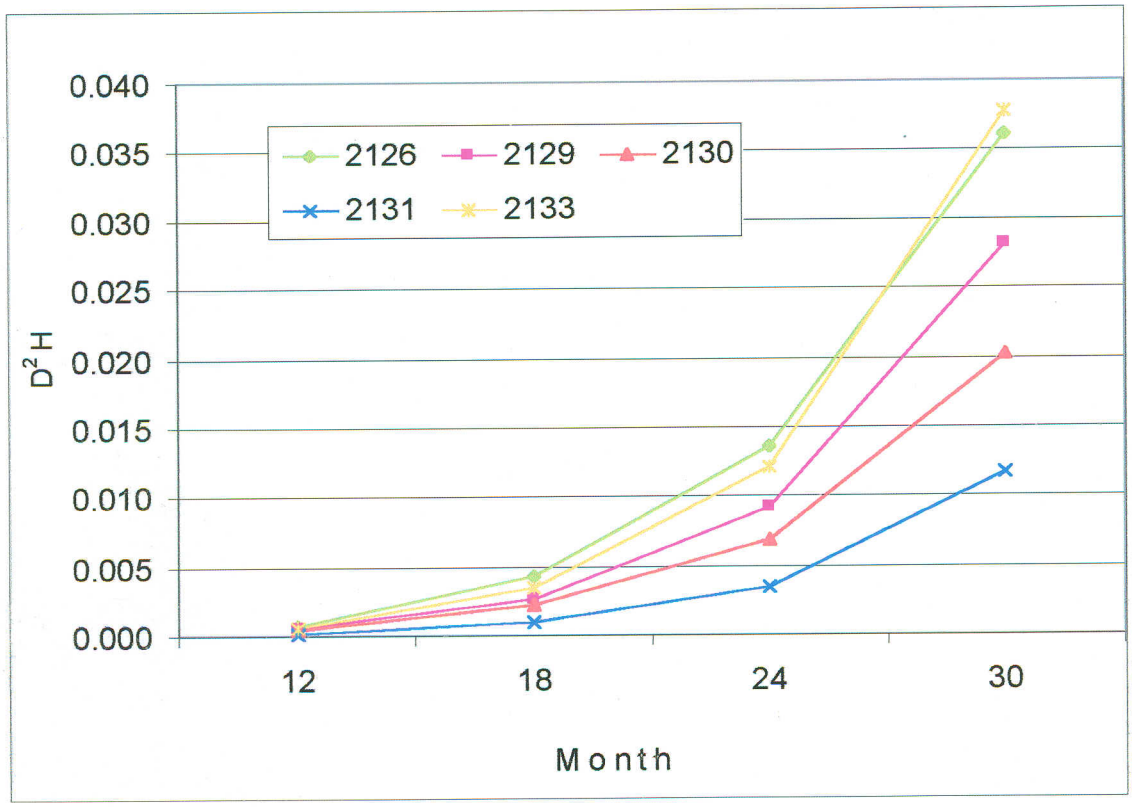


TABLE - 10 **CLONAL TESTING AREA - 4 (CASUARINA EQUESITIFOLIA)**

No. of Clones:- 14 No. of Replection:- 3 No. of Plants/Replection:- 9

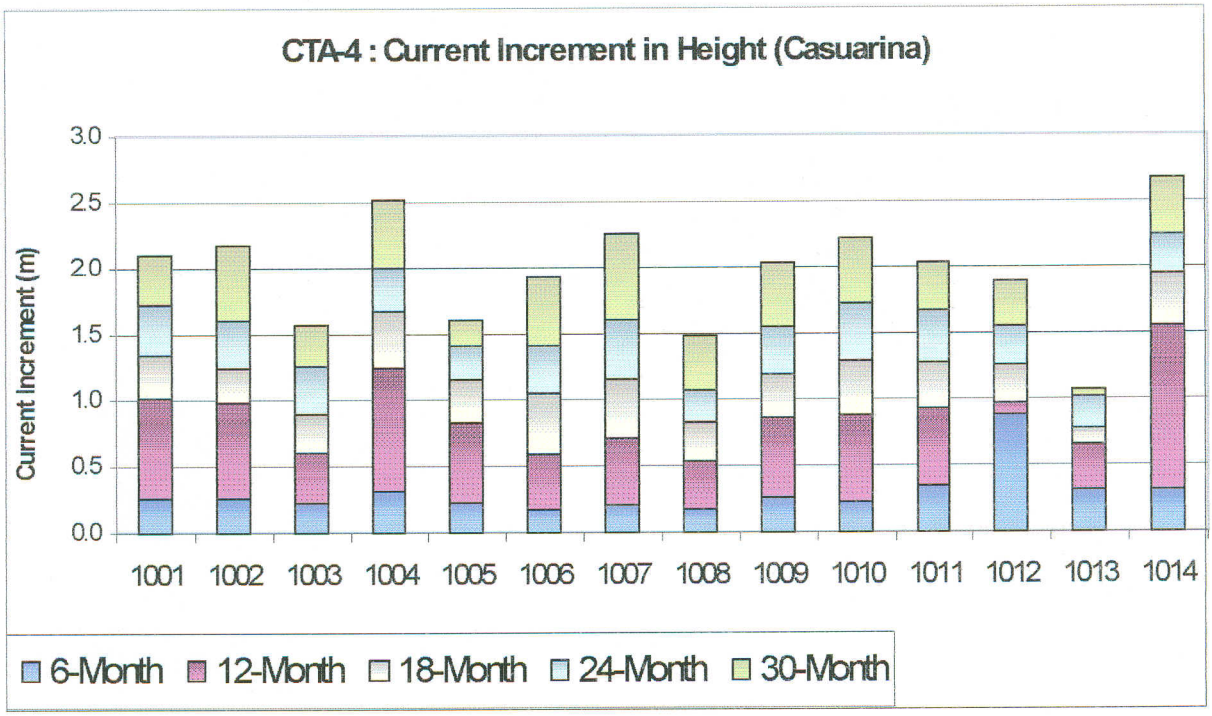
Height in meters CDM & GBH in cm

*CI = Current Increment, MI = Mean Increment*

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 1001 | R1 | 0.2 | 0.5 | 3.3 | 0.9 | 0.9 | 1.5 | 1.3 | 1.9 | 1.6 | 2.1 | 2.0 |
| | R2 | 0.4 | 0.5 | 5.5 | 1.4 | 1.1 | 1.5 | 1.6 | 2.0 | 2.1 | 2.4 | 2.5 |
| | R3 | 0.2 | 0.3 | 2.0 | 0.7 | 0.6 | 1.1 | 0.6 | 1.4 | 1.0 | 1.8 | 1.6 |
| | Avg | 0.3 | 0.4 | 3.6 | 1.0 | 0.8 | 1.4 | 1.2 | 1.7 | 1.5 | 2.1 | 2.0 |
| | CI | 0.3 | 0.4 | 3.6 | 0.8 | 0.8 | 0.3 | 0.3 | 0.4 | 0.4 | 0.4 | 0.5 |
| | MI | 0.3 | 0.4 | 3.6 | 0.5 | 0.8 | 0.5 | 0.4 | 0.4 | 0.4 | 0.4 | 0.4 |
| 1002 | R1 | 0.3 | 0.6 | 2.9 | 0.8 | 0.6 | 1.2 | 0.8 | 1.5 | 1.2 | 2.1 | 1.5 |
| | R2 | 0.2 | 0.8 | 5.0 | 0.8 | 0.8 | 1.0 | 0.9 | 1.3 | 1.1 | 1.8 | 1.4 |
| | R3 | 0.3 | 0.5 | 3.6 | 1.3 | 0.9 | 1.5 | 1.4 | 2.0 | 1.9 | 2.6 | 2.4 |
| | Avg | 0.3 | 0.6 | 3.8 | 1.0 | 0.8 | 1.2 | 1.0 | 1.6 | 1.4 | 2.2 | 1.8 |
| | CI | 0.3 | 0.6 | 3.8 | 0.7 | 0.8 | 0.3 | 0.3 | 0.4 | 0.4 | 0.6 | 0.4 |
| | MI | 0.3 | 0.6 | 3.8 | 0.5 | 0.8 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 |
| 1003 | R1 | 0.2 | 0.3 | 2.0 | 0.5 | 0.6 | 1.0 | 1.0 | 1.5 | 1.2 | 1.8 | 1.1 |
| | R2 | 0.3 | 0.6 | 3.2 | 0.7 | 0.8 | 1.0 | 1.0 | 1.3 | 1.1 | 1.6 | 1.1 |
| | R3 | 0.2 | 0.4 | 3.4 | 0.6 | 0.7 | 0.8 | 0.7 | 1.0 | 0.9 | 1.3 | 1.2 |
| | Avg | 0.2 | 0.4 | 2.9 | 0.6 | 0.7 | 0.9 | 0.9 | 1.3 | 1.0 | 1.6 | 1.1 |
| | CI | 0.2 | 0.4 | 2.9 | 0.4 | 0.7 | 0.3 | 0.2 | 0.4 | 0.1 | 0.3 | 0.1 |
| | MI | 0.2 | 0.4 | 2.9 | 0.3 | 0.7 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 |
| 1004 | R1 | 0.4 | 0.8 | 4.7 | 1.7 | 1.2 | 2.1 | 1.5 | 2.4 | 1.9 | 3.2 | 2.4 |
| | R2 | 0.3 | 0.5 | 3.4 | 1.1 | 0.8 | 1.5 | 1.1 | 1.8 | 1.4 | 2.0 | 1.5 |
| | R3 | 0.3 | 0.3 | 2.8 | 0.9 | 0.7 | 1.4 | 1.1 | 1.8 | 1.3 | 2.3 | 2.0 |
| | Avg | 0.3 | 0.5 | 3.6 | 1.2 | 0.9 | 1.7 | 1.2 | 2.0 | 1.5 | 2.5 | 1.9 |
| | CI | 0.3 | 0.5 | 3.6 | 0.9 | 0.9 | 0.4 | 0.3 | 0.3 | 0.3 | 0.5 | 0.4 |
| | MI | 0.3 | 0.5 | 3.6 | 0.6 | 0.9 | 0.6 | 0.4 | 0.5 | 0.4 | 0.5 | 0.4 |
| 1005 | R1 | 0.2 | 0.3 | 3.7 | 0.6 | 0.5 | 0.7 | 0.7 | 1.0 | 0.9 | 1.2 | 1.0 |
| | R2 | 0.3 | 0.5 | 3.4 | 0.8 | 0.8 | 1.2 | 1.0 | 1.5 | 1.2 | 1.4 | 1.5 |
| | R3 | 0.2 | 0.5 | 3.4 | 1.1 | 0.7 | 1.5 | 0.8 | 1.8 | 1.0 | 2.2 | 1.3 |
| | Avg | 0.2 | 0.4 | 3.5 | 0.8 | 0.7 | 1.1 | 0.8 | 1.4 | 1.0 | 1.6 | 1.3 |
| | CI | 0.2 | 0.4 | 3.5 | 0.6 | 0.7 | 0.3 | 0.2 | 0.3 | 0.2 | 0.2 | 0.3 |
| | MI | 0.2 | 0.4 | 3.5 | 0.4 | 0.7 | 0.4 | 0.3 | 0.4 | 0.3 | 0.3 | 0.3 |
| 1006 | R1 | 0.2 | 0.3 | 3.0 | 0.6 | 0.7 | 1.1 | 1.0 | 1.4 | 1.3 | 2.0 | 1.7 |
| | R2 | 0.2 | 0.4 | 2.8 | 0.8 | 0.6 | 1.2 | 1.0 | 1.5 | 1.4 | 2.0 | 1.8 |
| | R3 | 0.2 | 0.3 | 2.5 | 0.5 | 0.5 | 0.9 | 0.8 | 1.3 | 1.2 | 1.9 | 1.7 |
| | Avg | 0.2 | 0.3 | 2.8 | 0.6 | 0.6 | 1.1 | 0.9 | 1.4 | 1.3 | 1.9 | 1.7 |
| | CI | 0.2 | 0.3 | 2.8 | 0.4 | 0.6 | 0.5 | 0.3 | 0.4 | 0.4 | 0.5 | 0.4 |
| | MI | 0.2 | 0.3 | 2.8 | 0.3 | 0.6 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 |
| 1007 | R1 | 0.3 | 0.7 | 3.6 | 0.6 | 1.1 | 0.9 | 1.4 | 1.5 | 1.8 | 2.6 | 2.5 |
| | R2 | 0.2 | 0.3 | 2.5 | 0.9 | 0.7 | 1.5 | 0.9 | 1.9 | 1.1 | 2.2 | 1.9 |
| | R3 | 0.2 | 0.3 | 3.7 | 0.6 | 0.7 | 1.1 | 0.9 | 1.5 | 1.2 | 2.0 | 1.7 |
| | Avg | 0.2 | 0.4 | 3.3 | 0.7 | 0.8 | 1.2 | 1.0 | 1.6 | 1.4 | 2.3 | 2.0 |
| | CI | 0.2 | 0.4 | 3.3 | 0.5 | 0.8 | 0.4 | 0.2 | 0.5 | 0.3 | 0.6 | 0.6 |
| | MI | 0.2 | 0.4 | 3.3 | 0.4 | 0.8 | 0.4 | 0.3 | 0.4 | 0.3 | 0.5 | 0.4 |

| Clone No. | Rep No. | 6 month | | | 12 months | | 18 Months | | 24 Months | | 30 months | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Height | CDM | Branches | Height | GBH | Height | GBH | Height | GBH | Height | GBH |
| 1008 | R1 | 0.1 | 0.4 | 2.5 | 0.2 | 0.3 | 0.4 | 0.3 | 0.7 | 0.6 | 1.5 | 1.6 |
| | R2 | 0.2 | 0.5 | 3.2 | 0.3 | 0.4 | 0.6 | 0.6 | 0.8 | 1.0 | 1.4 | 1.6 |
| | R3 | 0.2 | 0.5 | 4.2 | 1.1 | 1.1 | 1.5 | 1.3 | 1.7 | 1.3 | 1.5 | 1.4 |
| | Avg | 0.2 | 0.5 | 3.3 | 0.5 | 0.6 | 0.8 | 0.8 | 1.1 | 1.0 | 1.5 | 1.5 |
| | CI | 0.2 | 0.5 | 3.3 | 0.4 | 0.6 | 0.3 | 0.2 | 0.2 | 0.2 | 0.4 | 0.6 |
| | MI | 0.2 | 0.5 | 3.3 | 0.3 | 0.6 | 0.3 | 0.3 | 0.3 | 0.2 | 0.3 | 0.3 |
| 1009 | R1 | 0.2 | 0.6 | 4.6 | 0.9 | 0.7 | 1.2 | 0.9 | 1.6 | 1.2 | 1.8 | 1.5 |
| | R2 | 0.2 | 0.4 | 3.4 | 0.8 | 0.9 | 1.2 | 0.9 | 1.3 | 1.0 | 1.5 | 1.5 |
| | R3 | 0.4 | 0.7 | 4.3 | 0.9 | 1.0 | 1.2 | 1.3 | 1.8 | 1.6 | 2.8 | 2.2 |
| | Avg | 0.3 | 0.6 | 4.1 | 0.9 | 0.9 | 1.2 | 1.0 | 1.5 | 1.3 | 2.0 | 1.7 |
| | CI | 0.3 | 0.6 | 4.1 | 0.6 | 0.9 | 0.3 | 0.2 | 0.4 | 0.3 | 0.5 | 0.4 |
| | MI | 0.3 | 0.6 | 4.1 | 0.4 | 0.9 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 |
| 1010 | R1 | 0.2 | 0.4 | 4.5 | 1.5 | 0.9 | 1.7 | 1.2 | 2.1 | 1.7 | 2.7 | 2.1 |
| | R2 | 0.2 | 0.5 | 2.8 | 0.5 | 0.6 | 1.1 | 0.9 | 1.6 | 1.2 | 2.0 | 1.2 |
| | R3 | 0.3 | 0.3 | 2.0 | 0.7 | 0.8 | 1.1 | 1.0 | 1.5 | 1.4 | 2.0 | 1.8 |
| | Avg | 0.2 | 0.4 | 3.1 | 0.9 | 0.7 | 1.3 | 1.0 | 1.7 | 1.4 | 2.2 | 1.7 |
| | CI | 0.2 | 0.4 | 3.1 | 0.6 | 0.7 | 0.4 | 0.3 | 0.4 | 0.4 | 0.5 | 0.3 |
| | MI | 0.2 | 0.4 | 3.1 | 0.4 | 0.7 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 | 0.3 |
| 1011 | R1 | 0.3 | 0.5 | 3.3 | 0.6 | 0.8 | 0.8 | 0.8 | 1.2 | 1.0 | 1.5 | 1.2 |
| | R2 | 0.5 | 0.5 | 6.3 | 2.0 | 1.4 | 2.4 | 1.7 | 2.7 | 2.0 | 3.2 | 2.9 |
| | R3 | 0.3 | 0.2 | 2.0 | 0.3 | 0.3 | 0.6 | 0.6 | 1.1 | 1.0 | 1.4 | 1.2 |
| | Avg | 0.3 | 0.4 | 3.8 | 0.9 | 0.8 | 1.3 | 1.0 | 1.7 | 1.3 | 2.0 | 1.8 |
| | CI | 0.3 | 0.4 | 3.8 | 0.6 | 0.8 | 0.3 | 0.2 | 0.4 | 0.3 | 0.4 | 0.5 |
| | MI | 0.3 | 0.4 | 3.8 | 0.5 | 0.8 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.4 |
| 1012 | R1 | 2.2 | 0.3 | 2.2 | 0.9 | 0.5 | 1.2 | 0.7 | 1.6 | 1.0 | 1.9 | 1.2 |
| | R2 | 0.2 | 0.7 | 3.6 | 0.6 | 0.7 | 1.0 | 1.0 | 1.2 | 1.3 | 1.6 | 1.5 |
| | R3 | 0.3 | 0.5 | 3.9 | 1.4 | 0.9 | 1.7 | 1.2 | 1.9 | 1.6 | 2.3 | 2.0 |
| | Avg | 0.9 | 0.5 | 3.2 | 1.0 | 0.7 | 1.3 | 1.0 | 1.6 | 1.3 | 1.9 | 1.6 |
| | CI | 0.9 | 0.5 | 3.2 | 0.1 | 0.7 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 | 0.3 |
| | MI | 0.9 | 0.5 | 3.2 | 0.5 | 0.7 | 0.4 | 0.3 | 0.4 | 0.3 | 0.4 | 0.3 |
| 1013 | R1 | 0.3 | 0.4 | 4.7 | 0.5 | 0.6 | 0.8 | 0.8 | 1.0 | 1.0 | 1.3 | 1.4 |
| | R2 | 0.2 | 0.3 | 2.4 | 0.5 | 0.5 | 0.8 | 0.6 | 1.1 | 0.6 | 0.9 | 0.9 |
| | R3 | 0.4 | 4.3 | 4.3 | 0.9 | 1.1 | 0.7 | 1.2 | 1.0 | 1.4 | 1.0 | 1.6 |
| | Avg | 0.3 | 1.7 | 3.8 | 0.6 | 0.7 | 0.8 | 0.9 | 1.0 | 1.0 | 1.1 | 1.3 |
| | CI | 0.3 | 1.7 | 3.8 | 0.3 | 0.7 | 0 1 | 0.2 | 0.2 | 0.1 | 0.0 | 0.3 |
| | MI | 0.3 | 1.7 | 3.8 | 0.3 | 0.7 | 0.3 | 0.3 | 0.3 | 0.3 | 0.2 | 0.3 |
| 1014 | R1 | 0.3 | 0.7 | 4.2 | 1.9 | 1.2 | 2.2 | 1.6 | 2.4 | 2.1 | 2.9 | 2.7 |
| | R2 | 0.4 | 0.7 | 4.1 | 1.9 | 1.0 | 2.3 | 1.6 | 2.7 | 2.1 | 3.1 | 2.5 |
| | R3 | 0.3 | 0.3 | 4 0 | 0.8 | 0.7 | 1.3 | 1.1 | 1.7 | 1.4 | 2.1 | 1.7 |
| | Avg | 0.3 | 0.6 | 4.1 | 1.5 | 1.0 | 2.0 | 1.4 | 2.2 | 1.8 | 2.7 | 2.3 |
| | CI | 0.3 | 0.6 | 4.1 | 1.2 | 1.0 | 0.4 | 0.4 | 0.3 | 0.4 | 0.4 | 0.4 |
| | MI | 0.3 | 0.6 | 4.1 | 0.8 | 1.0 | 0.7 | 0.5 | 0.6 | 0.5 | 0.5 | 0.5 |
| **Average** | | **0.3** | **0.6** | **3.5** | **0.9** | **0.8** | **1.2** | **1.0** | **1.6** | **1.3** | **2.0** | **1.7** |
| **SD** | | **0.2** | **0.3** | **0.4** | **0.3** | **0.1** | **0.3** | **0.2** | **0.3** | **0.2** | **0.4** | **0.3** |
| **CV %** | | **58.56** | **60.39** | **12.28** | **30.94** | **15.84** | **25.52** | **17.21** | **20.90** | **18.59** | **21.69** | **18.66** |

FIGURE - 43


CTA-4 : Current Increment in Height (Casuarina)
Current Increment (m)
3.0
2.5
2.0
1.5
1.0
0.5
0.0
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014
6-Month 12-Month 18-Month 24-Month 30-Month

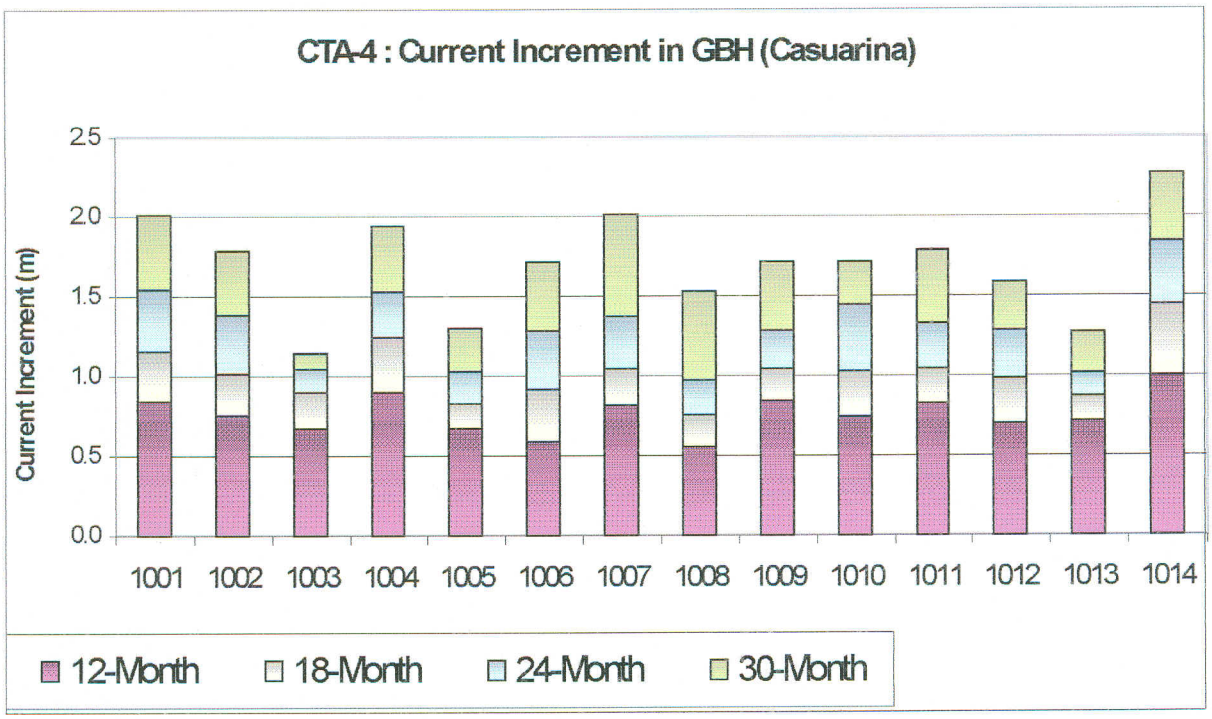
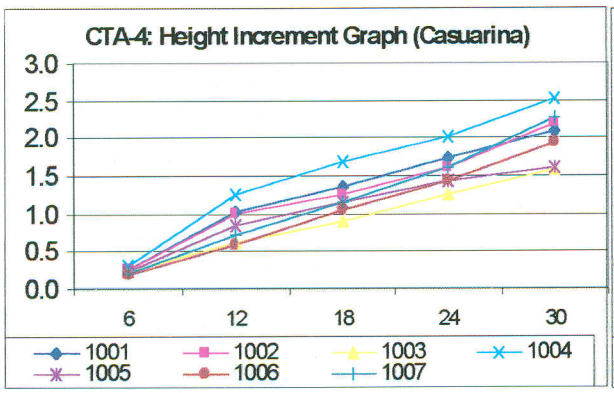
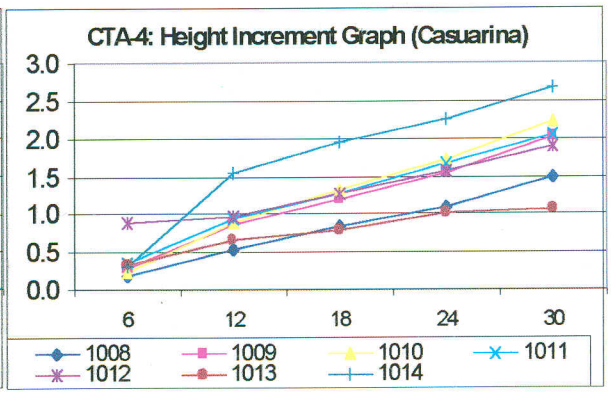
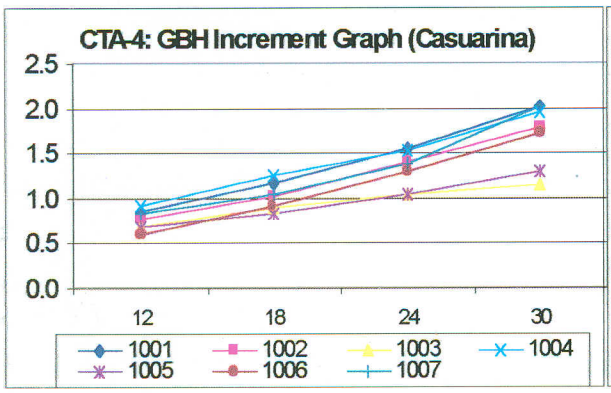

CTA-4 : Current Increment in GBH (Casuarina)
Current Increment (m)
2.5
2.0
1.5
1.0
0.5
0.0
1001 1002 1003 1004 1005 1006 1007 1008 1009 1010 1011 1012 1013 1014
12-Month 18-Month 24-Month 30-Month

**FIGURE – 44:- Current Increment Graph of Casuarina Clones in CTA – 4**



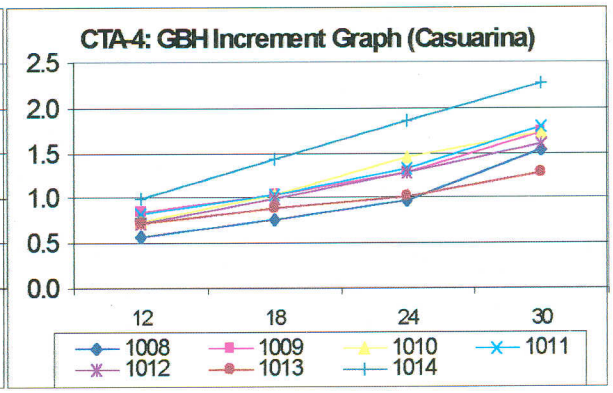
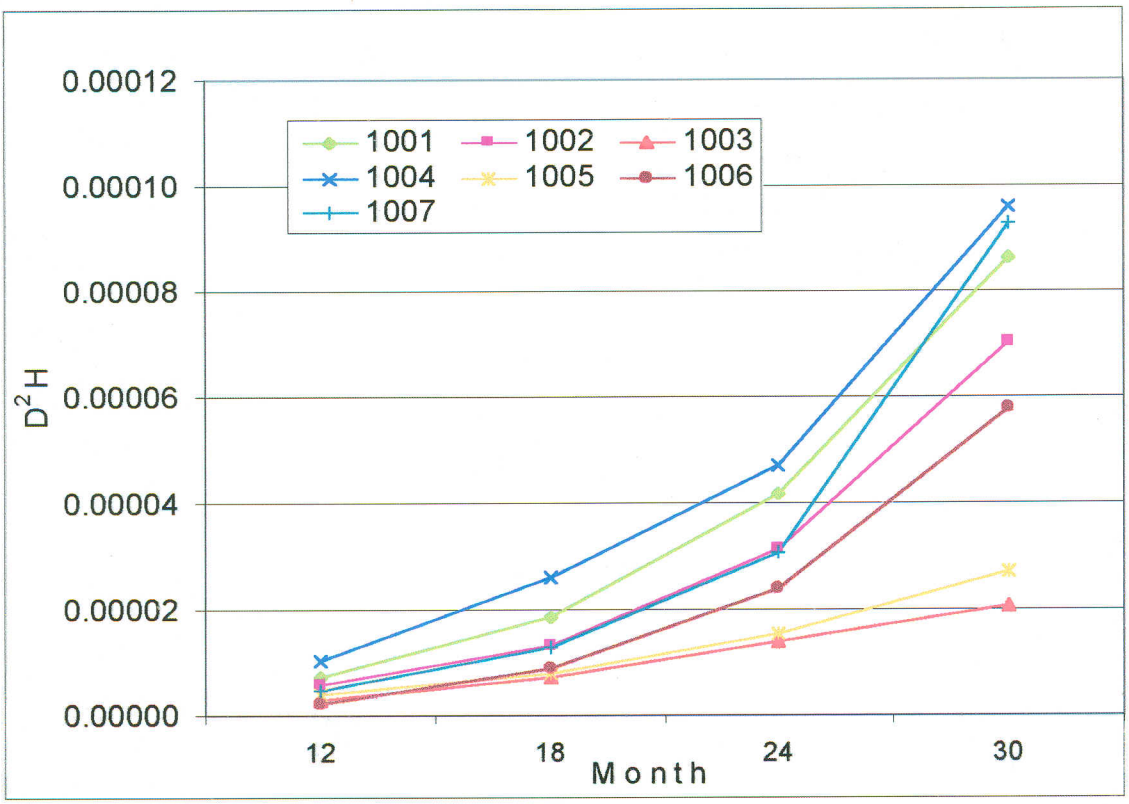
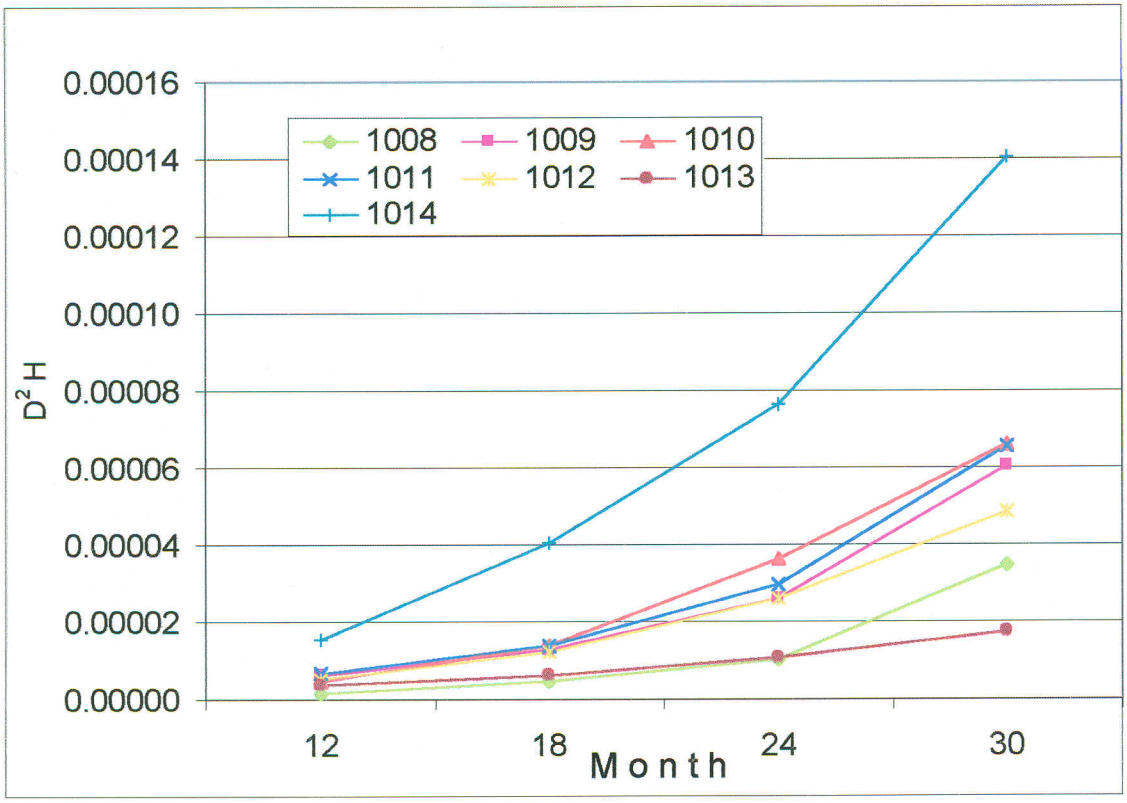



**FIGURE – 45 :- $D^2H$ Analysis of Casuarina Clones of CTA – 4**



## CONCLUSION

With this study it is re-confirmed that there is great degree of natural variability exists with respect to parameters, providing scope to improve the productivity of the plantation by increasing the frequency of high yielding trees in the plantations through clonal technology. It is possible to improve the growth of plantations multi fold by multiplying proven clones and planting specific clones in suitable agro-climatic conditions.

It has been observed that selected CPTs can bring down the heterogeneity in the pulpwood and help in standardisation of optimum conditions and chemical requirement for pulping which result in saving of other inputs besides improving the quality of end product.

Based on study of established clones of *Eucalyptus* and *Casuarina* developed under this project, 8 clones of *Eucalyptus* and 3 clones of *Casuarina* have been shortlisted. It will be possible to achieve multi-fold increase in the yield of pulpwood plantation using the fast growing clones developed under this project. Ultimately this will help not only the industry in meeting their raw material requirement but also make the tree cultivation more remunerative for the farmers.

Further monitoring of the growth and pulpwood quality needs to be assessed, as 30 months of monitoring period is too short for perennial pulpwood species. Clones need to multiplied and tested in multi-locational trials in wider agro-climatic conditions.

## CRITERIA FOLLOWED FOR CPT SELECTION

As different species by nature have different architecture; Selection traits may vary between different species and improvement programmes. The ideal plantation tree has following characteristics;

1. Straight, cylindrical, non-forking, non-twisting bole.
2. Fast growth.
3. Thin branches with wide branch angles.
4. High wood density* and long fibres.
5. Resistance to pest and diseases.

The selection concentrated on traits that have a moderate to strong degree or habitability. Experiences have shown that 1), 5) and 6) have stronger habitability than 2), 3) and 4).

## EFFECTS OF THE ENVIRONMENT ON CPT

Most characters are strongly influenced by the environment. Examples of such environmental factors that influence desired characters are as follows:

A. Size and volume: A tree in a stand my be tall and voluminous because:
   1) It is older than the other trees in the stand;
   2) It is growing an a better micro site than the surrounding trees;
   3) It has more space i.e. less competition from other trees;

B. Crown diameter. A tree may have a large, wide crown if it:
   1) Overgrows the other trees;
   2) It grows with wide spacing, i.e. little competition;

C. Bole form. A tree may have a poor bole form because of:
   1) Adverse light conditions and / or competition during juvenile growth;
   2) Mechanical or other damage to top shoot during juvenile growth;
   3) Damage of bole by lightning, typhoons or other strong environmental factors;

D. Wood density: High wood density may be due to slow growth.

## WHERE CPT HAD SELECTED

Selection is carried out in plantations. Certain considerations of importance in the choice of the site for selection are identified below:

1) Selection made from stands that are as pure in species composition as possible.
2) Selection concentrated on stands or plantations that are average or better in traits of interest.
3) Selection is best carried out in a mature stand, i.e. near to maximum height.
4) Selection in natural forests where selective logging has taken place have been avoided since that may imply that the best trees have been logged, leaving the poorer (genetic material) behind. Logging may also have influenced crown competition.

## HOW MANY HAVE SELECTED PER STAND (SELECTION INTENSITY)

The number of selected in a stand are evaluated after the grading. The candidates have not been selected too close to each other, since closely growing trees may be related, e.g. same parent(s). Selection intensity may depend on the variation of the stand. A rule of thumb suggests 1 tree / acre, i.e. one per 1000 trees.

## STEPS FOLLOWED FOR PLUS TREE SELECTION

1. **Mapping of area and stand** - Selected trees are demarcated on the map. The map is covered with plastic charteque with coordinates to facilitate location and demarcation of selected.
2. **Site description** - In case of homogenous environment it has been carried out as representative for the whole area. In case of heterogeneous area, site evaluation is conducted for each selected tree. Parameters include.

3. **Selection and marking of trees**

   Candidate trees are marked and graded. The marks have been taken care for district and conspicuousness. The tree is marked with a number, which corresponds to that in the grading sheet and on the map. Yellow, red or white paint have been used for numbers. Painted for bands on the trees.

## GRADING OF THE TREES

The candidate trees are measured and graded against comparison/check trees

a) **Height measurement**

Height has been measured by the use of clinometers.

On level ground: Sights at the top and then sight at the base. Measure angles Π1 and Π2; add the two figures and multiply baseline distance "d": (Π1 + Π2) x d = h

b) **DBH (Diameter at Breast Height, 1.35m)**

Measurement with diameter-tape or calibre gives figure directly without conversion. Using Tape: Notice "O" point, which is usually 4-5" from the end of the tape. Using a calibre: Two measurements at right angles to compensate for variation in cylindrical form, Record the average of the two measurements. Circumference measured with ordinary tape needs conversion according to the formula:

D = c/II, where d = diameter

C = circumference and

II = constant (3.1416)

Note: If there are buttresses, measurement should be above these.

c) **Crown diameter**

A narrow crown is desired. The diameter of the crown is estimated by projecting the outermost branches to the ground.

d) **Bole form:** Deviation form the desire ideal straight; cylindrical bole is evaluated. Following observation are made:

1. Basal sweep
2. Bends and twists
3. Trunk curves
4. Bole swellings
5. Leaning
6. Circularity

e) **The branch angle:** sometimes specified as third branch from below, is estimated. A wide angle is desired.

f) **Branch diameter:** Subjective estimates as compared to other trees in the stand and relative to the sixes of the tree. Small branch diameters are desired.

g) **Self pruning ability**

A long clear bole is desired. The presence of old branches, epicormic branches, or ramicorns below the living top, is assessed.

h) **Forking or apical dominance**

A non-forking clear bole is desired. The height to the first fork or the first live branch is measured. The figure may be evaluated as a percentage for the total tree height:

$A = b \times 100 / h$

Where A = Apical dominance (%)

B = Height to first forking

H = Total tree height

1. Sign of dead top or thin crowns
2. Nibbles, galls and discolouring of leaves and shoots
3. Major leaf or needles fall not coinciding with natural shedding.
4. Knots or tumours on trunk and branches
5. Scars, soft (rotten) spots, discolouring etc. of bark
6. Any visible fungus attack
7. Insect borings of wood
8. Any other visible insect or pest attack

If the tree shows any major signs of above pests, diseases or attacks, it should be rejected.

i) **Wood properties**

Specific gravity and fibre length are evaluated in the laboratory.

Core samples are taken by means of an increment borer.

The samples are stored in distinctly marked bags or boxes until laboratory examination.

A Typical Plus Tree Grading Sheet used during selection of CPTs

**JK PAPER LTD**
**(Forest Organisation)**

**DETAILS OF CANDIDATE PLUS TREE**

CPT NO.

1. Name of Farmer :
2. Father's Name :
3. Address - Village :
   Block : District :
   Pin :
4. Location and Address of the Plantation :
5. Area of the Planation :
6. Espacement (In mts )
7. Year of planting :
8. Source of seedlings :
9. Seed source :
10. Soil type :
11. Meterological Data :
    I Average Rainfall (mm) :

| II | Temperature (°C) | Summer | Winter | Rain days |
|---|---|---|---|---|
| | Maximum-Minimum | | | |

    III Altitude (m) MSL
12. Latitude :
13. Longitude :
14. Check Tree Data (Height / Girth)

| | | |
|---|---|---|
| 1 | 2 | 3 |
| 8 | CPT | 4 |
| 7 | 6 | 5 |

15. GROWTH DATA
    I Top Height of the Tree (m)
    II Merchantable Bole Height (m)
    III Girth at Breast Height (cm) :
    IV Volume (m3) :

| Billet No. | Length (m) | Mid Girth (m) | | Volume (m3) | | Weight (kg) | | Bark % |
|---|---|---|---|---|---|---|---|---|
| | | OB | UB | OB | UB | OB | UB | |
| 1 | | | | | | | | |
| 2 | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |
| - | | | | | | | | |

    V Crown Length (m) :
    VI Crown Width (m) :
    VII Wood Density (kg / m3) :
    VIII Date of Felling :
    IX Date of Coppice Collection :
    X Number of Cuttings collected
    XI Number of Ramets produced :
    XII CTA details where the clone in planted :

| Name | Location | Soil type | D O P |
|---|---|---|---|
| | | | |

    XIII Status of the clone : Selected / Rejected

Signature of the Officer
Name & Designation

# PULP AND PAPER RESEARCH INSTITUTE

(Regd. under Societies Registration Act. 1860)

JAYKAYPUR - 765 017, DIST. RAYAGADA, ORISSA (INDIA)


Date: 25th February, 2005

**To Whomsoever It May Concern**

The Pulp and Paper Research Institute, Jaykaypur, has tested Eucalyptus and Casuarina Species of CPT wood samples for their pulping, bleaching and pulp strength properties as a part of the study on clonal propagated hardwoods conducted by J.K. Paper Ltd. (Forest Organisation), Rayagada, Orissa.

It has been a privilege for us to be associated with this work.

Director


Phone (06856) 233456, 233550, 233770, 222070 Fax : (06856) 222238

e-mail : paprijkpur@sancharnet.in / directorpapri@myway.com

# A Step Towards .....

## Making Tree Plantation Remunerative for the Farmers & Securing Wood Supply for Industries and Making Prosperous Nation.....