TISSUE CULTURE PRODUCTION OF CLONAL TEAK FOR LARGE-SCALED PLANTATION ESTABLISHMENTS

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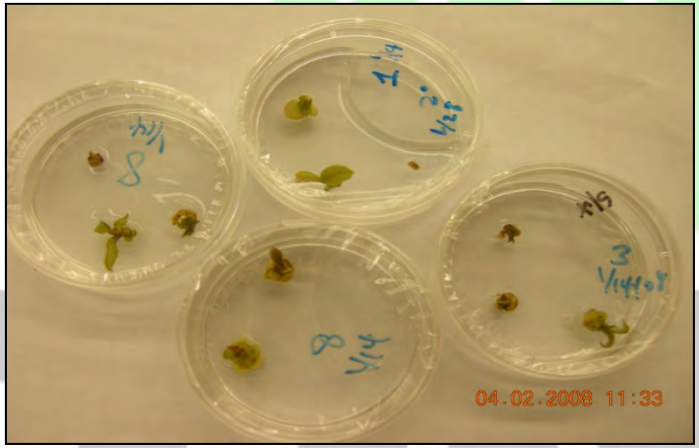
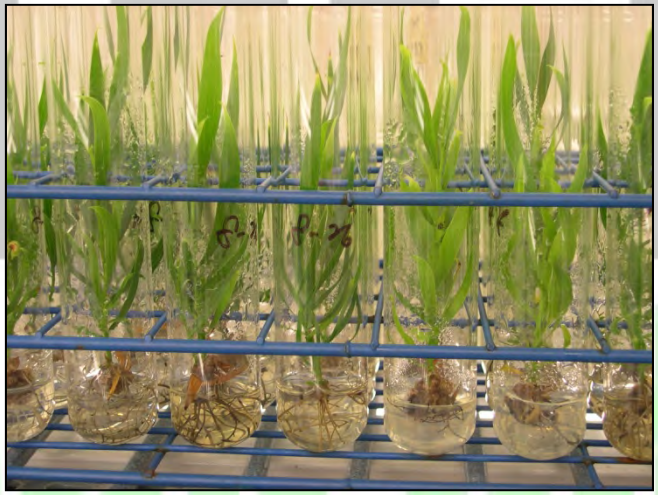
FIRST STARTED AS A R & D PROJECT BETWEEN CIRAD AND THE FORESTRY DIVISION OF INNOPRISE CORPORATION, COMMERCIAL ARM OF SABAH FOUNDATION GROUP

(TAWAU, 1991 – 2005) LOCATED IN TAWAU, EAST COAST OF SABAH

INVOLVED IN THE DEVELOPMENT OF *IN VITRO* PROTOCOLS FOR THE MICROPROPAGATION OF HIGH VALUE AND FAST-GROWING INDUSTRIAL FOREST TREE SPECIES, NAMELY, TEAK AND *ACACIA* SPP.





RATIONALE FOR STRONG RESEARCH INTEREST IN TEAK

ONE OF THE MOST SOUGHT AFTER TIMBERS IN THE WORLD!

Approximately 3 million cubic metres of Teak is harvested globally per annum from both native forests and plantations. Natural forests of Teak do not meet current or future demands and will soon be banned totally. A rising trend towards large-scaled Teak plantation establishment in Australia, Latin American countries and Africa is now observed.

STAGES IN THE DEVELOPMENT OF TISSUE CULTURE PROCESS OF TEAK

Selection of superior clone

Collection of young branches and shoots

Introduction of Explants for in vitro culture

Shoot development from responsive explants

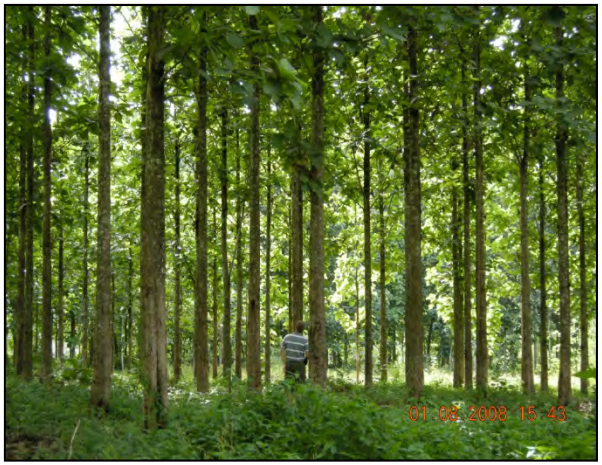
Elongation and Rooting stage

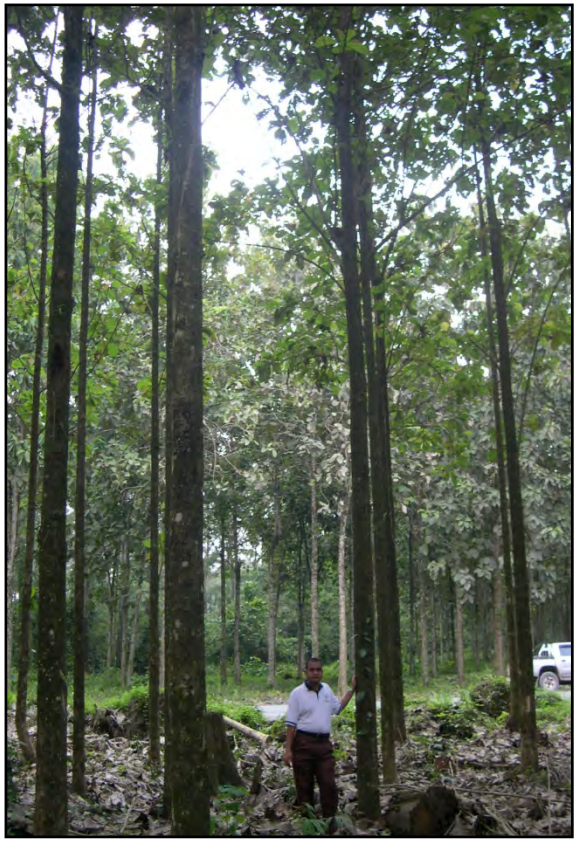
Multiplication of plantlets

Ex-vitro acclimatization of tissue-cultured teak plantlets

Rooting of tissue culture plantlets 3 weeks after *ex-vitro* transfer

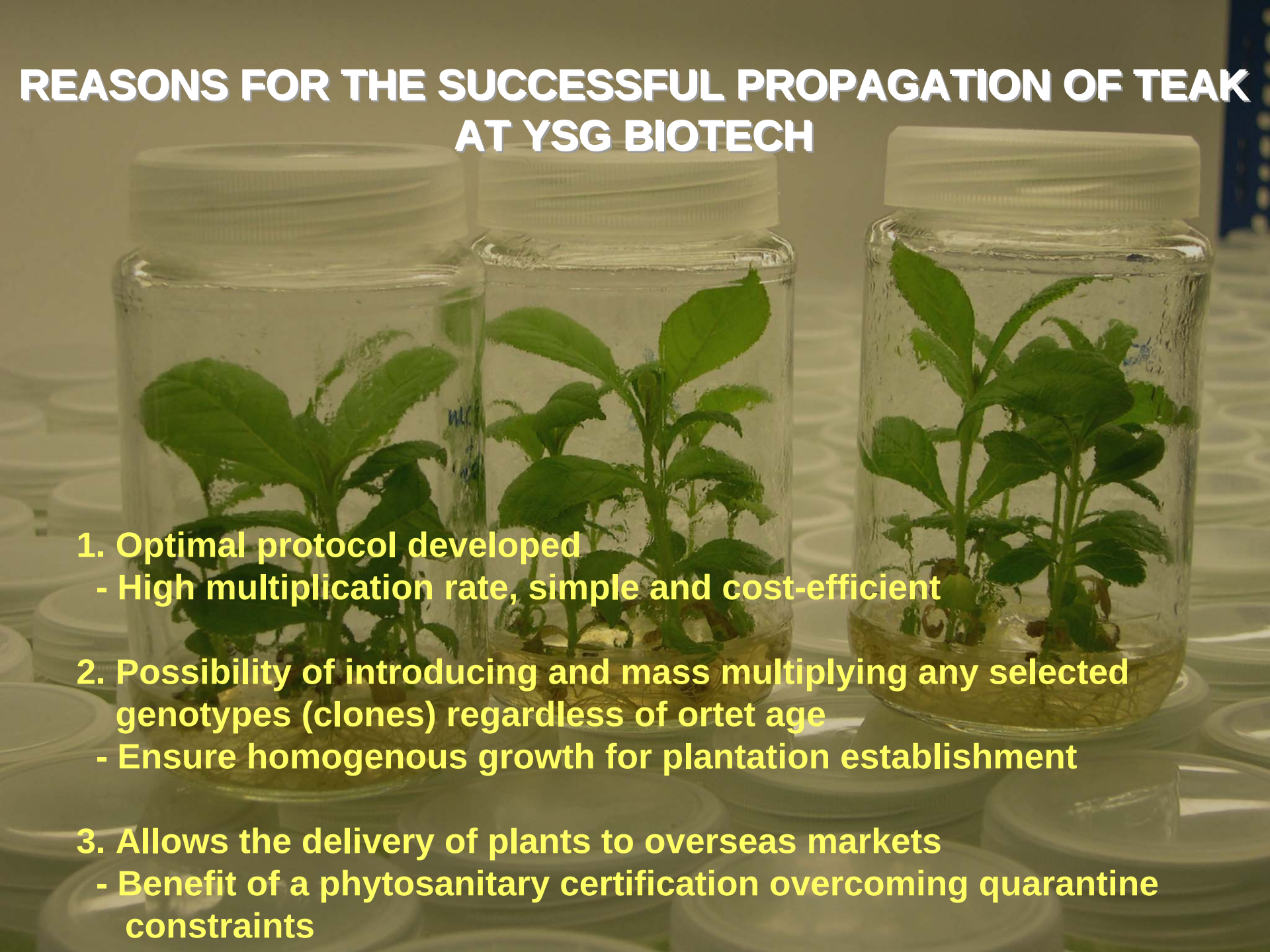
FIELD-TESTING OF TC-ISSUED TEAK CLONES





Straightness of bole with small branches (minimal knots), fast growth, and high heartwood to sapwood ratio, are characteristics of the selected clones, Solomon Island Origin, under Sabah's growing conditions. Mean annual growth of 2.5-3 cm in diameter and 3-4m in height can be expected.

REASONS FOR THE SUCCESSFUL PROPAGATION OF TEAK AT YSG BIOTECH



1. Optimal protocol developed
   - High multiplication rate, simple and cost-efficient

2. Possibility of introducing and mass multiplying any selected genotypes (clones) regardless of ortet age
   - Ensure homogenous growth for plantation establishment

3. Allows the delivery of plants to overseas markets
   - Benefit of a phytosanitary certification overcoming quarantine constraints

PRODUCTION OF SELECTED CLONAL MATERIALS ON A COMMERCIAL SCALE

ADVANCED RESEARCH ACTIVITIES WITH CIRAD

Destructive/plank sampling

Non-destructive/core sampling

WOOD AND DNA ANALYSIS (FINGERPRINTING) FOR CERTIFICATION AND MARKETING PURPOSES

ICSB/CIRAD Teak Clone

Identification

Species: *Tectona grandis*
Origin: Solomon Island
Clone number: TG2

Available in the form of **rooted cuttings**

or **tissue-cultured microcuttings**

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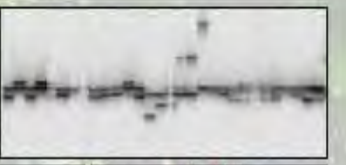
ICSB/CIRAD Clone TG1

DNA fingerprinting - Wood characteristics

DNA Fingerprinting



Microsatellite locus name	Accession EMBL Database	Alleles
CIRAD1TeakA06	AJ968929	215 227
CIRAD1TeakB03	AJ968930	248 248
CIRAD1TeakF05	AJ968931	268 276
CIRAD1TeakG02	AJ968932	168 168
CIRAD1TeakH10	AJ968933	228 228
CIRAD2TeakB07	AJ968934	143 145
CIRAD2TeakC03	AJ968935	280 280
CIRAD3TeakA11	AJ968936	274 280
CIRAD3TeakB02	AJ968937	237 251
CIRAD3TeakD09	AJ968938	207 209
CIRAD3TeakF01	AJ968940	217 229
CIRAD4TeakD12	AJ968941	143 143
CIRAD4TeakH09	AJ968943	226 228

Wood characteristics after 10 years of growth in Sabah conditions		Tropix reference [2]
Heartwood proportion	55 %	-
Basic density	550 kgm^{-3}	670 kgm^{-3}
Total shrinkage	4.3 %	-
Radial shrinkage	2.3 %	2.6 %
Tangential shrinkage	2.5 %	4.7 %
T/R Ratio (Nervosity)	1.1	1.8
Modulus of Elasticity	1172 MPa	-
Modulus of Rupture	102 MPa	98 MPa
Natural Durability [1]	Durable	Very Durable

[1] Durability towards Basidiomycete fungi, [2] http://tropix.cirad.fr/asiafeck.pdf

Data produced by: UR 36 Genetic Diversity and Breeding of Forest Species laboratory (http://www.cirad.fr/en/ur_recherches.php?id=101) with the help of M Pollet, G Chaix and UR 40 Production and Processing of Tropical Woods laboratory (http://www.cirad.fr/en/ur_recherches.php?id=102) with the help of N Boutahar, MF Thévenon and H Baillères, both research units of the Forestry Department of CIRAD

PLANTLETS PACKED FOR OVERSEAS MARKET

TOP TEAK

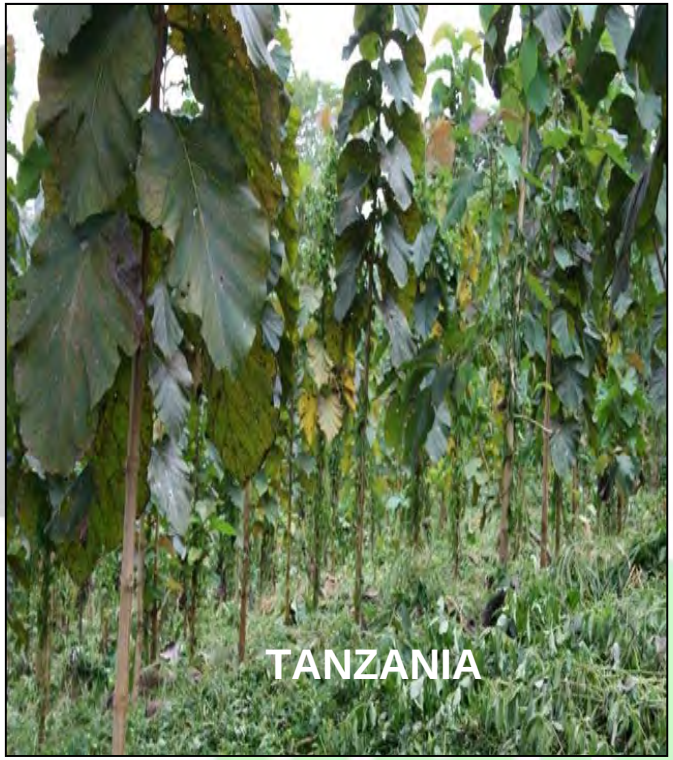
REGISTERED TRADE MARK FOR PLANT PRODUCTS

WORLDWIDE EXPORTATION OF TEAK PLANTLETS

FIRST COMPANY APPROVED BY AUSTRALIAN QUARANTINE & INSPECTION SERVICE (AQIS) AS A SUPPLIER OF TC TEAK PLANTLETS

Newly-established tissue culture teak plants in Queensland, Australia

TEAK PLANTATIONS USING MATERIALS FROM YSG BIOTECH



2 year-old clonal plantation established in fertile soils and showing very good uniformity in Brazil

TODAY, YSG BIOTECH SDN BHD IS ONE OF THE COMMERCIAL COMPANY UNDER THE SABAH FOUNDATION GROUP

(MAY 2005 – PRESENT)
NEW LOCATION IN KOTA KINABALU, WEST COAST OF SABAH


THANK YOU!