



## Establishment of the Research Institute for Sustainable Humanosphere, RISH

Prof. Hiroshi Matsumoto  
Director of RISH, Kyoto University

In April 2004, a new institute, the Research Institute for Sustainable Humanosphere (RISH) was established at Kyoto University by combining and expanding two previously existing organizations, the Wood Research Institute (WRI) and the Radio Science

Center for Space and Atmosphere (RASC). The WRI was founded in 1944 and re-organized in 1991 to expand its objectives to include global environment protection research, harmonized utilization of wood resources and the establishment of sustainable



society through a full use of biomaterials. The RASC was founded in 1961 as the Ionospheric Research Laboratory and, through two re-

organizations, had developed to an inter-university cooperative research center for the study of applied radio science and technology to cover middle and upper atmospheres, magnetosphere, and space, as well as ionosphere.

The objective of the RISH is to promote academic activities and education in the field of humanospheric science and thereby to contribute to both academic and public societies. Humanospheric science is defined as an interdisciplinary field of study that examines the humanosphere, which is composed of four vertical regions of earth in which human activity takes place. These vertically connected regions are the ground human-habitat, the forest-sphere (arbor-sphere), the atmosphere, and space. It is particularly concerned with providing academic and technological solutions to issues which critically affect the viability of *Homo sapiens* and human civilization such as energy, population, global warming,



and resource shortage problems. RISH proposes to deepen scientific research on these four vertical regions both separately and in terms of the interactions that take place among the four regions. In our studies, human welfare will be a constant concern and our research will therefore not only provide academic knowledge and intellectual information which aids in our understanding of our humanosphere, but also develop new technologies which will resolve the critical issues which human being will face throughout the century. To this end, RISH has four missions and three main structures. The four missions, which have been pre-set for the next six years, are 1) the assessment and reme-

diation of the humanosphere, 2) the development of science and technology through biomass and solar power satellite research toward a solar energy society, 3) the study of the space environment and its utilization, and 4) the development of technology and materials for cyclical utilization of bio-based resources. The three structures are the core research divisions, the Center for Exploratory Research on the Humanosphere, and Department of Collaborative Research Programs.

RISH will open its research facilities, databases, and collaborative research programs to the domestic and international research community. They include deterioration organisms labora-

tory (DOL) and living-sphere simulation field (LSF), wood composite hall and its facilities, middle and upper atmosphere (MU) radar, equatorial atmosphere radar (EAR), microwave energy transmission laboratory (MET-LAB), solar power station/satellite laboratory (SPSLAB), a high-performance computing facility (A-KDK), xylarium and its databases, radar and satellite observational databases, JSPS Core University Program and new projects to promote the four missions of RISH. Through various cooperative research and education programs, we also contribute to scientific development in Asia and the rest of the world.

## The Meeting on the International Collaboration between RISH, LIPI and LAPAN

Prof. Yuji Imamura  
RISH, Kyoto University



*Dr. B. Subiyanto, Prof. Y. Imamura, Dr. E. Sukara and Dr. L. Hakim, from left to right*

On July 17, 2004, a meeting on the international academic collaboration between RISH, LIPI (Indonesian Institute of Science) and LAPAN (National Institute Aeronautics and Space, Indonesia) was organized at Bandung inviting the President of Kyoto University, Professor Kazuo Oike.

The delegates were Dr. Endang Sukara, Dr. Lukman Hakim and Dr. Bambang Subiyanto from LIPI, and Mr. Wisjnu P. Marsis, Mr. L. Samosir,

Mr. Sri Kaloka Prabotosari and Mr. Suranto from LAPAN, and Prof. Toshitaka Tsuda and Prof. Yuji Imamura from RISH, Kyoto University.

At first, Prof. Yuji Imamura and Dr. Bambang Subiyanto explained that it is becoming more and more important to establish systems and strategies for sustainable production and utilization of tropical forest resources in order to achieve a sustainable, recycling-based society, and in this context, we are conducting the JSPS-LIPI Core University Program in the Field of Wood Science.

Then, the collaborative research studies in the program were outlined on the subjects of wood material science, wood biomass chemistry, wood bio-science, and wood and environment science. Also, the results of the support on man-power of the counter-

part country were announced. It was reported that five Indonesian scientists had received their PhD degrees either on the PhD course of study or through the Ronpaku system through this program.

It was emphasized that the program significantly contributed to the establishment and development of the Indonesian Wood Research Society since 1996, and the creation of the Research and Development Unit for Biomaterials in LIPI in 2004.

Another important academic activity, the progress in organizing the international wood science symposium (IWSS) was overviewed, and the 5th IWSS in September 2004 at Kyoto University Clock Tower Hall was announced to the delegates of the meeting along with a beautiful and impressive poster.

The delegates from RISH and LIPI reached agreement on the future plans



*Meeting with President of Kyoto Univ., Prof. K. Oike*

of the academic collaboration; those are the expansion to a multi-lateral program including other countries in South-East Asia, and the establishment of a satellite office or laboratories in the R & D Unit for Biomaterials and in the field in a tropical forest.

In addition, the staff of LAPAN

explained their cooperative research based on Equatorial Atmosphere Radar (EAR), which is a large Doppler radar facility located at the equator in West Sumatra, Republic of Indonesia.

Finally, the new research topics integrating RISH, LIPI and LAPAN were discussed among the participants,

clarifying progress in the collaborative research on sustainable forest management and forest resources, environmental impact assessment, mass-flow analysis and atmospheric monitoring above and below the plantation forests of *Acacia mangium*.

= Research Project No. 24 =

## Production and Modification of Cellulosic Hydrogel from Basil Plants

Dr. Lucia Indrati,  
Research Center for Physics, LIPI, Indonesia

This topic is a part of the research project No.24 which is "Production of Cellulosic Materials and Biomass Chemicals from Unutilized Plant Resources". This project aims to produce chemicals, cellulosic hydrogel and lignin-based functional polymers from unutilized bioresources, bagasse and basil plants and started in 2003.

Cellulosic compound is the most important renewable natural resource on earth. Previously, our image of cellulose is that of a hard crystalline fibrous material for use in paper and textiles.

Cellulose is also present as gel or hydrogel firstly shown in the berry of mistletoe. Cellulose hydrogel is a new material useful as a water absorbent, a gelatin agent, a coating material, an emulsifier, and a dispersion enhancer for inorganic particle. Since mistletoe is a rare plant and its berries are difficult to obtain, survey of new source of plants which have cellulose hydrogel with economically low price and availability of mass production is necessary.

Recently, a promising cellulose hydrogel in the epicarp of basil plants was characterized (Azuma et al., 1999). From this basis the following research subjects are planned:

1. Characterization of structure and properties of cellulose hydrogel. Translucent Cellulose hydrogel will be isolated

from various kinds of basil plants and its chemical and physical properties will be clarified. Application to various industrial fields and mass production are expected.

2. Genetic engineering of cellulosic hydrogel.

Enzymes that participate in biosynthesis of the cellulosic hydrogel will be identified and their genetic improvement, cloning of their DNAs, and future innovations of genetic engineering are expected.

3. Biodegradation of cellulosic hydrogel and native lignocellulose.

Cellulolytic enzymes originating from *Termitomyces* and bacteria symbiosised with higher termites will be isolated in an electrophoretically pure state and their DNA will be cloned after their enzymatic properties are characterized. Genetic engineering and mass production of these enzymes are also important requisites for practical use of these enzymes for their effective biodegradation agents.

Expected results

1. Characterization of physical, physicochemical and molecular dynamic properties of the newly discovery polysaccharides-hydrocolloids and development of usage of these biomaterials as bases of absorbent products as well as food direct-

ed products. Production of superabsorbent materials by combined utilization of various polysaccharide hydrobiopolymers. The plants that produce hydrocolloidal biopolymers will be genetically engineered to open a new source of environment-friendly ecomaterial.

2. Complete development of a system for production of new bioabsorbent materials that are to be "human friendly" and "nature friendly" in a direction of future development through changes of product concepts and application of polysaccharide-based materials.

The members involved in this cooperative research project are as follows:

### (Japanese side)

Takashi Watanabe\* (Kyoto Univ.)

Jun-ichi Azuma (Kyoto Univ.)

Masaaki Kuwahara (Akita Pref. Univ.)

Yoichi Honda (Kyoto Univ.)

Masahiro Sakamoto (Kyoto Univ.)

### (Indonesian side)

Bambang Prasetya\*\* (LIPI)

Euis Hermiati (LIPI)

Muhammad Samsuri (Min. of Res. and Technol.)

Tami Idiyanti (LIPI)

Lucia Indrati (LIPI)

Rike Yudianti (LIPI)

(\*: Project leader, \*\*: Vice project leader)



## - 5th International Wood Science Symposium (IWSS) - Sustainable Production and Effective Utilization of Tropical Forest Resources

The Organizing Committee of the 5th IWSS,  
RISH, Kyoto University

Since 1996, the International Wood Science Symposium (IWSS) has been held every second year, and this year we will hold the 5th IWSS in this September. At the opening of the 21st century, it is critically important to establish sustainable production and utilization of forest resources, which leads to welfare of the local community close to the plantation, and ultimately to establishment of the "sustainable humanosphere". In this context, the symposium is entitled "Sustainable Production and

Effective Utilization of Tropical Forest Resources".

After the start of the JSPS-LIPI Core University Program in the Field of Wood Science, more than 8 years have already passed. Now, it is good time to overview the Core University Program for the past 8 and a half years, and determine future research targets in the field of wood science and technology. Thus, the overview of the project is one of the aims of this symposium. Also, the symposium is designed to provide a

forum for scientists from Japan and Southeast Asian countries, and one keynote speaker is invited from each country; they will review the current status and future prospects of wood science and technology in their countries. In addition, we will have a poster session, so that we can discuss each topic face-to-face.

### General Information

#### Conference Venue

The Symposium will take place in Kyoto University Clock Tower Centennial Hall in the main campus on September 17-18, 2004.

#### Excursion

Scientific Tour to Himeji Castle, Himeji City, Hyogo Prefecture September 19, 2004

#### Symposium Organizers

Research Institute for Sustainable Humanosphere (RISH), Kyoto University, Japan

Research and Development Unit for Biomaterials, LIPI, Indonesia  
Universiti Putra Malaysia, Malaysia

#### Sponsor

Japan Society for the Promotion of Science (JSPS)

#### Local Organizing Committee Members

Dr. T. Umezawa (Chair)  
Dr. K. Baba, Dr. T. Hata, Dr. T. Hattori,  
Dr. Y. Honda, Dr. T. Mori, Prof. Y. Imamura, Mr. H. Sorimachi, Dr. J. Sugiyama, Dr. K. Umemura, Prof. H. Yano, Dr. T. Yoshimura, and Ms. M. Yuki

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### Presentations

#### Invited Lecture

JSPS Programs with Asian Countries

**Mr. Hiromichi Endo (JSPS)**

#### Keynote

Current Status and Future Prospect of JSPS Core University Program in Malaysia

**Dr. Ee Ding Wong (UPM)**

5th International Wood Science Symposium  
**Sustainable Production and Effective Utilization of Tropical Forest Resources**  
JSPS-LIPI Core University Program in the Field of Wood Science

September 17-19, 2004  
Kyoto University  
Clock Tower Centennial Hall  
Kyoto, Japan

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Research Institute for Sustainable Humanosphere, Kyoto University  
RISH

Indonesian Institute of Sciences  
LIPI

Japan Society for the Promotion of Science  
JSPS

The Sustainable Production and Effective Use of Forest Resources in the Philippines

Dr. Dwight A. Eusebio (Forest Products R & D Inst.)

Overview of the JSPS Core University Program in the Field of Wood Science - Review of the Past 8 Years and Future Prospects -

Dr. Toshiaki Umezawa (RISH)

Perspective of the Sustainable Production and Effective Utilization of Tropical Forest Resources in Indonesia, and the Role of LIPI-JSPS Core University Program

Dr. Bambang Subyianto (LIPI) and Ms. Anita Firmanti (RISH)

### Special Lecture

An Overview on Collaborative Observations of Equatorial Atmosphere Dynamics over Indonesia

Prof. Toshitaka Tsuda (RISH)

### Oral Presentation

#### Wood Material

The Impact of Using Java Teak for Earthquake Resistant Design -Case Study on Javanese Traditional Structure-

Y.P. Prihatmaji

Completion of Knock Down Timber House Construction Based on the Concept of South Sumatra Traditional Timber House Structure

A. Siswanto

Structural Glulam from Tropical Hardwood: Effects of Specimen Shape and Size on Evaluation of Bonding Strength Based on Hoffman Failure Criterion

P. Yang, E.D. Wong and Y.E. Tan

Development of Structural LVL from Tropical Wood and Evaluation of their Performance for the Structural Components of Wooden Houses Part-1.

Application of Tropical LVL to a Roof Truss

K. Komatsu, Y. Idris, S. Yuwasdiki, B. Subyianto, A. Firmanti and K. Yokoo

Application of Mechanical Stress Grading for Effective Utilization of Tropical Fast Growing Species for Building Materials

A. Firmanti, A. Sabarudin and J.F. Subrata

Application of Some Mechanical Fasteners on Laminated Veneer Lumber (LVL) Rafter Joints

M. Hadi, B. Subyianto, A. Firmanti, K. Komatsu and S. Yuwasdiki

Morphological Aspects of Wood Degrading Process by Termite or Marine-borer

I. Furukawa

Wood Plastic Composites Resistance to *Macrotermes gilvus* Termite (An Intermediate Result)

R.E. Ibach, C.M. Clemons, Y.S. Hadi and S. Yusuf

Feeding Behavior of Subterranean Termites on Steamed Wood

S. Yusuf and S. Doi

Biological Resistance of Wood-based Composites Impregnated with a Fungicide-termiticide Mixture Formulation Using Supercritical Carbon Dioxide

M. Muin and K. Tsunoda

Resistance of Japanese Wood Species to Attack by the Asian Subterranean Termite, *Coptotermes gestroi* (Wasmann)

C.-Y. Lee, P.-S. Ngee, A. Tashiro, T. Yoshimura and Z. Jaal

Detection of Hydrogen and Methane from the Feeding Activity of Termites Using a Gas Analyzer

M. Miura, Y. Yanase, Y. Fujii, S. Okumura, T. Yoshimura, Y. Imamura, T. Maekawa and K. Suzuki

Utilization of Tropical Fast-growing Tree Species - Bond Quality of Indonesian Fast-growing Tree Species-

E.M. Alamsyah, H. Yoshida, K. Taki and M. Yamada

The Bonding Properties of Some Tropical Woods

D.S. Nawawi, F. Febrianto and W. Syafii

Improving the Water Resistance of Sulfited Tannin Adhesive through Alkaline Treatment

P.Md. Tahir and O.C. Musgrave

Detection of Cracking Sound on Static Bending Test of Wood Compression by Acoustic Emission Monitoring

W. Dwianto, A.H. Prianto, Y. Amin and Y. Rosalita

Stress Grading of Tropical Lumber in the Philippines

A.C. Manalo, F.P. Soriano, T.C. Saralde Jr., E.A. Bonaagua, I.M. Pabuayon, C.M.C. Garcia and F.G. Lapitan

Study on the Utilization of Coconut Fibers for Panel Product Using Urea and Phenol Formaldehyde Adhesives

Sudijono and Subyacto

The Resistance of Treated and Untreated Tropical Wood Species to Marine Borers

M. Muslich

Biological Resistance of Wood Treated with Zinc and Copper Metaborates

T. Furuno, F. Wada, S. Yusuf and T. Kobayashi

Antitermite Property of *Artocarpus heterophyllus* - Identification of Termite-resistant Component-

S. Shibutani, S. Doi and S. Yusuf

Effects of the Moisture Content of Wood Blocks on the Feeding Preferences of Japanese Subterranean Termites

T. Nakayama, T. Yoshimura and Y. Imamura

Mandibles of Japanese Subterranean Termites, *Coptotermes formosanus* Shiraki and *Reticulitermes speratus* (Kolbe)

T. Yoshimura, N. Kagemori, J. Sugiyama, S. Kawai, K. Sera, S. Futatsugawa, M. Yukawa, H. Imazeki, K. Sakuma, S. Ozeki, M. Oyoshi, Y. Yanase, Y. Fujii and S. Okumura

Feeding Behavior of the Exotic Dry-wood Termite *Incisitermes minor* (Hagen)

Y. Indrayani, T. Yoshimura, Y. Yanase, Y. Fujii, H. Matsuoka and Y. Imamura

Development of Binderless Board from Kenaf Core

J. Xu, R. Widyorini and S. Kawai

Binderless Particleboards from Baggase Core and Baggase Face

R. Widyorini, J. Xu, K. Umemura and S. Kawai

Dielectric Relaxation Due to the Heterogeneous Structure of Wood Charcoal

H. Sugimoto, M. Norimoto and H. Yano

Effects of Removal of Matrix Substances as a Pre-treatment on the Compressive Deformation of Resin Impregnated Wood

Md.I. Shams and H. Yano

Bacterial Cellulose: The Ultimate Nano-scalar Cellulose Morphology for the Production of High-strength Composites

A.N. Nakagaito, S. Iwamoto and H. Yano

Manufacture of Curved Laminated Bamboo and its Properties

N. Nugroho, Noermalicha and S. Surjokusumo

Effect of Chitosan Treatment on Wood Properties

D. Nandika, Y. Rismayadi and Arinana

In-plane Shear Cyclic Load Testing for Shear Resistance of LVB Floor Panels Nailed to Wood Frame Floor Systems

Y. Idris, B. Subyianto, S. Yuwasdiki, K. Komatsu and S. Takino

Mechanical Properties of Sago Bark and Bamboo Glued Laminated Veneer

Y. Gandhi, I. Muslih and C.M.E. Susanti

Development of Panel Product from Natural Fiber of Sisal (*Agave sisalana*)

S.S. Munawar, B. Subiyanto, Subyacto and L. Suryanegara

Utilization of Ramie Stem Waste for Particleboard

L. Suryanegara, Subyacto, B. Subiyanto, S. Devi and K.W. Prasetyo

Veneer and Thin Plywood Overlaid for Quality Improvement of Particleboard Made of Palm Oil Empty Fruit Bunches

B. Subiyanto, E. Rasyid, M. Gopar and A. Firmanti

### Wood Biomass

Extractives from Some Tropical Hardwoods and Their Influences on Subterranean Termite (*Coptotermes curvignathus* Holmgren)

W. Syafii

Antitermic Activities of Extracts from the Bark of Some Tropical Hardwoods

S. Falah, W. Syafii and T. Katayama

Isolation and Identification of Antifungal Active Compounds from Amboyna, Balangeran and Sugi Woods

I.W. Kusuma, T. Ogawa, K. Itoh and S. Tachibana

Characterization and Properties of Cellulose Hydrogel from Various Kinds of Basil Plants in Indonesia

L. Indrarti, J. Azuma, M. Sakamoto and R. Yudianti

Morphological Properties of Seed Coat of *Salvia* spp.

R. Yudianti, L. Indrarti, M. Sakamoto and J. Azuma

Viscous Polysaccharide Present in the Leaves of Mangroves

J. Azuma, Y. Sakata and M. Sakamoto

Utilization of Burnt Woods from Secondary Forest after Forest Fire as Raw Material for Pulp and Paper Using Kraft Method

S. Muladi, E. Sukaton and A.R. Zarta

The Changes of Pulp and Paper Quality from Candelnut Wood (*Aleurites mollucana* L. WILLD.) Based on Storage Time

Z. Arifin, S. Muladi, E. Sukaton and A. Wahono

Optimization of Pulping Conditions for Kenaf Bast Fiber

W. Suwinarti, Y. Wang, Z. Cheng and K. Sameshima

Biomass Carbon from Oil-palm Residues

Subyacto, V. Castro, K. Ishimaru, G. Pari, T. Hata, Y. Imamura and S. Kawai

Lignin Degradation of Japanese cedar (*Cryptomeria japonica*) by White-rot Fungi for Production of Feedstuff and Bio-methane

R. Amirta, T. Tanabe, T. Watanabe, Y. Honda, K. Okano, Y. Sasaki, M. Kuwahara and T. Watanabe

Simultaneous Saccharification and Fermentation of Oil Palm Empty Fruit Bunch Pretreated by White Rot Fungi for Ethanol Production

Syafwina, T. Watanabe, Y. Honda, M. Kuwahara and T. Watanabe

Effects of Fungal Treatments on Ethanol Production from Baggase by Simultaneous Saccharification and Fermentation

M. Samsuri, B. Prasetya, E. Hermiati, T. Idiyanti, K. Okano, Syafwina, Y. Honda and T. Watanabe

Melanin Biosynthesis Inhibitory Activity of Indonesian Plants

E.T. Arung, K. Shimizu and R. Kondo

Extractives Characterization of Fancy and Industrial Woods of Indonesia by Brine Shrimp Test

K. Ogyama, N.J. Wistara and W. Syafii

Chemical Component and Fiber Dimension of Rubber Wood (*Hevea brasiliensis* Muell. Arg.) GT1 Clone

R.K. Sari, D.S. Nawawi and W. Syafii

Relationships between Lignin  $\beta$ -O-4 Stereo Struc-

ture and Aromatic Ring Type Found in 20 Wood Species Including Tropical Woods  
T. Akiyama, Y. Matsumoto, G. Meshitsuka and D.S. Nawawi

### Wood Bioscience

The Features and Intra-tree Distribution of Growth Rings in *Agathis loranthifolia*  
Y. Ogata, T. Nobuchi, M. Fujita and I. Wahyudi  
Vascular Bundles Structure of 14 and 25 Year-old *Elaeis guineensis* Jacq. Stems  
Md.H. Sahri and Z. Ashaari  
Introduction of New Method for Measuring Wood Fiber Length Using Single Cross Section and its Verification in *Acacia mangium*  
K. Honjo, Y. Ogata, M. Fujita and Md.H. Sahri  
Blind Pit and Intercellular Space in *Acacia mangium*  
C. Zhang, M. Fujita and K. Takabe  
Cellular Ultrastructural Observation of Trees by FE-SEM  
K. Yamane, T. Ito, Y. Sano, K. Arakawa and S.

Fujikawa  
Anatomical Features and Chemical Characterisation of Wood Cut from a Leaning Stem of *Acacia* spp.  
Z. Ashaari, T. Nobuchi, Md.H. Sahri and Md. Farizan  
Mechanical State of Cellulose Microfibrils in Wood  
B. Clair, T. Almeras, T. Okuyama and J. Sugiyama  
Growth and Properties of Meranti Merah (*Shorea selanica* Bl.) Grown in Jogjakarta  
S.N. Marsoem and S. Suwari  
In Vitro Propagation of 'Sengon' (*Paraserianthes falcata* (L.) Nielsen)  
N. Sumiasri, D. Priadi, S. Yokota and N. Yoshizawa  
Production of Transgenic *Acacia mangium* Expressing Cellulase Gene to Enhance Growth  
E. Sudarmonowati, S. Hartati, R. Hartati, Y.W. Park, T. Hayashi  
The Distribution of Tropical Mushrooms in Sibolangit Conservation Forest, North Sumatra, Indonesia  
K. Nurtjahja, E. Munir and R.P. Nugroho  
Profile of Enzyme Activity and Growth of Wood Rotting Fungi in Metal Ion Containing Media

E. Munir, T. Hattori and M. Shimada  
The Forest Ecology in the Lake Toba Catchment Area  
Z. Nasution  
Development of a Portable Raman Lidar for Observation of Water Vapor Distribution  
T. Nakamura, N. Sugimoto, T. Tsuda and M. Abo

### Poster Presentation

46 posters will be presented with a brief introduction in the 'poster flash' session.

For further information, please visit our web site at:

<http://www.rish.kyoto-u.ac.jp/iwss/iwss.html>

= New Research Project =

## Development of Environmentally Friendly Biocomposites from Sustainable Lignocellulosic and Adhesive Resources

Prof. Kinji Taki  
Faculty of Agriculture, Shizuoka University



Dividing wood particle by Mr. Entang Rasyid

This collaborative research focuses on the production of environmentally friendly biocomposites from sustainable resources of lignocellulosic materials and adhesives.

The lignocellulosic materials to be studied are agricultural by-products such as homogenous or mixtures of rubber wood and oil palm fibers, as well as potentially important fast-growing wood and non-wood materials such as kenaf, bamboo and tropical forest plantation species.



Mr. Eka Mulya Alamsya, measuring contact angle of wood

This study aims to produce high performance biocomposites from the existing diversified fast-growing timber species and agricultural by-products by using new resin adhesives and production techniques. Engineered product design such as strategic element combination/placement/orientation, and steam injection press may result in improved board properties.

Production of biocomposites from these diversified fast-growing resources will not only help to reduce the pressure on natural forests, it is also an alternative to overcome waste disposal problems in palm oil industries that is currently undergoing tremendous development in South-East Asia. Utilization of natural adhesives will enable us to produce low formaldehyde emission boards which are not hazardous to health, besides eliminating our dependence on non-renewable petroleum resource,

which has so far been our main source of adhesives.

This study will serve to establish the basis of a holistic approach in addressing the environmental conservation issues for sustainable society.

### (Japanese side)

Kinji Taki\* (Shizuoka Univ.)  
Shigehiko Suzuki (Shizuoka Univ.)  
Masaaki Yamada (Shizuoka Univ.)  
Shu-ichi Kawai (Kyoto Univ.)  
Kenji Umemura (Kyoto Univ.)  
Tadashi Okamoto (Kinki Univ.)  
Hidefumi Yamauchi (Akita Pref. Univ.)

### (Indonesian side)

Bambang Subiyanto\*\* (LIPI)  
Myrtha Karina (LIPI)  
Entang Rashid (Winaya Mukti Univ.)  
Eka Mulya Alamsya (Winaya Mukti Univ., Shizuoka University student, now )

### (Malaysian side)

Ee Ding Wong (Univ. Putra Malaysia)  
Paridah Md.Tahir (Univ. Putra Malaysia)

(\*: Project leader, \*\*: Vice project leader)

= Research Project No. 20 =

## Progress on the Total Utilization of *Acacia mangium* Project

Dr. Subyakto

R & D Unit for Biomaterials, LIPI, Indonesia

This project started in April 2002 with goals to provide new directions for the effective and sustainable utilization of *Acacia mangium*, one of the most important and multi-purpose fast growing tree species in Indonesia. The project covers some activities such as wood drying, bark utilization, production of composite, and testing and grading of *A. mangium* wood.

It is widely known that drying of *A. mangium* wood is very difficult due to the presence of tension wood and large portion of heart wood. Prof. K. Hayashi (Ehime Univ.) and Mr. Suranto (Gadjah Mada Univ.) are studying and trying to develop a new method of drying *A. mangium* wood.



Extraction of bark of *Acacia mangium*

In May 2002 we characterized 2 trees that were of 10-year-old *A. mangium* grown at Parungpanjang, West Java. We measured the proportion of leaves, branches, stem, bark and also analyzed the bark such as the extractive yield, tannin content, and Stiasny value. We found that the tannin content of the bark was more than 50% with very good quality for adhesive purpose (high Stiasny value). The research was continued by Prof. H. Yano (RISH, Kyoto Univ.) and Ms. Erna Susanti (Papua Univ.) to develop a new method for collecting tannin-rich bark powder by a mechanical condensation process, and

demonstrated that the tannin can be converted directly into a waterproof wood adhesive by mixing with formaldehyde. Exterior-grade plywood that met the requirements of JIS K6802 has been successfully produced by Prof. H. Yano and Prof. S. Kawai (RISH) using this adhesive.

Due to the scarcity of timber from natural forests and environmental points of view, the use of timber from plantation such as *A. mangium* will be increased. Therefore research on wide utilization of *A. mangium* especially for composite products is very important. Development of composite board such as particleboard from *A. mangium* bark and laminated veneer lumber (LVL) from *A. mangium* wood are conducting by Dr. Bambang Subiyanto and Dr. Subyakto (LIPI).

Testing and grading of small clear specimen and full scale test of *A. mangium* timber extracted from some locations in West Java and Sumatera is conducting by Ms. Anita Firmanti (Research Institute for Human Settlement). This research aims to observe the effect of location (soil condition, climate), silviculture practices, and age on the wood properties.

As a result of this project at least 5 scientific papers have been published in the international symposium proceedings and national journals.

In addition to the research activities we also had two project meetings where we enjoyed discussing and exchanging information on the progress of each individual research. The first meeting was held at Serpong on

28 May 2002, and the second was at Cibinong on 16 September 2003. All of the project members from Japan and Indonesia were present at the second meeting. From Japan present Prof. H. Yano, Prof. S. Kawai, Prof. K. Hayashi; from Indonesia present Dr. Bambang Subiyanto, Dr. Subyakto, Mr. Lisman Suryanegara, Ms. Anita Firmanti (Bandung), Mr. Suranto (Yogyakarta), and Ms. Erna Susanti (she had to flight about 6 hours from Papua). We plan to have the next meeting in August 2004. On 21-22 October 2003 we have a special symposium held in Kyoto with title of "International Symposium on Sustainable Utilization of *Acacia mangium*".

One of the other fruitful results of the project is adoption of one of our research result by a private company on the utilization of bark for adhesive. Since early 2004, barks of *A. mangium* from East Kalimantan are exported to Japan by an Indonesian company (PT Imago) to a Japanese company (Koshii Co. Ltd, Osaka). Extractions of bark from log, chipping, drying, packing and exporting are done by PT Imago and quality control of the barks before exporting is done by our group. It is expected that about 100-200 tons of dry barks will be exported every month.

The project will continue for another year (2005), we hope that the project will achieve remarkable results so that the goals of the effective and sustainable utilization of *A. mangium* will be realized to the benefit of both Japan and Indonesia.



Some members visited *Acacia mangium* plantation in Palembang in 2003

= Student from Indonesia =

## Study in Research Institute for Sustainable Humanosphere, Kyoto University

Mr. Rudianto Amirta

Forestry Faculty, Mulawarman University, Indonesia



In August 1999, I participated in short-term wood technology training in Japan, sponsored by The Tanabe South East Asia Foundation. At that time, the Tanabe Foundation guided us in visiting many institutes and universities in Japan, such as FPPRI Tsukuba, Shimane University, Tottori University and also the WRI of Kyoto University.

In the WRI, we visited some laboratories and discussed with the professors. That day was very important for me and was a starting point for my study in the institute. During the program, I had opportunities to meet Prof. Takashi Watanabe (now he is my professor). I asked him many things about biodegradation of wood by fungi, bio pulping, bio bleaching and also about the opportunity to continue my study in his laboratory. After I returned to Indonesia, I continued my communication with him by e-mail and he advised me to apply for a scholarship from Monbukagakusho via the JSPS-LIPI Core University Program in the field of wood science. I applied and after several months I was accepted for this program.

Since October 2001, I have been studying with Prof. Watanabe at the

Laboratory of Biomass Conversion as a doctor course student sponsored by Monbukagakusho. Study in a big university such as Kyoto University is part of my dream. Now, I am a student of Kyoto University. At the beginning of the program I faced many problems, especially in my daily living. I changed my work time, lifestyle and learned the Japanese culture. Everyday, I worked more than 10 h in my laboratory and the situation was quiet different from that in Indonesia. However, after 6 months everything was running as well as expected and I enjoyed my study.

I learned many things about fungal metabolites, wood components and lignin degradation, more intensively than before. New techniques, equipment and some research procedures related to my work were also studied. Professors, associate professors and all the members of the biomass conversion laboratory supported me. They have helped me solve my problems.

In the doctoral program, Ceriporic acids, the new fungal metabolites produced by a white-rot basidiomycete *Ceriporiopsis subvermispora*, were chosen as the main subject for my experiments. Isolation and structural analysis of the unsaturated fatty acid, ceriporic acid C was done during the first year of my doctor program. We submitted one paper about this and it was published in the journal of Chemistry and Physics of Lipids (CPL, 126, 2003). I also investigated the correlation between production of ceriporic acids and degradation of lignin during fungal treatment. We found

that production of ceriporic acids and loss of the lignin was increased as a function of incubation time. We believe that ceriporic acids must play an important role in the degradation of lignin in *C. subvermispora* culture. Detailed investigation of the lignin degradation and its correlation with the presence of ceriporic acids is still in progress.

In April 2004, WRI was combined with RASC and reorganized as Research Institute for Sustainable Humanosphere (RISH). RISH has a unique scientific atmosphere with well-maintained equipment and unlimited research possibilities including chemical and literature supply. I agree with this statement and I also like to point out that the unique scientific atmosphere has been very valuable and helpful in my research activities. Finally, I hope the combination of unique scientific atmosphere and effort will be fruitful in my study.

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Dropping in at a world heritage,  
Himeji castle on the way from an academic meeting

Title Back:

Illustrated by Tadayoshi Yamamoto, Member of Japan Contemporary Arts and Crafts Association