

# Hevea Research Platform in Partnership in Thailand



## Core Members



## Associate Members



## Supported by



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The website: <http://hrpp.ku.ac.th>

## Background

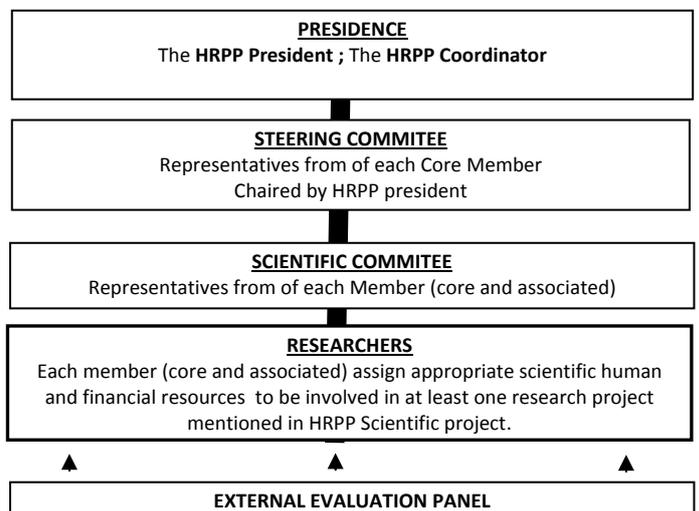
The superior qualities of **Natural Rubber**, extracted by tapping the rubber tree (*Hevea brasiliensis*), to the synthetic polymers make it indispensable for the industry. Since 1997, **Thailand** has been **the first producer** of natural rubber with around 30% of the world production. Besides their importance for Thailand economy and population, rubber plantations are a major component **to land use changes** occurring in South East Asia.

The “**Hevea Research Platform in Partnership**” (HRPP) was initiated by Thai and French researchers and institutions involved in long-term cooperative programs. This platform aims at strengthening the excellence in the rubber commodity chain as well as academic networks and regional cooperation through the sharing of knowledge and technology transfer.

HRPP was officially created in 2008 by the four core partners, Kasetsart University (KU), Prince of Songkla University (PSU), Department of Agriculture of Ministry of Agriculture and Cooperative (DOA) and CIRAD. Many universities and R&D institutions (5 from Thailand and 6 from France in 2013) became our Associated Members such as Mahidol University, Khon Khaen University, Ubon Rachathani University, ORRAF and BIOTEC for Thai side, Montpellier Sup Agro, INRA, IRD, University of Montpellier II, University Blaise Pascal of Clermont-Ferrand, University du Maine for French side.

HRPP is an information exchange platform where the members can share their vision, co-build new joint-research projects and co-produce high level scientific knowledge. Annual seminars and workshops support this dynamic. Activities under this platform are implemented by the HRPP members under supervision of a Steering and a Scientific Committee.

## HRPP ORGANIZATIONAL CHART



## Socio-Economics



Family farms are producing most of the Natural rubber. Understanding the way they face current and future challenges is the key.

### Factors driving rubber producers' practices and technological change.

The aim is to understand the complexity and diversity of the rubber smallholders' structure and behavior leading to differentiated agronomic practices. This is necessary to design appropriate techniques that would have better chance to suit farmer's situations and goals and to assess the conditions of adoption of new technologies.

### Impact of global and local changes on the rubber farming systems.

The aim is to provide a deep understanding about the socio-economic dynamics that are currently at work and may influence or orient future evolutions of rubber farming systems. Research activities focus on: 1) farmers' perception of changes; 2) changes in resource management as a consequence of climatic variation, price fluctuation, land changes and labour allocation; 3) rubber growing in non-optimal biophysical conditions (lowland area, dry areas).

## Biotechnologies and rubber planting material improvement



**Breeding rubber trees takes a long time. Biotechnologies are used to assist and shorten the process.**

**Genome mapping** based on QTL mapping, aims at developing Markers-Assisted Selection (MAS). A family was mapped with SSR (microsatellite) and AFLP markers, and phenotyped at field level. Two major QTLs showed important effects on growth, latex production and rubber quality.

**Functional genomics**, based on transcriptomics, aims at identifying the major genes expressed in latex production and adaptation to the environment. Candidate genes are studied for estimating the importance of their effects in selection.

**Plant micropropagation** aims at creating new varietal types such as clones from somatic embryogenesis, rejuvenated budded clones, or clonal rootstocks. Characterization of genes promoting somatic embryogenesis in *Hevea brasiliensis* is going on.

## Technology and rubber quality



**Natural Rubber has unrivaled properties but its natural variability is an issue.**

**Non-consistency of natural rubber: effect of non-isoprene.** The non isoprene components are often incriminated in the non-consistency of natural rubber quality. On-going works focus mainly on lipids and proteins which are the most important non-isoprene in natural rubber. The joint Laboratory of Biochemistry and Technology of Natural Rubber (**LBTNR**) hosted by Kasetsart University is dedicated to this problematic and equipped with high technology analytical tools (2D-SDS PAGE, Ultracentrifuge, GC-FID, GC-MS, HPLC DAD MS, ...).

### Characterization of post harvest maturation of natural rubber.

Maturation of cup coagula of latex and its consequences on TSR rubber quality are still not well characterized. On-going projects intend to address this issue through a multidisciplinary approach involving microbiology, enzymology, rubber technology but also sociology to assess all the factors which may act on quality before the first processing.

## Agronomy, Physiology and Environment



**From the latex cell to the plantation ecosystem.**

**Productivity of rubber tree and latex physiology.** The productivity of the rubber plantations directly depends on the physiology of specific latex producing tissues located in the trunk bark.

Molecular physiology and biochemistry are used to elucidate the processes of latex biosynthesis and model the latex cells functioning in reaction to tapping. The teams focus on carbohydrate dynamics (transport, mobilization and metabolism) and ethylene regulation. Experiments of innovative tapping systems tailored to clonal physiological characteristics, environmental conditions as well as socio-economic contexts are carried out, aiming at improving rubber production and farm profitability.

**Functioning of rubber plantation ecosystems.** To develop tools and methods to assess and predict (i) the performances (growth, yield) of rubber trees in non-traditional rubber areas and under climate change, (ii) the ecosystem services provided by rubber plantations, including C sequestration, maintenance of soil functional biodiversity and water regulation. Particular attention is given to the risks induced by climate changes (adaptation of tapping systems to erratic rainfall) and to the sustainability of plantations either when planted in poor soils (NE area) or after repeated cycles of rubber cultivation (southern area).

## The new International Master Curriculum in Natural Rubber Production, Technology and Management

Strengthening human capacities in natural rubber research and development is part of the overall objective of the HRPP Platform. Prince of Songkla University and Kasetsart University are opening in 2014 with the support of HRPP member institutions a joint Master curriculum with integrated knowledge in the whole value chain (from up-stream to down-stream).

### Training Aims

This Master is set up to develop and modernize the natural rubber production sector in sustainable and social-responsible ways by providing advanced level technical human resources in response to a demand from the rubber supply chain in Thailand and SE Asia. The curriculum is aiming to give a multi-disciplinary scientific and technical knowledge enabling the students to contribute in the fast-changing industry and markets worldwide.

### Career Prospects

Agronomist (knowledge of breeding, farming system); Director of a rubber business, technical production manager, manager of a rubber plantation ; Co-operative or private rubber processing business, sales manager, consultant ; bank officer: project analyzer, financial advisor;... scientist ; trainer/educator, rubber development officer/supervisor ; supply manager, technical consultant/advisor for professional or inter-professional organizations.

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