Research Prospectus

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Printed by:
KLUNG NANA VITHYA PRESS LIMITED PARTNERSHIP
Tel. +66-43-328589-91
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Standardization of medicinal plants and Thai traditional preparation.
Multi-Organic Risk Assessment of Endocrine Disruptors
CAD/CAE, Geometric modeling for yarn and fabric structures, Machining process and system
Manufacturing process and system
Selected Publication
Mahasarakham University is a soaring competitive friendly environment green University located at the heart of the Northeast of Thailand. It is known as the Center of Education, offering a world-class panorama with more environmentally responsible existence and sustainable projects.

MSU’s world-class quality has been made clear. Since 2011 to the present, a number of international organizations, including QS World, University Ranking, SClmaço Institution Ranking (SIR) World Report, UI GreenMetric World Universities Ranking, Webometric, 4ICU Web Popularity Ranking, and Alexa Web Ranking have considered MSU as the “fastest-growing world-class recognized university in Thailand.” MSU is ready for the internationalization and ASEAN 2015 that is coming to the Northeast of Thailand. It is also prepared and much willing to meet the 21st century challenges presented by the ever increasing mobility of students and academics.

MSU is a place of education and community where yesterday is being respected and preserved today, where 21st century education, international culture and community meet, and where the leaders of tomorrow learn MSU: Morality, Social Responsibility, and Unity. The past, the present, and the future are in good hands at Mahasarakham University.
I am studying the evolution of genes in Asian cultivated rice (*Oryza sativa*), wild rice (*O. rufipogon*) and weedy rice (*O. sativa f. spontanea*). By using molecular tools, these studies provide insights into the processes and mechanisms of evolution as well as accompany cultural selection on rice evolution during domestication events.

**Funding:**

Work in my laboratory is funded by grants from the government and Mahasarakham University and the BRT program.
Silk proteins from yellow silk of polyvoltine Bombyx mori

Since Mahasarakham University is located in the “Middle of Silk Production Area” of Thailand, my research interest was focused on the silk protein properties and their utilization, particularly for the yellowish silk thread produced by polyvoltine Bombyx mori silkworm. This area possesses the high variety of yellow silkworm strains which produced different yellow cocoons from the pale to the deep yellow one. The different in cocoon color was due to the color of silk coating protein named sericin.

This protein was known to responsible for many beneficial properties for human such as moisture maintain and antioxidant activity. My research revealed that the different in these yellow cocoons not only for cocoon colors but also for biological active properties. The understanding of silk protein property was challenged to the novel way of silk utilization. The research area such as cosmetics, agriculture by utilizing silk protein as a promoter or fertilizer as well as the research in material science by forming silk sheet as a scaffold for human skin tissue engineering are the ongoing research for my group.

Figure 1 Variety of yellow silk cocoon

Figure 2 Different pattern of silk protein extract from various yellow silk cocoon

Figure 3 Silk contained cosmetics
Production of mycelia and exo-polysaccharides by edible mushrooms and its properties

**Research work**

1.1 **Scope of work-objective:** Investigated the ability of edible mushrooms to produce mycelia and exo-polysaccharides in submerge culture. To determine properties of fermented broth and mycelia.

1.2 **Materials and Methods:** Three edible mushrooms (Schizophyllum commune, Auricularia auricula and Pleurotus ostreatus) have long been attracting a great deal of interest in many areas of foods and biopharmaceuticals, and are regarded as effective medicines used to treat various human diseases, such as hepatitis, hypercholesteremia and gastric cancer. Schizophyllum commune, Auricularia auricula and Pleurotus ostreatus are edible mushrooms which are consumed for their rich in fibre proteins vitamins and medicinal properties.

**The result benefits academic/ commercial**

This research shows 3 mushrooms have ability to produce mycelia and exo-polysaccharides. The cultivation of *S. commune* obtained mycelia (dry weight) 21.96 g /L at 15 days, while *P. ostreatus* and *A. auricula* cultures got mycelia at 16.30 and 3.67 g/L, respectively. Moreover, the mycelia from 3 mushrooms could ferment fruit juice to produce fruit wine. The highest alcohol concentration was 9.51% at 21-day of fermentation which achieved by using mycelia of *S. commune*, while *A. auricula* and *P. ostreatus* had low alcohol at 6.27 and 1.12 % of alcohol, respectively.

The fruit wine produced by 3 mushrooms mycelia were obtained total phenolic compound around 240.38 - 242.51 GAEs mg/L, have radical scavenging activity in 90 μmole of DPPH around 62.48 – 70.25 %, and contained crude exo-polysaccharides around 0.46 – 0.79 g/L of fruit wine.

The fermented broth from 3 mushrooms contained crude exo-polysaccharides. The crude exo-polysaccharides from culture broth of *S. commune* was 3.65 g/L , while fermented broth from *P. ostreatus* and *A. auricula* had crude exo-polysaccharides at 1.79 and 1.70 g/L, respectively. Also, the fermented broth of 3 mushrooms radical scavenging activity in 90 μmole of DPPH around 84.70 – 87.45 %.

These results showed the ability of mushroom mycelia to produced wine instead of yeast (*Saccharomyces cerevisiae*), whilst it was expects this wine could have a preventive effect against cancer and other health benefits. Fermented broth have potentials of antioxidant and also contained exo-polysaccharides.
My research interests are focused on both Mendelian and molecular genetics of basidiomycetes (mushrooms), particularly, construction of co-isogenic strains, fruiting body developments, mating type genes, gene transformation and genetic relationship among basidiomycete population. A model organism of mushroom (*Coprinopsis cinerea*) mostly used in my laboratory, because *C. cinerea* is an excellent model mushroom due to it has the small size, and can be easily grown on artificial medium under the standard laboratory conditions and has small genome without abundant transposon genes. *C. cinerea* consists of two types of mycelia, namely the monokaryons, and the dikaryons. The monokaryon has simple septa and forms constitutively within the vegetative mycelium asexual spores (oidia) on specialized aerial hyphae. The dikaryon is generated by mating of two compatible monokaryons. Dikaryon contains two district nuclei in a hyphal cell. The dikaryon has forming the clamp cells at each septum and develops fruiting bodies under appropriate conditions (low light intensity in a day/night rhythm, 80-90% humidity).

**Figure 1.** *Coprinopsis cinerea*

**Figure 2.** Basidia of *Coprinopsis cinerea* (A) Nuclei were stained by DAPI (B) Basidiospores (C) and Clamp cells of *Coprinopsis cinerea* (D).

**Figure 3.** Construction of co-isogenic strains of *Coprinopsis cinerea*, colonies of co-sogenic strains germinated from spores of generation 1 (A) colonies of co-sogenic strains were from generation 5 (B) similar colonies were produced from generation 6 (C)

**Figure 4.** *Cfs* gene was transformed into *Coprinopsis cinerea* strain OU2 which is a mutant strain with defected *Cfs* gene (A) Some part of *cfs* gene transformed into CFS mutant strain and the mutant strains showed the defective in primordial formation.
The Study of Pharmacological Efficacy of Dry Mulberry Burirum-60 in Alzheimer’s Disease

In this experiment, we used Morus alba Linn. Burirum 60 leaves collected from Mahasarakham University Research Plantation Field, the Division of Research Innovation and were prepared as a powder in capsule form to control the incidence and maintain brain function condition in Mild stage of Alzheimer’s disease patients. Morus alba Linn. contains many minerals and vitamin A, vitamin B, vitamin B3, vitamin B12, vitamin C, essential amino acids, Zinc, Magnesium, Sodium, deoxynojirimycin, GABA, Phytosterol, Calcium, Potassium, folic acid etc. The samples of this research were collected from silk weaving women, ages of 55-70 years old in Silk Innovation Weaving Village, supported by Mahasarakham University.

The samples were divided into 4 groups as follows: group no.1 of feeding silkworms weaving women and intake Morus alba Burirum 60 capsule, group no.2 of feeding silkworms weaving women and intake placebo, group no.3 of non feeding silkworm weaving women and intake Morus alba Burirum 60 capsule, group no.4 of non feeding silkworms weaving women and intake the placebo. All samples were tested with Cognitive Testing Scale and the selected samples were Mild cognitive memory function group. The dosage of Morus alba capsule would have 2 capsules after meals , once daily for 3 months and all the samples were tested for cognitive memory function using the scales of Sage1, Mini-Mental state Examination (MMSE), Functional Assessment Stage tool (Fast) for evaluation and confirmation of the efficacy of Mulberry (Morus alba Burirum 60) effecting the brain function. The data were tested with Wilcoxon Signed Rank Test and Kruskal Wallis statistical analysis. The result revealed that each 4 groups of Group no.1, no.2, no.3, and no.4 were 3.00, 1.50, 3.00 and 2.00 respectively. It showed that in each group had indicated mean scores with statistical significant difference at p-value 0.05. It showed the development of changing scores tested by SAGE1 scale within the group. Then we compared the mean scores difference among or in between groups by using the Kruskal Wallis statistical method. The result found that the mean rank score among 4 groups before the experiment were 14.10, 12.70, 7.30 and 7.90 respectively and the mean rank score among 4 groups after the experiment were 17.70, 8.70, 11.00 and 4.60 respectively. The higher rank of each groups indicated the higher development in obtaining the scores of SAGE1 tested by Kruskal Wallis after the experiment by oral intake of Morus alba Linn. Burirum-60 capsules with the dosage of 200 mg daily for 3 months. It showed the development of cognitive memory function by increasing the ranking scores of group no.1, group no.3 and group no.2 respectively.
Research areas

Water requirements for agriculture, water supply, industry, power generation, ecology and environment have increased in concert with population growth, lifestyle changes and economic expansion. A reservoir operation that uses rule curves can improve water budgeting, better respond to water requirements, provide positive solutions to flood problems, and achieve long term operation planning. Recently, the optimization techniques have been applied to solve the complex problems. My research areas are application of optimization techniques (linear programming, dynamic programming, genetic algorithm, differential evolution algorithm, simulated annealing algorithm, ant colony optimization, shuffle frog leaping algorithm, etc.) to solve water resource problems such as optimal reservoir rule curves, optimal crop planning, flood and drought control, and hydrological situation on land use and climate changes.
Potential utilization of recycled PET as an additive for thermoplastics based composite fibers

Polyethylene terephthalate (PET) is a plastic that has been used in various products, such as beverage containers, since the late 1970s. The plastics have entered into every aspect of our lives, being widely used particularly in the fields of packaging and building. The large amount used has caused major problems in terms of resource utilization and the environment. In this regard, it is particularly fortunate, because it is easily separable from other wastes and allows for a relatively economic recovery when properly assisted by the education of citizens and regulation. However, the recovered material after cleaning is not considered suitable for the production of bottles for beverages or water and a new route must be developed for its transformation into usable products. A possible upgrading and recycling approach consists of the blending of recycled PET (rPET) with different polyolefins, with the objective of saving time, needing relatively less investment for machinery, and obtaining a composite material with an increased value with respect to the starting polymers. However, although the properties of rPET are normally lower than those of the virgin material, the cost/effectiveness relation is better. The blends of rPET with common thermoplastics, such as polypropylene (PP) and polyethylene (PE) based on the concept of iMFCs, have received much attention during the last decade. Most previous works have suggested that the presence of functional compatibilizers could minimize the interfacial tension and improve adhesion between the two phases, and hence, result in an enhancement of the mechanical properties of the final products.

In current work, we interest to explore the potential of rPET as a processing lubricant with good thermal resistant, low-cost and easily available filler for the thermoplastic composites in comparison with liquid crystalline polymer (LCP). LCP- or rPET-filled thermoplastics (HDPE, PP, PS) composites in the form of fiber through extrusion and drawing processes. In addition, to extend the application of the rPET-containing composite fiber, the cross-ply (0°/90°) laminates of the polymer fibers were prepared using a film stacking method. Tensile, flexural and impact tests were employed to characterize the mechanical performance of the rPET-composite-fiber laminates.

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Bio-oil Production by Fast Pyrolysis of Biomass

Due to environmental concern and possible future crisis in energy production and sustainability, the use and the development of renewable and sustainable energy sources are of paramount importance. Biomass is an accepted form of renewable energy and is seen as a means of helping to reduce global warming by displacing the use of fossil fuels. Energy stored in biomass is derived from sunlight and can be either directly utilised by combustion or transformed into different forms of energy such as liquid fuel by a process called “fast pyrolysis”. Fast pyrolysis can apply virtually all types of biomass as far as they are dried enough (less than 10% moisture content). Since Thailand is an agricultural country, the biomass such as agricultural residues is readily available. Fast pyrolysis is globally regarded as a promising route for converting biomass into liquid fuel (also known as bio-oil) with solid char and gases as valuable by-products. Nevertheless, the knowledge and know-how of fast pyrolysis technology in Thailand is still in its infancy. Therefore, the Bio-energy and Renewable Resources Research Unit, Faculty of Engineering, Mahasarakham University, led by Asst.Prof.Dr. Adisak Pattiya has actively investigated on the production of bio-oil from fast pyrolysis of biomass as well as the upgrading of the bio-oil product to bio-gasoline.

The process for bio-oil production is shown by the following diagram. The first step of the production is the biomass preparation which includes two steps, drying and grinding to obtain dry biomass with suitable particle size. The biomass is continuously fed into the fast pyrolysis reactor by two screw feeders. The reactor is normally maintained at 400-600 °C. Inside the reactor is hot sand used as heat transfer medium. When biomass is in contact with hot sand in the absence of oxygen, fast pyrolysis reactions occur producing pyrolysis vapour with char as solid residue. The pyrolysis vapour and char particle are quickly entrained out of the reactor by nitrogen flow passing two cyclones where char particles are separated. The fast pyrolysis vapour together with char fines is then filtered through the hot filter to remove the residual char. Part of the vapour is rapidly cooled and condensed by a condenser, an electrostatic precipitator and dry ice/acetone condenser, thus producing what is called “bio-oil.”
Preparation and Applications of Biodegradable Polymers

Content Research:
Development of synthetic and natural biodegradable polymers for use in medical, pharmaceutical and packaging applications.

Research Process:
Production of poly(lactic acid) bioplastic from lactic acid by ring-opening polymerization

Results:
1. Production rate of poly(L-lactic acid) bioplastic in lab scale is approximate 10 kg/week.
2. Development of synthetic and natural biodegradable polymers for use in medical, pharmaceutical and packaging applications.
3. Resin of poly(L-lactic acid) bioplastic (production rate is approximate 10 kg/week).
Process and Product Development of Functional Foods

Our research unit focuses on both basic research and applied research. We characterize and identify the bioactive compounds in natural resources especially indigenous materials in Isann (north eastern region) including rice, vegetables, fruits (cultivated and wild), herbs, spices, edible flowers and edible insects etc. We have successfully found that a number of important bioactive compounds found in those samples. Our research is also extended to potential health enhancing properties of potent samples. We have also further developed optimum processes for the most appropriate conditions of functional foods using advanced techniques. We have collaborated with many distinguished scientists worldwide such as from Australia, Austria, China, Korea and USA.

Research Outputs:

**Patents & Petty patents:**
1. Process of mulberry tea for improvement of colour phenolic compounds and antioxidant activities
2. Low-glycemic index rice
3. Low-glycemic index porridge
4. Process of nut milk production
5. Production of omega-3 fatty acids from fungi
In 1992, Varavudh Suteethorn has become a reader of the Thai dinosaur team. He give most of the time for his work. Since 25 year the result have shown the worth of work hard. He discovered many important sites, ranging in age from the Triassic to the Cretaceous of non-marine Mesozoic rock, mainly in Northeastern Thailand for examples “Phu Kum Khao” while is the richest of dinosaur specimen and “Phu Nam Jun” which found more than 300 Isanichthys specimen and recently “Phu Noi” which found more than 1,200 specimen including sauropod, theropod, ornithopod dinosaur, crocodile, turtle, bony fish, freshwater sharks.). While other fossil materials are currently under study. This astonished locality are still discovery continuing unexpected vertebrate fossils which are well preserved and complete specimens. The team has resulted in the discovery of many specimens and international level. Among the main result of this cooperation are the discoveries plants, invertebrate and vertebrate. For insistence, the deposits of Khorat plateau have yielded 18 species dinosaur, including ancestor of Tyrannosaur (Siamotyrannus isanensis, described in Nature in 1996), The earliest known sauropod dinosaur (Isannosaurus attavipachi, described in Nature in 2000). Vertebrate other than dinosaur also occur, which comprise freshwater sharks, bony fish, temnospondyl amphibians, turtle, phytosaur, crocodile and pterosaur.
My research interest was focus on population genetics and ecology of black flies in Thailand. Black flies are insects of the order Diptera, family Simuliidae. There are 2,142 species described worldwide and approximately 98% of these were blood-sucking insects. Some species of the black flies were vectors of the infectious blindness disease, human onchocerciasis (or River blindness) which is a causal agent of more than 500,000 blindness in Africa. On the other hand, black flies were important components of stream ecology because they are often present as the major macroinvertebrates in the stream ecosystem. Black fly larvae contained giant chromosome (polytene chromosomes) which are important for taxonomic and evolutionary studies.

In Thailand, there are 90 species of black flies arranged in six subgenera of the genus Simulium. Because black flies were ubiquitous and taxonomic knowledge of them are thoroughly studied in Thailand thus black flies are interesting model species for population genetic and ecological studies. The objectives of my research on black flies are to assess effect of historical and contemporary ecological conditions on black fly diversity and evolution. Several research approaches including phylogeography, DNA barcoding, cytogenetic and ecology were used.

The results indicated that both contemporary and historical event could play significant role on black fly diversity and evolution. Phylogeographic studies in four black fly species in Thailand indicated that Pleistocene climatic change could have profound effect on biodiversity and evolution of Thai faunas. The results of my research pointed out that north and northwest of Thailand contain high genetic diversity thus need priority for conservation program. Meanwhile, ecological studies suggested that physicochemical factors such as stream width, depth, velocity, altitude and water conductivity are among the most important factors associated with species distributions. Adaptations to particular ecological conditions also found as driving factor promote black fly speciation. Cytological study indicated that some morphological species in Thailand (e.g. S. siamense, S. angulistylum and S. feuerborni) were composed of cytological distinct species (i.e. species complex).
Theoretical Analysis of Photoinduced Electron Transfer in Proteins

Photoinduced electron transfer (ET) reactions are always the first steps of energy conversion in solar cells, photochemical reactions of organic and inorganic compounds, photosynthetic reactions, and also photoreceptors in plants, bacteria, insects and even mammals. Scope of this work aims to establish which ET theory is most suitable for ET in proteins. If we could identify which theory best describes the experimental ET rates, we can expect huge applications of this theory to phenomena from solar cells, redox reactions of organic and inorganic compounds to photosynthetic reactions and photoreceptors.

The method consists of the following procedure

1) Molecular dynamics simulations of flavoprotein are performed to obtain sets of atomic coordinates of protein.
2) Donor-acceptor distances and electrostatic energies in the protein are calculated with the atomic coordinates.
3) Time-dependent ET rates are calculated with ET theories.
4) Fluorescence dynamics is obtained with the ET rates taking average over MD time region.
5) ET parameters in the ET theory and ET rates are determined so as to obtain a best-fit between the observed and calculated fluorescence decays.
Computational study of influenza virus

The avian influenza A virus (H5N1) is highly pathogenic and has been shown to cross the species barrier and infect humans. Scope of this work aims to understand and look insight into molecular level at the three targets of the virus’s life cycle, namely Hemagglutinin (HA), Neuraminidase (NA) and M2 channel, using molecular dynamics simulations.

The method consists of the following procedure:
1) Molecular dynamics simulations of targets are performed.
2) Structural and dynamical properties are analyzed.
3) Binding energies are calculated.
Increasing Value Added from Local Thai Silk Protein for the Beauty Care Production

Research Purposes

- To increase value added for beauty care products from the local Thai silk cocoon
- To develop the formula of cosmetic products with containing the silk protein
- To develop the production system followed by Good Manufacturing Practice (GMP) operation on the Food and Drug Administration of the department of health
- To register the products on intellectual property and distribute the products on the markets

Application the local Thai silk both of sericin protein and fibroin as outstanding active ingredient in beauty care products. There were many results to support the good properties of silk. Especially, in local Thai silk filament has the content of sericin and fibroin approximately 25-30, and 70-75%. Along with the good substance from the yellow pigment cocoon shell which rich of flavonoids such as quercetin and kaempferol which also good for skin. The research products have been testing for the quality over six years. It’s promising that many Thai people admire natural products. Therefore beauty care products with silk protein are accepted from the customer.

The knowledge and technology was gain from the experiments of cosmetic production. Processing of products could be passed to the people either the students who want to learn and practice the skill. Furthermore, the project release many items available under branding of Beauty By Silk (BBS). These silk products have been selling in Mahasarakham University Outlet (MSU) and other network over the country.
DNA Barcoding, Systematics and Molecular Phylogeny of Tropical Micro-lichen in Thailand

DNA barcoding and molecular studies on symbiotic organisms, such as lichens are helpful for identification and understanding the evolution of mutualistic relationships. The new tool in this century for identified lichen species is DNA barcode; it’s very powerful technique for taxonomist in the world. The knowledge of the diversity and phylogeny of lichens in SE Asia is currently poor, especially in Thailand. In traditional taxonomy of micro-lichen was separated mainly based on ascoma morphology. For example, the micro-lichen of large family calls Graphidaceae. Currently molecular data strongly suggest that Thelotremataceae is synonymous with Graphidaceae, now more than 1,000 species were member of this family.

This research will attract future students to this fascinating group of lichen in a framework for modern systematic studies, the evolution and contribute to understanding species concepts in micro-lichen in Thailand and SE Asia. Also this research will provide wide access of data, such as easy to use-identification tools, images for keys, and databases to the general public.

Since 2007, my research on taxonomy, molecular phylogeny and DNA barcode of micro-lichen in Thailand was found interesting result presented by publication on lichens was increase in last 6 years. In 2009-2010, I working on diversity of lichen was financial support by Division of Research Facilitation and Dissemination, Mahasarakham Universtiy, and then 2009-2011 was support by TRF for young researcher working on taxonomy and molecular phylogeny of lichen. In this year (2012-2016) I received the grant from TRF and Mahasarakham Universtiy for working on DNA barcoding, systematics and molecular phylogeny of lichen, this project on progress. The results of my research was found a new genus, 21 new species, 92 new records in Thailand, 14 new combinations, one new to SE Asia and 3 new records in SE Asia were presented on 17 international publications. A graduate student was finished her master thesis on lichen was participate on my research, Ph.D student who working on systematics and molecular phylogeny on one group of lichen in Thailand still working in my laboratory.
Taxonomy, Ecology, and Biogeography of land snails in Thailand

Objectives
1. To study taxonomy and geographic distribution of land snails in Thailand
2. To study species diversity, abundance, and habitat relationship of land snail assemblage along the latitudinal and elevational gradient in Thailand.

Methods
1. Hills and mountains in Thailand cover by undisturbed natural forests were selected for land snail sampling sites.
2. Plot sizes 20x20m was used for sampling land snails in each forest type in every 100m intervals along the elevation of the mountains.
3. Specimens from the fields were cleaned, identified, and counted number of individual in each taxon and each locality.
4. Species diversity, abundant, and habitat relationship of land snails in each locality were analyzed.

Results
1. The data from many isolated sandstone hills in Kalasin Province represents positive correlation between size of the hills and number of species.
2. In some isolated limestone hills in Loei Province, many un-identified land snails were discovered. These species, now, are in the process of study, manuscript preparation, and publication.

Benefit of the project
The aims of the project are
1. The knowledge about pattern of geographic distribution of all taxa of land snails in Thailand.
2. Try to use the diversity of land snails as the indicator for biodiversity in the study area.
3. Exhibit the knowledge from the observation in natural habitats and research to the public in The Shell Museum of Mahasarakham University.
Development of functional food products

Objectives
1. To develop functional food products from Thai indigenous in Thailand
2. To improve and develop processes for functional food products
3. To search for potential food sources for developing new functional food products
4. To add value to agricultural products and agricultural waste

Research implementation
1. Searching for potential food sources for developing functional food products
2. Development of the processes for producing functional food products
3. Development of the products
4. Product quality test
5. Obtain modified or new process and functional food products
Inner ear disease (vertigo and hearing loss), Infectious ear disease (chronic otitis media) and Nasal douch

Research topic

1. Effect of Cisplatin on distortion product Otoacoustic emission of Japanese patients. (main researcher) under the grant of International Fellowship Program from Takeda Science Foundation (P.E.), a Grant-in-Aid for Young Scientists (B) (22791595) (N.Y.), a Grant-in-Aid for Scientific Research (C) (22591907) (M.K.), a Grant-in-Aid for Scientific Research (C) (21592192) to (S.H.), and a Grant-in-Aid for Scientific Research (S) (23229009) to (J.I.) from the Ministry of Education, Culture, Sports, Science and Technology

2. Nested-PCR technique for detection of Pseudomonas aeruginosa in small quantity human tissue. (main researcher) under the grant from International Fellowship Program from Takeda Science Foundation (P.E.), The society for promotion of international Oto-Rhino-Laryngology. Inc (SPIO)

3. An assessment of aerobic bacteria in chronic suppurative otitis media patients in Mahasarakham hospital. (main researcher) under the grant from faculty of medicine Mahasarakham university.
Water resource management, Modeling and Forecasting

My research interest was focus on modeling and forecasting base on water resource management. Water shortages due to variable rainfall distributions and increasing community water demands often pose significant problems for the relevant regional authorities. Reservoirs play an important role in water resource management, especially for essential water supply during droughts. Reservoir operating rules are intended to guide and manage reservoir systems, so that water release is in the best interest of the system objectives. A multi-reservoir system in a river basin consists of several reservoirs located in series or in parallel. The multi-objective genetic algorithm (MOGA) approach is pursued in order to derive an optimal reservoir operational plan for the multi-reservoir system located in the Chi River Basin of Northeast Thailand.

The results strongly suggest that the reservoir management may be improved, although only two decision variables (storage and release) were considered in the investigation. Indeed, the notably high assurance in the calculations reported indicates that the reservoir managers may confidently proceed to suitably modify their operational procedures.

For the planning and design of crop scheduling and water management in Northeast Thailand, the distribution of weekly rainfall was investigated from data on weekly rainfall for a part of Chi River Basin surrounding the Lampao Reservoir. The data is fitted well by K4D with L-Moments estimation, and there is some evidence for a generalized Pareto distribution. There is usually one distribution that passes the goodness-of-fittest. For the estimated rainfall at the specific probability 0.75, there is low to no rainfall in the dry season, which is the best time for drying crops or any associated activity that has no water requirement (from week 1 to 6, 8, 10 and 45 to 52). On the other hand, there is very high value of rainfall in the rainy season (from week 19 to 40 and the awareness weeks for heavy rain are week 33 to 36).

I have 7 publications in international journals (e.g. Water Resource Management, Open Journal of Statistics, Journal of Water Resource and Protection, Thailand Statistician), one chapter published in Aspects of mathematical modeling, Birkhäuser Basel, and was a reviewer of several journals (e.g. Stochastic Environmental Research and Risk Assessment, Songklanakarin Journal of Science and Technology, British Journal of Applied Science & Technology).

I was an assistant team in workshop on Complex Sample Survey Design by National Statistical Office, and International Health Policy, Thailand and invited speaker at Chonnam University, Chonnam, South Korea.
Cultural Dimensions on the Fabric Cover of Palm-leaf Manuscripts: Case study in Mahasarakham Province.

The fabric cover of palm-leaf manuscript is important in protecting the manuscripts as well as expressing community cultures. This study investigated the fabric cover of palm-leaf manuscripts found at 36 temples in Mahasarakham Province including 11 districts and 2 sub-districts. Major purposes of this study were to analyze patterns of art and cultures, values, beliefs; and to develop a database of the fabric cover of palm-leaf manuscripts.

The findings indicated that in protecting the manuscripts, self-made fabric such as silk skirt called mudmee, phapoom, pha hang grarok, phakhawma (loincloth), and phasarog (skirt) were mostly used, followed by phalaykid made from cotton and silk, and other types of fabrics such as screened cotton fabric and brocade were also used.

Art patterns, colors, and designs appeared on the fabric reflected local identities. In addition, using silk fabric was a traditional way to protect manuscripts. However, other materials such as grass, bamboo, wooden boxes, and glass boxes were gradually used.

Originally a fabric cover was made and given to the monks with high respect, on the other hand, the later period a commercial fabric from the central Thailand was used due to the change in values and cultures.

My research interests in the fields of Monetary Economics, International Economics, Agricultural Economics and Economics of Public Finance. My researches were more specifically on issues related to government policy and its effect on economic activities and competitiveness of the county.

I started working on projects related to monetary policy, the research aimed to investigate the money demand behavior under inflation targeting framework in Thailand, with a research question is that whether there exist a stable long run and short run equilibrium relationship between real money demand (M1 or M2) and their determinants in Thailand after adopted the inflation targeting as a monetary framework of monetary policy. A co integration analysis and the Vector Error Correction Model (VECM) were conducted on quarterly data over 2001Q1 to 2010Q1. The results indicate that there exists a long run equilibrium relationship between real money demand (both M1 and M2) and its determinants: real income, exchange rates, and external interest rates.

After the first project, I continued working on monetary policy in Thailand by analyzing how monetary policy has been transmitted into the macro economy through the credit channel of monetary policy. In addition, the research also tested the effectiveness of monetary policy through credit channel in Thailand under Flexible Exchange Rate Regime by using the Vector Autoregression model (VAR). The results find that a change in the M1 money demand has more effect on economic growth while a change in M2 has a stronger effect on the price level. In addition, the results also show that the M1 money demand is responsive to credit channels of monetary policy.

Since the ASEAN Economic Community (AEC) become the popular issue among researchers, I worked on the ASEAN issue by using econometric model to analyze the stability of money demand in five major ASEAN countries. The objective of this research is to test the stability of money demand function in the ASEAN 5 countries, including Thailand, Singapore, Malaysia, Philippines, and Indonesia. The results indicate that there exists a long run equilibrium relationship between real money demand (M2) and its determinants: real income, exchange rates, and external interest rates in the ASEAN 5 countries. In addition, the CUSUM plot indicates that the money demand functions in the ASEAN5 are appeared to be stable.

Some of my research focused in the SMEs issue. I have done the research on factors influencing the Small and Medium Sized Enterprises (SMEs) the Northeastern Thailand access to the Bank Credit. The research found that the majority source of fund of the SMEs in Northeastern Thailand is the credit from domestic commercial bank. The factors the Influence the Small and Medium Sized Enterprises (SMEs) access to the bank credit including the business collateral, manager’s education, and working experience, the business market share and business plan, and transaction cost of credit. The findings of this research might use as a guideline for the SMEs entrepreneurs to prepare for access to bank credit. In addition, the government sector can also use this research as basic information for promote the SMEs in Thailand.

My current work focuses on the effects of government price intervention policy on the competitiveness of Thai rice export in ASEAN. The research was conducted by using secondary data, time series data from 1997 – 2012. The research found that Thailand still in the situation that highly competitiveness in world rice export. In addition, the research also shown that the factors affecting competitiveness of Thai rice export in ASEAN were ASEAN GDP, exchange rate, and the level of government price intervention.
The research has been implemented in order to minimize the Green House Glass Effect through the involvement of local communities.

Methodology

1. The research has been designed for further development with regard to data management using the community involvement and the training will be provided to enhance the capability of the farmers at the local, regional and national level minimizing the greenhouse gas effects.

2. To development the administrative management of Web Based GIS, it is named carbon2Markets proving that carbon stored under this project is real and provable. Interested persons can access to the information through the internet at www.carbon2markets.org. Nevertheless, carbon2Markets has been designed to support various internet protocols such as Keyhole Markup Language (KML), Web Map Service (WMS), Web Feature Service (WFS), Representational State Transfer (REST) and Simple Object Access Protocol (SOAP). Carbon2markets system has been designed and developed by Prof. Dr. David L. Skole and his staff from Michigan State University. Right after that, the system has also been developed for the Carbon Credit for Forestry in Thailand by Faculty of Sciences, Mahasarakham University.

Conclusion

The carbon credit compensation research project has been joined from farmers network Inpang from the 5 provinces of the Northeastern area of Thailand. The project is the collaboration between Faculty of Science, Mahasarakham University, National Research Council of Thailand (NRCT), Michigan State University, United States of America and Inpang Farmers’ Network. Under the research teamwork, both research team and farmers have conducted the infield check on biological data of the forest. It is also included the application of the Remote Sensing and GIS and Area Data Development System to be prepared for Forest Carbon Inventory for Thailand to be proposed to the Climate Change Market in Chicago’s Chicago Climate Exchange or CCX.

However, the project was able to calculate the carbon amount, and its value from the area 625 rai (1 ha = 6.25 rai) from the farmers joined the project, it is convertible to the amount of 75,000 ton carbon and it is sold at the price 4.25 US$ per ton carbon. The net amount of the income for the farmers joining the project is 37,000 US$ equivalent to 1,000,000 million baht from selling carbon in 2 years from 2011-2012. It must be noted here it is the first carbon credit sale for the first time for Thailand and ASEAN.

Academic achievement

Findings can be used as baseline data to further development of the Forestry Carbon Credit for compensation and voluntary sale for Thailand.
Laotian Migrant Workers in the Industrial Sector in the Northeast of Thailand

The research on employment processes among Laotian migrant workers in the industrial sector in the North East of Thailand aims to: 1) study employment process among Laotian migrant workers in the industrial sector, 2) study the interaction and operation of the government, entrepreneurs and labor management towards the lifestyle of Laotian migrant workers, 3) study working life in the industrial sector, the adjustment, struggle, and negotiation of Laotian migrant workers in their area of migration. The research was conducted using the qualitative method of interviews with individual Laotian migrant workers in the industrial sector, interviews with individuals involved with labor management including the government sector, private development agencies and entrepreneurs. The research findings showed that the lifestyle of Laotian migrant workers in the industrial sector in the Northeast of Thailand was under the method and condition of government policies and capitalism, which had ways to increase this fund by extracting surplus value from migrant workers.

The researcher used the concepts of Transnationalism from below and transnationalism in the dimension of the political economy analysis of David Harvey (2003) with regard to spatio-temporal fix and tactics in everyday life. It was found that the work life of migrant workers in each factory had common characteristics, e.g. they had to work hard and for long hours each day, they earned low daily wages and inadequate benefits, and their jobs exposed them to certain health and safety risks. It was also found that the tactics of entrepreneurs in terms of incentives in various forms – patronage systems and benefits – had forced migrant workers to work harder and expose themselves to greater risks in order to earn greater compensation. In addition, amid pressure, these migrant workers had to adjust, struggle and negotiate in order to survive in the new workplace and with new living conditions. Certain policies were proposed, such as the government should adjust labor management theories by incorporating an economic promotion concept, a national security concept, a human rights and human security concept, should place importance on the local level, the actual area of operation, and should establish a clear system and mechanism at all levels in order to perform labor management more effectively.
Science Education

Research Description

Dr. Prasart Nuangchalerm’s main area of research focuses on the teacher education development. He also writes on issues related to the instructional practice, science teaching, and teacher education. He is currently working on pedagogical content knowledge in which supported by the Institute for the Promotion of Teaching Science and Technology (IPST) also, preservice science teacher development through implementing various kinds of instructional strategies. He implements qualitative method to explain classroom phenomena and invite some learning innovation to preservice teacher classroom i.e. inquiry, problem-based learning, project-based learning, contemplative practices, cooperative service learning, and pedagogical content knowledge. In the industrial sector in the Northeast of Thailand was under the method and condition of government policies and capitalism, which had ways to increase this fund by extracting surplus value from migrant workers.

Research outcomes

Research on teacher development can promote teacher students reach the goal of 21st century skills. They incorporate some ideas and practices into school science as well. The results of previous research can be concluded to textbook that teachers should be known. Dr. Prasart Nuangchalerm summarized his lesson learned from research filed to Thai textbooks i.e. Internet for learning (2014), Science learning in the 21st century (2014), Conducting instructional research (2013, 2011), Instructional model (2011, 2010), Educational curriculum (2011, 2010).
Currently, reservoir operation in Thailand is a very challenging proposition because water resources are limited and change suddenly. A large volume of water is obtained in the rainy season, but there is lack of water in the dry season. As such, it becomes very important to find the best method to determine an exact water resource plan. The water requirements encompass agriculture, consumption, industries, power generation, ecology and the environment. These requirements have increased with an increase in the population, lifestyle changes and economic expansion. It is well known that droughts and floods occur each year in the northeast of Thailand. Therefore, a suitable criterion of optimal water operation for storage reservoirs needs to be found. It has been reported that reservoir operation using rule curves could provide a positive solution to flood problems and achieve long term operational planning. This research aims to develop reservoir management by using a conditional differential evolution algorithm, which combines a complex reservoir simulation system to search the operating rule curves. A conditional constraint was applied to the search process to reduce the fluctuation of operating rules. Minimum average water shortage and downstream flood control were adopted as the objective function of the search process. Two types of models, the conditional differential evolution (CDE) and the conditional genetic algorithm (CGAs), are developed. The results of CDE and CGAs as well as the rule curves which are used in the present (hereafter shown by present rule curves) were compared. The CDE model was evaluated to determine the optimum rule curves of the Lampao reservoir in the northeast region of Thailand. From the results, it was found that the reservoir operating rule curves from the CDE showed a lower frequency and quantity of water shortage than that of the present reservoir operating rule curves. In addition, the frequency and quantity of downstream flooding were reduced. The results also demonstrated that the CDE provided better reservoir operation in each inflow situation. Therefore, it can be said that the reservoir operating rule curves obtained from this research could help reservoirs operating in the Lampao basin in the industrial sector in the Northeast of Thailand was under the method and condition of government policies and capitalism, which had ways to increase this fund by extracting surplus value from migrant workers.
The functioning of the diverse flora as a whole, and how it both synthesizes knowledge from local and global sources worldwide and provides the key information to biodiversity knowledge and its value adding to the healthy products.

Domain 1: Diversity of weeds and agricultural management

The agricultural sector of Thailand is the most important sector in the economy, especially for food production. More recently, with rising population, food consumption has been continually increasing. Farm inputs are now rising, with the effect of increasing farmers’ incomes. Traditional weed controls such as hand weeding, ploughing and mulching are now replaced by a greater reliance on herbicides. Thus, the rapid changes of agricultural management can be factors that affect shifts in weed flora composition in ecosystems.

Scope of work

- Farmer’s perception on weed flora of Thailand
- Pilot study and observatory study for agriculture, environment & health
- A base-line list of weed species and the recent changes in weed flora of Thailand
- Impact of Thai rice agriculture to patterns of weed species occurrence and abundance
- The change of weed flora in the North-East arable fields and its importance for biodiversity

Domain 2: Tea products development: Value adding to local herbs in healthy tea products

Thailand is rich in plant species with high biodiversity, especially medicinal plants, attributed to the diversity of local wisdom in Thailand that combines traditional knowledge on herbal medicine. Thailand is the country’s potential to create healthy products from traditional herbs. Unfortunately, this knowledge is not being applied to the relay and the social life of the current levels. Herbal products on the market are still limited to a narrow range, with the use of herbs well known, only a few species. Resources make effective herbal high intrinsic value to be overlooked.

Mahasarakham University by experts from Walai Rukhavej Botanical Research Institute engaged as a consultant to the company in the research and development of herbal medicinal products from Thailand to markets worldwide, combining the local wisdom in Thailand along with the development of manufacturing technology, which is difficult because no one has ever done before. The Giving Tea Company has participated with Industrial Technology Assistance Program (iTAP) in development projects to add value to traditional herbal products, herbal tea, and healthy tea products.

In addition, research team helps in the discovery, development, formulation and manufacturing process improvements and industrial manufacturing companies to form a new tea blend which is popular in abroad from traditional herbs in the country. Importantly, what novelty and the product of the company advantage is that the benefit of human health with research support and outstanding products and have been well received by the market in the country and abroad.

Success in this project makes healthy market with good products to consumers and enhances the economic value of domestic resources, as well as the key for the company to enhance its competitiveness. The company plans to expand production by focusing on products and projects further to the global competition. “A great improvement to create more value from existing resources and knowledge. We want to develop a product based on what is in the country to create a brand of Thailand, known in the tea and can compete with foreign brands”.

This project is also academic performance by bringing products to registered patent in multiple items with a herbal tea 4 leaves, Cleansing, Mulberry Rice, and Absolute mulberry. Furthermore, the many items in between a registered patent include Diuretic renal care, Refresh; Aura, Anti-aging (or menopause), Elixir of life, Laxative, and Very berry tea.
Bioanalytical and analytical method development of drugs focusing on HPLC and CE techniques according to ICH guidelines

Research in the area of pharmaceutical analytical incorporates into most of research work in pharmaceutical sciences e.g. pharmacognosy, pharmacokinetics, pharmaceutical technology, pharmaceutics as well as medicinal chemistry. As an important tool to indicate both qualitative and quantitative analyses, understanding of separation behavior is very useful in the areas stated above. My research interest focuses on separation techniques, especially in HPLC and CE (capillary electrophoresis) both in theoretical and application aspects. This approach allows the determinations of achiral or chiral drugs and their related substances in raw materials and preparations. The extensive analytical techniques can be applied for determination of metabolite-profiling in complex matrices such as biological fluids and plants.

According to the current research, extraction of bioactive compounds with high yield using software-assisted optimization has been investigated by means of partial least square analysis and multiple linear regression analysis; for instance, extraction of mulberry leaves and edible flowers. To determine bioactive compounds mainly phenolic and flavonoid compounds, spectrophotometric and chromatographic methods have been applied for quantitative analysis. The high quality of the extract exhibits high amounts of bioactive compounds as well as safety consideration. Toxicity testing of the extract in animal model has been evaluated before product development process. For acute toxicity, blood chemistry parameters and major organ histology of experimental animals have been assessed.

In the field of drug analysis, the current research focuses on analytical method development and validation according to ICH guideline [Q2(R1)]. The well-developed and robust analytical methods of HPLC and CE perform an important role on the analysis of drug substances and drug products. In addition, the analysis of related substances including enantiomeric impurities, intermediates and degrade products are also important to indicate the quality of pharmaceuticals. For chiral analysis, stereoisomer separation employing native cyclodextrins and derivatives are used as chiral selectors. To understand complex constant and mobility of drug-chiral selector, cyclodextrin-modified CE is applied to investigate the separation mechanism. This technique is also used for the determination of enantiomeric impurities of drugs.

As mentioned previously, the research interest is primarily on the application of analytical techniques to investigate the separation of drugs, related substances and plant secondary metabolites in drug substances, drug products and complex matrices. Moreover, the optimization of extraction, analytical method development and product development are also performed by means of software-assisted to achieve the optimal point.
A device for controlling the heddle weaving for brocade woven

My research involves the design and construct of machinery applied in agriculture in order to replace workers and increase production rates. Research works are mainly concerned and focused on silk and silk products. In 2014, a device for controlling the heddle weaving for brocade woven was developed as my research. The motivation of this research came from gathering interviews the famous weaving group. It was found that an important issue of weaving is occurred when weaving pattern somewhat difficult, it is necessary to take at least 3 people weave together. Brocade pattern with more complex, it may be woven only 20 centimeters per a day. Therefore, many workers feel that brocade weaving is time-consuming and laborious work. They refuse to study and preserve the art of traditional weaving. The traditional weaving then began to be lost. From exploring and study problems, hence this research aims to design and develop devices that assist in brocade weaving. This equipment must be easy to use and maintain the uniqueness of traditional weaving as well.properly assisted by the education of citizens.

The device for controlling the heddle weaving for brocade woven has been improved under the guidance of the user. It can be divided into two parts. The first part was to modify hardware as follows; changed a control box, added a cover strap, increased the number of pneumatic cylinder from 15 to 20. The second part was to upgrade software. The new modification made the program more flexible. Users could also key in the pattern or modify the existing pattern by themselves. Furthermore, 13 brocade patterns were also recorded and they were ready to use.

From the experiment in using the device for controlling the heddle weaving, it was found that the device could reduce time of weaving at the average of 21.60 percent. Ngu Loi Pattern was a pattern that the assist device can perform the highest time saving, i.e., average of 36.13 percent. An analysis of brocade quality was done by comparing the quality of brocade woven from the assist device with brocade traditionally woven. The opinion score is expressed as a number in the range 1 to 5, where 1 is the lowest quality and 5 is the highest quality. The average values of the opinion score can be summarized as follows: 4.8 for the yarn quality within brocade, 4.9 for density, 4.7 for accuracy and 4.9 for continuity of brocade pattern. From the results in regard to brocade quality analysis, it could be concluded that the quality of brocade woven by the assist device was not different from brocade woven traditionally, i.e. the beauty and the identity of brocade fabric are retained, while the time is shorter.
Organic Synthesis and Chemical biology, Medicinal Chemistry, Pd Chemistry and Catalyst, Carbohydrates Chemistry, Natural Product

Assistant Prof. Uthai Sakee researches new synthetic methods, reagents and catalysts. The fundamental research focuses on:
(a) developing a spectrum of organometallic reagents as enabling tools in organic syntheses,
(b) Rational design and development of flexible novel multicomponent reactions (MCRs).
Another goal is the integration of the group’s successes in MCR chemistry and catalysis in approaches towards the total synthesis of complex natural products.
Macadamia drying by microwave-hot air combination

Research work

1. Scope of work-objective
   To study the kinetics of macadamia drying by microwave dryer combined with hot air including appearance of kernel and energy consumption.

2. Materials and Methods
   Macadamia nuts with shell with the initial moisture content of 18.35% wet basis was dried until the final moisture content less than 4% wet basis. The drying temperatures of 40, 50, and 60 degree Celsius combined with microwave powers of 300, 450, and 600 watts were the conditions of the study.

Summary

The result indicated that the increase in microwave power could reduce the moisture content of macadamia more than the increase of drying temperature. After drying and shelling, it found that the kernel of macadamia was darker when microwave power increased. Also, the dark color was not uniform in all conditions except the drying at microwave power of 300 watts in all drying temperatures. When considered in terms of energy consumption, the drying of 40 degrees Celsius combined with microwave power of 450 watts had the lowest energy consumption of 0.17 kW-h.

The result benefits academic/commercial

This drying technique could reduce the drying time of product to remove the moisture content down to safe storage level with less energy consumption.
Standardization of medicinal plants and Thai traditional preparation.

Research work:
During the last decade, use of traditional medicine has expanded globally and has gained popularity. In Thailand, people have been more interested in traditional medicine as well. However, a large number of people were indecisive to use herbal medicine because of the limitation of scientific evidence. Even though long historical use of many practices of traditional medicine, including experience passed on from generation to generation, has demonstrated the safety and efficacy of traditional medicine, but scientific data is needed to provide additional evidence of its safety and efficacy. Almost all of Thai traditional drugs whose their for mulae routinely contain up to a dozen or more botanicals have not been proved by scientific methods. I would like to support using of herbal medicine and Thai traditional preparation in Thailand, therefore my research work was focus on standardization of herbal medicine especially Thai traditional preparation which compose of many medicinal plants. Complete studied (Chemistry, toxicity, pharmacological activity, formulation, quality assurance, clinical study) of the potential Thai traditional drug, Prasaplai was represent of my work here.

Prasaplai is a Thai traditional preparation that is comprise ten medicinal plants and two chemical compounds. These components are the Acorus calamus L., Allium sativum L., Citrus hystrix DC., Curcuma zedoaria Roscoe, Eleutherine palminfolia (L.) Merr, Nigella sativa L., Piper chaba Hunt, Piper nigrum L., Zingiber cassumunar Roxb., Zingiber officinale Roscoe, sodium chloride and camphor. It has been commonly used by Thai traditional practitioners as a remedy for relieving dysmenorrhea and adjusting a cycle of menstruation as well as antiflatulent.

Like other traditional preparations, Prasaplai has been used for a long time but its pharmacological activities and quality control have not been scientifically proved before. Therefore, the pharmacological activities and characterization of Prasaplai were studied to prove or confirm the traditional use. The inhibitory of smooth muscle contraction, antiinflammatory and estrogenic activity were studied as models of anti-dysmenorrhea of Prasaplai including acute toxicity test for safety. The characterization of Prasaplai by HPLC and identification of some major peaks as markers of Prasaplai preparation were investigated. Formulation and clinical study of Prasaplai were also done to prove the traditional use.

The result benefits academic / commercial
The results of pharmacological activity corroborate the effectiveness of the traditional use of Prasaplai as well as its safety which were confirmed by no toxicity and no report in the traditional use. These results showed that Prasaplai is a good alternative drug for relieving dysmenorrhea. The guideline for standardization of Prasaplai by HPLC was established to support the quality control of Prasaplai and to enhance patient’s confidence. The major compounds in the HPLC chromatogram were identified. Moreover, three new fatty acid esters were found in the HPLC chromatogram of Prasaplai during the chemical characterization. They were isolated and identified as two new compounds,(E)-4-(3,4-dimethoxyphenyl)but-3-en-1-yl linoleate and (E)-4-(3,4-dimethoxyphenyl)but-3-en-1-yl oleate and one known (E)-4-(3,4-dimethoxyphenyl)but-3-en-1-yl palmitate. Finally, the origin occurring of these compounds were studied. The result of clinical study also supported the traditional use of Prasaplai.

The know-how from Prasaplai research was transferred to PharmCare Pharmaceutical which was established by Faculty of Pharmacy, Mahasarakham University since 2012. Prasaplai and many products from medicinal plants were produced under the PharmCare brand and sell on the market now. All products of PharmCare were scientifically researched by our staff of Faculty of Pharmacy, Mahasarakham University.
Introduction to main research topics

Research performed within my research group is directed at the investigation of steroid actions in various regards. The actions of gonadal steroids in and outside the reproductive neuroendocrine system are analyzed, and in particular the actions of endocrine disruptors (EDs) are being investigated within the EURISKED consortium. Selective Estrogen Receptor Modulators (SERMs) and Selective Androgen Modulators (SAMs) of plant and medicinal mushroom origins, and purification of active compounds and their effects on the (ageing) brain, reproductive neuroendocrine, cardiovascular, skeletal and uro-genital systems are investigated in the context of the EUROESTROGENES and NRCT projects.

Scope of research work and objectives:

EDs have been defined as exogenous substances that alter function(s) of the endocrine system and consequently cause adverse health effects in an intact organism, or its progeny, or (sub) populations. Molecular and cell biological experiments as well as research in animals and in the human indicate that EDs act via receptors of the steroid receptor super-family and can have effects on many organs of the body. Steroid receptors for estrogens, androgens, adrenocorticoid and thyroid hormones are found in practically all cells of the body. The functions of the brain, thyroid, and the reproductive neuroendocrine, cardiovascular, immune and skeletal systems during development and in adult life are regulated by these hormones, and can therefore be affected by EDs. An EDS with a defined action in one organ (e.g. estrogenic activity) can exert similar or no estrogenic or even antagonistic effects in other organs. Risk assessment for organs known to be estrogen-, androgen-, progestin-, glucocorticoid- or thyroid hormone-receptive following exposure to EDs cannot be completely made yet. The ultimate goal of my research project is to study such effects with basic experimental tools. Due to the high risk of undesirable side effects physicians and patients are now insecure whether to continue or begin with hormone replacement therapy (HRT) and are therefore seeking for alternatives. As a result, plant extract producing companies claim estrogenic and/or anti-androgenic activities with only desired but no adverse effects. The most prominent examples are soy bean, white kwoa krua (Pueraria mirifica), and the medicinal mushroom Phellinus linteus. Whether their health claims are justified or not needs to be confirmed both in laboratory tests and in clinical studies. The aim of the present project is therefore to shed some new lights on the effects of soy isoflavones (genistein, daidzein, equol), puerarin, and the extracts of Phellinus linteus on the brain, reproductive neuroendocrine, skeletal, immune and thyroid functions in both female and male individuals.

Materials and methods:

In order to identify substances as EDs with possible estrogenic, anti-estrogenic, androgenic, anti-androgenic, or thyroid hormone action the methods used by my research group are genomic and proteomic array assays, recombinant cell lines with reporter genes, cell lines with defined receptor populations and biological endpoints. For determination of acute and chronic effects in various organs in the neuroendocrine, cardiovascular, skeletal, thyroid, immune and uro-genital systems of developing and steroid-deprived rats or mice, measurements of gene and protein expressions are made. In addition, measurement of the expression of male and female sexual behavior and fertility are also included. ED concentrations in body extracts, organs and the blood of experimental animals are performed.

Expected outcomes:

- Risk assessment through in vitro effects of EDs, and of the extracts of the medicinal mushroom Phellinus linteus in cell experiments with special reference to the steroid receptor type involved in these effects and whether these effects may be organ specific
- Risk assessment through in vivo effects of EDs, and of the extracts of the medicinal mushroom Phellinus linteus in animal experiments with special reference to multi-organic effects and the resulting risk assessments thereof
Scope of work-objective

Many researchers have developed models to display the visual characteristics of real yarns for modeling ply yarns structure, woven fabrics, knitted fabric and complex textile composite yarns. Most of the previous works regarding geometrical modeling of yarn structure are based on single line yarn path. The fiber finite elements are developed to predict yarn. Most of them are regarding the numerical solutions of systems of analytical equations for yarn mechanics. These presentations are limited to virtual representation and prediction of the micromechanical properties of yarn structure. Therefore, other approaches to describe the yarn structure need to be considered.

Material and methods

Proposed new geometric model for constructing three-dimensional fibres, yarns and fabrics (woven, knitted and textile composite) structure based on fiber assemblies model. CAD (Computer Aided Design) software is used to model of fabric structures as an assembly of many fibers by twisting based on new geometric model. Next step is finite element analysis method. CAE (Computer Aided Engineering) method is used to predict the properties of the models and is investigated. The results are compared with experiment.

Figure 1. CAD model of fibre assemblies for 6.0 twist factors (Ø = 0.18 mm ×3.0 mm, 125 filaments)

Figure 2. Example of finite element model of fibre assemblies (a-d) with 0 degree twist angle, 3D model, front view, mesh generated at fixed and clamped point, respectively, (e-h) with 38.35 degree twist angle, 3D model, front view, mesh generated at fixed and clamped point, respectively.
Selected Publication

Assistant Professor Adisak Pattiya, Ph.D.


2. Bhuwakietkumjohn N, Rittidech S, Pattiya A. Correlation to predict heat transfer characteristics of the top heat mode closed-loop oscillating heat pipe with check valves (THMCLOHP/CV). Experimental Heat Transfer, 2013, Accepted Manuscript (Impact Factor: 0.927)


16. Suttibak S, Sripateep K, Pattiya A. Production
27. Pattiya A (Editor.) Proceedings of the international conference on Science, Technology and Innovation for Sustainable Well-Being (STISWB), 2009, 1034 pp


17. Thanonchat Imsombut*, Mangkorn Srisa-ard, Prasong Srihanam, Yodthong Baimark*. Preparation of surfactant-free linear and star-shaped poly(L-lactide)-b-methoxy polyethylene glycol microparticles by emulsification-diffu


52. Nualchai Kotsaeng, Yaowalak Srisuwan, Yodthong Baimark*, Nual-anong Narkkong, Wilaiwan Simchuer. Preparation and Characterization of Poly(D,L-lactide) and Silk Fibroin Nanocomposite


Associate Professor Sirithon Siriamornpun, Ph.D.
International Publications (* corresponding author)
(up to 40 peer reviewed international publication)

National Publication


International conference papers


Associate Professor Pairot Pramual, Ph.D.


20. Pramual, P., Kuvangkadilok, C., Baimai, V., and...

Sakboworn Tumpeesuwan. Ph.D.
Associate Professor Anuchita Moongngarm, Ph.D.


17. Jintana Sungspaha, Anuchita Moongngarm, Rumpai Kanesakoo. 2009. Application of Germination and Enzymatic Treatment to Improve the Concen-


Proceedings and Conferences

1. Piyatida Srijinda, Anuchita Moongngarm, and Tattdao Paseephol

2. Panuwat Danγṣungnoen, Anuchita Moongngarm, Sirirat Deeseenthum
Comparison of Resistant Starch Content and Survival of Lactobacillus spp. on Four Different Sources of Resistant Starch. 2012 International Conference on Life Science and Engineering IPCBEE vol.45.17 IACSIT Press, Singapore.

Changes in chemical compositions, enzyme activities, physical properties, and antioxidant activity during germination of rough rice. 56TH Australian Cereal Chemistry Conference 10-14 September 2006. Perth, Wa, Australia.


Assistant Professor Buavaroon Srichaikul, Ph.D.
New Research Publications

1. An Explorative Research of Ancient Thai Folk Literature Extracted from Classic Ancient Palm Leaf Scriptures.(The Social Sciences Journal, Revised Manuscript has been accepted for publication.,2011)

2. The Therapeutic and Clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Manuscript of Palm Leaf Scriptures.(Research Journal of Pharmacology, Revised Manuscript has been accepted for publi-
3. Factual Consensus for the Success Level of the Student Centered Learning Prototype within the framework of the Bachelor Degree Level, Faculty of Public Health, Mahasarakham University, Thailand. (Research Journal of Medical Sciences, Revised Manuscript has been accepted for publication., 2011)

4. The Therapeutic and Clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Manuscript Volume No. 2 of Palm Leaf Scriptures. (Research Journal of Biological Sciences, Revised Manuscript has been accepted for publication., 2011)

5. Comparative Study of Chlorophyll Content in Leaves of Thai Morus alba Linn. Species. (Plant Sciences Research, Revised Manuscript has been accepted for publication., 2011)

6. The Therapeutic and clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Palm leaf Scripture, Final accepted for publication ) in Journal of Biological Sciences, 2011.

7. An Explorative Historical Research of Ancient Thai Folk Literature “ Sutthanu Chadok “ Extracted from Classic Ancient Thai Palm Leaf Scripture. (Final accepted for publication in Journal of Social Science.), 2011.

8. The Therapeutic and Clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Manuscript Volume No. 3 of Palm Leaf, Buavaroon Srichaikul, Gordon Bakker; Sunthorn Dejchai; Advances in Natural Science, CS CANADA, Vol. 5, No.1, 2012, pp. 29-36


12. The Therapeutic and Clinical Drug Review of Thai Traditional Herbal Remedies Extracted from Ancient Thai Medicinal Manuscript Volume No. 5 of Palm Leaf, Buavaroon Srichaikul; Supachai Samappito; Gordon Bakker; Sunthorn Dejchai; Advances in Natural Science, CS CANADA, Vol. 5, No.2, 30 th June 2012.  


Assistant Professor Vallaya Sutthikhum, Ph.D.

PUBLICATIONS


4. Waleerat Kodsang, Reon Somana and Vallaya Sutthikhum*. Molecular Mass Distribution, Antioxidant


PATENT

SELECTED CONFERENCE PROCEEDINGS
Meeting of the Japanese Society of Sericultural Science, Kansai branch (jointed with Kyushu branch), October 24-25, Kyoto Institute of Technology, Kyoto, Japan.


Assistant professor Peem Eiamprapai, MD


3. ภีม เอี่ยมประไพ, ยาซุฟุมิ มัตซึมูระ, ฮารุคาซุ ฮิراอุมิ, โนริโอะ ยามาโมโต้, ชุนจิ ทาคาคุระ, จูอิจิ อิโต้. ๒๕๕๔ Nested PCR technique for detection of Pseudomonas aeruginosa in small quantity human tissue. วารสารวิทยาศาสตร์และเทคโนโลยีมหาวิทยาลัย มหาสารคาม (ฉบับพิเศษ การประชุมทางวิชาการ มหาวิทยาลัยมหาสารคาม ครั้งที่ ๗): ๒๘๒-๗.

4. ภีม เอี่ยมประไพ, นรรธพร พัชรเวทิน, พรชัย พัวรัตน อรุณกร. ๒๕๕๕ เชื้อแบคทีเรีย และการตอบสนองต่อยาปฏิชีวนะในผู้ป่วยโรคหูหนวกเรื้อรังโรงพยาบาลมหาสารคาม. ธรรมศาสตร์เวชสาร ฉบับที่ ๔

5. ภีม เอี่ยมประไพ. ๒๕๕๔ ยาหยอดหูสำหรับโรคหูหนวกเรื้อรัง. วารสารหู คอ จมูก และใบหน้า ฉบับที่ ๓ กรกฏาคม-กันยายน

6. ภีม เอี่ยมประไพ. ๒๕๕๔ ประสบการณ์ศึกษาวิจัย ณ มหาวิทยาลัยเกียวโต ประเทศญี่ปุ่น. Proceeding lecture การประชุมวิชาการ ครบรอบ ๘๐ ปี แพทเทสมัคมแห่งประเทศไทย ในพระบรมราชูปถัมภ์

Assistant Professor Bungon Kumphon, Ph.D.


Association professor Weenah Weesapen, Ph.D.
1. The Cultural Dimensions on the Fabric Cover of Palm-leaf Manuscripts: Case study in Mahasarakham Province. Published in Humanity and Social Science Journal. Mahasarakham University 2008
2. Isan Local Wisdom in Medicinal Manuscripts. Published in Humanities and Social Sciences Journal. Mahasarakham University 2009 Saranya Raksong, Ph.D.


Asst. Prof. Teerawong Laosuwan, Ph.D. and Pornchai Uttarak, Ph.D.

Assistant Professor Rumpai Gaensakoo, Ph.D.
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Associate Professor Sunan Saikrasun, Ph.D.


Rachanee Nam-Matra, PhD

1. Nam-Matra, R. (2012). A study of the abundance and diversity of rice weeds of Thailand, with special emphasis on their variation with different methods of rice cultivation, University of Reading.


Assistant Professor Uthai Sakee, Ph.D.


Assistant Professor Lamul Wiset, Ph.D.


Professor Preecha Prathepha, Ph.D.

Assistant Professor Prayook Srivilai, Ph.D.


Assistant Professor Prayook Srivilai, Ph.D.


Associate Professor Keartisak Sriprateep, Ph.D.


Ranking of MSU

**2013**
- Country Rank: 3
- World Rank: 49
- Website: http://greenmetric.ui.ac.id

**2014**
- Country Rank: 13
- South East Asia Rank: 161
- World Rank: 776
- Website: http://www.webometrics.info/

Institutions Ranking (SIR) World Report 2012: Global Ranking
- Country Rank: 15
- Region Rank: 767
- World Rank: 2863
- Website: http://www.scimagoir.com/

**Mahasarakham University’s Rating for 2013**
- Overall
- Employability
- Teaching
- Facilities
- Internationalization
- Innovation
- Engagement