Thai-Swedish Trilateral Development Cooperation Programme

GENERAL INFORMATION

A joint Doctoral Fellowship Programme for students from Bangladesh, Bhutan, Nepal, Sri Lanka and CLMV countries (Cambodia, Lao PDR, Myanmar, and Vietnam) is co–sponsored by the Thailand International Cooperation Agency (TICA), the National Research Council of Thailand (NRCT), and the Swedish International Development Cooperation Agency (Sida) (managed by the International Science Programme (ISP), Uppsala University).

This joint Doctoral Fellowship Programme is a joint collaboration between Sweden and Thailand aiming at supporting interested students from Bangladesh, Bhutan, Nepal, Sri Lanka and CLMV countries (up to five scholarships per year) to pursue their doctoral studies in Thailand and Sweden, with the opportunity to undertake research with Thai and Swedish advisors of academic excellence in the scientific fields of Chemistry, Mathematics, Physics, and Biology.

1. Academic disciplines, qualifications, and duration of studies

1.1 This programme is open to public and private personnel as well as university graduates from all academic disciplines in the field of Chemistry, Mathematics, Physics, and Biology in particular regarding studies contributing to the development objectives of the applicant's country.

1.2 The interested applicants should have the following qualifications:

- A master's degree in a discipline related to the proposed doctoral study with a GPA of not less than 3.5 (from a total of 4.0) or equivalent from an institution of higher education recognized by NRCT, and
- A bachelor's degree with a GPA of not less than 3.0 (from a total of 4.0) or equivalent from an institution of higher education recognized by NRCT;
- Research publication(s) or oral/poster presentation(s) at a scientific meeting with English abstract(s) will be given a priority;
- Appropriate background to undertake the proposal he/she has outlined.

1.3 The fellowship will be awarded when a successful applicant has been accepted as a doctoral student in a Thai university's doctoral programme recognized by NRCT.

1.4 The prospective major thesis advisor of the applicant in a Thai university's doctoral programme must be qualified under the regulation stipulated by NRCT.

1.5 Participants are expected to complete their doctoral studies within 3 consecutive academic years (2 years in Thailand and 1 year in Sweden). Should any participant wish to prolong his/her research (in Thailand or Sweden), his/her major thesis advisor

in a Thai university's doctoral programme will have to submit a request to NRCT.

1.6 This request will then be submitted to TICA and the ISP for consideration. If approved, the prolonged period of study should not exceed 1 year in Thailand or in Sweden.

1.7 Once the prolongation of the study has been approved, TICA and NRCT shall be responsible for the expenditures allocated in individual granting contract to cover the prolonged period of the study undertaken in Thailand for no more than 1 year. The ISP shall be responsible for the expenditures incurred in Sweden. However, if a student cannot complete his/her doctoral study within 4 years, he/she will still be able to pursue his/her doctoral study within the timeframe set by his/her university in Thailand, but with his/her own support.

2. Application procedures

2.1 Any interested applicant should submit three (3) copies of completed application form together with proposed research plan and relevant documents listed in the attached checklist to the Royal Thai Embassy or Royal Thai Consulate in their respective countries.

The detailed guidelines for application are as follows;

i. For the government officer: must get approval from their organizations prior to submitting their application through the designated focal point agency for development cooperation in their respective countries;

ii. For the non-government officer : must get approval from their organizations prior to submitting their application directly to the Royal Thai Embassy or Royal Thai Consulate in their respective countries

iii. For the students who are currently studying in Thai Universities : must get permission from their organizations to continue study for doctoral degree prior to submitting their applications directly to the Royal Thai Embassy or Royal Thai Consulate in their respective countries.

2.2 **Up to five (5) fellowships** may be awarded each year for postgraduate students from Bangladesh, Bhutan, Nepal, Sri Lanka and CLMV to pursue their Ph.D studies in Thailand and Sweden.

2.3 The Royal Thai Government will inform the nominating government (or relevant authority) whether or not the nominee(s) has been accepted for the course, normally at least two months before the programme of study starts.

2.4 Information of programme and the application form can also be accessed or downloaded at the following websites:

National Research Council of Thailand (NRCT)
https://nriis.nrct.go.th

Thailand International Cooperation Agency (TICA)
https://tica-thaigov.mfa.go.th

3. General Qualification

An applicant must:

3.1 be a citizen from one of 8 eligible countries, namely the Kingdom of Cambodia, the Lao People's Democratic Republic, the Union of Myanmar, the Socialist Republic of Vietnam (CLMV); the People's Republic of Bangladesh, or the Federal Democratic Republic of Nepal, or the Kingdom of Bhutan, or the Democratic Socialist Republic of Sri Lanka;

3.2 be under 40 years of age;

3.3 fulfill the qualifications required by NRCT, as described under 1.1 and 1.2;

3.4 be fluent in written and verbal English as courses are conducted in English;

3.5 be in good health, both physically and mentally, as they are required to stay throughout the course;

3.6 meet the required qualifications specified for the programme;

3.7 be prepared for at least three years for a study leave as required for a successful candidate.

4. Allowances and Expenses

The following allowances and expenses will be borne by the Royal Thai Government and the Swedish Government:

4.1 An economy class air ticket from an appropriate international airport of the student's home country to Thailand will be sent to each participant by a representative of the Thai Airways International, or through the National Airline Office in the participant's country. An air ticket to the home country will be issued to each participant just one week before the completion of his/her Ph.D. study as well as the fellowship contract. Participants should not buy air tickets themselves and should be advised that if they do so, the cost cannot be reimbursed.

4.2 For research study in Sweden for 1 year, the participant's major thesis advisor has to submit a travel and research plan, in consultation with the Swedish co-advisor, to the ISP at least three months before the end of the Swedish fiscal year (31 December) for approval prior to their study leave beginning January of the following year. The ISP will arrange for an economy return air ticket from Sweden.

4.3 While studying in Thailand, each participant who study in Bangkok, Nonthaburi, Pathum Thani, Nakorn Pathom, Samut Prakan, Phuket or Chonburi will receive the monthly allowance of 16,000 Baht, which is living allowance at the rate of 7,000 Baht to cover meals, local transportation and other personal expenses; and accommodation allowance at the rate of 9,000 Baht; and other expenses, such as health insurance, educational and research expenses, educational materials, field trips, and thesis preparation. For participants who study in other provinces will receive monthly allowance in the amount of 14,000 Baht, which is living allowance

at the rate of 7,000 Baht and accommodation allowance at the rate of 7,000 Baht. It is suggested that each participant bring some pocket money to cover the initial expenses before the allowance is paid.

4.4 While studying in Sweden, each participant will receive a health insurance, exemption of fee for residence permit, and a monthly subsistence allowance covering personal expenses and accommodation.

4.5 Participants should be in good health and must not have any health condition, which may require treatment in Thailand and Sweden during the study.

5. Regulations

Participants are required to observe the following regulations:

5.1 Participants should only stay at places recommended by the Royal Thai Government and the Swedish Government.

5.2 Participants must not bring any family members with them to Thailand and Sweden.

5.3 Participants must return to their home countries after the completion of his/her Ph.D. studies as well as the fellowship contract at the scheduled date. Participants are required to fly only on the route designated and must not make any alterations. Please be informed that the maximum allowable baggage that can be loaded on flights is 20 kilograms. Participants will be responsible for any cost incurred in exceeding this limit.

5.4 Participants must observe the rules and regulations of the institution(s) and the fellowship contract.

5.5 Participants must refrain from engaging in political activities, or any form of employment for profit or gain.

List of RGJ advisors 2020/2021

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Keywords: molecularly imprinted polymer; stationary phase; separation; chromatography; pesticide

Summary of research:

Title: Bio-based molecularly imprinted polymers as stationary phase for chromatographic separation of pesticides

Pesticide residue analysis is becoming one of the most active directions in the field of analytical chemistry. At present, the modern analytical techniques for pesticide detection usually involve chromatographic techniques. The key to chromatographic separation is a sustainable retention and elution process. Choosing the appropriate columns, whether commercial or under development, could be somewhat confusing for the analytical chemists. Because of the pesticide components and their contents in different samples are very different, therefore, modification of analytical conditions depends on types of pesticide residue active ingredients in such interested samples. This research project aims to develop novel stationary phases, based on molecularly imprinted polymers (MIPs), for selective separation of pesticides and overcome the lack of existing columns.

Generally, molecularly imprinting technology is based on the formation of a complex between a target (template) molecule and a functional monomer in the presence of a large excess of cross-linking agent through covalent or non-covalent interactions. After template removal, specific recognition sites complementary in shape, size and chemical functionality to the template molecule are left behind within the polymer. However, MIP preparation based on conventional strategies required large amount of organic or toxic solvents, time-demanding, energy-consuming which end-up in contradiction with the green chemistry viewpoints. To solve these problems, molecularly imprinting technology based on green chemistry principles are applied in the development of novel MIPs. Based on a green synthesis strategy, in this project, biocompatible functional monomer, natural cross-linker, and water as green porogenic solvent will be introduced in MIP preparation process to reduce usage of toxic chemicals and waste prevention. To the best of our knowledge, there is no literature of bio-based MIP as a stationary phase for selective separation of pesticides in real samples. Therefore, biodegradable MIPs in this work would provide a selective and environmentally friendly method to determine the target pesticides.

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Keywords: Phytochemistry; Functional ingredients; Biological properties; Biomass valorization

Summary of research:

Plant Bioactive Compound Group (BAC Lab), is established as part of the department of plant and soil sciences. Though is not an official operating unit, the main focus is to highlight the values of plant diversity richness and complexity of northern Thai culture through their phytochemical compositions and local knowledge and employ innovative technology that drive global sustainable development goals (SDGs). Leading by Dr. Sarana Sommano, BAC lab has absorbed this model policy and adopted the theme which has become its research core research strength. Besides, BAC also considered resilience as the backbone research concept which support the flexible growth of Thai economics. BAC delineates a way forward to support the resilience by concerning key productive resources including intellectual, social, environment, human and economic. As a result, more than 50 scientific publications, technology and research transfers, petty patent and reports have been produced from BAC lab. BAC Lab has 11 past and current members in total, comprising of 2 postdoctoral Researchers, 4 higher degree graduates and 5 post graduate students (phD and Master's programs). In-line with the government plans to transform conventional agro-industries and service sectors toward a value-based and innovation-driven economy, Dr. Sommano and her team try to upgrade plant natural resources through their valuable bioactive ingredients for novel food, feed and pharmaceutical industries along with encouraging manufacturing by-products utlisations.

Under her supervision and research expertise, the BAC research themes are divided into 3 major areas and each group members pursue research on different topics, which are inter-correlated. The first area looks at bioresources for bioactive compounds from the local availability. Within this area, Dr. Sommano and her students use ethnobotany tool to acquire the knowledge of plant utlisations including that of edible or utlisable from the locals of northern Thai culture. The nutritional values and phytochemical properties are also accessed with the recommendation of their uses in the different industries. The ultimate purpose is to value-add the almost forgotten plant species that urge local/native plant conservation. The second area highlights physiology and analytical chemistry of plants of the economic importance. Plant responds to biotic or abiotic stresses through bioactive compound biosynthesis. This biochemical mechanism is beneficial in most case for example as elicitors for bioactive accumulation.

However, this would be adversary in the area of post-harvest physiology where over expression of the mechanism could lead to discolouration. Dr. Sommano has looked at these responses in different plants including ornamentals, herb and fresh cuts. Besides, the advance analyses of aromatic crops have also developed at the BAC lab, and the lab is known as one of the leading research groups that document aromatic profiles of specialty Thai spices. Transitioning to

sustainability will require innovation, not just in technological and economic terms but also in governance and culture. The last area is the applied technology and innovation in plant science to the industries. For more than 15 years, Dr. Sommano has worked with plant food industries. One area that always interest food manufacturers is to answer the question whether food processing affect the stability of bioactive ingredients. Through that, BAC has also partnered with the Excellent centre of physics at Walailak University and developed dielectric technology for processing and preserving of the natural ingredients. Dr. Sommano has also wrote comments for novel industries of industrial crops through their functional properties.

The following figure illustrate different areas of research interests in plant bioactive ingredients conducted at BAC lab.