List of VET courses offered by Aqua-Centre of AIT, Thailand

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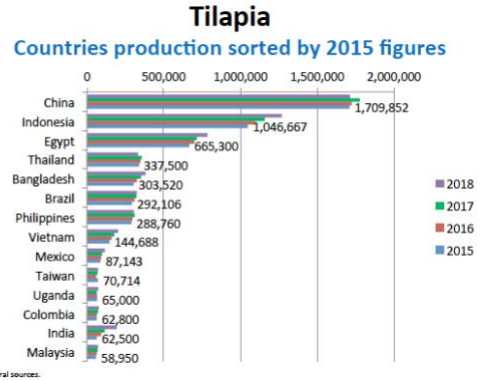
ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 1:
Tilapia Farming: Breeding, Nursing and grow-out

Background

Nile tilapia (*Oreochromis niloticus*) is the most widely cultured species in the world. In terms of production volume, it is second to carps. It is playing a significant in food and nutrition security globally as its farming exists in about 150 countries and still expanding rapidly. Over 7 million mt is produced annually led by PR China, Indonesia, Egypt, Thailand and Bangladesh and followed by others.



Average of estimates from several sources.

As it grows fast, survives in harsh conditions and has a good texture of meat with no intramuscular bones, it has been promoted by many development agencies including FAO/UN, UNDP, WorldFish including AIT. More importantly, its farming very sustainable as it feeds on phyto-planktons, which can be produced on-site in green water ponds, and low protein diets formulated using locally available farm byproducts, with limited or no fish meal at all (0-5%).

Thailand is one of the most successful countries in farming tilapia especially for mass-scale hatchery production, and cage culture. AIT developed the technology in early 1980s realizing its potential, and the need for high quality fry in mass scale. The techniques include management of broodstock in large nylon hapas, collection of eggs and artificial incubation using glass jars, larval rearing in shallow trays, production of monosex fry using hormonal sex-reversal technique, and hapa nursing and grading before selling. AIT also conducted a series of research to develop low-cost grow system using organic manures and inorganic fertilizers in ponds. There are hundreds of private farms and public stations adopting the AIT technology in Thailand, over 300 in Bangladesh, and altogether over thousands in many countries Asia and Africa. As a result of the technology adoption by good quality fry are readily available, mass scale farming has been possible. According to the Thai Department of Fisheries, there are over 200,000 farmers culturing tilapia throughout the country. It is available in almost all the restaurants, streets vendors, local markets, and supermarkets in Thailand, and also has been exported abroad.

AIT wants to organize this training to make available to everyone who wants grow tilapia to provide its technology to and share experiences with any interested

individuals and organizations, public or private, located in Thailand or any other countries. Training includes

Learning outcome

- Enhanced knowledge on biology, reproduction and nutrition of tilapia
- Demonstrate skills on tilapia breeding, nursing and grow-out
- Demonstrate skills on making feeds, feeding and planning
- Enhanced knowledge of hatchery and farm management
- Ability to develop a business plan for tilapia hatchery & grow-out farms

Training period: 2 weeks
Training fee: 1,329 Euro /participant (Exclusive of living and travel costs)

Lectures –11 lecture session (11 x 3=33 hrs)

Lecture 1: AIT Hatchery Technology
Lecture 2: Fisheries / Aquaculture: Global Perspective
Lecture 3: Tilapia Farming: Status and Trends Worldwide
Lecture 4: Farm / Hatchery Design and Layout
Lecture 5: Tilapia Grow-out Systems
Lecture 6: Water Quality Monitoring and Management
Lecture 7: Feeds & Feeding Management
Lecture 8: Economics and Marketing
Lecture 9: Health Management & Bio-security
Lecture 10: Fish Processing, Food Quality & Safety
Lecture 11: Tilapia Hatchery / Farm Business Plan
Practicals: Brood preparation, harvest, cleaning, weighing, incubation, MT feed preparation, feeding, nursing, grading, conditioning, packing & selling

Practical – 10 lecture session (10 x 3=30 hrs)

Brood preparation, egg harvest, cleaning, weighing, estimating, incubation, MT feed preparation, feeding, nursing, grading, conditioning, packing & selling

Materials needed:

Broodfish at least 1-2 hapas (60 m2 size, approx.. 200 females and 100 males per hapa), swim-up, SRT and nursing fry,
Feed ingredients: Cassava flour, fishmeal, soybean meal, oil, vitamin mix, MT hormone/stock solution, ethanol 95% etc. (1 kg total for sinking pellets) and at least 10 kg for floating feed).

Final report including business plan: by each participant – max. 5 pages and presentation on the final day.

Presentation of results by the group of students (Seminar Room)

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by: students / participants

Resource persons: Prof. Peter Edwards**,** Prof. Kwei Lin, Dr Ram Bhujel and others.

ASIAN INSTITUTE OF TECHNOLOGY
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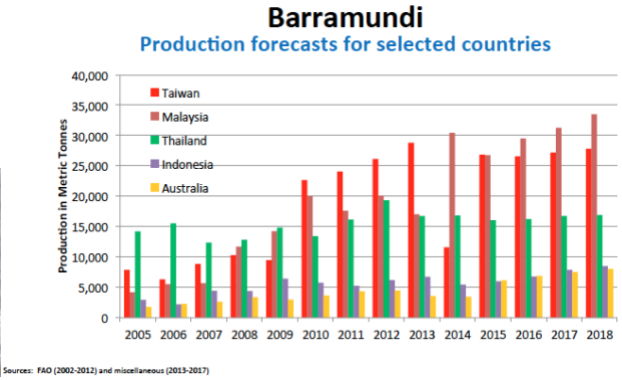
SSNS Training Course 2:
Sea Bass Farming: Breeding, Nursing and grow-out

Background

Asian Sea bass (*Lates calcarifer*) by name itself is considered as one of the best seafood items. Its white meat has a good taste and with no bones. It is a high value commercial species in Asia and the Pacific.



Many countries have tried Asian Sea bass culture with little success. Thailand is one of the most successful countries in farming Asian Sea bass. Techniques of induced spawning, larval rearing/nursing and grow-out farming have been successfully practiced by commercial farmers. As a result, fry are readily available, and food fish is also available in almost all the restaurant and markets in Thailand. Grow-out farming is done in brackish water cages. But recently it is also grown in freshwater ponds. Fish is either sold fresh or on ice or exported to neighboring countries such as Malaysia, Singapore, Hong Kong Australia etc. Several countries are interested to develop its farming. This training course has been designed to provide up-to-date knowledge about Asian Sea bass farming and skills in induced breeding, larval rearing, nursing and grow-out.

Learning outcome

- Enhanced knowledge about sea bass farming
- Demonstrate skills on Sea bass breeding, nursing and farming
- Ability to develop a business plan

Training period: 1 week
Training fee: 885 Euro /participant (Exclusive of living and travel costs)

Lectures – 6 hours (3+3) – Classroom

1. Current trends and scope for farming and biology of Sea bass
2. Breeding, nursing methods and grow-out farming techniques i.e. feeding, water quality management etc.

Practical – 15 hours (3+3+3+3+3) – Lab and field

- Fish (4-5 pairs of min. 3 kg in size) and
- Tanks with plenty of aeration systems and saline water (28-30 ppt)

- Breeding (hormone injection) and larval rearing by doing in a private farm (use hormone 1 cc Suprefact/20 cc sterilized water or normal saline water for 10 brooders, 2.5 ml/brooder). (OR- 1 ml Suprefact/9 ml sterilized water and use only 1 ml/brooder).

Final report including business plan: by each participant – max. 5 pages

Presentation of results by the group of students (Seminar Room)

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by students / participants

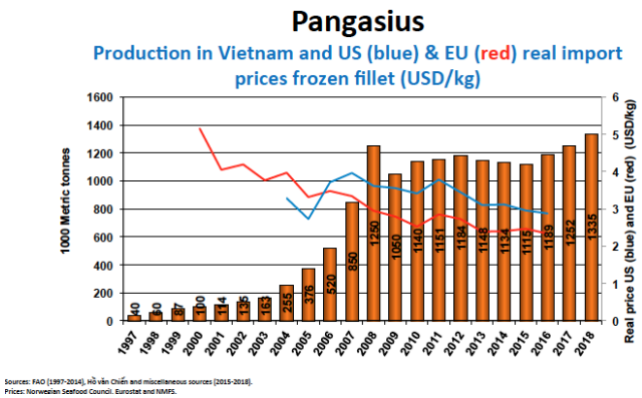
Resource persons: Dr Ram Bhujel & Dr Renu

ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 3:
Pangasius and Catfish Breeding & Nursing

Background

Pangasius (*Pangasus hypophthalmus*) is a native of Asia and the Pacific region. Unlike African catfish (*Clarias gariepinus*), it is omnivorous in nature. Vietnam is the leading producer and exporter of Pangasius in the world. Its production took off after 2004 and peaked in 2008 early due to successes in induced breeding for mass-scale fry production and expansion of export market. It grows fast and has white meat which is favoured by the western world. Many other developing countries are interested to introduce it to solve the seafood insecurity and malnutrition. It is grown in Bangladesh, Cambodia, India, Nepal, Thailand and many other countries.



Adoption of its farming has been patchy due to limitation on skills in breeding and nursing technologies. If right method is not used, survival of hatchlings can drop to zero as they are carnivorous at the early stage. Therefore, AIT offers training program to provide opportunities to participants with hands-on practice i.e. hormone injection and stripping, is organized in a private hatchery in Nong Suea which collects up 40 kg eggs in a day and sells over 5 million catfish fry in a single day. The Manager says, demand reaches up to 10 million a day but that is too much work to do. Its again hard to believe but this is happening in Thailand.

Learning outcome

- Enhanced knowledge about Pangasius farming and its role on seafood and nutrition security
- Demonstrate skills on Pangasius breeding, nursing and farming
- Ability to develop a business plan to run a pangasius/catfish hatchery or grow-out farm

Training period: 1 week
Training fee: 885 Euro /participant (Exclusive of living and travel costs)
Lectures:

The major training topics include:

3. Lecture 1 - Biology, and production status & trend
   Lecture 2 - Broodfish maturation and breeding
   Lecture 3 - Egg Incubation and larval rearing
   Lecture 4 - Grow-out methods: Nutrition and feeding management

Practical – 15 hours (3+3+3+3+3) – Lab and field
Practical include hormone injection, stripping, incubation etc. The hatchery where our trainees are taken for practice produces and sells over 5 million catfish fry in a single day. The Manager says, demand reaches up to 10 million a day but that is too much work to do. Its again hard to believe but this is happening in Thailand. Our trainees inject the fish, and assist in stripping several kilos of eggs; and will have no question on how manage such a large-scale hatchery.

Required materials:

- Brood fish (4-5 pairs of min. 5 kg in size) and
- Circular tanks with nets for egg incubation and hatching
- Breeding (hormone injection) and larval rearing in a private farm
- Dose: 1 cc Suprefact/20 cc sterilized water or normal saline water for 10 brooders, 2.5 ml/brooder). (OR- 1 ml Suprefact/9 ml sterilized water and use only 1 ml/brooder).
- Alternatively, PG can also be used in combination with suprefact

Final report including business plan: by each participant – max. 5 pages

Presentation of results by the group of students (Seminar Room)

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by students / participants

Resource persons: Dr Ram Bhujel & Mr Point

ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 4:
Snakehead farming: Breeding, Nursing and grow-out

Background

Channa sp. is widely accepted fish in Thailand and Asia. There are many species such as *C. striatus, C. marulius, C. micorlepis, C. asiatica* etc. As *Channa* were found in the wild, it was not cultured in the past. Culture began since mid 1970s. Initially, 1-2 cm wild fry or fingerlings were collected from the rice fields. Thousands of rice farmers in the rural villagers were asked to catch them and keep them alive in plastic bags to give to the farmers. Wild seed collection has always issue of unpredictable supply. Therefore, efforts were made to produce by induced breeding. Artificial breeding has been successful in near the natural condition. Culture methods have been developed in China, India, Thailand and Vietnam and its production is increasing recently.

AIT wants to organize this training to make available to everyone who wants grow snakehead to provide its technology to and share experiences with any interested individuals and organizations, public or private, located in Thailand or any other countries. Training includes

Learning outcome

- Enhanced knowledge on biology, reproduction and nutrition of snakehead
- Demonstrate skills on snakehead breeding, nursing and grow-out
- Demonstrate skills on making feeds, feeding and planning
- Enhanced knowledge of hatchery and farm management
- Ability to develop a business plan for hatchery, nursing and grow-out farms

Training period: 1 weeks
Training fee: 1,329 Euro /participant (Exclusive of living and travel costs)

Lectures –11 lecture session (11 x 3=33 hrs)

Lecture 1: Welcome and introduction
Lecture 2: Fisheries / Aquaculture: Global Perspective
Lecture 3: Snakehead Farming: Status and Trends Worldwide
Lecture 4: Farm / Hatchery Design and Layout
Lecture 5: Snakehead Grow-out Systems

Lecture 6: Water Quality Monitoring and Management
Lecture 7: Feeds & Feeding Management
Lecture 8: Economics and Marketing

Practical: in a private farm Klong 13, Nong Sue

Practical – 5 lecture session (5 x 3=15 hrs)

Brood preparation, selection, hormone preparation, injection, egg stripping, feeding, nursing, grading, etc.

Materials needed:

Broodfish
Hormone
Syringe

Final report including business plan: by each participant – max. 5 pages and presentation on the final day.

Presentation of results by the group of students (Seminar Room)

- Techniques and lessons learned
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by: students / participants

Resource persons: Dr Ram Bhujel, Mr. Point and others.

ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 5:
Breeding and Culture of Oysters and other Shellfishes

Background

Oysters (*Crassostrea gigas* and others) are high value seafood items found in local vendors, grocery stores, supermarkets and restaurants in fresh, dried and freezing forms. They are mostly caught from the sea. There is a concern about its sustainable supply while catching from the wild population. Therefore, there is need to develop its culture systems. Farming could be highly profitable. More interestingly, some oysters are culture to produce even pearls. Similarly, there are other shellfishes, which can play an important role in food and nutrition security; namely, mussels, cockles, snails and so on. Thailand is one of the most successful countries developing breeding of a wide variety of aquatic animals and also farming. Research and Development has been carried out in many stations of Department of Fisheries (DoF), universities and colleges. Breeding and culture of oysters and other shellfishes is one of the few new innovations occurring in southern Thailand.



AIT offers this training to make the technologies available to everyone who wants grow oysters to provide its technology to and share experiences with any interested individuals and organizations, public or private, located in Thailand or any other countries.

Learning outcome

- Enhanced knowledge on biology, reproduction and nutrition of shellfishes
- Demonstrate skills on shellfish breeding, nursing and grow-out
- Demonstrate skills on making feeds, feeding and planning
- Enhanced knowledge of hatchery and farm management
- Ability to develop a business plan for shellfish hatchery & grow-out farms

Training period: 2 weeks
Training fee: 1,329 Euro /participant (Exclusive of living and travel costs)

Lectures –6 lecture sessions (6 x 3=18 hrs)

Lecture 1: Fisheries / Aquaculture: Global perspectives
Lecture 2: Seafood Products and Nutrition Security
Lecture 3: Biology of Shellfishes and their habitats
Lecture 5: Single cell algae and stock culture

Lecture 6: Oyster Breeding and Research
Lecture 7: Water Quality Monitoring and Management
Lecture 8: Feeds & Feeding Management
Lecture 9: Cooking shellfishes and products

Practical – Lecture sessions (5 days x 8=40 hrs)
Shellfish breeding, feeding, etc. including algal culture

Field visits: Two field visits and one city excursion (Bangkok)

Final report including business plan: by each participant – max. 5 pages and presentation on the final day.

Presentation of results by the group of students/participants (Seminar Room):

- Techniques and lessons learned (whole morning/afternoon)
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by: students / participants

Resource persons: Dr. Sumittra, Dr Ram Bhujel and others.

Program Schedule
April 17 – 29, 2019
Mussels, Oysters and Snails breeding and fattening

Date / Day	Morning session (09:00 – 12:00 hrs)	Lunch break	Afternoon session (13:30 - 16:30 hrs)
April 17	Arrival and pick up and transfer to AIT Hotel		
April 18	Welcome, Introduction and Orientation **Lecture 1**: Fisheries / Aquaculture: Global perspectives by Dr. Ram C. Bhujel		**Lecture 2:** Seafood Products and Nutrition Security by Dr. Ram C. Bhujel
April 19	08:30 – 18:00 hrs. – Trip to Bangkok (Wat Pho, Wat Warun, MBK, and Siam Paragon)		
April 20	Visit to fish / seafood markets in Talat Thai and Future Park		
April 21	Leave AIT at 6 am to fly by AirAsia from Don Muang to Trang		Visit to Trang RMUTT Aquaria and Seabeach
April 22	**Lecture 3:** Biology of Shellfishes and their habitats - Dr. Sumittra		**Lecture 4:** Single cell algae and stock culture
April 23	**Lecture 5**: Oyster Breeding Research by Dr. Sumittra		**Lecture 6:** Cockle Breeding Research by Dr. Sumittra
April 24	**Practical1**: Single cell algae and stock culture for feeding practice (08:00 – 17:00 hrs)		
April 25	**Practical2:** Oyster Breeding practice (08:00 – 17:00 hrs)		
April 26	**Practical3:** Check stage, change water, survival rate and feeding practice, Cockle Breeding practice (08:00 – 17:00 hrs)		
April 27	**Practical 5:** Check stage, change water, survival rate and feeding practice (08:00 – 17:00 hrs) Crab breeding and fattening.		
April 28	**Practical 6:** Calculation in Feeding, growth rate, survival rate and size selection. Visit oyster farm and stay (Oyster home stay)		
April 29	Morning – fly back to Bangkok then stay in Bangkok overnight Stay over night in Bangkok (Pratunam/ Indra area) for shopping Wrap up and certificate award during Dinner at a Local Restaurant		
April 30	Return back		

ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 6:
Aquaponics

Background

Aquaponics is an integrated multi-trophic system that combines aquaculture and soilless vegetable farming i.e. hydroponics. Cultivating opportunities for income



generation, food security and climate-change resilience through aquaponics Aquaponics is growing around the world and the technology is becoming increasingly popular. Its role for food security would be particularly relevant because the global population now exceeds 7.2 billion and is growing rapidly.

Aquaponics is an exciting new direction in growing pure, clean food in a more sustainable way. The system results in a symbiosis between fish, microorganisms and plants, and encourages sustainable use of water and nutrients, including their recycling, while at the same time the nutrients for the plants are supplied from a sustainable, cost-effective and non-chemical source. Currently, aquaponics is a small but emerging business sector that attracts more and more capital. Aquaponic is suitable for use in urban as well as rural areas with availability of limited land. This training course has been designed to provide technical and business knowledge about aquaponic and it is our conviction that this technology has the potential to play a significant role in food production in the future.

Learning outcome

- Enhanced knowledge about aquaponic
- Opportunity to manipulate and engineer symbiotic relationships
- Develop small scale Aquaponic system
- Ability to develop a business plan

Training period: 1 week

Training fee: 885 Euro /participant (Exclusive of living and travel costs)

Lectures – 6 hours (3+3) – Classroom

4. Current trends and organic food supply chain
5. learned about the environmental, operational, and socio-economic effects of aquaponics
6. Different aquaponic system
7. Planning and management of aquaponic system; water quality, plant quality, fish quality and quality slandered.

Practical – 15 hours (3+3+3+3+3) – Lab and field

1 Aquaponic greenhouse tour in AARM, AIT– NFT, Media based system
2 Identify each component (AIT Aquaponics systems)
3 Preparation of different media for micro-organism
4 Preparation of fish stock
   a. Preparation optimum condition water for fish
   b. Adjust water flow and water quality measurements
5 Plant Maintenance
   a. Identify the suitable plant for each system,
   b. Identify the nutrient deficiency through plant (observation)
   c. Pest identification under microscope
   d. Preparation of organic pest solutions
   e. Preparation of vermiculture

6 **Field visit**- "Aquaponic Thailand" farm, Samutprakarn – Vertical aquaponic

Final report including design the aquaponic system/business plan: by each participant – max. 5 pages

Presentation of results by the group of students (Seminar Room)

1 Techniques and lessons learned
2 Wrap-up by Instructor (1 hour)

Feedback and evaluation by students (MSc and PhD) / participants

Resource persons: Dr Ram C. Bhujel and Anusha Perera

ASIAN INSTITUTE OF TECHNOLOGY
AQUA-CENTRE

SSNS Training Course 7:
Seaweed farming

Background

Seaweed (*Caulerpa lentillifera*) or sea vegetables are forms of green algae that grow in the sea. and rich in antioxidants, vitamins, and minerals, seaweed packs a serious nutritional punch. Seaweed is part of a healthy diet and is used in herbal medicines in many traditional cultures. Seaweed may be able to find fresh seaweed, seaweed sushi, crispy seaweed, seaweed soap, Otherwise, you may find many types of dried seaweeds in the supermarket and online, such as on Amazon. Mostly of seagrass caught from the sea, cage culture in the sea and in the farm. Farming could be highly profitable, sustainable supply and processing for make more value. More interestingly, some seaweed is culture to produce even cosmetic and dietary food.

Thailand is one of the most successful countries developing seaweed farming and processing. Research and Development has been carried out in many stations of Department of Fisheries (DoF), universities and colleges. Culture and processing of seaweed (*Caulerpa lentillifera*) is one of the few new innovations occurring in southern Thailand.

AIT offers this training to make the technologies available to everyone who wants grow seaweed and seaweed processing to provide its technology to and share experiences with any interested individuals and organizations, public or private, located in Thailand or any other countries.

Learning outcome

- Enhanced knowledge on biology and nutrition of seaweed.
-Demonstrate skills on seaweed farming in the sea and farm system.
-Demonstrate skills on making value of seaweed and processing.
-Enhanced knowledge of farm and management.
-Ability to develop a business plan for seaweed and marketing.

Training period: 2 weeks

Training fee: 1,329 Euro /participant (Exclusive of living and travel costs)

Lectures –6 lecture sessions (5 x 3=15 hrs.)
Lecture 1: Introduction in seaweed culture.
Lecture 2: Biology and Utilization of seaweed.
Lecture 3: Environment factors for seaweed culture.
Lecture 4: Seaweed culture in the cement pond, earth pond and cage culture.
Lecture 5: Farm management, Harvest, Post-harvest and Processing.

Practical – Lecture sessions (15 hrs.)
Practicum 1: Check water quality, prepare the seaweed and fertilizer.
Practicum 2: Prepare the seaweed for culture.
Practicum 3: Water changing, Fertilizer application, harvest and Post-harvest.
Practicum 4: Practice crispy seaweed, seaweed soap, seaweed preservation.

Field visits: 5 field visits and one city excursion (Bangkok)

Field visits 1: DoF at khlong 13.
Field visits 2: Office of the Royal Development Projects Board (ORDPB), seaweed farm and learning
Center.
Field visits 3: Outdoor seaweed farming at Ban Leam Sak, Krabi province.
Field visits 4: Indoor seaweed farming at Ban Taling Chan, Krabi province.

Final report including business plan: by each participant – max. 5 pages and presentation on the
final day.

Presentation of results by the group of students/participants (Seminar Room):
-Techniques and lessons learned (whole morning/afternoon)
- Wrap-up by Instructor (1 hour)

Feedback and evaluation by: students / participants

Resource persons: Dr. Manoch, Dr Ram Bhujel and others.

Program Schedule
Seaweed farming

Date/Day	Morning session (09:00 – 12:00 hrs)	Lunch	Afternoon session (13:30 - 16:30 hrs)
December 1	Arrive, Check-in AITCC hotel and rest		
December 2	Welcome, registration and Food &Nutrition security through Fisheries /aquaculture projects by Dr. Ram C. Bhujel/ Anusha orientation		Field visit together with the other group
December 3	Field trip:Talat Thai 8-9 ==> Office of the Royal Development Projects Board (ORDPB), seaweed farm and learning center		
December 4	Check-out hotel and flight to Trang		
December 5	Warming welcome and orientation at Rajamangala university Lecture1: Introduction in seaweed culture Dr. Prasert Tongnunui		Lecture2: Biology and Utilization of seaweed Dr. Manoch Khumjareon
December 6	Lecture3: Environment factors for seaweed culture Dr. Manoch Khumjareon		Practicum: Check water quality, prepare the seaweed and fertilizer Dr. Manoch Khumjareon
December 7	Lecture4: Seaweed culture in the cement pond, earth pond and cage culture Dr. Manoch Khumjareon		Practicum: Prepare the seaweed for culture Dr. Manoch Khumjareon
	Lecture5: Farm management, Harvest, Post-harvest and Processing Dr. Manoch		Practicum: Water changing, Fertilizer application, harvest and Post-harvest Dr. Manoch
December 8	Practicum: Practice crispy seaweed, seaweed soap, seaweed preservation Dr.Chutinuch Sujarit,Dr.Nopparat Mahea		
December 9	Certificate, Wrap up and discussion		
December 10	Field trip: Check-out hotel, Go to Krabi, visit indoor farm and outdoor farm and check in hotel at Krabi		
December 11	Free day, take a rest, on day trip, relax		
December 12	Check-out hotel and flight to Bangkok stay in Hotel in Pratunam / Indra area		
December 13	Free day		
December 14	Check in hotel AITCC, wrap up and certificate award ceremony		
December 15	Return		