



Grouper Hatchery Production Training Course
Gondol Research Institute for Mariculture, Bali, Indonesia
1st - 21st May, 2002

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The training course was organized and supported by the Ministry of Marine Affairs and Fisheries, Indonesia, the Network of Aquaculture Centres in Asia-Pacific (NACA), the Australian Centre for International Agricultural Research (ACIAR), the Asia-Pacific Economic Cooperation (APEC) and the Japan International Cooperation Agency (JICA). It is one of the activities of the Asia-Pacific Marine Finfish Aquaculture Network (<http://www.enaca.org/grouper/>). The training course was conducted at the Gondol Research Institute for Mariculture (GRIM), northern Bali, Indonesia, which is equipped with good facilities for training and research and has excellent experience in breeding of several grouper species. This is the first time that GRIM has offered a regional training course on grouper hatchery production in cooperation with NACA and the Asia-Pacific Marine Finfish Aquaculture Network, although it has provided training in grouper breeding and culture for Indonesian scientists, technicians and farmers for some time.

14 participants attended the training course from 8 economies in the Asia-Pacific region; Thailand, Indonesia, Hong Kong China, Singapore, Vietnam, Malaysia, the Philippines and Colombia. The training course attracted four people from the private sector and 10 from government research institutes around the region.

Picture 1: Group Photo



Opening and Institute Tour

Gondol and NACA staff, and the resident JICA marine fish breeding expert, opened the training course with a welcome speech. After the official opening the participants were given the opportunity to introduce themselves and toured the facilities at GRIM with the director Dr Adi Hanafi and his staff.

Picture 2: Participants touring facilities guided by Gondol officers observing the broodstock tank



Picture 3: Participants visiting new superintensive systems with Dr Adi Hanafi (Director of GRIM) and officers



The training course

During the 21 days of training, participants were provided with a mix of practical, hands on training, supported by lectures and working discussions on various topics, broadly covering the following:

- Grouper Seed Production
- Live Food Production
- Broodstock and egg management
- Sex and maturation manipulation
- Parasitic diseases
- Bacterial diseases
- Viral diseases
- Transportation of eggs and seed
- Nutrition and feed development
- Floating net cage culture
- Mariculture development in Indonesia

Practical work

One of the essential components of the training course was on the job training. The participants were divided into four groups, with each group assigned to handle and take care of one tank of larvae. The responsibilities of the group members were to feed the larvae, clean tank bottom, counting rotifer in the larvae tanks, harvest rotifer in the live feed section, and enrich live feed such as rotifer and *Artemia*.

The participants were also provided with other on the job training including:

- Preparation of larval rearing tanks (*Picture 4*)
- Larviculture (*Picture 5*)

- Aeration control
- Management for prevention of surface tension death
- Rotifer density estimation (**Picture 6**)
- Live feed culture
 - Microalgae (**Picture 7; Picture 8; Picture 9**)
 - Rotifer (**Picture 10; Picture 11; Picture 12**)
 - *Artemia* (**Picture 13**)
- Egg harvesting, handling, examine egg quality and estimation of hatching rate (**Picture 14; Picture 15; Picture 16; Picture 17**)
- Broodstock, feeding, handling and post spawning handling (**Picture 18; Picture 19; Picture 20; Picture 21; Picture 22**)
- Feed preparation and feeding (**Picture 23**)
- Examining gut contain of early larvae
- Diseases (**Picture 24; Picture 25; Picture 26**)

Picture 4: Preparation of larvae culture tanks by participant from Thailand



Picture 5: Participants observing Day -30 larvae in larvae tanks prepared for the training course



Picture 6: Participant counting rotifer populations under supervision of GRIM technician



Picture 7: One participant doing a cell culture for microalgae in laboratory



Picture 8: Lecturer explaining the microalgae pure culture in indoor system



Picture 9: Participant observing different type of microalgae under the microscope



Picture 10: Participants harvesting rotifers with GRIM technician supervision



Picture 11: Vietnam participant transporting rotifers to holding tank



Picture 12: Harvesting enriched rotifers for feeding to larvae



Picture 13: Participants harvesting enriched Artemia larvae



Picture 14: Participants harvesting eggs from broodstock tank with GRIM technician



Picture 15: GRIM technician showing egg counting to participants



Picture 16: Participant observing eggs quality under the microscope



Picture 17: Observing packing of eggs for distribution



Picture 18: Observing enrichment of broodstock food



Picture 19: Participants observing broodstock feeding at GRIM



Picture 20: Lecturer explaining to participants the microchip instruments and their application



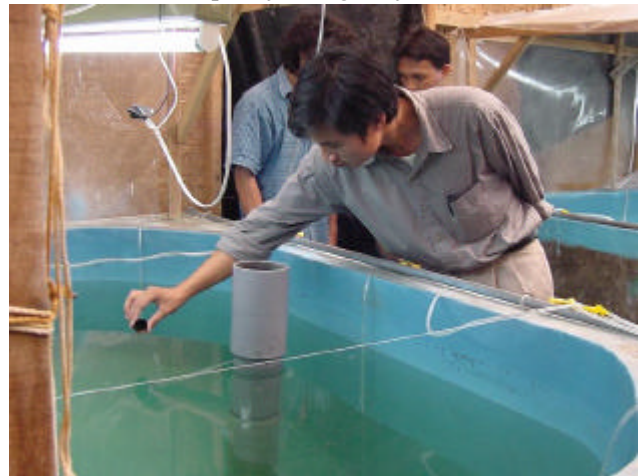
Picture 21: Hand pressure to check broodstock after spawning



Picture 22: Checking broodstock post spawning



Picture 23: Participant feeding artificial diet to larvae



Picture 24: Lecturer explaining parasitic disease of grouper species in the Parasitic Laboratory at GRIM



Picture 25: Bacterial diseases laboratory class



Picture 26: Lecturer showing participants after freshwater bath of broodstock, used to check whether external parasite attack the broodstock



PCR Test

After the theoretical section on diseases, particularly viruses, participants were provided a one day session on step-by-step PCR test procedures for grouper larvae to determine whether the larvae are infected with VNN virus. (**Picture 27**)

Picture 27: Observing PCR test preparation and procedures



Feed Preparation and Manufacturing

After the lecture on Nutrition and Feed Development, participants were given a hand on practical lesson on feed preparation and manufacture. The group was brought to feed production section at GRIM and shown how to prepare and produce artificial pelleted feed. The formula for the feed was provided by GRIM. The participants were provided step-by-step guideline for making the pellet feed, and explanation of the feed machineries. Some participants were given the opportunity to do work on pellet spreading on the drying tray. (**Picture 28; Picture 29**)

Picture 28: GRIM technicians checking on the quality of feed produced



Picture 29: GRIM technician shows participants on how to make pelleted feed by small machine



Observations

Participants were provided chances to observe broodstock selection and examine egg development stage for Napoleon wrasse. Activities such as blood sampling and injecting microchip for broodstock of Napoleon wrasse and mouse grouper were also observed by participants. (**Picture 30; Picture 31; Picture 32; Picture 33; Picture 34**)

Picture 30: Observing Napoleon wrasse activities – blood sampling



Picture 31: Observing Napoleon wrasse activities – egg development stage sampling



Picture 32: Participants were explained and shown egg sampling from Napoleon wrasse broodstock



Picture 33: Scanning the *Cromileptes altivelis* broodstock to check identity



Picture 34: Preparing for injecting microchip in broodstock of *Cromileptes altivelis*



Field Trips

Field trips were organized to visit grouper backyard hatchery, grouper nursery, live fish traders and exporters, fish market and also floating cages. Participants were also provided the opportunity to visit some milkfish hatcheries nearby.

Grouper backyard hatcheries

Three commercial backyard hatcheries were visited, providing an opportunity for the participants to see for themselves how the system actually operates and works. (**Picture 35; Picture 36**)

Picture 35: Field trip to a backyard hatchery, observing algae culture tanks



Picture 36: Field trip visit to a backyard hatchery, observing larvae culture tanks for *Cromileptes altivelis*



Grouper nursery

One big commercial nursery was visited. The nursery cultured mouse grouper and tiger grouper. This nursery bought fry at 2 cm in length and grows them to juveniles. (**Picture 37; Picture 38; Picture 39**)

Picture 37: Field trip visit to grouper nursery farm – outdoor nursery area



Picture 38: Field trip visit to grouper nursery farm – indoor nursery area



Picture 39: Observing feeding activity at the grouper nursery farm



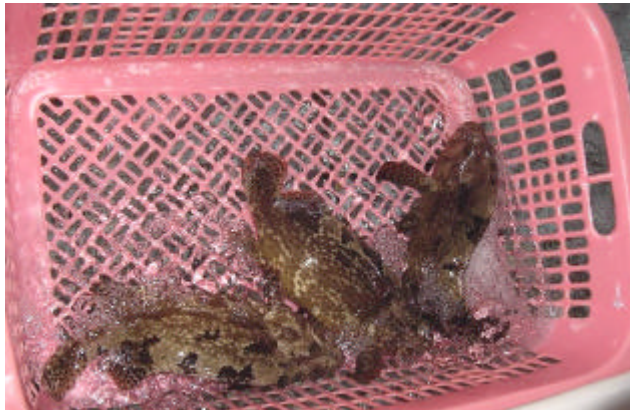
Live fish traders and exporters, and fish market

A one-day trip was organized for participants to visit live fish traders and exporters. Two live fish exporters were visited. One was dealing on coral trout and the other is mixed of grouper species, but mainly on *Epinephelus* spp., such as tiger grouper. After the live fish section the group was brought to visit the local fish market, which is the main fish market in Denpasar area. (**Picture 40; Picture 41; Picture 42; Picture 43; Picture 44; Picture 45**)

Picture 40: Field trip visit to live fish trader and one exporter



Picture 41: Main holding grouper species in trader and first exporter– *Epinephelus fuscoguttatus*



Picture 42: Field trip visit to live fish trader and second exporter – packing activities



Picture 43: Main coral reef fish species held by trader and second exporter – *Plectropomus* spp



Picture 44: Field trip to local fish market



Picture 45: Some coral reef fish species for sale in the local fish market



Floating net cages

The participants were provided a chance to visit the broodstock holding cages nearby GRIM and also visited GRIM's floating net cages for grouper nursery from 2 inches to stocking grow-out cage size. The group also went to visit a floating net cage farm which cultures mainly milkfish, and is also beginning with grouper culture, particularly mouse grouper. **(Picture 46; Picture 47; Picture 48; Picture 49)**

Picture 46: Field trip visit to broodstock holding floating net cages nearby GRIM for various marine finfish species



Picture 47: Participants observing the wooden frames of floating net cages in GRIM with explanations being provided by Dr Adi Hanafi and officer



Picture 48: Field trip visit to GRIM nursery floating net cages for grouper species



Picture 49: Field trip visit to floating net cages of milkfish and grouper culture



Private Sector Interaction and Discussion Session

Additional activity such as informal meeting with the private hatchery operators were also arranged so that participants could learn from success stories and problems that were facing by the private sector in Indonesia in grouper seed production. Discussion sessions with technician and lecturers at GRIM were also organized as needed. (*Picture 50; Picture 51*)

Picture 50: Small group discussion with GRIM technician



Picture 51: Private sector interaction and discussion session



Certificate and Closing

Overall the training course was a successful one, participants experiencing a lot of activities and also being provided some commercial interaction, that provided opportunities for participants as well as the local hatchery operators, traders and exporters and products suppliers. Each participant was awarded a certificate of completion by ACIAR, APEC, GRIM, JICA and NACA. The training course was closed by Director of Research Center for Aquaculture, Indonesia, Dr Ketut Sugama. (Picture 52; Picture 53)

Future similar training course may be run, anyone interested please contact grouper@enaca.org.

Picture 52: Vietnam participant receiving certificate of completion from lecturer



Picture 53: Closing speech by Dr Ketut Sugama

