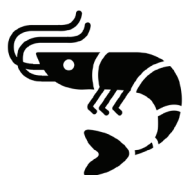


# The Nutritious Pond Project

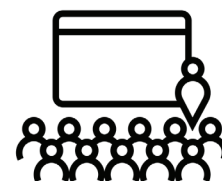
*Newsletter #9, June 2019*

## Highlights - In this issue



- Summary of the special session and the Nutritious Pond presentation at 12<sup>th</sup> Asian Fisheries and Aquaculture Forum (AFAF) in Iloilo, Philippine
- Update on the current farm trial in Hoa De cooperative, Mekong Delta

- Kabir is defending his PhD : “Feeding fish or pond...?”
- New publications
- Scaling initiative in South Asia and Africa



## 12<sup>th</sup> Asian Fisheries and Aquaculture Forum (AFAF) Iloilo, Philippines



After successful presentations at the [World Aquaculture Conference in Montpellier](#)

(France) last summer, the research team (e.g Marc Verdegem, Devi Hermesen, Kabir Kazi, Tran Huu Tinh and Olivier Joffre) presented their research at the [12<sup>th</sup> Asian Fisheries and Aquaculture Forum](#) (AFAF) in Iloilo, Philippines.

The presentation around the Nutritious Pond concept was made during a special session on [Sustainable Sea-Food Security](#) last April 10, 2019. The session was joined by [PASMI](#), [ALEGAMS](#), [Fish4Food](#), and [ARF project Mangrove Polders](#), other NWO funded projects.



The presentations were grouped into 3 themes.

1. 'Recent advances in pond ecology and nutrition';
2. 'Innovation design in aquaculture';
3. 'Adoption of aquaculture technology'.

The presentations were well attended, and followed by a lively workshop on "How to Make Innovations in Aquaculture Contribute to Inclusive Business and Equal Access to Food"? Recommendations resulting from this special session can be downloaded [here](#) and presentation [here](#).



## New on-farm experiment in Hoa De cooperative, Mekong Delta

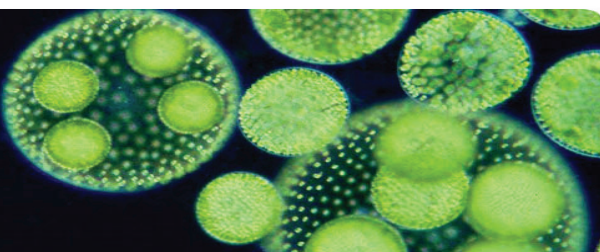
*Experiments on semi-intensive *P. vannamei* culture are still continuing!*

*Following our last experiment in 2018 using molasses and a progressive feed load, the research group conducted a workshop to discuss the 2018 results and to design the 2019 experimental protocol.*



In 2018, results showed higher daily growth of individual shrimps in trial ponds (138 mg/day) than control ponds (114 mg/day). In trial ponds, the shrimp feed input was lower and carbohydrates were added, compared to control ponds that received conventional feed at the recommended feed load.

The culture period was longer in Trial ponds (more than 70 days) compared to control ponds that were affected by disease. During the design workshop held on the October 24, 2018 at Can Tho University, members of the innovation platform discussed the recent results from both field trials and from PhD research conducted by Kabir, Devi and Tinh.







**Tran Thuu Tinh** presented his latest research testing different types of carbohydrates added to conventional feed and the effects on shrimp growth. The experiments showed that corn starch performed better than molasses. Both diets aimed at a C:N ratio of 14. In six weeks of culture in controlled environment (a mesocosm), on average, individual shrimp reached 4.5 g with a low protein diet based on corn starch compared to 2.25 g with a low protein diet based on molasses. This key result was accepted by participants, and the use of corn starch in the early steps of culturing *P. vannamei* was integrated into the protocol of the 2019 on-farm experiment.

The results of **Kabir Kazi's** research on using low protein-high energy pellets on tilapia were also discussed during the workshop. His on-farm research shows that using such pellets achieves better growth, more efficient use of the feed inputs and higher contribution of the natural food to the fish diet compared to conventional diet. The study also shows higher economic results when using a low protein diet compared to conventional diet.

After a vivid discussion, participants decided not to test a single pellet with a low protein content on *P. vannamei*. Participants, and especially farmers and extension service workers, questioned whether such results could be replicated with shrimp. They wanted to first have a proof of concept for the use of such pellets on *P. vannamei* in a controlled environment before testing on-farm. This research is presently conducted at Wageningen University, and outcomes will be communicated to the farmers as soon as the results become available.

### 2019 protocol

As a result of these findings, it was decided to test a similar protocol to 2018, but to use corn starch rather than molasses for the period of pond preparation until 41 days of culture.

The progressive feed load is similar to 2018, with a 25% reduction of the recommended feed load from day one to day 25, then a 15% reduction until day 45, followed by a reduction of 5% until day 60 and a 10% reduction until harvest.

The experimental setting is also similar to 2018, with three control ponds and three treatment ponds, using post larvae (subsidized by Viet Uc) from one common batch nursed on similar commercial feed (provided by Skretting). The experiment is currently on-going, with an expected harvest in early July 2019.



**More in the next Newsletter!**





# Farmer Field Day and Master Class in the Mekong Delta

On May 29, Marc Verdegem gave a master class at Can Tho University on pond ecology and an ecosystem approach to aquaculture. The audience was composed of Bachelors students from the Advanced Aquaculture program and Masters students from South East Asia (Vietnam, Cambodia, Lao PDR), Europe (France) and Africa (Uganda, Nigeria, Malawi). The presentation used recent research results from the Nutritious Pond project to question current methods of feeding fish and shrimp and to define new approaches to feeding in pond aquaculture.

This class was followed by a Farmer Field Day in Hoa De Cooperative, Soc Trang province. The cooperative members, cultivating *P. vannamei*, have been involved in the project since 2016.



Farmers from Hoa De cooperative and from other cooperatives using similar production systems were invited to a demonstration and presentation of the project results. The audience included students and researchers from Can Tho University, agents of aquaculture certification agencies and extension services from Soc Trang Province. In total, 30 people attended the demonstration.

Can Tho University researchers and the farmers involved in the trials presented the results of three years of experiments. Recommendations for the nutritious pond diet, together with a protocol to reduce the feed load and to add carbohydrates (e.g. cornstarch, rice bran and ground cassava), were presented and discussed with the audience.

Farmers' questions were related to the application of the technology and how to calculate the dose of carbohydrates. The farmers' interest was centered around creating a stable and good environment for *P. vannamei*, and reducing the incidence of disease in the pond.





Mr Hoa, from the provincial Department of Agriculture and Rural Development (DARD), who has been following the project for the last four years, emphasized that this technique is easy to implement from a technical point of view, and is also very low-cost.

*“It is like biofloc but easier to deploy at the farm, especially for small-scale farmers. You do not need to have an intense aeration system and high stocking density. Like biofloc, the Nutritious Pond concept approaches the nutrition of the shrimp from a food chains perspective, taking into account the natural food and not only the commercial feed”.*

To support dissemination of the technique, the project issued a leaflet in Vietnamese presenting the technique and giving simple recommendations on how to apply carbohydrates while reducing the feed load.

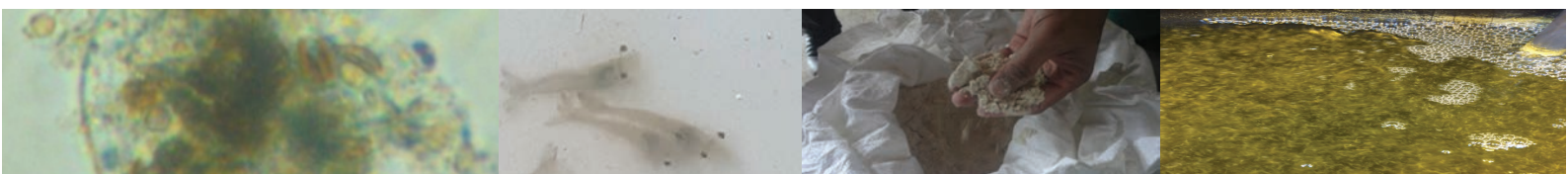


*Who do you trust?*

*A study on technology adoption behaviour amongst shrimp farmers!*

To continue to examine the process of adoption by aquaculture farmers, the project conducted an on-farm survey of 270 farmers in the Mekong Delta. The survey looked at farmers' access to knowledge and their levels of trust in different sources of knowledge, and the effects these factors can have on farmers' adoption of new technology.

The on-going data analysis with the Strategic Communication group of Wageningen University will explore the relationships between the frequency of interaction with knowledge sources, the trust associated with such knowledge sources, and the influence these factors have on technology adoption. Results will be complementary to the [previous study](#) published on this topic.



## PhD research



Devi is now writing her thesis. Her defense is planned for Fall, 2019. More papers will be submitted in the coming weeks!

Kabir Kazi is defending his PhD: “*Feeding fish or pond...?*” in Wageningen on June 18 at 11 am (GMT+1).

You can watch his defense live [here](#). The full thesis, with the four research chapters, will be available soon.



Tran Tuu Tinh is now in Wageningen University to complete his last experiment. After testing the effects of different types of carbohydrates on shrimp growth, Tinh is now looking at the forms in which carbohydrates can be added to the shrimp diet. In the last experiment conducted in a mesocosm with *P. vannamei* stocked at 50 ind/m<sup>2</sup>, Tinh is now testing three diets:

- One control diet (conventional pellets);
- One Nutritious Pond diet, with reduced feed load (pellets) and corn starch added separately;
- One Nutritious Pond diet, with a low protein pellets where the corn starch is already added to the pellets.

Results are expected in August 2019. Depending on the results, this low protein pellet will be tested in a pond environment. This current experiment will complement recent similar research conducted on tilapia by [Kabir](#).

## Publications

The project recently published the following articles:

- Kabir, K.A., J.W. Schrama, J.A.J. Verreth, M.J. Phillips, M.C.J. Verdegem. 2019. [Effect of dietary protein to energy ratio on performance of Nile tilapia and food web enhancement in semi-intensive pond aquaculture](#). Aquaculture 499. pp.235–242.
- Kabir, K.A., Verdegem, M.C.J., Verreth, J.A.J., Phillips, M.J., Schrama, J.W., 2019. [Effect of dietary protein to energy ratio, stocking density and feeding level on performance of Nile tilapia in pond aquaculture](#). Aquaculture 511
- Joffre, O.M., Poortvliet, P.M. & Klerkx, L., 2019. [To cluster or not to cluster farmers ? Influences on network interactions , risk perceptions , and adoption of aquaculture practices](#). Agricultural Systems, 173, pp.151–160.
- Joffre O.M., M, Verdegem. 2019. [Feeding Both Pond and Fish: A Pathway to Ecological Intensification of Aquaculture System’ INFOFISH International No 3/2019: 55-58](#)

Presentations related to the project given at 12th Asian Fisheries and Aquaculture Forum (AFAF) in Iloilo, Philippines the can be downloaded [here](#).

# Scaling Out!

The Nutritious Pond project is ending in 2019. It is time to scale out our knowledge and the lessons learned during those four years.

- During his PhD research, Kabir deployed one experiment with 40 farmers to test two types of diet (up-coming publication). In 2019/2020, a larger scale experiment is planned in Bangladesh.
- A PhD research is planned for the period of 2020 to 2024, to investigate the potential of the Nutritious Pond approach in carp polyculture in **Bangladesh**.
- In **Egypt**, within the Abassa research center, Wageningen University, WorldFish and Skretting will test lysine requirements in pond diets for tilapia. Two diets, one enriched in lysine and a diet deficient in lysine, will be tested in terms of the effects on the production and growth of tilapia.
- In **Zambia**, Wageningen University, and WorldFish will test three different diets for tilapia:
  - One commercial diet found on the market will be the control;
  - One nutritious diet formulated using local ingredients. The diet will have an 18% protein content. The treatment will include also inorganic fertilizer;
  - One supplement diet locally produced in Zambia with a 18% protein content.

One experiment will be conducted in an experimental station in southern Zambia. The experiment will be in ponds with small tanks and using Nile tilapia as a model. A second experiment will be conducted in on-farm conditions in the northern part of Zambia testing the diet of *Oreochromis. macrochir*.

The experiment, funded by FISH CRP, will start in Fall 2019 and run until 2020.

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