



Faculty of Science is delighted to present the first issue of e-Science Putra Newsletter. This thrice-yearly e-newsletter aims to disseminate and highlight the latest research findings, activities and contribution to the community by the Faculty members. We hope that you enjoy reading this newsletter.

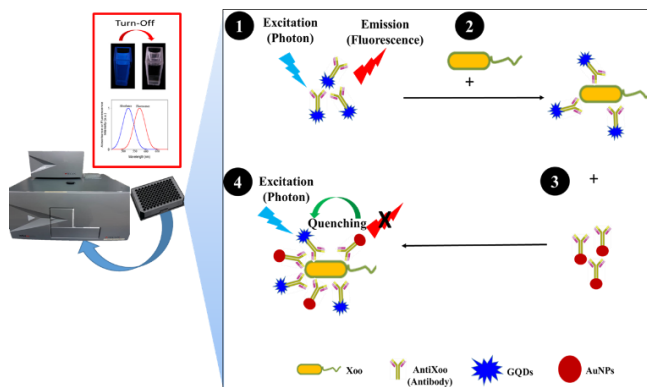
HIGHLIGHTS

- **Fluorescent-Graphene Quantum-Dots for Xoo Detection**
- **Vibriosis Marine Fishes**
- **Nest-Site Baya Weaver**
- **Armigard**
- **Assessment Semen Quality and Breeding Soundness in Small Ruminants**

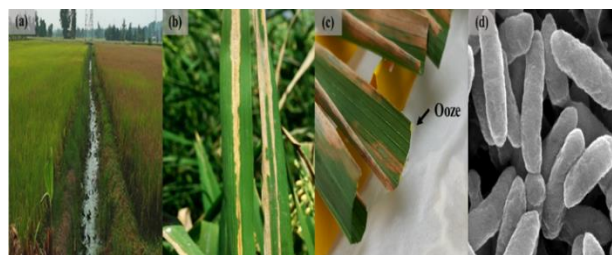
FLUORESCENT-GRAPHENE QUANTUM-DOTS FOR Xoo DETECTION

A group of researchers led by Assoc. Prof. Dr Jaafar Abdullah and his team (Prof. Dr Nor Azah Yusof, Dr Helmi Wasoh) in collaboration with researchers from MARDI (Norhafniza Awaludin, Dr Faridah Salam and Kogeethavani) carried out research focused on the development of **turn-off fluorescent-graphene quantum-dots based immunoassay** for the early detection of *Xanthomonas oryzae* pv. *oryzae* (Xoo), a gram-negative bacteria that causes rice bacterial leaf blight disease.

The specific antibody against Xoo cells was produced as specific bio-recognition molecules. The conjugation of this antibody with graphene quantum-dots and gold nanoparticles was performed and characterized respectively. The combination of these two bioprobes as fluorescent donor and metal quencher showed fluorescence signal changes proportional to the logarithm of Xoo cells in the range of 10^0 to 10^5 CFU/mL⁻¹.



Schematic diagram of fluorescent-graphene quantum-dots based immunosensor that using two probes of antibody conjugated with GQDs and gold nanoparticles



Bacterial leaf blight disease in rice crops (a) A view of BLB-infected paddy field at Sekinchan, Selangor, Malaysia; (b) BLB's symptom of yellowish strip lesions along the leaf margin; (c) Bacterial ooze from BLB infected leaves (IRRI) and (d) scanning electron microscopy (SEM) image of Xoo cells

VIBRIOSIS IN CAGE-CULTURED MARINE FOOD FISHES

Malaysian aquaculture sector has achieved rapid growth in production in the past 20 decades, which has contributed significantly to people's nutrition and livelihoods in this country. However, in recent years, various diseases have become a major constraint on production and trade in aquaculture industry.

Vibriosis, a disease caused by several species from genus of *Vibrio* is a number one ranked bacterial disease by the Department of Aquaculture Malaysia. This disease leads to economic losses among the cage-cultured marine fishes.



The sampling activity conducted at a commercial floating cage farm located at Pulau Ketam, Klang

Vibriosis project: Motivated by the lack of updated epidemiological data on vibriosis in Malaysia, a two-year project was conducted, led by Assoc. Prof. Dr Amal Azmai from Department of Biology, Faculty of Science and was funded by the 'Geran Putra Berkumpulan' from Universiti Putra Malaysia. The project also brings together a collaborative team of researchers from Department of Aquaculture, Faculty of Agriculture and Department of Veterinary Laboratory Diagnostics, Faculty of Veterinary Medicine, Universiti Putra Malaysia.

This project involved a cross-sectional and longitudinal study to determine the prevalence of *Vibrio* spp., to identify the risk factors, transmission, clinical signs and histopathological changes in infected fish, and to understand the antibiotic resistance profiles and distribution of

virulence genes of *Vibrio* spp. isolated from cage-cultured marine food fishes.

Focusing on the three most economically important marine food fishes; hybrid grouper, seabass, and red snapper, the study involved food fishes; hybrid grouper, seabass, and red snapper, the study involved twelve-month sampling of the fishes reared in a commercial floating cage farm at Pulau Ketam, Klang, Selangor. Among the key findings from the study are the year-long occurrence of *Vibrio* spp. in both diseased and healthy cultured fishes and the influence of fluctuating and decreasing water quality as the main risk factor for the disease.

Further study in pathogenicity testing also demonstrated a higher severity of the disease

in cultured fish affected by concurrent infection. Moreover, possible transmission routes of the potentially pathogenic *Vibrio* spp. via the newly introduced fry and wild fish was noted in this study. In addition, majority of the *Vibrio* isolated from the cultured fishes exhibited multiple resistance to 13 tested antibiotics, which represents a real concern to both aquatic animals and human health.



Cultured hybrid grouper affected with vibriosis

batch of fingerlings and appropriate husbandry management such as routine monitoring for sick fishes, practicing good hygiene, maintaining optimum water quality and stocking density to reduce stress to the fish. Moving forward, the data obtained from this study will be used for development of preventative measures which are more environment friendly and can ensure sustainability of aquaculture system in Malaysia. The cooperation between epidemiologists, fish health scientists and aqua culturists will also be beneficial, and therefore, efforts for such collaborations should be initiated from all needed parties.

Prevention and control of vibriosis: The long-term vision of this project is to provide further understanding on vibriosis as to aid in biosecurity enforcement and vaccine development to combat vibriosis. Based on the findings, farm operators were educated on the importance of biosecurity implementation in farm to prevent and control vibriosis.

The biosecurity strategy included use of high-quality fingerlings with better disease resistance towards *Vibrio* infection, quarantine of the new



Dr. Amal and team at Pulau Ketam

Report by: Mohammad Noor Amal Azmai, Department of Biology, Faculty of Science, Universiti Putra Malaysia.
(email:mnamal@upm.edu.my)

FACTORS AFFECTING THE NEST-SITE SELECTION AND THE INFLUENCE OF MICROCLIMATE ON NEST STRUCTURE OF BAYA WEAVER, *Ploceus Philippinus*

Baya Weavers are widely distributed local birds at Peninsular Malaysia, known as *Ploceus philippinus* in scientific term and more commonly known as “Burung Tempua” in Malay. They are gregarious birds that roost communally throughout the year and are seed-eating birds with rounded and conical bills. The males of this species are coloured with a bright yellow crown and breast during breeding season while the females are much dull in comparison. Baya Weavers get their name because of their elaborately woven nests. Male birds weave the nests and use them as a form of display to lure prospective females.

Unlike nests of most bird species, a Baya Weaver's nest is enclosed where eggs are guarded by the females in a comfortable egg chamber where the only way in and out of the nest is through an entrance tube. The nest is shaped like a kidney has can easily range from 23 cm to 114 cm. Within the nest structure, there are different stages of the nests that are built by the male birds, namely the wad stage, the ring stage and the helmet stage. If a female accepts a helmet stage or also known as the incomplete nest, the male together with the female complete the nest with an entrance tube and egg chamber followed by reproduction. It is important to select suitable nest location to ensure the reproduction success of birds since it determines the environmental conditions the adults, eggs, and chicks will be exposed to as Baya Weavers inhabit open areas, agricultural lands and sometimes even urban areas, the choice of nesting trees are often palm trees (*Elaeis guineensis*), river tamarinds (*Leucaena leucocephala*) or fruit trees such as mango trees (*Mangifera indica*). There are many factors that influence their choice to settle on a nesting tree as a nesting location.



A complete Baya Weaver's nest suspended from a palm tree at Bangi, Selangor

The nesting location should be able to deliver obligatory protection against predators and harsh environmental conditions. The macrohabitat of a location may also play an important role in a Baya Weaver's nesting choice such as a location with dense vegetation to conceal the nest's presence or with waterbodies below the nest. Another factor that contributes to safety of nests is the height at which the nests are built on trees, where higher nests are safer and contributes to nesting success.



An incomplete Baya Weaver's nest suspended from a mango tree at UPM Selangor without an entrance tube and egg chamber

Our results in a study conducted at Selangor and Perlis shows that the higher the nest from the ground, the longer the nest structure built. This could also apply to nests with low height having shorter nest structure which shows that nests higher from ground are safer enabling birds to build large nests while lower nests are forced to have a shorter structure which otherwise will enable risks of predation.

Microclimate is climatic condition of a small specialized area, few meters or less from earth's surface which differs from surrounding atmospheric condition. The fibres used by Baya Weavers to build nests create pores that allow the light in the nest and air circulation from external environments. The different environmental conditions inside and outside the nests could be due to an optimal internal environment required for the reproduction success of Baya Weave. For example, in harsh environments with high temperature, regulation of the internal temperature of the nest is important to increase the survival rates of chicks.

This also enables the temperature and light intensity inside the nest to be lower than the atmospheric temperature. In the study we conducted it shows that the longer the nest, the lower the temperature inside the nest. This could be influenced by long nests being built at higher position from ground which is closer to the canopy cover of the nesting tree and providing a cooler internal environment.

Baya Weavers are special birds to this country and are protected under the Wildlife Conservation Act 2010. Deeper understanding of these unique nests hopefully will lead to protection of this bird in future conservation effort and lessen the exploitation of their nests for ornamental purposes.

Report by: Marina Mohd. Top @ Mohd. Tah, Department of Biology, Faculty of Science, Universiti Putra Malaysia. (email: marinamohd@upm.edu.my)

ARMIGARD BY NANOCIPTA



Modern agriculture is dependent on progress made in the basic sciences, especially in Chemistry. Fundamental studies such as the synthesis of new organic or inorganic material and use of natural products designed to play a role, whether as fertilisers or enhancers in crop production or to reduce problems associated with agricultural production like weeds or pest control, is vital. In the Department of Chemistry, several initiatives have been taken to carry out fundamental and applied research related to agricultural progress.

A group of researchers led by Dr Nur Kartinee Kassim, Dr Norazlinaliza Salim (both from Faculty of Science) and Dr Norhayu Asib (Faculty of Agriculture) used nanotechnological methods to formulate a new antifeedant and repellent bioformulation called **Armigard** which is an organic formulation containing natural active material that acts as an antifeedant and insect repellent especially for cruciferous vegetables.



Jenis tanaman Sayuran krusifer	Serangga perosak Ulat plutella, Ulat ratus	Kadar banchuhan 20 mL/5Liter	Kadar sehektar 375 mL/hektar
Kadar kandungan			
Terpena		3% w/w	
Bahan Penstabil		97% w/w	

Report by: Nur Kartinee Kassim, Department of Chemistry, Faculty of Science, Universiti Putra Malaysia. (email: kartinee@upm.edu.my)

ASSESSMENT OF SEMEN QUALITY AND BREEDING SOUNDNESS EXAMINATIONS OF SMALL RUMINANTS



Community-Collaboration project at Agropolitan Farm

Dr. Mashitah Shikh Maidin and team from Department of Biology, Faculty of Science, UPM has organized community-collaboration project and worked closely with Mr. Arshad M. Ali, Farm Manager of Agropolitan Farm Besut Setiu. The team were sharing information with the farmers and the farm's workers on theory of reproductive physiology, proper feeding during breeding and hands-on activities in evaluating the capability of males in settling females through reproductive breeding quality. Other than physical examination and assessment of the reproductive organ, ethical procedure of semen collection by using artificial vagina and semen analysis were also practically introduced to the farmers.

An increasing food demand on livestock products including from small ruminants; sheep and goats has led to mass production of livestock to feed growing population. However, there are increasing concerns in terms of the environmental factor such as increasing global temperature indirectly affect the reproductive performances of male and female animals. The workshop on assessment of semen quality and breeding soundness examinations of rams Dorper was held at Agropolitan Farm, Besut Setiu, Terengganu was motivated to have optimal farm productivity.



Hands-on activity during the workshop

Report by: Mashitah Shikh Maidin, Department of Biology, Faculty of Science, Universiti Putra Malaysia. (email: mashitah@upm.edu.my)

EDITORIAL TEAM:

Prof. Dr. Zanariah Abdul Majid,
Assoc. Prof. Dr. Mohammad Noor Amal Azmai
Assoc. Prof. Dr. Thahira Begum
Jivananthan a/I Arumugam
Ruzila Hussain Shaari



FACULTY OF SCIENCE, UNIVERSITI PUTRA MALAYSIA, 43400 UPM SERDANG, SELANGOR DARUL EHSAN, MALAYSIA



+603 97696601/6602/6603



www.science.upm.edu.my



fs_tgps@upm.edu.my

