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# From cows to humans - one embryologist's experience

**Shan Wikinson**[1*]
[1]Tennessee Reproductive Medicine, Tennessee, USA

***Corresponding author:** swilkinson@trmby.com*

**Abstract**

Bovine embryos are incredibly similar to human embryos - blastocysts are 150+ microns. Even the gestation period is approximately 280 days in both species. I began my experience with bovine reproductive physiology at Mississippi State University (MSU), where I had the pleasure and privilege of knowing Suntorn. At MSU, we worked with the whole animal model, and my research focused on heat stress effects on bovine milk production and reproduction. It was interesting and meaningful work, but I knew I was not destined to work with cows long-term. While at MSU, my major professor, Dr. John Fuquay, Ph.D., put me in touch with a former student who worked as an embryologist at the Audubon Center for Research of Endangered Species (ACRES) in New Orleans. I took part in a two-week internship at ACRES, where I handled my first oocytes - from domestic felines.

**Keywords:** embryologist, embryos, oocytes

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# Environmental strategies to mitigate heat stress in feedlot cattle

**Leonel Avendaño-Reyes[1]*, and Ulises Macías-Cruz[1]**
[1]Instituto de Ciencias Agrícolas, Universidad Autónoma de Baja California Valle de Mexicali, Baja California, México

***Corresponding author:** *lar62@uabc.edu.mx*

**Abstract**

Hot climatic conditions are becoming a significant concern for feedlot cattle health and welfare, negatively impacting the economy of the beef cattle industry. Heat stress on cattle originates from high environmental temperature and high relative humidity, high solar radiation, and low wind speed. Therefore, protection against extremely hot weather is essential in arid and semi-arid regions of the world. Providing shade structure to feedlot cattle creates a microclimate inside the pen, assisting cattle to regulate their body temperature by cooling part of the pen area. So shades have the potential to mitigate heat stress from feedlot cattle, improving their physiological constants and their productivity. This manuscript discusses some aspects of heat stress in feedlot cattle, such as the thermoneutral zone, physiological changes in response to heat stress, and thermal radiation. Particular emphasis is placed on shade characteristics and design and results from research developed in shade utilization for feedlot cattle operations.

**Keywords:** heat stress, shade, feedlot cattle

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# Fish conservation in the lower Mekong basin: diversity and abundance in Thailand

**Rachanee Nammatra[1]*, Eakapol Wangkahart[2], Wachiraporn Kumnerdpet[3], Panarat Phadee[2], Bouziane Khalloufi[4], Apichet Pholoeng[1], and Soawapak Toemcheep[1]**

[1]Biodiversity and Conservation Research Unit, Walai Rukhavej Botanical Research Institute, Mahasarakham University, Maha Sarakham, 44150, Thailand

[2]Division of Fishery, Faculty of Technology, Mahasarakham University, Maha Sarakham, 44150, Thailand

[3]Office of the National Water Resources, Juthamard Building, 89/168-170, Vibhavadi Rangsit Road, Talad Bang Khen Sub-District, Lak Si District, Bangkok, 10210 Thailand

[4]Palaeontological Research and Education Centre, Mahasarakham University, Maha Sarakham, 44150, Thailand

***Corresponding author:** *rachanee.n@msu.ac.th*

## Abstract

The Mekong Basin is a biodiversity hotspot and a vital natural resource for five countries (China, Thailand, Laos, Cambodia, Vietnam). Regular biodiversity monitoring is essential to assess human impacts on basin ecosystems through fishing and habitat modifications (e.g., hydroelectric facilities). This study evaluated fish diversity and abundance in the Lower Mekong Basin during a 14-month survey conducted in 2020-2021. Eight stations distributed along the Mekong Mainstream in Thailand were sampled (Chiang Rai, Loei, Nong Khai, Bueng Kan, Nakhon Phanom, Mukdahan, Amnat Charoen, and Ubon Ratchathani) by using beach seines of different mesh sizes (2cm, 1mm) and fish market surveys. Each station was sampled during five campaigns to consider the impact of seasonality (flood season, low-water dry season, lowest-tide dry season). For each sample, fish abundance and diversity data are associated with water parameters (e.g., temperature, pH, water quality). Based on the results of the three first campaigns (July 2020 – February 2021), 3,555 fishes were collected, with a total weight of 53.180 kilograms, representing 29 families, 93 genera, and 170 species. Based on their migration pattern, 31 species are considered white fish, 35 species as grey fishes, and 14 as black fishes, with the migration behavior of the remaining species being variable or unknown. Species richness, local abundance, and fertility index are compared for the different stations and seasons. Species richness and abundance show variations between the stations and seasons. Data gathered from fish market surveys and in-depth interviews with fishers are used to quantify the economic importance of the different species. Three criteria related to fish diversity and financial interest are defined to classify the areas according to their level of risk exposure (high, medium, and low). This classification is used to raise awareness and educate the civil society to build a fish conservation policy through the Fish Conservation Project. The database resulting from this survey aims to be a baseline for comparison to assess changes in fish diversity and abundance in the Lower Mekong Basin for the years and decades to come.

**Keywords:** fish conservation, Mekong Basin, diversity, Thailand

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# Coffivino process: a new era of coffee fermentation

**Wanphen Jitjaroen[1]***
[1]Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna Lampang campus, 52000 Thailand

***Corresponding author:** *wanphenjit@hotmail.com*

**Abstract**

Developing fermentation quality is crucial in developing regular coffee to specialty coffee. Therefore, the Arabica Research Team, Rajamangala University of Technology Lanna, Thailand, has invented a new fermentation technique called the "Coffivino process." The aim is to create specialty coffee with a consistent level of quality in every season on an industrial level. This technique is inspired by wine fermentation technology, which combines the Semi-carbonic maceration process with the Yeast process. The new process matches the type and quantity of nutrients with the desired coffee cherry quality. Analyzing and controlling the quality of the entire fermentation process shows that the Coffivino process can create coffee with unique attributes, a wider variety of flavors, and higher intensity than the traditional process. This new technique would be the perfect solution for the fermentation of unhealthy quality coffee cherries on an industrial level and improving specialty coffee's sensory quality.

**Keywords**: Coffivino, coffee, fermentation, semi-carbonic maceration, yeast, Arabica

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# Frozen dough: prospects, challenges, and efforts to overcome the challenges

**Erni Sofia Murtini[1]* and Patricia Rayas-Duarte[2]**
[1]Food Science and Biotechnology Department, Agricultural Technology, Universitas Brawijaya, Malang, Indonesia
[2]Biochemistry & Molecular Biology, Robert M. Kerr FAPC, OSU, Stillwater, Oklahoma, USA

***Corresponding author:** *erni.murtini@ub.ac.id*

## Abstract

From its invention in the 1970s, the popularity of frozen dough technology has continued to increase up to the present time. It is projected that the global market share of frozen dough keeps growing. Frozen dough is grouped into three categories; un-fermented frozen dough (UFD), fermented frozen dough (FFD), and par-baked frozen dough (PBFD). The prepared dough is frozen to reach the core piece dough temperature to -10$^{o}$C, and it is held at freezer temperature (around -20$^{o}$C) storage for determined periods. The UFD requires defrosting and proofing before it is ready to bake, FFD requires a short/no time resting period, and the PBFD requires reheating to obtain freshness and proper crust color. Frozen dough technology provides freshly baked products, the critical factor of customer preference for buying bread. It also prolongs shelf life, saves time-space and production cost, and accelerates the industrialization of food. However, frozen dough technology still has challenging problems to solve since, in fact; it reduces the yeast cells viability (causes long wake-up time, decreases the $CO_2$ gas production), disrupts gluten protein network integrity (due to ice crystal formation/ recrystallization causing less gas retention), and increases water mobility (releases water from gluten matrix). Disruption of protein network and less yeast viability cause a decrease in bread quality (poor loaf volume, uneven porosity). Frozen storage also changes starch conformation and increases the firmness of bread crumbs. There have been advances in overcoming the challenges. For example, use specific yeast for frozen dough, increase the yeast cells' viability by changing the yeast growth phase and rate, and screen freeze-tolerant yeast strains. Other advances include frozen dough formulations combining enzymes, improvers/emulsifiers, and additives to maintain the quality during the freezing step, such as protein/peptides and polysaccharides with antifreeze properties. Advances in freezing technology have included optimizing each step in the production line.

**Keywords:** frozen dough, challenges, solutions

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# The agricultural data retrieval fitting for data science and machine learning processing aspect

**Sutthisak Sukhamsri**[1,2*]
[1]Information Technology Dept., Rajamangala University of Technology Lanna, Thailand.
[2]Computer Science and Information Engineering Dept., National Taiwan University of Science and Technology, Taiwan

***Corresponding author:** *sutthisak@rmutl.ac.th*

## Abstract

This article proposes the guidelines for retrieving the data relevant to the agricultural process. The three agricultural data types were comprehensively defined according to the machine learning aspect and modern agricultural process. The first data type is a tracking data type; following this data type is specific to the livestock tracking process based on geolocation data from GPS or network sensors in farm or spatial areas. This data type emphasized the livestock population concentration and migrating behavior. The second data type is the monitoring data type. The general sensors in the modern farming process were aggregated data in periodic and streaming forms—especially the data format from ubiquitous electrically and digitally sensors at present. The third proposed data type is the visual data type; this data type focuses on the application of computer vision and the deep learning aspect. The still images and motion images data are specific to information extracting and classification via various deep learning modeling. For instance, plants disease detection, harvest produce sorting, and plant cultivars. Eventually, this article also indicated the appropriate methods to retrieve the data from as mentioned data source on behalf of fitting to the standardized dataset format for programming with the diversity of data science and machine learning tools. Therefore, the completeness of the data which was influenced the machine learning performance and its accuracy foremost.

**Keywords:** agriculture, data science, machine learning

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# The effect of heating time with microwave on the analysis of proximate, NDF, ADF, tannin, and phytic acid of linseed flour as poultry feed

**Sartono. H.G.M[1*], Sjofjan.O[2*], Natsir. M.H[2], and Nuningtyas. Y.F[2]**
[1]Student of Nutrition and Animal Feed, Faculty of Animal Husbandry,
[2]Lecturer of Nutrition and Animal Feed, Faculty of Animal Husbandry,
Brawijaya University, Jl. Veterans, Lowokwaru, Malang City, East Java 65145

***Corresponding author:** *osfar@ub.ac.id; ozziemuzaki@student.ub.ac.id*

## Abstract

This study aims to determine the microwave heating of linseed flour as a broiler feed ingredient against proximate analysis, ADF, NDF, tannin, and phytic acid. This study uses a heating method using a microwave. The experiment was assigned in a completely randomized design (CRD) with four treatments and five replications. The treatments consisted of linseed feed without microwave heating or control (T0), linseed heating by microwave for 5 minutes (T1), linseed heating by microwave for 10 minutes (T2), and linseed heating by microwave for 15 minutes (T3). The variables observed in this study included crude protein, crude fat, crude fiber, gross energy (GE), acid detergent fiber (ADF), neutral detergent fiber (NDF), phytic acid, and tannin. To determine ether linseed can be used as feed ingredients, statistical analysis of variance (ANOVA) from a completely randomized design (CRD) is needed. If there is a significant effect on the treatment, it is continued with Duncan's Multiple Range Test (DMRT). The results showed that microwave heating of linseed had a very significant effect ($P<0.01$) on crude protein, crude fiber, crude fat, gross energy (GE), acid detergent fiber (ADF), neutral detergent fiber (NDF), phytic acid and tannins. This is presumably because heating can increase the nutritional value and reduce the anti-nutritional weight of the feed, including phytic acid and tannins. This study concludes that heating linseed with a microwave for 5 minutes gives the best results to be used as a substitute for broiler feed.

**Keywords:** linseed, microwave, proximate analysis, tannin, phytic acid

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# Nutrient leaching from red Tilapia feed for evaluated waste loading

**Anawat Keeratethaweesuk[1*], Supawit Triwutanon[2], Srinoy Chumkam[3], and Orapint Jintasataporn[1*]**
[1]Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok 10900, Thailand
[2]Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand
[3]Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University Under the Royal Patronage, Pathum Thani, Thailand

***Corresponding author:*** *Anawat.kee@ku.th; ffisora@ku.ac.th*

## Abstract

The aquaculture industry, one of the important agricultural businesses, can cause an environmental problem and its sustainability public concern. Nutrient leaching from commercial feed hasets has been reported as one reason for the deterioration of the water body**.** This study investigated the nutrient leaching from Aquafeed to water for evaluating waste loading to public water areas. Two red Tilapia feed for nursing and grower fish in cage culture was sampled and left in the water at different periods of 0, 5, 15, 30, 60 min and then collect the remaining feed to dry for determining the percentage of lipid, nitrogen, phosphorus, and weight loss or organic matter loss. The results showed that both feeds had increased nutrient leaching according to immersion time and lipid was the highest leaching compared to other nutrients. In nursery feed, lipid leach from feed around 5-10% after 5 min of immersion time and increased up to 30% in 60 min of immersion time. The other nutrients, nitrogen, phosphorus, and organic matter, leach from feed less than 5% in 15 min and leaching increased up to 10% in 60 min of immersion time except phosphorus leaching less than 5% in 60 min of immersion time. In grower feed, lipid leach from feed around 10-15 % after 5 min of immersion time and up to 30% in 60 min of immersion time. The other nutrients, nitrogen, phosphorus, and organic matter, leach from feed less than 5% in 15 min and leaching increased up to 5-10% in 60 min of immersion time. Phosphorus leaching from grower feed was higher than nitrogen leaching, unlike nursing feed with phosphorus leaching less than nitrogen. Hence in fish cage culture, the nutrient leaching cause publishes water deterioration due to the nitrogen, phosphorus, organic matter loss according to the production of fish culture in that area or reservoir.

**Keywords:** Nutrient leaching, waste loading, nitrogen, phosphorus, organic matter, Tilapia feed

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# The effect of the water content of vegetable waste cauliflower leaves as a silage material on nutritional content of silage produced and its palatability in rabbit

**Vira Sabrina[1]* and M. Marjuki[2]**
[1]Student of Animal Production Department, Faculty of Animal Science, University of Brawijaya, Malang, Indonesia
[2]Lecturer of Animal Production Department, Faculty of Animal Science, University of Brawijaya, Malang, Indonesia

***Corresponding author:** *virasabrina99@gmail.com*

## Abstract

This study aimed to determine the effect of the moisture content of cauliflower leaves from vegetable waste as a silage material on the nutritional content of the resulting silage and its palatability in rabbits. The experiment was conducted using a completely randomized design (CRD) with three treatments and four replications. The treatments in this study were cauliflower leaf waste silages made from cauliflower leaf wastewater with three different water contents: fresh (87.49%), 60.34%, 40.18%, and 10% rice bran, and the addition of molasses 6%. The variables measured were the content of dry matter, ash content, crude protein, crude fiber, and palatability. The results showed that cauliflower leaf wastewater silage in each treatment ($P<0.05$) had a very significant effect on the content of dry matter, organic matter, crude protein, and crude fiber. The highest average nutrient content was in the P2 treatment with the water content of 40.18% with BK content (33.59%), Ash content (12.34%), PK (27.02%), SK (17.07%). The results of palatability observations indicated that the silage of cauliflower leaf vegetable waste in treatment P1 showed the highest level of consumption compared to treatments P0 and P1. This showed that the P1 treatment has a better level of palatability while the silage with the lowest level of palatability is the silage treatment P0 and P2. This study concluded that cauliflower leaf vegetable waste as silage material at a moisture content of 40.18% had the highest average nutrient content of the resulting silage. The results of palatability tests of the three treatments showed that rabbits preferred cauliflower leaf silage in the P1 treatment.

**Keywords:** cauliflower leaves, silage, nutrient content, palatability

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# Efficacy of β-1,3-glucan and vitamin C supplement in pulse feeding program on growth performance, and pathogenic bacterial control during nursing of juvenile red Tilapia (*Oreochromis* spp.) under farm condition

**Swangdacharuk G.[1*], Supawit Triwutanon[2], Srinoy Chumkam[3], and Orapint Jintasataporn[1*]**

[1] Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok 10900, Thailand
[2] Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand
[3] Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University Under the Royal Patronage, Pathum Thani, Thailand

***Corresponding author:** *sw_grin@yahoo.com*; *ffisora@ku.ac.th*

## Abstract

Juvenile stage of red Tilapia is the stage of developing immune. To achieve expected immune defensive results, farmers have to feed their fish with immune modulator products. This may result in overstimulation and adversely affect the tilapia defense system. This study aimed to evaluate the suitable application of immune stimulants, β-1,3-glucan, and vitamin C, during the nursery of fingering red tilapia on growth performance and controlling bacteria under challenging conditions. The research was assigned in CRD with three different diets: 1) Control without any supplementation, 2) 35% Ascorbyl Phosphate supplementation (VC35), and 3) Combination of Coated Vitamin C 19% and β-1,3-Glucan 9% from algae (BGVC). Supplementary products were applied on the top coating of commercial feed at an inclusion rate of 0.5% on treatments. Supplemental feed was used as a pulse feeding program, once every three days. The initial fish size was 0.34±0.02g and stocked at 500 individuals in a 2x1x0.4 $m^3$ net cage. Fish were fed with equal feed in all treatments, 6,735 g per cage. After harvest, fish were subject to challenge with *Aeromonas hydrophila* at a cell concentration of 3.4 x $10^7$ cfu via intraperitoneal (IP) injection. The results showed that average survival rate (SR), average daily weight gain (ADG), feed conversion ratio (FCR), and specific growth rate (SGR) were significantly different ($P<0.05$). BGVC had the highest in all parameters with SR of 79.77±3.87%$^b$, ADG 0.34±0.02 g per day, FCR of 0.75±0.10 $^c$, and SGR of 7.25±0.15% per day; VC35 only showed a significant improvement in FCR at 0.96±0.01$^b$ compared to control at 1.12±0.22$^a$. Post challenge, total Aeromonas count in blood show significantly lower, 2.47±0.68 and 3.28±1.50 x $10^3$ cfu$^b$ in BGVC and VC35, respectively, while control was shown 7.18±2.19 cfu$^a$. In conclusion, pulse application of Vitamin C and β-1,3-Glucan every three days can enhance farm productivity, an advantage for tilapia nursery farms.

**Keywords:** Algae beta-glucan, immunomodulator, vitamin C

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# The effect of using organic protein as a feed ingredient on egg weight, egg index, egg white index, egg yolk index, and eggshell thickness in laying hen

**Meilina R.F[1*], Sjofjan O.[2]*, Natsir M.H[2], and Nuningtyas Y.F [2]**
[1] Student in Nutrition and Animal Feed, Faculty of Animal Science,
[2] Lecturer in Nutrition and Animal Feed, Faculty of Animal Science,
Brawijaya University, Jl. Veteran, Lowokwaru, Malang, East Java 65145

***Corresponding author:** osfar@ub.ac.id; meilinariz@student.ub.ac.id*

## Abstract

The research aimed to observe the effect of adding organic protein as a feed ingredient for laying hens on egg weight, egg index, egg white index, egg yolk index, and eggshell thickness in laying hens. The research material used in this study was 200 laying hens (unsexed) strain Isa Brown aged 33 weeks in layer phase. Laying hens feed consisting of corn, rice bran, concentrate, and organic protein produced by PT Miwon Indonesia. The design used was a mixture of basal feed without organic protein as control feed (P0), adding with organic protein 1% (P1), 2% (P2), 3% (P3), and 4% (P4). The variables observed were the quality of eggs, including egg weight, egg index, egg white index, egg yolk index, and eggshell thickness. To determine the effect of the addition of organic protein on external quality, the analysis used a Completely Randomized Design (CRD); if there is an effect on the treatment, it is continued with Duncan's Multiple Range Test (DMRT). The results showed that the addition of organic protein as a feed ingredient for laying hens did not have a significant effect (P>0.05) on egg weight, egg index, egg weight, egg index, egg white index, egg yolk index, and eggshell thickness and eggshell thickness. This is thought to be caused by the addition of too little organic protein. It is hoped that further studies will examine the effect of organic protein on laying hens with a higher ratio.

**Keywords:** organic protein, egg weight, egg index, eggshell thickness

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# Antimicrobial activity of gamma-aminobutyric acid (GABA) against virulent pathogenic bacteria for aquaculture

**Yuparat Inbumrung[1,4*] Supawit Triwutanon[2], Srinoy Chumkam[3], and Orapint Jintasataporn[1]**

[1] Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok 10900, Thailand
[2] Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand
[3] Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University Under the Royal Patronage, Pathum Thani, Thailand
[4.] Department of Fisheries, Ministry of Agriculture and Cooperative, Thailand

***Corresponding author:** *yuparat.inb@gmail.com*

## Abstract

Gamma-aminobutyric acid (GABA) is a non-essential amino acid that is currently proposed to improve the immune system of farmed aquatic animals through dietary supplementation. This study aims to evaluate the antibacterial activity of GABA against virulent pathogenic bacteria for aquaculture, namely *Vibrio parahaemolyticus*, *V. alginolyticus*, and *Aeromonas hydrophila.* The *in vitro* evaluation of antimicrobial activity was studied on a commercial GABA product using minimal inhibitory concentration (MIC) and agar disc diffusion technique to determine the lowest concentration of the assayed antimicrobial agent. The pathogenic bacteria were prepared in nutrient broth for 24 hr., then centrifuge collected the bacterial cells and adjusted the concentration by spectrophotometer 640 nm at OD 0.1 (MacFarland No.0.5). Thiosulfate-Citrate-Bile Salts-Sucrose (TCBS) Agar and Rimler-Shotts Medium Base (RS Medium Base) were used for Vibrio spp. and Aeromonas, respectively. Fluoroquinolone group 20 ppm was used as a positive control. The paper disc contains the commercial GABA product at the desired concentration at 0, 5000, 7500, 10000, 25000, and 50000 ppm, then placed on the inoculated agar surface and incubated at 30 °C for 18-24 hr. The diameter was measured from the clear zone inhibition (millimeters). The results showed that 25,000 ppm was the minimal inhibitory concentration against *V. parahaemolyticus* with the clear zone of 7-8 mm compared to 8 mm by the Fluoroquinolone group. The antibacterial activity was not observed with *V. alginolyticus and A. hydrophila*. The commercial GABA product has a resistant inhibition response against *V. parahaemolyticus* (diameter ≤ 12 mm.). This study confirmed the efficiency of GABA against causative bacteria of virulent diseases in economically farmed aquatic animals.

**Keywords:** gamma-aminobutyric acid (GABA), antibacterial, paper disc diffusion

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# *In vitro* inhibition studies of resin acids to *Vibrio parahaemolyticus, Vibrio alginolyticus, Aeromonas hydrophila*

**Chonnikarn Piyavorasakul[1*], Supawit Triwutanon2 Srinoy Chumkam[3], and Orapint Jintasataporn[1*]**

[1] Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok 10900, Thailand
2 Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand
3 Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University Under the Royal Patronage, Pathum Thani, Thailand

***Corresponding author:** *ffisora@ku.ac.th; chonnikarn.piy@ku.th*

## Abstract

Negative straight pathogens in rod form are commonly found in marine and river ecosystems and freshwater ecologies. The aquatics animal diseases indicated that *Aeromonas* spp. and *Vibrio* spp. can be a major affected the digestive tract and immune system. Natural resin product (RA) as a polyphenol that can inhibit the microbial population in the digestive system in terrestrial animals and a few research in aquatic animals. This experiment was investigated on the inhibitory of resin acid products in powder form, a mixture of resin acids from pine, stabilized on polyphenols, and liquid form, the 8% resin acids from coniferous evergreen trees, which includes the pine, and spruce at 0, 5000, 7500, 10000, 25000 and 50000 ppm using the disc for agar disc diffusion method (ADM) and a broth dilution method (BDM). The sever bacteria, *Vibrio parahaemolyticus*, *Vibrio alginolyticus*, and *Aeromonas hydrophila*, concentration with spectrophotometer 640 nm at OD 0.1 (MacFarland No.0.5) were prepared for both techniques. Results displayed that ADM of powder resin acids from pine can inhibit only *V. parahaemolyticus* at 50000 ppm (9 mm). In addition, liquid resin acids from pine and spruce can stated control at 10000 ppm and inhibit all of these three pathogen species, including *V. parahaemolyticus* and *Aeromonas hydrophila* at 25000 and 50000 ppm in case of clear zone around 8-9 and 7-8 mm, respectively, and *Vibrio alginolyticus* at 50000 ppm (8 mm). BDM at 50,000 ppm of powder resin acids from pine can inhibit only *V. parahaemolyticus* with remaining bacteria 1.1x10$^{2}$CFU/ml. For liquid resin acids from pine and spruce at 25,000 ppm(1.7x10$^{2}$CFU/ml) and 50,000 ppm (1.2x10$^{2}$CFU/ml) can inhibit *V. alginolyticus*, at 50,000 ppm (1.4x10$^{2}$CFU/ml) can inhibit *V. parahaemolyticus*. Overall, the clear zone from ADM and the bacteria count from BDM have resulted similarly.

**Keywords:** Resin acid; feed additive; *V. parahaemolyticus, V. alginolyticus, Aeromonas hydrophila*

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# Urea utilization in feed in terms of the methods and uses for improving the appearance of ruminants

**Lilin Putri Jasmine[1], and Marjuki[2]**
[1]Undergraduate student of Animal Science Faculty, University of Brawijaya, Malang
[2]Lecture of Animal Science Faculty, University of Brawijaya Malang

***Corresponding author:** lilin_jasmine@student.ub.ac.id; marjuki@ub.ac.id*

## Abstract

The feed has a vital role in the livestock business, about 70% of total livestock production. Lack of feed nutrients is a major obstacle in increasing livestock productivity. Farmers make efforts to provide conventional feed, but the price of conventional feed tends to be expensive, thereby increasing production costs—the way to solve giving urea to livestock. Urea is known to contain a source of non-protein nitrogen; urea in feed consumed by livestock will quickly dissolve and be hydrolyzed into ammonia by rumen bacteria. Protein degradation in the rumen will produce ammonia, VFA, and CO2, where ammonia will be utilized as a microbial protein source. The material used is to compare various methods of giving urea to drinking water, urea with molasses, urea with starch, ammoniated urea straw, and block urea molasses on Dry Matter Intake, Daily Body Weight Gain, Feed Conversion from ruminants. The use of urea in ruminant feed is dedicated to its use for the treatment of ammoniated urea and as a supplementary feed in the form of UMB. The results had an average feed consumption UMB of 7438,72 g/head/day for cattle and average feed consumption of 619.10-623,95 g/head/day for goats and sheep with an average feed conversion of cattle 7,35 and goats and sheep has an average of 9.27-10,24 with a daily body weight gain of cattle 777,44 g/head/day, sheep and goats 67,90 -101.19 g/head/day compared to JUA which has a higher average conversion value in goats and sheep from 13.98-14.20. At the same time, urea gives a directly high risk of death in livestock. From these data, urea with the UMB method gives more significant results on livestock appearance in terms of feed consumption, feed conversion, and daily body weight gain of ruminants.

**Keywords:** appearance of ruminants, daily body weight gain, feed consumption, feed conversion, non-protein nitrogen

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# Immune responses of Asian Seabass (*Lates calcarifer*) after *Vibrio parahaemolyticus* and *Aeromonas hydrophila* infection

**Sarinpan Kokau[1*], Supawit Triwutanon[2], Srinoy Chumkam[3], and Orapint Jintasataporn[1*]**

[1] Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok 10900, Thailand
[2] Faculty of Veterinary Medicine, Kasetsart University, Kamphaeng Saen, Nakhon Pathom, Thailand
[3] Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University Under the Royal Patronage, Pathum Thani, Thailand

***Corresponding author*: *ffisora@ku.ac.th*; *sarinpan.k@ku.th***

## Abstract

An immune system is a system of biological structures and processes within an organism to defend the body against foreign microorganisms. In this study, the Asian seabass (*Lates calcarifer*) immune response before and after pathogenic bacteria infection was investigated. Seventy-five Asian seabass 80 ± 2 g were acclimated in challenge test aquarium for seven days and then distributed into three groups. Each group has three replicates(aquarium) and stocked ten fish per aquarium. The first was control without applying any pathogenic bacteria. The other two groups were used severe pathogenic bacteria, namely *Vibrio parahaemolyticus* and *Aeromonas hydrophila*, separately by one dose of intraperitoneal injection 0.1 ml each at the concentration of 1.4x $10^8$ CFU/ml and 5.2x $10^8$ CFU/ml, respectively. After a challenge for 24 hrs, fish blood samples were collected from the caudal vein for determining immune response in terms of red blood cell, white blood cell, hematocrit, hemoglobin, serum protein, and Immunoglobulin M(IgM). The results after bacterial infection showed that the immune parameter value was significantly different among these three treatments. In normal conditions, hematocrit was 13.20±1.48% and then increased significantly after being infected by *V. parahaemolyticus* (31.20±2.28%) and *A. hydrophila (*34.60±0.55%). Serum protein and IgM in normal condition was 4.27±0.14 and 1.00±0.25, respectively, and these decreased significantly after being infected by *V. parahaemolyticus* (2.72±0.23mg/dl and 0.74±0.19g/l) and *A. hydrophila* (0.70±0.04 mg/dl and 0.13±0.02g/l). Therefore, Asian seabass immune response changed during pathogenic bacteria infection by *V. parahaemolyticus* and *A. hydrophila* to defend animals from the severe condition, especially in hematocrit, serum protein, and IgM.

**Keywords:** Asian seabass, immune response, challenge test, *Vibrio parahaemolyticus*, *Aeromonas hydrophila*

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# Evaluation of Gedi forage (*Cnidoscolus aconitifolius)* potential as a feed

**Puspita Sekar Kirana Dewi[1*], Marjuki[2]**
[1]Student of Faculty of Animal Science, University of Brawijaya, Malang, 65132, Indonesia
[2]Lecturer of Faculty of Animal Science, University of Brawijaya, Malang, 65132, Indonesia

***Corresponding author**: puspitasekar@student.ub.ac.id*

**Abstract**

Gedi (*Cnidoscolus aconitifolius)* is many planting in the Bojonegoro area, but the utility isn't optimized. In a while, the benefit of the Gedi plant is much. Previous studies have stated that Gedi is used as a medicine for weight loss, ulcers, diabetes mellitus, high blood pressure, cancer, and kidney disease. This research was conducted from August to September 2021. This research was carried out in the Bojonegoro area and analyzed in the Laboratory of Nutritional and Feed, Animal Science Faculty, Laboratory of environment source Faculty of Agriculture, University of Brawijaya. The study aimed to analyze the potential of Gedi forage (*Cnidoscolus aconitifolius)* as a feed based on the characteristics, palatability, and nutritional content. The materials used in this study are samples of the Gedi plant from Bojonegoro. The method is carried out using case studies through surveys, direct observations, and data collection from the literature and other sources. In fresh produce, the average was 221,7±43,77, and according to the laboratory tests, the dry matter content was 13,34%, and crude protein content was 24,86%. In the palatability test, three out of five goats chose the Gedi plant. Gedi plants have potential as animal feed based on their morphology, characteristics, nutritional content, and palatability. It is recommended to process the Gedi plant first before giving it to livestock to obtain maximum results.

**Keywords:** Gedi plant, characteristics, nutritional content, palatability

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# Effect of organic mineral cocktail on growth performance of hybrid catfish (*Clarias gariepinus* × *Clarias macrocephalus*) fed different protein sources.

**Lumlertdacha P.[1],Chumkam S.[2] and Jintasataporn O.[1*]**
[1]Department of Aquaculture, Faculty of Fisheries, Kasetsart University, Bangkok, Thailand
[2]Faculty of Agricultural Technology, Valaya Alongkorn Rajabhat University
Under the Royal Patronage, Pathum Thani, Thailand

***Corresponding author**: ffisora@ku.ac.th*

## Abstract

An experiment on hybrid catfish (*Clarias gariepinus* × *Clarias macrocephalus*) diet supplemental organic mineral cocktail was conducted to compare the effects of chromium-L-methionine, zinc-amino acid complex, and selenomethionine between supplementation in planted-base diet and poultry meal-based diet on growth performance. The study was designed as Factorial **2**x2 in CRD. Two factors were factor A, an organic cocktail mineral supplementation: zinc amino acid complex 45 mg/kg, selenomethionine 0.4 mg/kg diet, chromium-L-methionine 0.5 mg/kg diet compared to non-supplement organic cocktail mineral. Factor B was a plant-based diet with 47% soybean meal compared to a poultry meal-based diet of 16%. All diets were added 80 ppm xanthophyll. Factor A and B were applied to 4 treatments and five replicates, T1: poultry meal-based with no mineral cocktail, T2: poultry meal-based diet added mineral cocktail on top, T3: a plant-based diet with no mineral cocktail. T4: plant base diet added mineral cocktail on top. A 6-week trial was conducted in a net cage installed in an earthen pond. The catfish with an average of 52 g/individual was stocked at 34 fish per cage (17 individual/$m^2$). The result showed that organic mineral factor has no significant effect on growth parameters in terms of Yield, WG, FCR, ADG, and Survival ($p<;0.05$). However, the plant-based diet shows significantly improved growth in terms of Yield, WG, FCR, and ADG ($p<0.05$). Furthermore, the growth parameter of fish fed the poultry meal-based diet with mineral cocktail added on (T2) had significantly better growth performance in terms of FCR, WG, ADG, and survival ($p<0.05$) compared to poultry meal-based with no mineral cocktail (T1). In conclusion, a planted-based diet significantly improves growth performance compared to the poultry meal-based diet. Hybrid catfish diet was recommended to add on a mineral cocktail for improving growth performance and survival in fish fed with poultry meal-based diet.

**Keywords:** zinc amino acid complex, selenomethionine, chromium-L-methionine, organic mineral, hybrid catfish

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# Effect of $N_2$-fixing and IAA synthesis endophytic bacteria on growth of *Vanda* under greenhouse condition

**Wanwisa Inkaewpuangkham[1], Kanokwan Panjama[1], Chaiartid Inkham[2], Yupa Chromkaew[1] and Soraya Ruamrungsri[1*]**

[1]Department of Plant and Soil Science, Faculty of Agriculture, Chiang Mai University, Chiang Mai 50200, Thailand

[2]Plant Nutrition and Hydroponics Research Unit, Science and Technology Research Institute, Chiang Mai University, Chiang Mai 50200, Thailand

***Corresponding author**: sorayaruamrung@gmail.com*

## Abstract

*Vanda* is one of the orchid genera that are important commercial crops. It was traded in both cut flower and plant form. In 2018, the *Vanda* export of Thailand had a marketable value of about 0.13% as cut flowers and 8.9% as the orchid plants. Orchid cultivation is usually used a large number of fertilizers for growth and development, which lead to high cost and environmental problems. Therefore, this research was aimed to study $N_2$-fixing and IAA produced by endophytic bacteria as biofertilizers under greenhouse conditions. This research was conducted in a completely randomized design (CRD), and *Vanda* plantlets from tissue culture were inoculated with isolate 3S19 endophytic bacteria compared with deionized water (as a control treatment). Each treatment had twenty replications. The results showed that there were no significantly different between isolate 3S19 inoculation plants and with sterilized deionized water in plant height and leave number at 2, 3, and 4 months after inoculation, whereas root length and a number of roots were significantly different at four months after inoculation. The data from this research is beneficial as primary data for biofertilizer application to *Vanda* orchid.

**Keywords:** *Vanda*, orchid, endophytic bacteria, biofertilizer

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# Comparative extraction of Hemp *(Cannabis sativa* L.*)* seed oil by conventional and soxhlet extraction methods

**Kanittha Sookkerd[1*] and Lalita Siriwattananon[1]**
[1]Faculty of Agricultural Technology, Rajamangala University of Technology Thanyaburi, 39 Moo.1 Klong 6, Khlong Luang, Pathum Thani, 12110 Thailand

***Corresponding author:** *kanittha_so@rmutt.ac.th*

## Abstract

Hemp (*Cannabis sativa* L.) is a multi-purpose plant that recently got lots of attention in Thailand. In previous years, various studies have been done regarding the application of hemp fiber, especially in the textile sector. After the government has unlocked regulation regarding hemp cultivation and its application, hemp seed has become a great part as oil content in the seeds can be used for multiple purposes. The extraction process of hemp oil becomes more important to get a higher yield. So, this research interest has been focused on comparing conventional and soxhlet extraction methods using water, n-hexane, and petroleum ether as extraction solvents. The experimental results showed that the conventional extraction method for hemp seed oil using n-hexane has the highest yield of 18.78%, followed by petroleum ether of 17.06% and water of 4.56%. In addition, the soxhlet extraction method using petroleum ether showed significantly ($p \leq 0.05$) highest yield of 24.44% compared to those of n-hexane 21.65% and of water 1.27%. According to the experimental results, it was concluded that the soxhlet extraction method using petroleum ether as an extraction solvent is recommended to get a higher oil yield from hemp seed.

**Keywords:** hemp seed, oil extraction method

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# Application of heterosis and heterobeltiosis analysis for selection of 16 Okra (*Abelmoscus esculentus* L. Moench) crosses

**Indah Wahyuningsih[1]* and Chanulak Khanobdee[1]**
[1]Rajamangala University of Technology Lanna, Lampang campus, 52000, Thailand

***Corresponding author:** *Indah.wn26@gmail.com*

## Abstract

The application of heterosis and heterobeltiosis analysis for selection of 16 okra crosses was conducted during December 2019 to October 2020. This study was evaluated by Randomized Complete Block Design (RCBD) with three blocks and two replications. The combined analysis was applied and showed that yield, weight per fruit, length per fruit and dark greenness of fruit was significantly different in each crop and line. Based on important traits of yield and dark greenness the AE0041/15(AE004/AE023//AE022/AE016)-10-1-3-2-sib-1-1-7-6 had the highest heterosis and heterobeltiosis 0f 32.6% and 37.7%, respectively. The dark greenness of 1(AE004/AE023//AE022/AE016)-9-3-2-6-sib-2-3-1-1/1 (AE023/ AE022// AE022/AE016)-9-3-2-6-sib-2-3-2-2 exhibited the highest heterosis and heterobeltiosis of 930.7% and 418.6%, respectively. The 15(AE004/AE023//AE022/AE016)-10-2-3-2-sib-1-1-2-3/1(AE004/AE023//AE022/AE016)-9-3-2-6-sib-2-3-1-1 showed a high result of heterosis and heterobeltiosis with 94.2% and -10.1% of weight per fruit. The 15(AE004/AE023// AE022/AE016)-9-3-2-6-sib-2-3-2-2/1(AE004/AE023//AE022/AE016)-9-3-2-6-sib-2-3-1-1 exhibited a high result of heterosis and heterobeltiosis with 96.5% and 6.4% for length per fruit.

**Keywords:** Okra, combined analysis, heterosis, heterobeltiosis

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# Effect of wheat (*Triticum aestivum* L.) seed rate and harvesting time on yield, reducing sugar content, and phenolic content in wheatgrass juice

**Surakiat Khumphanalaisathit [1], Hathaichanok Pattaampan [1,] Phayungsak Manochai [1], Tanongsak Sassa-deepaeng [2] and Tunyaluk Bouphun[3*]**

[1] Department of Agricultural technology, Faculty of Sciences and Agricultural technology, Rajamangala University of Technology Lanna Lampang, Pichai, Lampang 52000, Thailand

[2] Department of Sciences, Faculty of Sciences and Agricultural technology, Rajamangala University of Technology Lanna Lampang, Pichai, Lampang 52000, Thailand

[3]Department of Agro-Industry, Faculty of Sciences and Agricultural technology, Rajamangala University of Technology Lanna Lampang, Pichai, Lampang 52000, Thailand

***Corresponding author:** *than259@yahoo.com; tunyaluk@rmutl.ac.th*

## Abstract

Wheatgrass juice quality is defined by a good source of wheat varieties and the optimal seed rate and harvesting time of wheat grain. The objectives of this study were to determine the seed rate and harvesting time of wheat (Fang-60) on yield, reducing sugar content, and total phenolic content (TPC) in wheatgrass juice. An experiment was designed using a 3x3 factorial in a completely randomized design with variable seed rates (150, 200, and 250g) and harvesting time (6d, 8d, 10d), three replications, and nine treatments. This experiment showed significant differences in plant height and grain yield. This particular study indicated seed rates and harvesting time affected wheatgrass juice yield, reducing sugar content and TPC. Results revealed T9 (250g, 10d) had the highest yield of wheatgrass juice, T3 (250g, 6d) had the highest reducing sugar content, while T4 (150g, 8d) had the highest TPC whereas the seed rate was 250 g, which resulted in a reduction in TPC. This could be due to the density of stems per area influencing wheatgrass growth. According to this study, selecting the appropriate seed rate and harvesting time are important for wheatgrass juice to provide nutrients for its intended purpose.

**Keywords:** wheatgrass, seed rate, harvesting time, reducing sugar content, phenolic content

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# Study Analysis of the Increasing Deforestation Phenomenon on the Potential for Transmission of Covid-19 to Indigenous People in Indonesia

**Edwin Setiawan[1*], Qonita[1], Patricia Yosephine[1], Anugerah Putri Malidha[1], and Aqila Aziz[1]**
1 Faculty of Agriculture, Brawijaya University, Malang, 65145, Indonesia

***Corresponding author:** *esetiawan173@gmail.com*

## Abstract

Large-scale deforestation, which renders all forest ecosystem activities inoperable, is the most a severe consequence of deforestation for losses. This activity allows forest organisms to migrate to the homes of people who live in the forest's immediate surroundings, primarily indigenous peoples. The involvement of organisms that migrate from the forest to the surrounding settlements resulted in psychological and physical health problems in the surrounding population. Animals are forest organisms that transmit disease to humans, and animals, throughout, can transmit diseases to humans, recognized as zoonotic diseases. Many researchers have highlighted SARS-CoV-2 as a zoonotic disease. This virus exacerbates Covid-19, which pangolins and bats would define. The primary objective of these animals is to increase the amount of Covid-19 and SARS-CoV-2 cases in Indonesia. This virus spreads to indigenous people living near the forest. Covid-19 is a virus family that provokes zoonotic disease, predominantly in bats and pangolins. These viruses are meant to refer to as RNA viruses. Coronavirus is responsible for numerous fatal respiratory infections in humans. Deforestation, on the other hand, will involve people from outside parties to play a role in deforestation to allow indigenous peoples living near the forest to interact with these external social parties. In general, the prevalence of droplets that disseminate through human-to-human interaction is one of the causes of Covid-19 spread; of course, this will significantly accelerate the spread of Covid-19, especially within and between indigenous peoples that live near forest lands.

**Keywords:** Covid-19, deforestation, indigenous, transmission

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# The integration of passive and active satellite sensors for water resources extraction and mapping for sugarcane plantation area in Northeastern, Thailand: Geoinformatics approaches

**Sopholwit Khamphilung[1*] and Suprasit Konyai [2]**

[1]Department of Geoinformatics, Faculty of Informatics, Mahasarakham University, Maha Sarakham, Thailand
[2]Department of Agricultural Engineering, Department of Engineering, Khon Kaen University, Khon Kaen, Thailand

***Corresponding author:*** *sopholwit.c@msu.ac.th*

## Abstract

The study presents water resources extraction and mapping for sugarcane plantation area in NE, Thailand by integrating of passive and active satellite imageries, namely Sentinel-1A (Microwave active instrument) and LANDSAT 8 OLI satellite data (Passive instrument), by applying of 4 approaches covered of 8 provinces, within in 2 periods in the same year (March and November 2019), namely (1) Unsupervised classification (2) Density slicing (3) Normalize differential Water Index (NDWI), and (4) water area extracted directly from Sentinel-1A imageries. The results indicated that in process 1 and process 2, surface water resources were obtained from process 1 located in Nakhon Ratchasima province by a water area of 398.86 square kilometers. In process 2, the water resource found 616.12 square kilometers. Process 1 and 2 showed that the results differed in the water area, while some areas showed small fluctuated changes. In process 3, the moisture index was used from the wavelength information using NDWI indices. The results showed that Nakhon Ratchasima and Ubon Ratchathani provinces with the highest moisture index by 1 scattered in some areas, while other provinces showed surface moisture index are between 0.3-0.4, respectively. In process 4, water resources were directly extracted from Sentinel-1A imageries using the backscattering coefficient ( $\int$ ) between -10 and -15 dB, which the surface water resources area effectively shows spatial relationships and backscattering coefficients. The results showed that the most area of water resources was found in March, located in Khon Kaen province by area of 418.64 square kilometers. The most area found in November is in Ubon Ratchathani province, with the area of 353.78 square kilometers, respectively.

**Keywords:** water resources extraction, remote sensing, Sentinel-1

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# Effect of leonardite and nutrient management on growth and yield of Cowpea (*Vigna unguiculata* L. Walp.)

**Dina Nuon[1]*, Parinyawadee Sritontip[2], and Chiti Sritontip[1,2]**
[1] Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna, Lampang, 52000, Thailand.
[2] Agricultural Technology Research Institute, Rajamangala University of Technology Lanna, Lampang 52000, Thailand.

***Corresponding author:*** *nuondina@gmail.com*

## Abstract

This study aimed to evaluate the effect of leonardite and nutrient management on the growth and yield of cowpea (*Vigna unguiculata* L. Walp.). A cowpea plantation was established in the greenhouse from July to October 2021 at the Agricultural Technology Research Institute, Rajamangala University of Technology Lanna, Lampang, Thailand. The experimental design was a Completely Randomized Design (CRD) with nine treatments and ten replications: (1) control, (2) 500 kg/Rai leonardite, (3) 1,000 kg/Rai leonardite, (4) 500 kg/Rai leonardite + 100% chemical fertilizer application based on soil analysis, (5) 1,000 kg/Rai leonardite + 100% chemical fertilizer application based on soil analysis, (6) 500 kg/Rai leonardite + 75% chemical fertilizer application based on soil analysis, (7) 1,000 kg/Rai leonardite + 75% chemical fertilizer application based on soil analysis, (8) 100% chemical fertilizer application based on soil analysis and (9) 75% chemical fertilizer application based on soil analysis. The result showed that the leonardite application with chemical fertilizers application based on soil analysis affected the vegetative growth and yield of cowpea. The treatments that applied with only leonardite and without fertilizer were lower on the growth and yield of cowpea. Therefore, the appropriate application of leonardite with chemical fertilizers based on soil analysis can help the growth of cowpea and affect the productivity of cowpea.

**Keywords:** Leonardite, nutrient management, cowpea

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# Development LINE chatbot for local textile information of Karen Ban Pa Rai Nuea, Tak

**Natchapol Khammee[1] and Wanchana Joobanjong[1]**
[1]Information Technology, Rajamangala University of Technology Lanna Tak, Tak, 63000, Thailand

***Corresponding author:*** *wanchana1987@gmail.com*

**Abstract**

Recently, textile has been one of the symbols represented in local culture. The textile of each area is unique and is affected by local wisdom. Karen people are unique in the production process, color, and design from generation to generation. This research aimed to develop a Line Chatbot to provide textile, tourism, and design information. Firstly, the textile data was collected and verified from Ban Pa Rai Nuea area, Prathat sub-district, Mae Ra Mad district, Tak province. Then, Line Chatbot was generated by Line Business. Line chatbot consists of five main menus, textile information, gallery, tourist information, map, and contact information. The satisfaction level of users is at a good level.

**Keywords:** textile, LINE Chatbot, Information Technology

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# Effects of nutrient solution concentrations and micro/nanobubbles on the growth and yield of cherry tomato in hydroponics

**Suchada Thichuto[1*], Chiti Sritontip[1,2], Parinyawadee Sritontip[2,] and Vishnu Thonglek[3]**
[1*] Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna, Muang, Lampang 52000
[2] Agricultural Technology Research Institute, Rajamangala University of Technology Lanna, Muang, Lampang 52000
[3] Faculty of Engineering, Rajamangala University of Technology Lanna, Muang, Chiang Mai 50300

***Corresponding author:*** *s.thichuto@gmail.com*

## Abstract

A study on the effects of nutrient solution concentrations and micro/nanobubbles (MNB) on the growth and yield of cherry tomatoes in nutrient solution culture was investigated. The experiment was conducted in a greenhouse environment from July to October 2021 at the Agricultural Technology Research Institute, Rajamangala University of Technology Lanna, Lampang. The 3x2 factorial in the CRD experiment was planned. Factor A was the concentration of the nutrient solution (Electrical conductivity: EC) at three levels: EC 1 mS/cm, EC 2 mS/cm, and EC 3 mS/cm, and factor B was the use of micro/nanobubbles and without micro/nanobubbles. The results showed that the EC at 1 and 2 mS/cm had an inflorescence diameter greater than 3 mS/cm. The 3 mS/cm level increased the green leaf changes and the chlorophyll fluorescence and also enhanced the amount of total soluble solids. The EC 1 mS/cm + MNBs treatment was the greatest on fruit width, length, and weight.

**Keywords:** tomato, micro/nanobubbles, electrical conductivity

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# Develop a Website for local travel route publication of Baan Mai Ngam, Tak

**Thanapoom Phrommuangdee [1] and Wanchana Joobanjong[1]**
[1] Information Technology, Rajamangala University of Technology Lanna Tak, Tak, 63000, Thailand

***Corresponding author:*** *wanchana1987@gmail.com*

**Abstract**

This research aimed to develop a website for presenting the sightseeing route of Baan Mai Ngam area, Tak province. Firstly, tourist information was collected from the relevant persons in the area. Then the route was designed into four routes, and the routes testing was confirmed by the relevant persons. The photos were taken and collected. The infographic of the sightseeing route, 360-degree panoramic images, and the VDO clip of the sightseeing route. Then the website was designed and developed. Moreover, the route map was created to display the infographic of the sightseeing route and display the route map online. The tourist information accessibility of Baan Mai Ngam area was investigated by participatory action with local people.

**Keywords:** Travel Route, Web Application, Information Technology

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# Influence of micro/nanobubbles on the physiological changes and fruit quality in muskmelon

**Le Quy Tung[1*], Chiti Sritontip[1,2], and Vishnu Thonglek[3]**
[1*] Faculty of Science and Agricultural Technology, Rajamangala University of Technology Lanna, Muang, Lampang 52000
[2] Agricultural Technology Research Institute, Rajamangala University of Technology Lanna, Muang, Lampang 52000
[3] Faculty of Engineering, Rajamangala University of Technology Lanna, Muang, Chiang Mai 50300

***Corresponding author:*** *lequytung.mofa@gmail.com*

## Abstract

This study investigated the effects of micro/nanobubbles (MNBs) on muskmelon growth in the hydroponic system. A nutrient solution to solute melon growing under two levels of Electrical Conductivity (EC), low and normal, was treated by MNBs under time schedules 0, 5, and 10 minutes. Ten plants in each treatment plot for recording. The vegetative showed that the green leaf color, chlorophyll fluorescence, and leaf nutrient concentration (N, K, Ca, and Mg) enhanced in EC 2 mS/cm and MNBs treatments. Growth indicators were measured after 56 days of growth were recorded and compared to assess the health status of plants data collecting for fruit quality. Statistical analysis showed that there were significant when using MNBs differences between the treatments. Despite the differences in the fruit of muskmelon in comparison between treatments, MNBs greatly supported the growth of plants. The fruit grown in nutrient solution containing MNBs for 5 minutes demonstrates 6-15% higher weight rates. MNBs greatly affected fruit quality, and changes began to be noticeable from week 3 in the growth cycle of the muskmelon plant.

**Keywords:** muskmelon, micro nanobubble, hydroponics