Message from the I-SEEC 2014 Chairman

The I-SEEC Conference was initiated by Rajamangala University of Technology Isan, Sakonnakhon Campus in December 2008. This year is the 6th I-SEEC, and the number of papers to be presented increases every year. This may be due to a stronger network between researchers among universities both in Thailand and internationally. The areas of research include science and technology, social sciences, engineering and energy. The abstracts of all research papers published in this Khon Kaen Agriculture Journal (Supplement Issue) are comprised of Agricultural Science and Biotechnology. After a standard peer review of the journal, full manuscripts will be published as electronic files in the online journal. We hope that the conference will disseminate the progress of significant research, aid in sharing new technology, and help expand professional networks.

We thank the Faculty of Agriculture, Khon Kaen University for allowing us to distribute our research work in the Khon Kaen Agriculture Journal (Supplement Issue). This will help make our work more useful.

We wish to express our sincere thanks for the financial support of our co-hosts for this conference: the Office of the Higher Education Commission, Rajabhat Universities - Loei, Sakon Nakhon, Nakon Ratchasima, Chiang Rai and Pibulsongkram. We very much appreciate the contributions of all of the participants to the conference. We also would like to thank the Organizing Committee Members for their continuous efforts to make this conference a great success. Grateful acknowledgement should be given to the keynote and invited speakers who have made the conference more significant and fruitful. We look forward to seeing more academic cooperation in the future.

Kind Regards
Viboon Pensuk, Ph.D.
The 6th I-SEEC 2014 Chair
Research article

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Phaiboon Boupha
Survival rate and nursing cost of *Macrobrachium rosenbergii* larvae nursed in rock salt water instead of natural sea water

Siriporn Kotamee\textsuperscript{1*} and Attasat Wiseansat\textsuperscript{1}

**Abstract:** A research study aimed to compare survival rate and nursing cost of *Macrobranchium rosenbergii* larvae nursed in rock salt water instead of natural sea water. The larvae were nursed in plastic boxes containing 50 litters of water volume. Four boxes contained rock salt water while the other four boxes contained natural sea water. Five thousand individuals of the larvae (100 individuals/l) were nursed in each box for 30 days. A comparative study between both types of nursing was conducted. The result found that survival rate of the larvae nursed in rock salt water was 1,488 individuals while those of natural sea water was 1,675 individuals with no significant difference. Regarding nursing cost, however, nursing in rock salt water showed significantly higher cost than nursing in natural sea water with the cost of 1,281.4 baht/box and 140.56 bath/box, respectively.

**Keywords:** survival rate, rock salt water, natural sea water, nursing cost, *Macrobrachium rosenbergii*

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Developing sustainable local cattle and buffalo markets in Udon Thani

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Abstract: This study aims to seek the development of sustainable cattle and buffalo business markets in Udon Thani. The instrument used in the study was focus group interviews with farmers divided into 3 groups: first, the group of farmers who sell cattle and buffalo in the market; second, the group of merchants who buy and sell cattle and buffalo in the market and third is the group of merchants in the market in Udon Thani. The data were collected from the interviews on the current situation and future trends of this business. The results showed that the direction of the business market is changed from the original: from use for work and for consumption become use for the beauty and as a source of capital accumulation. A group of interested young people who have knowledge and experience in this business is increasing which can be called professional farmers.

Keywords: cattle and buffalo market, development business, Udon Thani

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Prevalence of gastro-intestinal strongyles in native beef cattle under small holder management condition in Udon Thani, Thailand

Sudawan Chuenpreecha*, Yoswaris Semaming and Rittichai Pilachai

Abstract: Strongyles (Nematoda, Strongylida) affecting cattle are presently recognized as the most important helminth parasites of these animals. Strongyles are a major cause of economic losses in the beef cattle through abortion, losses in weight and fertility, especially in temperate areas including Udon Thani, Thailand. Thus we are interested to design a cross-sectional study to investigate the prevalence of gastro-intestinal strongyles infection in beef cattle in Udon Thani, Thailand. The total of 401 faecal samples from beef cattle were examined using the simple floatation technique and Ritchie formalin-ether sedimentation technique to evaluate parasitic eggs. The results showed prevalence of Strongyles 71.32 % (286) Paramphistomum spp. 44.64 % (179), Capillaria spp. 7.48 % (30), Trichuris spp. 1.25% (5), Strongyloides spp. 0.75% (3), Fasciola spp. 0.45% (2) and Toxocara spp. 0.25% (1) were found. These results showed the first evidence of the highest prevalence of Strongyles in small holders farms in Udon Thani, Thailand. Therefore, further studies are needed to investigate the correlation between risk factors, health problems and these emerge in native beef cattle in Udon Thani, Thailand

Keywords: strongyles, native beef cattle, Udon Thani

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Socioeconomic status on labor use, health management and problems of buffalo farming in Udon Thani province, Thailand

Chonlawit Yuwajita\textsuperscript{1*}, Netnapa Pabkuntod\textsuperscript{2}, Janpen Wiseddee\textsuperscript{2} and Ketsuda Khojaturus\textsuperscript{2}

Abstract: Socioeconomic Status, including labor use, Health management and problems, and ancillary work done along with buffalo farming in Udon Thani Province was studied. There were 52 farms had been interviewed between August 2014 to September 2014. The study was found 100% of labor was use the families labor themselves and all buffalo farming had grew rice. The farmers valued veterinary services and advices as the most important problems (40.38\%) and buffalo farming health problems was found 7.69\% of dystocia, retained placenta and abortion. The finding reviewed the major problem that should be taken into consideration by officials, involved. Also buffalo farming should be continually promoted by government sectors to help solving economic problems as a whole.

Keywords: buffalo, labor use, health management

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Prevalence of gastro-intestinal parasites of cattle in Udon Thani province, Thailand

Chonlawit Yuwajita¹*, Patthira Thongfueang² and Chongpol Jaiwangdee³

Abstract: Gastro-Intestinal (GI) Parasitic Infections remain one of the major constraints to ruminant production in Thailand. Insidious productivity losses through reduced feed intake and decreased efficiency in feed utilization, associated with subclinical or chronic conditions of parasitic infections are often the cause of large economic lost. The objectives of this study were to; 1) assess the prevalence of GI parasitism in cattle in Udon Thani Province, Thailand; 2) determine the species of existing GI parasites. A total of 461 cattle fecal samples from Udon Thani Province, Thailand were collected and examined using simple floatation and simple sedimentation methods. There were 45.34% in cattle infected with various GI parasites including liver flukes (Fasciola spp.) 3.69%, rumen flukes 18.67%, Strongylodie spp. 11.06%, Capillaria spp. 5.64% and Thrichuris 3.47% respectively. The high incidence of parasitism of cattle might have been due of the relative low influence of feeding behavior and deworming program. In circumstances of very high infection, management and treatment is highly recommended.

Keywords: gastro-intestinal (GI) parasites, cattle, Thailand

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Effect of ozone water (O$_3$) and lactic acid dipping on meat quality and appearance

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Abstract: A 3x3 factorial in CRD was used to study the effect of dipping duration on meat quality and appearance by using ozone (O$_3$), lactic acid and deionized water. The pork samples Longissimusdorsi were dipped in solution with 10, 20 and 30 seconds, under room temperature (28±3°C). The pH of meat samples at 45 mins. and 24 hrs. Postmortem, color value (L*, b*, and a*), drip loss, cutting force, were measured as parameters of meat and appearance. It was found that the meat pH at 45 mins. and at 24 hrs. after slaughtering were not significantly different (p>0.05) at time of dipping 10, 20, 30 seconds. It was also found that drip loss, cutting force, brightness, yellowness were not significant. Only redness value of meat (a*) was significantly affected by of the time of dipping 10, 20 and 30 seconds (p<0.05) with score values of 4.01, 4.44 and 4.12, respectively.

Keywords: meat quality, appearance

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Effect of aging period on turkey meat quality (age 6 months)

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Abstract: An experiment was conducted to determine the effect of aging period on turkey meat quality for 6 months. The samples were divided into 6 groups (0, 6, 12, 24, 36 and 48 hours) which 5 replicated in each. Completely randomized design (CRD). The study showed the consumer acceptance by using satisfy scale 5 levels of the score, the results showed that textural quality of the meat of 4, 5 and 6 group gained more consumer acceptance score than 1, 2 and 3 group, and the difference was significant (P< 0.05). For textural quality values were 3.08, 3.17, 3.22, 3.92, 3.88 and 4.11 in the group 1, 2, 3, 4, 5 and 6 respectively. For meat quality, the results showed that the pH at 48 hours, cocking loss percentage, compression force and shear force were significantly different (P < 0.05). The values were 5.82, 5.79, 5.76, 5.43, 5.16, 5.04, 24.08, 24.24, 24.45, 25.27, 27.17 and 27.44 percent; 40.14, 37.73, 37.44, 35.05, 34.73 and 27.63 N; 8.72, 7.62, 7.41, 6.46, 4.54 and 4.31 kg.

Keywords: Turkey, aging and meat quality

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Effect of effective microorganism (EM) and cassava starch on the physical quality and organic acid composition of native grasses silage in central region of Lao PDR

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Abstract: The objectives of this study were to determine the physical quality and organic acid composition of native grasses silage with the addition of effective microorganism (EM) and cassava starch. The native grasses in central region of Lao PDR were cut into pieces as long as pieces 2-3 cm. Two native grasses were randomly allocated in a randomized complete block design with six treatments: T1 = 10 ml EM + 0 g starch, T2 = 7.5 ml EM + 2.5 g starch, T3 = 5 ml EM + 5 g starch, T4 = 2.5 ml EM + 7.5 g starch, T5 = 0 ml EM + 10 g starch, T6 = silage without additive (control). Three of which were sampled on days 0 and 30 after ensiling. The color of silage was measured by the CIE L*a*b* system using Hunter Labmini scan EZ. The results showed that the silage treated with 10 g of starch had a lowest pH (pH = 3.82). Silage with 2.5 ml of EM with 7.5 g starch had higher greenness more than control. Organic acids and short chain fatty acids of silage such as succinic acid, formic acid, acetic acid, propionic acid and butyric acid at 0 day of ensiling were not significantly different. However, the highest level of lactic acid at 30 days of ensiling was Hymenachne sp. grass silage treated with EM 5 ml + starch 5 g (T3). In conclusion, effective microorganism and starch used in this study improved color characteristics, reduced pH content of silage and increased lactic acid concentration of grass silage.

Keywords: effective microorganism, cassava starch, grass silage

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Effect of sugarcane bagasse treatment on gas production and ruminal degradability by using \textit{in vitro} gas production technique

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**Abstract:** The experiment was conducted to investigate the effectiveness of urea with soybean and calcium hydroxide treatment of sugarcane bagasse on gas production and ruminal degradability by using \textit{in vitro} gas technique. The experimental design was a completely randomized design (CRD) and the dietary treatments were sugarcane bagasse treated with urea (2.4 g/kg dry matter) with soybean (2.5 and 5 g/kg dry matter) and calcium hydroxide, Ca (OH\(_2\)) (2.5 and 5 g/kg dry matter) + control group. Sugarcane bagasse was taken to treated with respective treatment by dissolving in 100 ml water/g sugarcane bagasse and ensiled in a plastic box at room temperature for 14 days. Ensiled sugarcane bagasse were examined by \textit{in vitro} gas production. Rumen fluid was collected from three ruminally fistulated native crossbred beef cattle with an average body weight of 350 kg. During the incubations, gas production was recorded at 0, 3, 6, 9, 12, 18, 24, 36, 48, 72 and 96 hr after incubation. The results revealed that gas production from the insoluble fraction (b), potential extent of gas production (a+b) and cumulative gas production were significantly (P<0.05) increased in all treatments and were highest in urea 4% and urea 4%+soybean 2.5% treatment (55.3, 53.5 and 50.1 ml/0.5 g DM substrate), respectively. \textit{In vitro} degradability of DM was not different among treatments (P>0.05). While, the urea, soybean and calcium hydroxide treatment were influenced on the \textit{in vitro} organic matter degradability and highest in urea 4%+ calcium hydroxide 5% (59.2\%) (P<0.01). Based on this experiment, it could be concluded that urea, soybean and calcium hydroxide treatment could enhance gas fermentation and degradability of sugarcane bagasse.

**Keywords:** sugarcane bagasse, in vitro gas production, degradability

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Replacing soybean meal by *Mimosa pigra* (L.) meal on nutrient digestibility and rumen fermentation in growing goats

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**Abstract:** The aim of this study was to determine the effect of replacing soybean meal (SBM) with *Mimosa pigra* (L.) meal in the diet of meat goats. Growing goats were randomly assigned to four dietary treatments according to a replicated 4x4 Latin square design. Dietary treatments were four levels of replacement of SBM with *Mimosa pigra* (L.) meal at 0, 33, 67, and 100% of crude protein (CP) in concentrates. The results showed that there were no significant differences on production performance of animal fed the experimental diets. The highest for body weight change were found in 33% replacement SBM (P>0.05). Data on rumen fermentation have indicated that ammonia (NH₃) concentrate, pH, and microbial population were not significantly affected. The results suggested that *Mimosa pigra* (L.) meal could replace up to 100% of SBM in concentrate of growing goats fed rice straw as roughage. Based on these results, using 100% *Mimosa pigra* (L.) meal as the main source of protein to completely replace soybean meal was beneficial to growing goats in terms of nutrient digestibility and rumen fermentation.

**Keywords:** *Mimosa pigra* (L.) meal, replacing, digestibility, fermentation

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Effect of Mao (*Antidesma thwaitesianum* Mull. Arg.) seed supplementation on *in vitro* rumen protozoal population and digestibility using a gas production technique

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Abstract: This experiment was to investigate the effect of Mao seed (MS) levels on digestibility and rumen gas production using *in vitro* gas production techniques. The experimental design was a completely randomized design (CRD) and the dietary treatments were MS supplementation at 0, 4, 8, 12, 16 and 20 mg with 0.5 g of roughage and concentrate in a ratio of 60:40. The results revealed that the intercept value (a), gas production from the insoluble fraction (b), gas production rate (c), potential extent of gas production (a+b) and cumulative gas production (72 h of incubation) were not significantly different among treatments (P>0.05). Supplementation with MS did not affect *in vitro* dry matter degradability (IVDMD), *in vitro* organic matter degradability (IVOMD), true digestibility and NH₃-N concentrations (P>0.05). Populations of protozoa tended to decrease when increasing level of MS (P<0.05). Based on this study, supplementation with MS could be efficiency utilize in rumen in terms of reduced protozoan population, and degradability and *in vitro* gas production.

Keywords: Mao seed, gas production technique, in vitro, degradability, protozoan population

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Feed intake, digestibility and blood parameters as influenced by *Aspergillus niger* or *Saccharomyces cerevisiae* fermented Napier grass (*Pennisetum purpureum*) mixed with fresh cassava root for beef cattle

Nonthasak Piamphon¹*, Chalong Wachirapakorn², Pariwat Pornsopin³, Pichetpong Sotawong⁴ and Pongsatorn Gunun⁵

**Abstract:** This experiment was to investigate the effect of *A. niger* and *S. cerevisiae* on fermented Napier grass mixed with fresh cassava root (NC) on the blood biochemistry, blood enzymes, hematological and nutrient digestibility of feed in beef cattle. Four female beef cattle (350±14 kg) were randomly assigned according to a 4×4 Latin square design. The cattle were fed with four dietary treatments with Napier grass (Control), Non-microbial fermented NC (F-NC), *A. niger* fermented NC (AF-NC) and *S. cerevisiae* fermented NC (SF-NC). All animals were given their respective treatments *ad libitum*. The results revealed that dry matter (DM) intake and nutrient intake were increased (*P*<0.01) in animals given AF-NC and SF-NC. Nutrient digestibility was significantly affected by AF-NC and SF-NC (*P*<0.01). Moreover, NH₃-N and glucose concentrations increased (*P*<0.05) when cattle were fed AF-NC, whereas the blood enzymes and hematological parameters were not altered among any treatments (*P*>0.05). Based on this experiment, it could be concluded that *A. niger* and *S. cerevisiae* fermented NC could improve feed intake, nutrient digestibility and blood biochemistry in beef cattle.

**Keywords:** fresh cassava chip, *S. Cerevisiae*, *A. Niger*, blood biochemistry, digestibility, beef cattle

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Improving the nutritive value of reed, *Phragmites australis*, for ruminants by culturing with the white-rot fungus *Ceriporiopsis subvermispora*

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**Abstract:** Culturing reed (*Phragmites australis*) with the white-rot fungus *Ceriporiopsis subvermispora*, improved its nutritive value for ruminants. In experiment 1, the reed was ground into a fibrous powder and then tap water was added to a moisture content of 65%. The reed substrate (RS) was then sterilized and cultured with *C. subvermispora* at 32°C for 2, 4, 6, or 8 weeks. Experiment 2 was conducted to determine whether supplementation with rice bran stimulated lignin degradation in reed and thus enhanced the digestibility of reed. The reed and rice bran substrate (RRBS) was prepared by mixing with rice bran at a dry basis weight ratio of 19:1. RS was cultured for 4 or 6 weeks and RRBS was cultured for 6 weeks. In experiment 1, organic matter (OM) and the content of fibrous components without cellulose in RS decreased (*P*<0.05) following culturing with *C. subvermispora*, The *in vitro* OM digestibility (IVOMD), *in vitro* neutral detergent fiber (NDFom) digestibility (IVNDFomD), and *in vitro* gas production during 48 h of incubation (IVGP) increased (*P*<0.05) following culturing with *C. subvermispora*, from 32.9%, 17.7%, and 74 ml/g OM at 0 weeks to 81.9%, 74.4%, and 217 ml/g OM at 8 weeks. In experiment 2, OM, NDFom, and lignin content in RRBS cultured for 6 weeks were lower (*P*<0.05) than those in RS cultured for 6 weeks. The IVOMD and IVNDFomD of RRBS cultured for 6 weeks were higher (*P*<0.05) than those of RS cultured for 6 weeks. We suggest that *C. subvermispora* is capable of improving the nutritive value of reed and that supplementation with rice bran accelerates the degradation of lignin in the reed and would shorten the culturing period needed.

**Keywords:** Ceriporiopsis subvermispora, digestibility, lignin, reed, white-rot fungus

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Comparative study on commercial semen extenders and storage time on the quality of boar semen

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Abstract: The aim of this study was to compare the percentage of sperm life, motility, and abnormal morphology of boar spermatozoa extended in the four commercial extenders. Five boar ejaculated semen were stored (38x10⁶ spermatozoa/ml) in the two commercial extenders devised for short-term preservation (BTS and Dilumax-BTS) and the two long-term preservation extenders (D-Max⁶ and Gold life) with a randomized completely block design. The samples were stored for 9 days at 17 ºC. On day 0, 1, 3, 5, 7 and 9 of storage, sperm motility, sperm life and morphology of the stored semen were evaluated. Across the storage days, the percentage of individual motile and total sperm life were significantly decreased (P<0.01) after storage. On day 5, 7 and 9 after storage, the percentage of sperm life in D-Max⁶ and Gold life were significantly (P<0.01) higher compared to BTS and Dilumax–BTS diluted semen. The individual motile sperm life reduction below 60 percentages were observed from days 5 to 9 of storage in BTS, Dilumax–BTS and Gold life, whereas the semen stored in D-Max⁶ was observed the individual motile sperm life above 60 percent up to day 7 of storage. However, none of the semen extenders were associated with the morphology of spermatozoa. The data revealed that semen extended in D-Max⁶ had the highest percentage of individual motile sperm life throughout the 9-days storage period. It can be concluded that Gold life, BTS and Dilumax–BTS preserved sperm quality for up to 3 days of storage, whereas D-Max⁶ preserved the sperm quality for up to 7 days of dilution.

Keywords: extender, storage, quality, semen, boar

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Wastewater treatment using Spirulina Platensis at TH Truemilk dairy farm - Nghia Dan District – Nghe An province

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Abstract: The present study aimed to assess waste water treatment ability of *Spirulina platensis* from TH Truemilk dairy farm – Nghia Dan district – Nghe An province. This study was conducted for nearly one year and included monthly water analysis for various physico-chemical factors. *Spirulina platensis* belonged to blue green algae viable for biological treatment. The results showed reduce nutrient concentrations from wastewater such as, nitrate, phosphorus and sulphate. In addition, the ability of these algae to reduce B.O.D, C.O.D, T.D.S, calcium and magnesium hardness. The recorded ability of this algae on removing nitrate 77.53%, active phosphorus 75% and sulphate 61.23%. While C.O.D 75.14% T.S.S 73.68%, B.O.D 69.38 %, calcium and chloride 59.17 %, 51.05 % during the eleventh day of treatment.

Keywords: Dairy, Wastewater, Treatment, Microalgae, Nutrients

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Antioxidant activity of hydrophylic extract from straw mushroom and its effect on shrimp melanosis

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Abstract: The present study was to investigate the antioxidant activity of hydrophilic extract from straw mushroom and its effect on shrimp melanosis. The antioxidant activity of the mushroom extract was determined by DPPH radical scavenging, total reducing power, hydrogen peroxide scavenging and lipid peroxidation inhibition activities. The inhibitory effect of the mushroom extract on melanosis of shrimp was analyzed by immersing the shrimp into the mushroom extract. The results showed that the mushroom extract as a potent antioxidant and prevented the melanosis development effectively when compared with the controls. These observations suggested that the mushroom extract is a potential antioxidant, which has the ability to control melanosis in shrimp during ice storage.

Keywords: Mushroom, Antioxidant, Shrimp, Melanosis

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Farmers’ adoption towards the government project “the system of rice intensification” in Tin Kaew village, Luang Prabang, Lao PDR

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Abstract: This study was conducted in Tin Kaew Village, Luang Prabang, Lao PDR, to investigate three purposes: 1) farmer’s knowledge and correct practices through the System of Rice Intensification, 2) cultivation problems towards the System of Rice Intensification and 3) farmer’s adoption regarding the System of Rice Intensification. The questionnaire was accomplished for data collection. The findings of this study were divided into three portions: 1) farmers’ practices, 2) cultivation problems and 3) farmer’s adoption concerning the System of Rice Intensification supported by the government. According to the farmers’ practices, most of them still practiced transplanting incorrectly (97%), and the ability of water control in the paddy fields was ineffective (64.86%). Besides, cultivation problems frequently mentioned by the farmers were: 1) plant disease and insects (\(\bar{x}=1.80\)), 2) labor shortage (\(\bar{x}=1.89\)), 3) correct practice ignorance (\(\bar{x}=1.71\)), 4) drought (\(\bar{x}=1.80\)) and 5) some flooded areas (\(\bar{x}=1.80\)). However, the overall farmers’ feedback indicated that the System of Rice Intensification was adopted in the high level (= 2.63).

Keywords: farmers’ adoption, The System of Rice Intensification

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Clustering analysis of salinity responses in indigenous rice by sorting algorithm

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Abstract: Salinity responses in 30 lines of Thai indigenous rice and 4 control lines were evaluated at the seedling stage. Clustering analysis on the basis of stress responses was further tested by a sorting algorithm using the software MATLAB. Sodium chloride at concentrations of 0 and 103 mM added into the nutrient solution was used for a control and salt stress treatments, respectively. Physiological responses including shoot dry weight, root dry weight, survival rate and visual-symptom score were recorded. The results showed that the data could be analyzed by sorting algorithm analysis method. All examined lines were classified into 10 related subgroups, which were then merged into 3 main groups. These were tolerant, moderately tolerant and susceptible regarding their responses to sodium chloride stress. Eight of 30 lines of indigenous rice were salt tolerant. Based on these data, accession no. KKU.ULR076 (named, How-klang), KKU.ULR198 (Brown sticky rice) as well as the tolerant-ecotype-Pokkali exhibited a similar ability in salinity responses. However, 10 of 30 lines of indigenous rice were identified as susceptible.

Keywords: salt stress, rice, clustering analysis, sorting algorithm

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Inhibitory effect of essential oils from local Thai medicinal plants against common human pathogens

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Abstract: This study aimed to extract essential oils from some local Thai medicinal plants, namely Citrus hystrix DC. (Kiffir lime), Cymbopogon citratus Stapf. (Lemon grass), Cymbopogon nardus Rendle (Citronella grass) and Ocimum basilicum L. (Sweet basil) by a hydro-distillation method and investigate their antimicrobial efficiency against four common bacterial species. Using this hydro-distillation method, the highest percentage yield was found from the essential oil extracted from sweet basil (1.19%), whereas citronella grass gave the lowest yield of the essential oil (0.28%). Agar-disc diffusion technique was used to test for the antimicrobial activity of these essential oils against Staphylococcus aureus, Escherichia coli, and Salmonella Group B, isolated from specimens of patients from Kalasin Hospital. Essential oil extracted from lemon grass showed higher tendency to inhibit all pathogens. Antimicrobial index (AI) was used to report the antimicrobial efficiency. Result showed that S. aureus and Salmonella Group B were the most sensitive to the essential oil extracted from lemon grass, shown their AI as 5.07 and 1.15, respectively. The highest antimicrobial index against E. coli was found when testing with the essential oil from citronella grass, followed by lemon grass, their AI as 2.28 and 2.22, respectively. This result suggested that the promising antimicrobial property of the essential oil from lemon grass which could be useful in pharmaceutical treatments.

Keywords: essential oil; Thai medicinal plant; antimicrobial index

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Biological control of tomato leaf blight disease by using antagonistic *Bacillus subtilis*

Kaltima Phichai

**Abstract:** Tomato is one of the important economic vegetable crops which are attacked by several serious diseases such as leaf blight. *Bacillus* genera is most feasible biocontrol microorganism suppress several pathogens like *Alternaria* spp. The efficiency of the antagonistic treated plant by strains was evaluated using an in vitro assay. Dual culture examination was performed to investigate the ability of antagonistic bacteria to inhibit the growth of leaf blight caused by *Alternarias*pp. The efficacy of antagonistic *Bacillus subtilis* showed that the bacterium effectively suppressed the development of *Alternaria alternate* and *Alternaria* sp. at 38.67 and 32.89 % respectively while chemical fungicide agent (mancozeb) could inhibit the pathogen at 38.89 %. The shake flask culture of *B. subtilis* in 7 formulas media was carried at laboratory with 200 rpm for 120 hours at room temperature (30°C). The results showed that the high cell density at 96 hours has been found for all medium. The highest cell density of 3.6 x 10^8 CFU mL^-1 was achieved from NGB medium. These findings support the potential use of *B. subtilis* for biological control of *Alternaria* spp. on tomato plants.

**Keywords:** antagonistic bacteria, biological control, leaf blight, *Bacillus subtilis*, *Alternaria* spp.

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Some study results on medicinal plants using by the Thai ethnic minority in Pu Hoat nature reserve area, Nghe An province, Viet Nam

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Abstract: The research results showed that the medicinal plants used by the Thai ethnic minority in the Pu Hoat nature reserve area, Nghe An province consisted of 618 species and 137 families. Of all the parts of plants, leaves were most used for medical treatment followed by stems, flowers and fruit. Medicinal plants are used to treat 17 different groups of diseases. Among these medicinal plants, we identified that the 10 species are listed in the 2007 Vietnam Red Book.

Keywords: Medicinal plants, medical treatment, Thai ethnic minority

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Screening of antibacterial and antifungal herbs used for treatment in traditional medicine

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Abstract: Traditional medicine in Thailand usually uses many herbs to cure diseases. For a long time, many traditional medicinal doctors have used grinded herbs as drugs for the skin disease treatment. However, few herbs have been known so far. Therefore, it would be a great interest to widely screen more antibacterial and antifungal medicinal plants as a library to be used by traditional medicinal doctors. A total of 100 plants including known medicinal plants and interested plants were selected. The selected herbs were freshly grinded without addition of any solvents before subjecting to antibacterial and antifungal tests. The selected plants were screened for antibacterial and antifungal activities against pathogens causing dermatitis including \textit{Pseudomonas aeruginosa}, \textit{Staphylococcus aureus} and \textit{Candida albicans}. The result indicated that 4 selected medicinal plants, \textit{Allium sativum} L., \textit{Allium cepa} Linn, \textit{Allium ascalonicum} and \textit{Capparis} sp. showed both antibacterial and antifungal activities. This finding is a pioneer demonstrating the use of grinded fresh fruits of \textit{Capparis} sp. to inhibit some bacteria and fungi causing dermatitis. An addition of any solvents during a leave grinding was not required.

Keywords: antibacterial, antifungal, herps

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Study of mushrooms and wildlife animals biodiversity in the
Ponsongkram community forest, NonSung district,
Nakhon Ratchasima

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Abstract: The Ponsongkram community forest is located in the center of the village, surrounded by seven villages of Non Sung district including the village of Ban Yaka, Ban Nong Hua Rad, Ban Maroom, Ban Mai, Ban Khoksaard, Ban Donmoung and Ban Makha in Nakhon Ratchasima province. These area composes of many kinds of forest, such as evergreen forests and deciduous forests. The study of diversity of mushrooms and wildlife animals was carried out by surveying once a month during rainy season 2013 (June 2013 to August 2013). Results of the survey revealed totally 26 mushroom species which 23 species could be identified. The identification mushrooms were classified to 15 genera, 10 families and 4 orders. All of them were divided into 4 groups according to their roles and functions in the forest ecosystem, namely, decomposed mushrooms 4 species, ectomycorrhizal mushrooms 11 species, termite mushrooms 1 species and unknown roles and function 7 species. The study of the various types of wildlife was done by interviewing people in the area were hunters and foragers older generation to see a wild animal ever found. The interview also study by using the participation of the villagers for wildlife, using cage traps and placing the mesh in the course are expected to be used as animal feed path in a straight line (Line trekking) and from a survey of the research team. The animals were 28 species of animals mammals 11 species, reptiles 12 species and amphibians 5 species can be sampled organisms and found the animal footprints while walking 19 species including foxes, hares, variable squirrels, tree, shrew, mongoose, roof rat, palm civet, flying lemur, frogs, caecilian, green frogs, ballon frogs, toads, oriental whip snakes, Indochinese rat snakes, sunbeam snake, common sun skink, forest skink and curve toe gecko. and a wildlife that is not found by the survey including small indian civet, large indian civet, mask palm civet, banded krait, malayan pit viper, cobra, reticulate python, green pit viper and copperhead racer. They also found traces of the footprints and dung of carnivores, which is expected to be a small civet.

Keywords: Ponsongkram community forest, Mushroom, Wildlife animals

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Study on karyotype and in vitro micropropagation of Zephyranthes grandiflora

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Abstract: This research aimed to study the plant morphology of Zephyranthes grandiflora and to compare the optimal synthetic medium for plant growth under in vitro culture. The Murashige and Skoog (MS) medium supplemented with various concentrations of BA and NAA as growth regulators. This experiment was completely randomized design (CRD) with three replications. The first factor (BA) was divided into three levels (0, 2 and 4 mg/L) and the second one (NAA) was comprised three levels (0, 0.5 and 1 mg/L). Both factors were added sugar 30 g/L, agar 8 g/L with pH 5.8-5.9 and cultured at 20 ºC for six weeks. The karyotype test from the root tip of Z. grandiflora was carried out by using the Feulgen squash technique. The results showed that the underground stem was bulb-like. The leaf was linear, obtuse, bunchy and large with two jagged edges. The flower was bright pink color and funnel forms with six perianth petals, six androecium and one gynoecium. Inferior ovary had three carpels and three loculs. The stigma had three jagged edges and seed was not observed in this time. After culturing for six weeks, the results exhibited that the MS medium supplemented with BA 0 mg/L and NAA 0.5 mg/L could induce the shoot growth averaged Shoot length Leave length number of Roots Root length Total Weight 18.85±0.67, 10.37±0.51, 10.25±0.79 ,5.23±0.55 and 5.14±0.46 respectively. Based on chromosome investigation, diploid set for Z. grandiflora was 2n = 48 and three groups of chromosome were classified including four metacentric (1, 2, 21 and 22), 10 submetacentric (3, 7, 9, 12, 14, 16, 17, 18, 23 and 24) and acrocentric (10 4, 5, 6, 8, 10, 11, 13, 15, 19 and 20) chromosome pairs, respectively.

Keywords: Zephyranthes grandiflora, morphology, plant tissue culture, karyotype

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Isolation of new bacteria of farm reared frogs 
(Haplobatrachus rugulosus) in UdonThani province

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Abstract: The aim of the present was to isolate bacteria from farm reared frogs in Udon Thani Province, as no previous information exists in this Province despite frog farms are common in this area. The farm reared frog (Haplobatrachus rugulosus) was studied in Udon Thani Province. Three bacteria were isolated and posteriorly confirmed by sequencing, being Staphylococcus haemolyticus, S. saprophyticus and Bacillus siamensis which were reported for the first time in frogs. These findings proved the need of bacteriological surveys in farm reared frogs and the possible consequences in their health.

Keywords: Haplobatrachus rugulosus, Staphylococcus haemolyticus, Staphylococcus saprophyticus, Bacillus siamensis, farm frog

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Color pattern variation on two species of wild frogs in North East of Thailand

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Abstract: Two species of frogs, the tree frog *Polypedates leucomystax* (Gravenhorst, 1829) (Rachoporidae) and the Asian Grass frog *Fejervarya limnocharis* (Gravenhorst, 1829) (Ranidae) were surveyed from several localities to study its presence and pattern variability. *Polypedates leucomystax* shows high pattern variability that could make confusion on the assignation of the species. In *Fejervarya limnocharis*, the vertebral stripe shows high variations on size and color. Three localities were surveyed: Phu Wua Wildlife Sanctuary, Na Yung-Nam Som National park and the Campus of Udon Thani Rajabhat University. We present the results showing variation in same locality and between localities. No previous information exists in both natural reserves studied, providing first data in the present study.

Keywords: *Fejervarya leucomystax*, *Fejervarya limnocharis*, color pattern variability

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Isolation and screening of actinomycetes from soil for their enzymatic and antifungal activity

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Abstract: Actinomycetes, a slow growing gram positive bacteria, are known as an organism that is useful in the search for bioactive compounds. One hundred twenty-nine isolated of actinomycetes were isolated from soil samples collected in Phulungka National Park, NakhonPhanom province. The isolates were identified as actinomycetes by morphological studies. All isolates were selected on their basis of their chitinolytic, amylolytic, cellulolytic activities by screening. Enzymatic activities of 81 isolated strains for chitinolytic, 75 isolated strains for amylolytic and 41 isolated strains for cellulolytic, it was confirmed by formation of clear zones of hydrolysis around the colonies. Antifungal test using selected phytopathogen as test strains and it was observed that 75 isolated strains showed antagonistic reaction with Fusarium sp. FT-04. The isolate of actinomycetes strains were identified as Streptomyces, Microbispora and Microtetraspora.

Keywords: isolation, screening, Actinomycetes, enzymatic, antifungal activity

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Isolation and characterization of Rhizobium sp. from root of legume plants

Kingchan Malisorn* and Chidkamon Prasarn1

Abstract: Root nodules were collected from legume plants, there were subfamily Mimosoideae, Caesalpinioideae and Papilionoideae. One hundred thirteen rhizobium strains were characterized by biochemical tests. Physiological properties of all isolated strains were fast growing indicated that isolated rhizobia and had the same colony morphology and produced high, slimy mucous transparent to creamy colored colonies on YMCA plates after 3 days of incubation at 37°C. All strains were rod shaped, gram-negative and did not absorb red colour when cultured in YMA containing congored. All strains utilized glucose, manitol, lactose as fermentation sugar. The isolates from present study may be useful to increase the symbiotic nitrogen fixation in legume plants.

Keywords: isolation, characterization, Rhizobium, legume plant

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Soil insect diversity comparison between dry dipterocarp forest and mixed deciduous forest of northeastern Thailand

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Abstract: The study of diversity soil insects in plant genetic protection area of RSPG, Nampung dam EGAT, Phu Phan district, Sakon Nakhon province during December 2011 and August 2012 was studied. The aims of this project are to study conserving plant genetic diversity in plant genetic diversity in protected areas following the project undertaken through the initiative of her Royal Highness Princess Maha Chakri Sirindhorn (RSPG) in Plant Genetic Protection Area of RSPG, Nampung Dam EGAT and to check and list insects in soil. The sampling areas were conducted by survey in dry deciduous forest (DDF) and mixed deciduous forest (MDF) for 4 times. The result observed that there were 6 orders and 20 families of soil insects found during survey. There was totally 1,804 soil insects observed in DDF areas (934 individuals) and MDF areas (870 individuals). The Formicidae family was the most abundant (1,411 individuals) followed by the Termitidae family (256 individuals) and the Blaberidae (41 individuals), respectively. The biodiversity index of DDF areas is 0.7975, which is less than MDF areas (1.545). It can be concluded that DDF areas have more abundance than MDF areas but diversity of soil insects in MDF areas was higher than DDF areas.

Keywords: Soil insects, Nampung dam EGAT, dry dipterocarp forest, mixed deciduous forest

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Diversity of edible mushrooms in Phuphrabat Historical Park, Udon Thani province

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Abstract: Phuphrabat Historical Park is called Stones Garden on the foothills of the Phuphan Mountains in Ban Phu district with 68 km north-west of Udon Thani, Thailand. Diversity and abundance of plants, animals and especially mushrooms are notably observed in the park. The habit of all edible mushrooms is in the nature forest ecosystem. The objective of this study was to explore the diversity of edible mushrooms in Phuprabat Historical Park. The research was conducted from May 2014 to July 2014 during the rainy seasons. The samples were collected along the tourist path. The results found that the total number of 12 species of edible mushrooms in 12 genera belonging to eight families in order Basidiomycotina. The edible mushrooms in Boletaceae (3 species) were found predominantly followed by Phallaceae, Russulaceae, Amanitaceae, Sclerodermataceae, Lycoperdaceae, and Lentinaceae.

Keywords: edible mushroom, diversity

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Diversity of land snails in Phuphrabat Historical Park, UdonThani province

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Abstract: Phuphrabat Historical Park is located in Ban Phue District, Udon Thani Province, Thailand. This area has an abundance of forest and high diversity of organisms. There is a wide variety of animals, fungi, mushrooms, plants and land snails. The land snails play an important role as predators and consumers in the food chain. Moreover, people have associated them as food and medicine. The variety of land snails investigated several habitats in Phuphrabat Historical Park. The study was conducted from October 2013 to September 2014 along the tourist path. The results showed that all samples were classified to two orders, three families, four genera and five species. They were *Hemiplecta distincta*, *Hemiplecta siamensis*, *Cryptozona siamensis*, *Cyclophorus volvulus* and *Pseudobuliminus (Giardia) siamensis*.

Keywords: land snail, diversity

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Xanthophyll, lycopene, β-carotene and antioxidant activity of selected Thai fruits

Nittaya Khonsarn¹ and Siriporn Lawan²

Abstract: Xanthophyll, Lycopene, β-carotene content and antioxidant activity of 11 selected kinds of Thai fruit were determined. The result showing the highest average Xanthophyll content was found in cantaloupe (1.31±0.07 mg/100g edible portion). Lycopene content in Tang-Mo was the highest (131.00±1.72 mg/100g edible portion). The Thai tropical fruit with the highest β-carotene content was Ma-moung (127.12±2.12 mg/100g edible portion). Antioxidant activities of eleven selected Thai tropical fruit were determined by DPPH radical scavenging and FRAP assays. The results showed Mayom displayed the highest antioxidant activity by the DPPH assay, with 94.33±0.60 % inhibit. Mayom also had the highest antioxidant activity by the FRAP assay (4.19±0.01 mM FeSO₄). This study revealed two things. The first is that all types of Thai tropical fruit contained different Xanthophyll, Lycopene and β-carotene contents. The second is that antioxidant activity of selected Thai tropical fruits was high. People can choose any kind of selected Thai tropical fruit in local markets and consume 3-5 serving/day and receive enough carotenoid agent for effective antioxidant activity to support their health.

Keywords: xanthophyll, lycopene, beta-carotene, antioxidant activity, Thai selected fruit

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Isolation and identification cellulolytic microorganism from bovine rumen at TH Truemik Dairy Farm-Nghia Dan District-Nghe An Province

Le Minh Thanh and Hoang Vinh Phu

Abstract: Using anaerobic techniques and the method of preparing media for roll tubes, we have isolated 18 bacteria strains from bovine rumen. The estimation of cellulose activity was carried out through the examination of glucose productivity and total percent of amount CMC was digested. Total celulase activity has been at 0.022U and over 80% amount of CMC was digested. The isolated strains named D1, D2, D4, D5, D6, D7, D13, D14, D15 were identified as high cellulase activity. The results indicated that these strains could be used for fermentation reaction to produce foods for dairy cow. On the other hands, these strains could be used to treat pollution at TH true milk dairy farm. This study is only initial, so further studies should be conducted to estimate potentiality of treatment pollution and fermentation food for dairy cow.

Keywords: Rumen, cellulose, microorganisms
Effect of two-stage dilute acid pretreatment on xylose production from rice straw hemicelluloses

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Abstract: Two-stage dilute acid pretreatment was innovatively used together in this study to improve the effectiveness of xylose production from rice straw hemicelluloses. Under the best pretreatment conditions (the solid to liquid ratio of 1:10, 1.5% H2SO4, 121 ºC, 60 min; the solid to liquid ratio of 1:6, 1.0% H2SO4, 121 ºC, 60 min), the maximum yield of xylose, total sugars, and acetate were 2.43, 3.16, and 0.19 g/g rice straw, respectively. This form of two-stage dilute acid pretreatment was a promising method of increasing the overall yield of xylose as a substrate for process of the cellulose-to-biofuel or other biochemical products.

Keywords: Pretreatment, Xylose, Rice Straw, Hemicellulose

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Study of optimum conditions for ethanol fermentation from molasses by thermotolerant yeast

Parinyapan Phetcharat

Abstract: The present research aimed to study the optimum conditions for ethanol fermentation from molasses by thermotolerant yeast. The thermotolerant yeast strain (NK1-4) was previously isolated from Thai traditional starter (Loog-pang). The NK1-4 yeast strain was incubated in different conditions of temperature (30, 35 and 40°C), pH (4.0, 4.5, 4.8, 5.0 and 5.5) and molasses concentration (18, 20, 22 and 24 °Brix). The result indicated that NK1-4 yeast strain exhibited the highest ethanol production when cultured in 22 °Brix molasses medium, pH 5.5 and incubated at 35 °C. Therefore, NK1-4 yeast strain was cultured in larger scale using 3000 ml. of 22 °Brix molasses medium, pH 5.5 and incubated at 35 °C. The result showed that NK1-4 yeast strain produced the highest ethanol concentration (7.1% v/v) on day 8.

Keywords: Thermotolorant, Yeast, Molasses, Ethanol, Fermentation

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Isolation of \( \beta \)-mannanase-producing bacteria from Roi Et Rajabhat University

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Abstract: Thirty eight mannanase-producing bacteria were isolated from 12 soil samples which located in and outside of Roi Et Rajabhat University. The mannanase screening was carried out on Luria-Bertani agar containing locust bean gum (LBG) stained with iodine solution. After screening two isolates which highest halo ratio were selected and named KP1 and KP4. Mannanase activity was determined by DNS method using LBG as substrate at 50, 55 and 60 °C. The mannanase activity of KP1 and KP4 at 60°C for 5 min was 0.89 and 1.17 U/min and at 60°C for 30 min was 0.35 and 0.26 U/min. KP1 and KP4 were identified by partial 16S rRNA gene sequence, biochemical test and morphology, respectively. The results of bacterial identification is identified KP1 as \textit{Bacillus subtilis} and KP4 as \textit{Bacillus amyloliquefaciens}

Keywords: mannanase, bacteria, isolation

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Development of pharmabiotics as antibiotic alternatives for seafood security and marine aquaculture health: two case studies from Vietnam

Van Duy Nguyen

Abstract: Pharmabiotics are any biological materials derived from gut microbes, including probiotics, bacteriocins, bacteriophages and bioactive molecules. They have been introduced in food, agriculture and clinical settings to replace the use of traditional antibiotics. This has led to a current threat posed by multi-drug resistant bacteria. This research aims to develop bacteriocins or bacteriocin-producing bacteria as new pharmabiotics for improving seafood security and marine aquaculture health. We screened bacteria isolated from Vietnamese traditional fermented foods and marine animals of interest to the aquaculture industry (lobster, tiger shrimp, otter clam, snubnose pompano and cobia) for antimicrobial and bacteriocin-like activities in order to uncover biodiversity of bacteriocin producers. It was further intended to explore potential applications in seafood preservation and marine aquaculture. In total, 32 screened isolates showed antimicrobial activities and 15 of these exerted bacteriocin-like activities. Sequencing of 16S rRNA genes identified the isolates as members of the nine genera Lactobacillus, Bacillus, Proteus, Providencia, Klebsiella, Alcaligenes, Enterococcus, Enterobacter and Cronobacter. The bacteriocinogenic isolates showed a wide antimicrobial spectrum against foodborne and animal pathogens. This suggests their potential use as drugs and probiotics in food, aquaculture, livestock and clinical settings. In the first case of study, two strains Lactobacillus plantarum T8 and T13 were found to produce bacteriocins of Class I (Lantibiotics), which remained active at 121°C for 15 min, at pH 4-10 and with proteinase K but deactivated by α-chymotrypsin treatment. The application of culture extract from the strain T13 with a cell concentration of 10^10 CFU/ml or crude bacteriocin extract from the strain T8 with bacteriocin activity of 800 AU/ml was shown to prolong the chilling preservation of fresh cobia meat compared to a control. In the second case study, the protective effect of bacteriocinogenic Bacillus and Lactobacillus isolates were tested in aquaculture-raised spiny lobster (Panulirus ornatus) juveniles. Lobsters receiving the probiotic treatments displayed increased growth and reduced feed conversion rates after 60 days, and increased survival rate after a pathogen Vibrio owensii DY05 challenge relative to the control. This study represents the first evidence of the use of bacteriocins or bacteriocin producers as biopreservatives for fresh cobia meat and as probiotics for lobsters.

Keywords: antimicrobials, aquaculture, bacteriocins, pharmabiotics, probiotics

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High-throughput approaches to screen the effective bioplastic producing bacteria by using biodiesel waste by product as carbon source

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Abstract: With dramatic use of biodiesel in world-wild consequently increase the accumulation the huge amounts of by-products, mainly crude glycerol via transesterification reaction. Therefore, use of the biotechnological strategies for biotransformation of crude glycerol to the other valuable products would be advantageous. In this research, we have attempted to use biodiesel waste by-product to produce an environmentally friendly bioplastic of polyhydroxyalkanoates (PHAs) by newly isolated strain from different bacterial sources. The primary isolation was carried out by using the standard morphological and their colonial appearance. 47 positive isolates were screened and selected from 250 isolates by Nile red staining-colony under UV-light. Then spectrofluorometric technique was used to evaluate the high potential PHAs-producing strain. The results showed that 11 PHAs-producing strains were detected with high folds intensity and effective growth. The accumulation of PHAs was further investigated in cells which were cultured in the medium containing 20 % (w/v) glycerol waste by-product without optimization process and revealed that isolate NK14 showed the highest dry cell weight (6.74 g/L) and PHAs production (3.07 g/L). Therefore, this research results highlight the high potential of microbe that might be the exploitable application for the industrial PHAs production from biodiesel waste by-product.

Keywords: Polyhydroxyalkanoates, PHAs, Biodiesel waste byproduct, Crude glycerol, Bioplastic

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Fermentation of cocoa with addition of lactic acid bacteria

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Abstract: Natural fermentation of cocoa beans is a complex process. This is due to the wild microflora in the materials, mainly yeasts, lactic acid bacteria, acetic acid bacteria and others. Addition of some useful microorganisms such as yeasts and/or certain bacterial species has showed to be very promising in improving the quality of the fermented bean for chocolate production. This research was to study the effect of adding naturally isolated lactic acid bacteria during cocoa fermentation on the bean quality. A lactic acid bacteria product containing at least $2.3 \times 10^7$ cfu of \textit{Lactobacillus fermentum} per g was used at different ratios to the bean mass. These were 0% (for comparison), 2%, 4% and 6% (w/w) at the beginning of fermentation and/or 2% at 24-hour intervals during fermentation. This resulted in 16 different regimes. Fermentation lasted up to 7 days. Mixing of the beans was done after 48 and 96 hours of fermentation. Samples were taken every 24 hours for enumeration of yeasts, lactic acid bacteria, and acetic acid bacteria as well as for pH measurements. A cut test was performed on fermented beans (after being sun dried) for their quality assessment. It was found that the ratios of bacteria product used and times of bacterial addition significantly influenced the quality of fermented beans. The samples in which 6% of the bacteria product was added at the start with 2% bacteria product addition at days 2, 3 and 4 of the fermentation yielded the best results. In these samples, the counts of lactic acid bacteria and acetic acid bacteria at the end of fermentation were also the highest in comparison with other samples. The results showed that addition of lactic acid bacteria at certain concentrations and time intervals resulted in positive effects on bean quality.

Keywords: Cocoa, fermentation, Lactic acid bacteria

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Chemical properties and sensory characteristics of Tomyum Puffed Rice

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Abstract: This paper examines the chemical properties and sensory characteristics of a product made from glutinous rice flour. Tomyum puffed rice was made from glutinous rice flour and seasoned with tomyum powder. The purpose of this study was to investigate the quality of the characteristics of tomyum puffed rice. Four treatments consisted of a control with no tomyum flavor added (TYN), puffed rice with tomyum broth (TYB), puffed rice with tomyum powder (TYP) and puffed rice admixed with tomyum powder (TYM). Proximate analysis measured moisture, fat, protein and ash. Results showed no significant difference (P<0.05) among the samples. The panelists evaluated each sensory characteristic of the samples using a 5-point hedonic scale. TYM had the highest score for overall acceptability. The acceptability of the remaining samples was in descending order, TYP>TYB>TYN. Color values were expressed as $L^*$, $a^*$, $b^*$. All samples had $L^*$ values less than TYN. Additionally, all samples had $a^*$ values higher than TYN. Lipid oxidation was evaluated through measurement of thiobarbituric acid (TBA) values. The values of TBA were not significantly different (P<0.05) among all samples for the first 3 months of storage at 25°C. However, TYN parameters slowly increased after 5 and 6 months of storage.

Keywords: puffed rice, tomyum, chemical composition, sensory evaluation, glutinous rice flour

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Preparation of a malt beverage from different rice varieties

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Abstract: This research is an investigation of a malting process using three different varieties of glutinous rice. The malted beverages produced in this study were made using rice cultivars RD6, Niaw Ubon2 and Hawm Skon. The malting process can be divided into three steps, soaking, germination and kilning. The resulting beverages were analyzed to determine their physical, chemical and sensory properties. Colour and viscosity differences between these products were not significant (p>0.05). Their acidity ranged between pH 5.5 to 6.0. The total soluble solids content (TSS) values of beverages made from the three rice cultivars were similar (15-16 °Brix). Sensory evaluation of the quality attributes of the beverages (colour, order, flavor and the overall sensory) revealed that malted beverages made from the Niaw Ubon2 rice variety with 48 hours of soaking time and a kilning temperature of 50-56 °C enabled production of an acceptable malted beverage.

Keywords: rice varieties, malting process, malted beverage

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Studying the potential of Khai Phran production (water algae sheets) in Luang PraBang, the Lao people’s democratic republic in preparation for joining the ASEAN community

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Abstract: Khai Phran is a famous food product from Luang PraBang, Laos. It is made from green fresh water algae collected 1 to 2 meters below the surface of flowing streams. Khai (Cladophora spp.) is commonly found in the Mekong River and its tributaries. The current study was done by observing production methods and interviewing producers from 11 of 40 families in Munag-Kum Village. Chemical composition of Khai Phran was determined by standard methods. Khai Phran production is the primary occupation of this village. It is made during the months of September through April. Furthermore, the process uses traditional knowledge of producing Khai Phran to improve flavor and shelf-life. A questionnaire was administered to 100 Laotian and foreign tourists to learn their opinions about Khai Phran. The main ingredients of Khai Phran are newly harvested Khai (fresh water algae), salt, and tamarind. The minor ingredients are olives, seasoning, tomato, garlic, and sesame. The method for Khai Phran production involves (1) cleaning fresh Khai, (2) moulding Khai sheets, (3) adding seasonings and (4) drying and (5) packaging. Its proximate composition is 24.01% protein, 31.71% fat, 10.98% ash, 24.59% fiber, 8.71% carbohydrate and 8.11% moisture (dry basis). To survey tourist opinions of Khai Phran, the questionnaire used in the study show that 57% of the tourist were familiar with the product. Among Asians, this increased to 64.91%. On a scale of 1-5 (dislike very much-like very much), Khai Phran was assessed for its flavor, physical characteristics (color, shape and size), quality and safety, nutritional value, packaging, price, convenience, ease of eating and the total average attributes. Tourists rated the product as 3.95 ± 0.79, 3.86 ± 0.69, 3.60 ± 0.73, 3.46 ± 0.80, 3.26 ± 0.97, 3.40 ± 0.73, 3.93 ± 0.82, 3.89 ± 0.92, and 3.66 ± 0.26, respectively. Khai Phran production in Luang Prabang follows a great traditional process and provides a livelihood for many people. It is an attractive and pleasant product enjoyed by tourists.

Keywords: Khai Phran, fresh water algae, Luang Pra Bang, traditional food product

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Effect of osmotic dehydration on antioxidant compounds and sensory acceptance of vegetable snacks

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Abstract: Dehydration of vegetables is a process commonly used to preserve the product. However, collapse of the structure, discoloration and beneficial compound loss are frequent quality problem. The combination of osmotic dehydration (OD) and hot air drying is widely used process that could improve the qualities of dried fruit and vegetable products. The objective of this work was to study the effect of OD using salt solution as a pretreatment on certain properties of pumpkin, sweet potato, mushroom and carrot snacks. Pumpkin, sweet potato, mushroom pieces were soaked in 5% salt solution (sodium chloride) for 30 and 60 min. The vegetables were then dried at 60°C until their $a_w$ were 0.35-0.45. The unsoaked vegetables were also served as control samples. The products in PE bags were storage for 1 month at ambient temperature. The phenolic and flavonoid compounds, color, texture of the dried samples were determined compared with control products. The sensory acceptance of vegetable snacks (dried vegetables with seasoning spices) was evaluated by using 9-point Hedonic scale. The results showed that, OD was affected antioxidant content of the products ($p<0.05$), depended on type of vegetables. The flavonoids, higher than 50% was remained in osmotically dried pumpkin as compared to a control one, but the advantage on phenolics retention was not found. Total color change of the snacks was decreased by OD. However, sensory characteristics and hardness value was not improved by OD. The process optimization concerning on solution types, soaking and drying conditions will be investigated in further work in order to promote sensory acceptability. The above results suggest that the OD process used in this work could be recommended as a simple method for healthy products, flavonoid rich products. In addition, this simple process may provide beneficial health effect to the consumers economically.

Keywords: antioxidant, drying, flavonoids, functional food, pretreatment

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Effects of formulation on characteristics of probiotic yoghurt enriched by Gac fruit

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Abstract: The objective of this research was to analyze the physicochemical, microbiological, and sensory characteristics of Gac fruit and passion fruit enriched-probiotic yoghurt. The products were formulated by different formulations of skim milk powder and sugar. The research was designed as Complete Randomized Design (CRD) with 2 treatments, which were consisted of skim milk powder (4%, 6% and 8%) and sugar concentration (4%, 6% and 8%). Parameters were titrable acidity, pH, texture, syneresis, viscosity, colour, microbiological characteristics, and sensory test. The results showed that the concentration of skim milk powder and sugar significantly affected (p < 0.05) the titrable acidity, pH, syneresis, viscosity, texture (hardness and cohesiveness), colour ($L^*$ and $a^*$) and total yogurt bacteria counts. The yoghurt that was formulated by 8% skim milk powder and 4%, 6%, or 8% sugar (A3B1, A3B2, and A3B3) resulted in relatively good quality yoghurt based on its physicochemical and microbiological properties. However, sensory analysis showed that the treatment of A3B2 (skim milk powder 8% and sugar 6%) resulted in the most preferred yoghurt based on the average of hedonic score. It had the characteristics of 13.23% for the titrable acidity, 3.43 for pH value, 2.76 N for hardness, 0.35 for cohesiveness, 3.86 for syneresis, 221.74 mPas for viscosity, 7.2 log CFU/g of yogurt bacteria counts and 6.6 log CFU/g of Lactobacillus acidophilus counts.

Keywords: Skim milk powder, probiotic, yoghurt, Gac fruit

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Food Security: Concept and Problems

Nukul Inthakul

Abstract: Food security can be the indicator for the quality of life and human security. The concept of food security occurred from the starvation of the world population especially the poor and underprivileged group. The important dimension of the food security consists of food availability, food access, food utilization and stability of food. Between 2010 to 2012, 870 million people or 12.5% of the world population starved. Most of them were 852 million people or 14.9% who resided in the developing country. The food insecurity of the world population is still in the crisis level. Although Thailand has the sufficient food from the internal product and the import, there is the risk of the fluctuation between the crop production and the energy crops in the long term. The groups of poor people in the rural and urban in the North and North East region and people in the urban area will be the risk group who will face with the impact from the increasing of food price, the contamination during the food preparation including the residual chemicals. The establishment of the food security in the household and local community level is relevant to the sustainable development. The conditions of the food security in each context of the area are different in terms of the economics, social and culture, therefore; the study to evaluate the condition, factors, and wisdom of local community is very necessary for the determination of the government policy as well as the community policy in order to prevent and eliminate the problem which will lead to the development of the quality of life and the establishment of the sustainable human security.

Keywords: food security, poverty

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Performance of a low-cost direct passive solardryer for Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L. drying: case study of Nakhon Ratchasima province in Thailand

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**Abstract:** In this study, a low-cost direct passive solar dryer was designed and constructed with available local materials. Field level experiments on solar drying of Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L. using solar dryer was conducted at Nakhon Ratchasima Province in Thailand. The solar dryer which was direct type was tested with Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L., in order to evaluate the drying rate of these product. The moisture content of Jerusalem artichoke, *Curcuma mangga* Val. And *Maranta arundinacea* L. were reduced to 21.07±1.12, 21.72±1.81 and 19.88±0.72 \% (w.b.) respectively in 3 days of drying in the low-cost direct passive solar dryer while it took 3 days of drying to bring down the moisture content of similar sample to 25.53±2.02, 26.22±1.78 and 24.83±1.33 \% (w.b.) in traditional method. The Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L. dried faster with the low-cost direct passive solar dryer than with the sun drying. The Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L. dried in the low-cost passive solar dryer was completely protected from insects and dust.

**Keywords:** low-cost direct passive solar dryer, moisture contents, Jerusalem artichoke, *Curcuma mangga* Val. and *Maranta arundinacea* L.

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The study of ratio and type of binder for the screw press chaff charcoal machine

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Abstract: The aim of this research was to study of ratio and type of binder for the screw press chaff charcoal machine. The testing stuff was the black rice husk ash from the combustion section of Chaiwat Hayok and others (2013)'s the chaff charcoal compressing machine. The type of binder was 3 types of cassava starch, molasses, and Ansavanada. The results of testing, it was found that the binders for compressed chaff charcoal were cassava starch and molasses. The suitable ratio of cassava starch binder for charcoal compression was 10:3:10 kilograms (black rice husk ash: cassava starch: water). The suitable ratio of molasses binder for charcoal compression was 10:3 kilograms (black rice husk ash: molasses). The testing results of density value, compression strength in vertical and horizontal, and calorific value were higher than minimum standard of compressed charcoal.

Keywords: compressed charcoal, chaff charcoal, husk

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The feasibility study of solar irrigation: economical comparison between diesel and photovoltaic water pumping systems

Phaiboon Boupha1*

Abstract: This article investigates the feasibility of solar powered irrigation processes in Udon Thani province where photovoltaic technology can be used to gather solar energy to run submersible pumps to supply water for crop cultivation. The researchers collected data concerning required water for growing several crops and then calculated water volume for a plot of land. Subsequently, two commonly used pumps (solar, diesel) with same power ratings (1 hp) were chosen. Specific area irrigated by these pumps for different crops was calculated from the water volumes they supplied. Finally, total irrigation costs (at present conditions) of these types of irrigation choices for a period of ten years were computed and analyzed. The study highlights that irrigation with solar energy for certain crops, namely potatoes, and backyard gardens are very much less expensive than diesel powered irrigation.

Keywords: Solar irrigation, renewable energy, green farming, photovoltaic pumping, solar energy for agriculture.

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Wireless sensor networks system for a paddy field

Phaiboon Boupha1*

Abstract: Nowadays, communication is important in everyday life and advances in technology have improved communication. Wireless sensor networks (WSN) are part of a technology that is widely used. WSN is a combination of sensor systems and communication systems to monitor conditions in the environment. Networks of wireless sensors can be used send and receive information. This is important in agriculture since it is useful to monitor the environment to make informed decisions. When correctly deployed, productivity can be improved with easy to use systems.

Keywords: Wireless sensor network, External sensor, Microcontroller application, Environment monitoring

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คำแนะนำในการเตรียมเรื่อง

1. เรื่องที่จะลงพิมพ์ต้องมีผู้เขียนหรือผู้ร่วมเขียนอย่างน้อย 1 ท่านที่เป็นสมาชิกวารสารแก่นเกษตร
2. เรื่องที่จะลงพิมพ์ต้องเป็นบทความวิจัยหรือบทความทางวิชาการที่เป็นเรื่องเกี่ยวกับเกษตรและไม่เคยตีพิมพ์ที่ใดมาก่อน
3. ต้นฉบับต้องมีเนื้อเรื่องที่สมบูรณ์จบในฉบับ พิมพ์หน้าเดียวบนกระดาษพิมพ์สั้น (A4 หรือ 8.5 นิ้ว × 11 นิ้ว) มีความยาวไม่เกิน 15 หน้า ควรจัดพิมพ์ด้วยโปรแกรมพิมพ์เอกสารทั่วไป เช่น MS-Word ใช้รูปแบบข้อความ Cordia New ขนาด 14 pts. หรือ Times New Roman ขนาด 12 pts. โดยเว้นระยะระหว่าง 1.5 บรรทัด (กรณีที่ใช้โปรแกรม MS-Word ให้เลือกแบบ > ช่องน้ำ > ระยะระหว่างบรรทัด > 1.5 บรรทัด)
4. อ่านคำแนะนำในการเตรียมต้นฉบับ (ภาษาอังกฤษ) ได้ที่เว็บไซต์ http://ag2.kku.ac.th/kaj/ (English manuscript preparation access at website: http://ag2.kku.ac.th/kaj/)
5. เรื่องที่เป็นรายงานการวิจัยควรมีหัวข้อตามลำดับดังนี้
   - ชื่อเรื่อง: หัวภาษาไทยและภาษาอังกฤษ
   - ชื่อตำแหน่ง และหน่วยงานผู้เขียน: หัวภาษาไทยและภาษาอังกฤษ
   - บทคัดย่อ: ความยาวไม่เกิน 300 คำ และให้ระบุคำสำคัญและ (ระยะสั้นสู่ความสำคัญ) ไม่เกิน 5 คำ ว่า ABSTRACT ด้วย Keywords:
   - บทนำ: แสดงความสำคัญของปัญหา การตรวจเอกสาร และวัตถุประสงค์ของงานวิจัย
   - วิธีการศึกษา: ควรเขียนให้กระชับและเป็นขั้นตอนที่เหมาะสม ประกอบด้วยขั้นตอนการเก็บข้อมูล แผนการทดลอง การวิเคราะห์ผลทางสถิติที่เหมาะสม และระบุสถานที่และช่วงเวลาที่ดำเนินการวิจัย
   - ผลการศึกษา: บรรยายสรุปผลการวิจัยแต่ละขั้นตอนการวิจัยที่เกี่ยวข้องกับความในตารางหรือรูปประกอบ (ถ้ามี) ตารางหรือรูปประกอบให้ใช้ภาษาอังกฤษทั้งหมด
   - วิจารณ์: (อาจรวมกับผลการศึกษา) ควรประกอบด้วยหลักการที่ออกมาจากการวิจัยเปรียบเทียบกับผลการวิจัยของผู้อื่น ปัญหาหรือข้อได้เปรียบในการวิจัยของผู้เขียน แผนการดำเนินงาน และแนวทางที่จะนำไปใช้ประโยชน์สูงสุด: (อาจรวมกับวิจารณ์) ไม่ควรเขียนเกิน 500 คำ แต่ควรสรุปให้สอดคล้องกับวัตถุประสงค์ คำขอตุน (ถ้ามี) สำหรับผู้ช่วยเหลืองานวิจัย หรือการเตรียมเอกสาร (แต่ไม่ได้เป็นผู้ร่วมงานวิจัย) แหล่งทุนหน่วยงาน หรืออื่นๆ ตามความเหมาะสม
   - คำขอบคุณ: เพื่อแสดงความรู้สึกขอบคุณ (ถ้ามี)
   - บรรณานุกรม: (bibliography) ซึ่งใช้ประกอบการเขียนแต่ไม่ได้อ้างอิงในเนื้อเรื่อง แต่ถามหาค่าเฉลี่ยและค่า P-value ของ.dataset permanent ที่มีความถี่ 100%, 10 ชนิด, 1 มก./มล. เป็นต้น และหากมีการแสดงค่าเฉลี่ยและค่า P-value ต้องแสดงค่า standard error of mean (SEM) ประกอบ
6. การอ้างอิงในเนื้อเรื่องให้ใช้ระบบชื่อ-ปี เช่น ศักดิ์ และสิทธิ์ (2526) รายงานว่า... หรือ... (ศักดิ์ และสิทธิ์, 2526) กรณีผู้เขียน 3 คนขึ้นไปใช้ ศักดิ์ และคณะ (2526) รายงานว่า... หรือ Smith et al. (2526) กรณีที่มีหลายรายงานอ้างอิงเรื่องเดียวกัน ให้ใช้... (ศักดิ์ และสิทธิ์, 2526; กาญจน์, 2538; Smith, 2005) โดยเรียงตามปีที่พิมพ์ และภาษาไทยก่อนภาษาอังกฤษ
7. ตารางและภาพประกอบเว้นระยะห่าง 1 บรรทัดโดยจัดพิมพ์แยกในเนื้อเรื่อง การใช้ตัวเลข (footnote) ของตารางให้ใช้ระบบตัวเลขแสดงค่าสถิติ เช่น 1/ 2 เป็นต้น ซึ่งต้องมีบรรยายในตารางในหน้าที่เรื่อง เช่น ตาราง 1 Genetic parameter estimations of... ควรแสดงชื่อภาพประกอบให้ชัดเจนลงในตาราง เช่น Figure 1 The relationship between... ควรแสดงหน่วยสำคัญให้ชัดเจน เช่น *** หรือ **** สำหรับ P<0.05 และ P<0.01 ตามลาดับ หน่วยในตาราง (และในเนื้อเรื่อง) ให้ใช้ระบบเมตริกซ์ โดยใช้เป็นอักษรย่อ เช่น 100%, 10 ชนิด, 1 มก./มล. เป็นต้น และหากมีการแสดงค่าเฉลี่ยและค่า P-value ต้องแสดงค่า standard error of mean (SEM) ประกอบ
8. บรรณานุกรม (references) ซึ่งใช้ประกอบการเขียนแต่ไม่ได้อ้างอิงในเนื้อเรื่อง แต่ถามหาค่าเฉลี่ยและค่า P-value ของ.dataset permanent ที่มีความถี่ 100%, 10 ชนิด, 1 มก./มล. เป็นต้น และหากมีการแสดงค่าเฉลี่ยและค่า P-value ต้องแสดงค่า standard error of mean (SEM) ประกอบ
2) การอ้างอิงวารสาร (journal) ถ้าวารสารมีชื่อย่อให้ใช้ชื่อย่อพันธุ์นี้ เลขวิธี, ปี, ชิ้น, จำนวน, และวารสาร วรรคสุดท้าย. 2546. ความเป็นไปได้ในการผลิต เมล็ดพันธุ์เร่งสุกของพืช งาลูกผสมเพื่อการเจริญ. ด.วารสาร. 32: 63-73.


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ลายเซ็นผู้สมัคร.................................................................

(สำหรับนักเรียน-นักศึกษา)

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วารสาร "แก่นเกษตร" พิมพ์ปีละ 4 ฉบับ ค่าบริการสมาชิกรายปีมีดังนี้

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