Establishment of an efficient protocrom-like body proliferation system in *Ionopsis utricularioides*

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Introduction

Ionopsis utricularioides, an *Oncidium* alliance, has long lasting flower and may have potential as potted-plant in the flower market. As cross pollination is difficult to obtain seeds, an efficient microprogation is important.

Material and methods

Protocorm-like bodies (PLBs)

6-benzylaminopurine (BAP) + α-naphtaleneacetic acid (NAA)

Comparison of salt strength ± solid and liquid culture

4 weeks

Measure FW, PLB weight, shoot weight, and browning rate

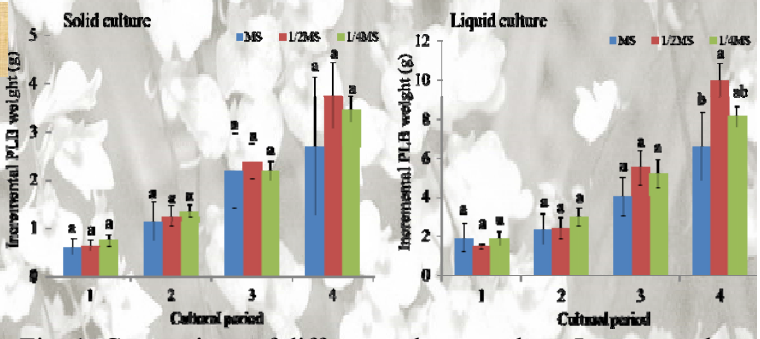

Fig. 1. Comparison of different salt strength on Incremental PLB weight between solid and liquid culture during 4 weeks.

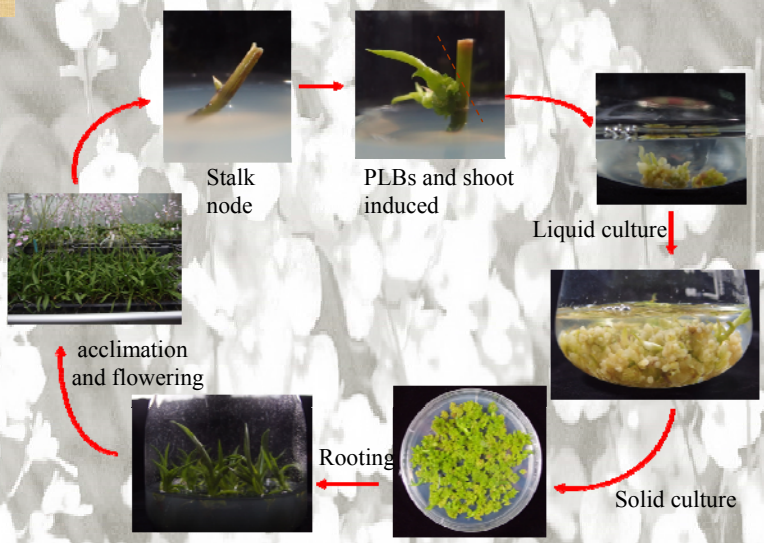

Fig. 2. The process of *Ionopsis utricularioides* micropropagation.

Results

Table 1. Effect of different media on proliferation of PLBs of *Ionopsis utricularioides* after 4 weeks.

Medium[z]	Increment fresh weight (g)	PLB weight (g)	Shoot weight (g)	Browning (g)
A	3.15 a	0.97 cd	2.71 a	0.05 a
B	2.96 a	1.71 ab	1.77 a	0.03 a
C	2.47 a	1.47 abc	1.53 a	0.12 a
D	2.77 a	1.39 abc	1.91 a	0.02 a
E	2.48 a	1.05 cd	1.96 a	0.14 a
F	2.35 a	1.78 a	1.12 a	0.00 a
G	2.24 a	1.38 abc	1.42 a	0.04 a
H	2.42 a	1.32 abcd	1.54 a	0.22 a
I	2.52 a	1.24 bcd	1.82 a	0.20 a
J	2.54 a	1.20 bcd	1.86 a	0.30 a
K	2.95 a	1.70 ab	1.79 a	0.12 a
L	1.56 a	0.81 d	1.28 a	0.28 a

[z] MS medium supplemented with different concentrations of BAP and NAA. All experiments consisted of four independent replications with 0.5 g PLBs per replicates. Values followed by different letters in a column are significantly different at $P \leq 0.05$ by LSD.

Conclusion

The result showed that MS medium with 0-2 mg L^{-1} BAP and 0.1-1 mg L^{-1} NAA could efficiently induce and proliferate PLBs. Increasing the concentration of NAA decreased the proliferation of PLBs. Besides, 1/2 strength MS with both solid and liquid culture were more effective on PLBs proliferation.

Reference

Murashige, T. and F. Skoog. 1962. A revised medium for rapid growth and bioassays with tobacco tissue culture. Physiol. Plant 15: 473-497.

Abstract Collection

IPSFAB 2017

August 30-31

Preface

In 2016, the integrated ASEAN Economic Community (AEC) has been officially launched. One of the main purposes of this integration is for the development of science and technology since it is a key factor in sustaining economic growth, enhancing community wellbeing and promoting integration in this region.

In order for ASEAN science to become world class and be globally competitive, it requires the driving forces from the three main scientific areas of (1) food science and technology (2) agricultural technology and (3) biotechnology. ASEAN is home to one of the world's most precious natural resources, and the most diverse microbial community. Scientific strength in this region would be significantly enhanced provided that appropriate collaborative networks amongst member countries are promoted. In addition, education sectors should focus more on internationalizing their curricula and universities across this region should find more opportunities to collaborate in research and academic activities.

The Faculty of Technology, Mahasarakham University (MSU) has organized the 4th International Postgraduate Symposium on Food, Agriculture and Biotechnology (IPSFAB 2017) with the aims to share research experience on food, agriculture and biotechnology amongst Thai and international postgraduates. The conference will provide a starting stage for collaborative networks among postgraduates from Thai universities and ASEAN countries. This will strengthen research community locally and internationally and provide the international academic medium for postgraduates to benefit from it.

A. Moongngarm

(Assoc. Prof. Dr. Anuchita Moongngarm)
Dean of the Faculty of Technology
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Effect of breeds on growth performance and meat quality in swine

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Abstract:
The objective of this research was to evaluate the effect of different breeds on growth performance and meat quality in swine. Swine is another important economic animal. Growth performance and meat quality traits are economic trait in swine production. If pigs thrive can sell quickly, reduce production costs. The breed is one of important factor for growth performance and meat quality. This study used growth performance and meat quality data from commercial farm in different 3 breed pigs (Duroc, Pietrain and Crossbreed). The analysis effected of breeds on growth performance and meat quality using PROC GLM, predicted regression linear model using PROC STEPWISE and correlation among growth performance and meat quality traits using PROC CORR by SAS (1998). The result found that, means of percent lean (PL, %) and average daily gain (ADG, g/d) were 55.92% and 143.58 g/d, respectively. The effected of different breeds on growth performance and meat quality was found for PL, ADG, back fat (BF, cm), loin eye area (LEA, cm^2), live weight (LW; kg), and average daily gain at 104 day (ADG 104 d, g/d) ($P<0.01$). Breed of Pietrain and Crossbreed pigs were PL, BF and LEA higher more than Duroc pig. Moreover, Pietrain pig was higher ADG (147.91 g/d) more than Duroc (143.26 g/d) and crossbreed (143.24 g/d). For LW and ADG 104 d found that, Duroc and Crossbreed pigs were higher than Pietrain pig. The result of regression linear model address that, LW, aFD, ADG 104 d and LEA accounted for the greatest amount of variation of PL ($R^2 = 0.93$). The correlation between ADG 104 d and LW was higher ($r = 0.82$, $P<0.001$). Moreover, the correlation of LEA and PL was ($r = 0.81$, $P<0.01$). The conclusion of this research showed that crossbreed pig was high growth performance.

Keywords: breeds, growth performance, swine

Effects of maize and potato intercropping on crop root system and soil aggregates in sloping field

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Abstract:
Soil and water loss in sloping field seriously affects the sustainable development of agriculture in Yunnan province. Four treatments (MM maize monoculture, PP potato monoculture, PM potato and maize intercropping, CK blank control) and three repetitions (slope degrees of 10, 20, 30 were studied) were set up in this study. The results showed that in different planting patterns, root characteristic value (root content, root number, root length) and soil depth were negatively correlated. At 0-10cm, root content, root number and root length of maize, PM treatment increased by 33.79%, 18.46% and 14.38% respectively compared with MM treatment. At 0-10cm, root content, root number and root length of potato, PM treatment increased by 5.32%, 17.66% and 23.99% respectively compared with PP treatment. The content of soil aggregates treated with PM above 5 mm was 35.71%, 41.52% and 71.32% respectively higher than that of PP, MM and CK treatment, respectively. Content of water stable aggregates treated by PM was 54.87%, higher than 8.42%, 10.41% and 21% by MM, PP and CK treatment respectively. In conclusion, maize and potato intercropping can enhance root system, promote the formation of soil aggregate and reduce soil erosion.

Keywords: sloping field, intercropping, root characteristics, soil aggregate

Different organic fertilizers improve the normalized enzyme activity of flue-cured tobacco soil under chemical fertilizers reduction

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Abstract:
This research was aimed to determine the effects of different organic fertilizers (OF), bio-organic fertilizers (BIO) on the soil enzyme activity of flue-cured tobacco under chemical fertilizers reduction through four years of field experiment.-Normalized enzyme activity was used to discuss the relationship between soil enzyme activity and the soil available nutrient and the relationship between soil enzyme activity and soil organic carbon. The results showed that, under four years chemical fertilizer 20% reduction, combined application with different organic fertilizers could increase the yield and the quality of flue-cured tobacco. It helped increased the soil organic matter, soil labile organic carbon and soil enzymes activity significantly. In comparison with the conventional fertilization (CF, 100% chemical fertilizer), the activities of soil urease, alkaline phosphatase, dehydrogenase and invertase of OF treatment increased by 27.72%、11.11%、51.39% and 14.12% respectively. The activities of soil urease, alkaline phosphatase, dehydrogenase and invertase of BIO treatment increased by 27.72%、27.78%、58.51% and 26.52% respectively. The normalized enzyme activity of OF and BIO increased by 11.88% and 19.88% respectively. The normalized enzyme activity of BIO was 7.15% higher than that of OF. Pearson correlation analysis showed that soil normalized enzyme activity of flue-cured tobacco was extremely significantly related to soil available nutrient and soil organic carbon. In conclusion, 20% chemical fertilizer reduction combined with bio-organic fertilizer is a better practice for improving soil fertility, yield and quality of flue-cured tobacco.

Keywords: chemical fertilizers reduction, organic fertilizer, normalized enzyme activity, labile organic carbon, soil of flue-cured tobacco

Effect of pre-treatment processes and stability testing of lemongrass (*Cymbopogon citratus*) extract on α-glucosidase inhibitor (AGI) and α-amylase inhibitor (AAI) activities

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Abstract :

Lemongrass was proved in the previous studies to be one of Indonesian local plants with relatively high activity in inhibiting α-glucosidase and α-amylase enzymes and thus it can be useful to lower blood glucose level in diabetic patients. This health benefit of lemongrass has unfortunately not been widely explored in the herbal industries. Even though lemongrass has become one of the main raw materials in such industries, the use of lemongrass has been purposed mostly to obtain its aroma and taste. Commercialization of lemongrass as herbal medicine or functional food ingredients with α-glucosidase inhibitor (AGI) and α-amylase inhibitor (AAI) activities requires a closer study on how these activities can be affected by different pre-treatment processes of fresh lemongrass. In this work, the effect of different washing and drying scenarios during the pre-treatment process of lemongrass extraction on both AGI and AAI activities was studied. The result showed that a combination between 2 times washing and oven drying at 40°C offered the optimum AGI activity. The AAI level was found to be significantly decreased as lemongrass had gone through drying process. However, when compared among different drying methods and different sequences of washing process, the AAI level was found to be relatively unaffected. Stability testing of powdered lemongrass extract was additionally conducted in real time and accelerated conditions to make an estimation of the shelf-life. The shelf-life of powdered lemongrass extract was found to be ±12 months (at 25°C) and ± 6 months (at 30°C).

Keywords : lemongrass, AGI, AAI, diabetes

Evaluation of cookies quality enriched with resistant starch type 2 (RS2) and resistant starch type 3 (RS3) from banana (*Musa paradisiaca formatypica*)

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Abstract :

This research was aimed to evaluate cookies quality with the enrichment of resistant starch type 2 (RS2) and resistant starch type 3 (RS3) from unripe banana. Cookies were formulated with the addition of RS2 and RS3 with three levels of substitution: 10%, 20%, and 30% of the wheat flour basis. RS2 was obtained through water-alkaline extraction, while RS3 was obtained through starch modification by using autoclaving-cooling cycles method. Quality of cookies was evaluated on *in vitro* digestibility, hardness, color, and sensory acceptance. Both RS2 and RS3 was found to decrease the digestibility of cookies. However, effect of RS3 was more obvios compared to RS2 even at 10% of substitution level. In both type of RS, the higher substitution level resulted in the lower digestibility. Hardness of RS2 and RS3-enriched cookies at all substitution levels did not show any significant difference compared to control. Color measurement showed that both type of RS resulted in the significantly darker color of cookies, though the effect was more intense in RS3 substitution. The darker color of cookies was observed along with the increasing substitution level. Sensory acceptance test conducted for aroma, taste, hardness, and overall acceptance attributes showed that panelists rated all the RS2 and RS3-enriched cookies at all substitution levels equally with the control but lower for color attribute. The addition of RS3 at 20% level of substitution was suggested as it was found to be the most acceptable in all attributes tested, while having the significantly lower digestibility compared to control cookies.

Keywords : autoclaving-cooling, banana starch, cookies, *in vitro* digestibility, resistant starch

Overripe tempe powder potential application as plant-based instant stock

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Abstract:
Recent studies and local wisdom have support the usage overripe tempe (OT) as plant-based umami source ingredients. In this study, structurized market survey was done to select the target commercial product as direction for OT processing and formulation. The market survey area was defined as commercial market offline located in Tangerang. Thirty validated respondents were taken into survey. Based on following criteria of umami source ingredients: (1) powder or granule; (2) used in Indonesian savory dishes; (3) used by most of the valid respondents, instant chicken stock was selected as target commercial product. Subsequent market survey done showed that taste is the most important selection factor for instant stock. Powder of OT was made using oven drying and freeze drying method. Analysis of umami intensity, using ranking test and attribute intensity scaling sensory evaluation with 30 untrained panelist, showed that oven dried OT had higher umami intensity and thus was selected for the preparation method of OT powder. Formulation of OT stock was done using Design Expert software based on commercial chicken stock formula. Despite the high score of selected formula (6.71 $\pm$ 1.27) indicating the product was liked slightly to moderately, when compared to commercial target products OT stock had significantly lower umami intensity (5.65 $\pm$ 1.64) and thus lower acceptance score (5.48 $\pm$ 1.55) compared to commercial product (6.81 $\pm$ 1.35; 7.10 $\pm$ 1.25). The study showed OT powder opportunity to be applied as umami source ingredients of plant-based stock with further improvement.

Keywords: overripe tempe, instant stock, formulation, umami

Extraction and stability analysis of antioxidant activity from *Stenochlaena palustris*

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Abstract :
Stenochlaena palustris is an edible fern from *Blechnaceae* family known as the one of natural antioxidant sources. Antioxidant is a compound with molecular structure that is able to donor its electron to free radical molecules and terminate the chain reaction of free radicals. Antioxidant has a function to prevent various diseases caused by oxidative stress. Our bodies will be healthier if vegetables and fruits with high antioxidant content are sufficiently consumed. The aims of this research were to determine the proper maceration solvent to obtain *S. palustris* extract with highest antioxidant activity and to analyze the antioxidant stability through different temperatures, pH, light condition, and time of the extract *S. palustris* from the selected solvent. The solvent used are ethanol 70% and distilled water with three different extraction times, 12, 24, and 48 hours at room temperature. It is revealed that maceration using distilled water for 48 hours had the highest antioxidant activity compared to other extraction samples using DPPH assay. The extract with highest antioxidant activity was observed through stability test with different temperatures (5^0C, 30^0C, 50^0C, 70^0C, 90^0C), pH (4, 5, 6, 7), and light conditions (dark and bright). The stability test revealed that the antioxidant activity, total phenolic and flavonoids content of the selected extract on pH 4 and 5 stored at 70^0C was more stable than the other conditions.

Keywords : *Stenochlaena palustris*, antioxidant activity, extraction, stability.

Prevalence of foodborne pathogens in ready-to-eat foods in the markets in Khon Kaen, Thailand

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doi: 10.10.14457/MSU.res.2017.18

Abstract :
The aims of this research were to evaluate consumer behavior regarding the consumption of ready-to-eat foods and to evaluate the prevalence of pathogens in ready-to-eat food products obtained from the markets of Khon Kaen, Thailand. The research was divided into two parts; part one was a consumer behavior survey. The results showed top three highly consumed ready-to-eat foods were fresh vegetable salads, followed by sandwiches and Thai fresh spring rolls, respectively. Subsequently, the microbial contamination in the selected food products was collected and analyzed in Part two. The 54 samples were collected from two types of markets; open markets and supermarkets located in Khon Kaen. The presence of contaminated pathogenic bacteria; *Salmonella* spp., *Listeria monocytogenes*, *Staphylococcus aureus* was investigated by selective media. Poor hygiene was indicated by total coliforms and the presence of *Escherichia coli*. The results revealed that *Salmonella* spp. was detected in 5 of 27 (19%) samples of open markets and 5 of 27 (19%) samples of supermarkets. *L. monocytogenes* was detected in 4 of 27 (15%) samples of open markets and 3 of 27 (11%) samples of supermarkets. *S. aureus* was detected in 8 of 27 (30%) samples of open markets and 9 of 27 (33%) samples of supermarkets. Total coliforms were contaminated in 27 of 27 (100%) samples of open markets and 23 of 27 (85%) samples of supermarkets. *E. coli* was contaminated in 2 of 27 (7%) samples of open markets and 1 of 27 (4%) samples of supermarkets. A contamination of *L. monocytogenes* in open markets was higher than that in supermarkets. A contamination of *S. aureus* in supermarkets was higher than that in open markets; however, a contamination of *Salmonella* spp. in supermarkets was equal to that in open markets. This data provided food safety information of ready-to-eat foods for consumption of both markets in Khon Kaen.

Keywords: Prevalence, ready-to-eat, foodborne pathogens, Thailand

Survival of probiotic bacteria in fruit juice jelly products

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Abstract:
The aims of this work were to determine the sensory evaluation (in terms of color, odor, flavor, textureand overall liking) of three types of fruit juice jelly products, growth curves of *Lactobacillus acidophilus* TISTR 1338 and *L. casei* TISTR 390 and their survivals in fruit juice jelly products during storage at 5°C for 9 days. The sensory scores showed that there was no significant difference of overall liking scores among jelly products. According to their growth curves, both probiotic bacteria had entered the stationary phase with an average of 9 log cfu/ml after incubation for 26 h. Probiotic bacteria were cultured for 26 h for studying the survival of probiotic bacteria in fruit juice jelly products. It was found that the numbers of *L. acidophilus* TISTR 1338 and L. *casei* TISTR 390 decreased from the initial numbers of 9.23 log cfu/g and 8.97 log cfu/g to 6.80 log cfu/g and 7.73 log cfu/g, respectively, after 9 days of refrigerate storage. However, there was no significant difference ($p > 0.05$) between viabilities of *L. acidophilus* TISTR 1338 and *L. casei* TISTR 390 on day 9. The survival of bacteria reduced during storage; however the final cell concentrations were still higher than the minimum therapeutic levels (≥5 Log cfu/g) for probiotics in the products.

Keywords: probiotic bacteria, survivals, fruit juice jelly

The binding of WSSV VP37 to shrimp hemocytes is mediated by its C terminal domain

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Abstract :
White spot syndrome virus (WSSV) is an envelope virus causing a high mortality of shrimp within 3-7 days. In this study, we characterized VP37 protein of WSSV and investigated its binding with shrimp hemocytes based on ELISA technique. The results showed that VP37 protein was able to bind with shrimp hemocytes in a dose-dependent manner. Truncation of VP37 revealed that while the VP37 fragments containing C-terminal domain region was bound strongly with shrimp hemocytes, the VP37 fragment with C-domain disrupted showed very weak hemocytes binding. For the first time, we proposed that the binding of VP37 to shrimp hemocytes was mediated by its C-terminal domain.

Keywords : WSSV, VP37

Aeromonas jandaei and *Aeromonas veronii* caused disease and mortality in Nile tilapia, *Oreochromis niloticus* (L.)

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Abstract :
Motile *Aeromonas* species were known as a major cause of fish disease. *Aeromonas* species are commonly bacteria in aquatic environment. *A. hydrophila* is known as a major etiological agent of enteric pathogen in fish and aquaculture animal and identified as an danger species in Thailand for a long times while other species was overlooked. Here, we identified two isolates of Non - *A. hydrophila* mainly recovered from diseased Nile Tilapia exhibiting histopathology resemble to that *A. hydrophila* infected fish from commercial farm. These 2 stains were identified as *A. jandaei* and *A. varonii* base on 16s rDNA and phenotypic feature, respectively. From the challenging experiment, it revealed that challenging the fish with $3.7x10^6$ CFU of *A. jandaei* and $2.9x10^6$ CFU of *A. varonii* caused the mortality rate of 100% after challenging 24 h without any clinical signs. From the histological examination of death fish revealed the hemorrhagic of internal organ after challenging. The mortality rate of the challenged fish was reduced according to the dose of bacterial challenging. The survival challenged fish could resist to these two bacteria with the dramatic reduction of the mortality rate to 0%-12% despite challenging with $3.7x10^6$ CFU of *A. jandaei* and $8.9x10^6$ CFU of *A. varonii*

Keywords: 16s rDNA, *A. jandaei, A .varonii, A. hydrophila*

Emergence of tilapia lake virus in Thailand and an alternative semi-nested RT-PCR for detection

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Abstract :
Tilapia lake virus (TiLV) is an emerging virus that causes a disease in Nile Tilapia and Red tilapia. TiLV Infectious disease reduces tilapia and red tilapia production and exportation worldwide. Endemic areas of TiLV are Ecuador, Colombia, Egypt and also Thailand, which have resulted in 90% mortality after infection. Because of the severe disease after infection from TiLV, the identification of the virus in fish is very important to control the extreme spreading of the virus in Tilapia farm. Therefore, semi-nested RT-PCR technique was developed to detect TilV infection in Tilapia. The result showed that TiLV infection was found in Tilapia from different farms located in 3 regions of Thailand detected by semi-nested RT-PCR. The sensitivity of this semi-nested RT-PCR technique was high with the detection limit of 7.5 copy number of virus by using the pGEM-415 as the control template in the semi-nested RT-PCR reaction. From *in situ* hybridization, it was also revealed that TiLV was found in multiple tissues of virus including liver, kidney, brain, spleen, gill and connective tissue. The nucleotide sequence of gene segments 1, 5, 9 from TiLV isolated in Thailand was analyzed, and it was found that these gene segments had the nucleotide homology of 97% to those of TiLV discovered in Israel. The amino acid sequence encoded from these gene segments of TiLV isolated in Thailand also had the identity of 98% to those of TiLV discovered in Israel.

Keywords: tilapia lake virus, RT-PCR, Thailand

Heparan sulfate is a potential receptor for VP37 of white spot syndrome virus

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Abstract :

VP37 of White Spot Syndrome Virus (WSSV) is believed to be an viral envelope protein responsible for the attachement of WSSV to shrimp heamocytes. However, the shrimp molecule that is targeted by VP37 is still unknown. Here in this study, we demonstrated through ELISA assay that the binding of VP37 to shrimp heamocytes could be prevented by soluble sulfated galactan (SG) extracted from red seaweed (Gracilaria fisheri). This observations allowed us to hypothesize that VP37 might be able to recognize SG-like molecules presented on the surface of shrimp heamocytes. Since there is a report on the presence of heparan sulfate (HS) in shrimp tissues, we then performed Surface Plasmon Resenance (SPR) analysis to investigate the binding of VP37 to HS. Our SPR analysis showed that VP37 strongly bound to HS with the binding affinity of 1 µM. Interestingly, it was also shown through SPR assay that the binding of VP37 to HS could be blocked by SG. This prompted us to propose that the attachment of WSSV on shrimp tissue is mediated by the binding fo VP37 to HS presented on the surface of shrimp tissue and that prevention of this interaction by SG can help reduce infectivity of WSSV in shrimp as previously seen in other previous studies.

Keywords : WSSV, VP37, Heparan-like glycosaminoglycans

Effect of grain development on antioxidant activity of Thai landrace rice

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Abstract :
This research was conducted to investigate the total phenolic content (TPC), anthocyanin content (AC) and antioxidant capacity of two varieties of Thai landrace rice i.e. Kumbikiew (black glutinous rice) and Niaow Dang (red glutinous rice) at 30, 37 and 51 days of grain development. The results showed that the TPC of Kumbikiew rice was highest at 51 days (319.72 mg GAE/100 g db); however the TPC of Niaow Dang rice (424.50 mg GAE/100 g db) was highest at 30 days and significantly higher than those at later stages ($p \leq 0.05$). Overall, Kumbikiew rice had higher AC than Niaow Dang rice at all stages of development after flowering. Both cultivars showed the highest AC at 30 days (178.67 and 1.11 mg Cyanidin-3-glucoside/100 g db, respectively). The antioxidant capacity determined using DPPH, ABTS radical scavenging and FRAP assays demonstrated as trend similar to that of TPC. The FRAP values, DPPH and ABTS scavenging activities of Kumbikiew rice at 51 days (6.38 mmol $FeSO_4$/100 g db, IC_{50}^{DPPH} 2.05 mg/ml and IC_{50}^{ABTS} 1.49 mg/ml, respectively) were significantly higher than those at 30 and 37 days. The highest antioxidant activities of Niaow Dang rice were detected at 30 days, showing reducing power (FRAP) at 5.75 mmol $FeSO_4$/100 g, IC_{50}^{DPPH} at 2.17 mg/ml and IC_{50}^{ABTS} at 1.31 mg/ml.

Keywords: Thai landrace rice, TPC, anthocyanin, antioxidant activity

The physical properties, chemical compositions, and sensory evaluation of instant powder beverage containing melatonin prepared from vegetables

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Abstract :
Melatonin is a naturally occurring compound *found* in plants, animals, and microorganism. It plays an important role in maintaining body's *circadian rhythm in animals and* has antioxidant property. This study was carried out to develop instant powder beverage using germinated red bean, lemon glass, and onion as a sources of melatonin. Proportion of the components used in the beverage was prepared using Mixture Design Method, which generated beverage of 6 formula including germinated red bean (X_1 = 30-50%) : lemon grass (X_2 = 10-35%) : onion (X_3 = 15-42%). The effect of different proportions of raw materials on the appearance, color, texture and overall acceptability of product was evaluated using 9-Point hedonic scale. The results indicated that the proportion of germinated red bean: lemon grass: onion of 50:40:10 gained the highest score of acceptance. Six beverage powder formulas were also determined for physical properties and chemical compositions. It was found that the beverage powder containing melatonin had suitable physicochemical properties and was high water absorption index (1.11 - 2.44 g / g), water soluble index (19.57 - 20.79%) and solubility (18.73 - 20.83 % residue). The study suggested that the preparation high melatonin beverage powder has potential to produce as a functional food.

Keywords: Melatonin, Functional food, Instant powder beverage, Biological rhythm

Phenolic compounds and antioxidant activities of gold apple (*Diospyros decandra* L.) green and ripe fruit

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Abstract :
The objective of this study was to analyze the phenolic compounds and antioxidant activities of gold apple (*Diospyros decandra* L.) green and ripe fruit. The samples were analyzed for total phenolic content (TPC), total flavonoid content (TFC) and phenolic compounds using HPLC. Antioxidant activity was analyzed using 1,1-diphenyl-2-picrylhydrazyl radical scavenging (DPPH) and ferric reducing/anti-oxidant power assays (FRAP). The results showed that ripe fruit had higher content of TPC (125.77 mg GAE/g), TFC (5.82 mg RE/g) and FRAP (1546.64 mmol FeSO4/g) than those in green fruit. The green and ripe fruits had high DPPH value (146.99 and 147.64 mgTrolox /100g, respectively). Major phenolic acids identified were protocatechuic acid, p-hydroxy benzoic acid, vanillic acid and caffeic acid, while predominant flavonoids were rutin and myricetin. This study has provided useful information that local fruits are potential sources of bioactive components with high antioxidant properties that may be of interest to the consumers and public health workers.

Keywords: antioxidant activity, phenolic compound, flavonoid, *Diospyros decandra* L.

Effect of thermal processings on physical, chemical properties and volatile compounds of coconut (*Cocos nucifera* L.) sugar

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Abstract:
The objectives of this research were to study the physical, chemical properties and volatile compounds of both coconut sap and sugar and changes in the physical, chemical properties and volatile compounds of coconut sugar during heating processes. The physical, chemical properties including moisture content (MC), water activity (a_w), total soluble solids (TSS), color parameters, intimidated browning product (IBP) and browning index (BI) values and volatile compounds were determined. The coconut sap was heated at 110 and 120°C for 6 and 4.5 hours, respectively. The physical, chemical properties and volatile compounds of coconut sugar were investigated. The results found that the MC and a_w decreased with increasing heating times while TSS increased with the times for both of heating temperatures of 110 and 120°C. The color parameters for both heating temperatures of 110 and 120°C fell in the same trend showing that the L* decreased, a*, b*, IBP and BI values increased with the heating times. The major volatile compounds found in coconut sugar for both temperatures were 2, 3-dimethyl pyrazine, 2, 5-dimethyl pyrazine, 2-methyl pyrazine and 5-methyl furfural. Most of volatile compounds increased with the heating times. Thus, along heating time could be applied to develop the aroma of coconut sugar.

Keywords: coconut sugar, heating conditions, physical and chemical properties, volatile compounds

Production of yoghurt from different types of milk

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Abstract :
This research was aimed to investigate the production of yoghurt from plant milk including soy and peanut milk and also from animal milk including cow and goat milk using four different levels of yoghurt starter as 2, 3, 4 and 5 %. The results revealed that yoghurt produced from soy and peanut milk with 2% (w/v) yoghurt starter (*Lactobacillus delbrueckii* subsp. *bulgaricus* and *Streptococcus salivarius* subsp. *Thermophiles* ratio 1:1) incubated at 43 ◦C for 5 hours contributed to the pH result of 4.64 and 4.71, respectively ,% titratable acidity of 0.41 and 0.36, respectively, % syneresis of 57.62 and 65.77, respectively ($p \leq 0.05$). In addition, yoghurt produced from cow and goat milk with 3% (w/v) yoghurt starter incubated at 43 ◦C for 3 hours contributed to the pH result of 4.98 and 4.62, % titratable acidity of 0.72 and 0.68, % syneresis of 27.12 and 32.68, respectively ($p \leq 0.05$).

Keywords : yoghurt, soy milk, peanut milk, cow milk, goat milk

Species composition of fish in rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand

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Abstract :
Species composition of fish in rice fields of That Phanom District, Nakhon Phanom Province, Northeast Thailand were studied during May - September 2016. From 1,018 collected specimens, totally, 7 orders, 18 families, 31 genera and 38 species of fishes were recognized. The most dominant order is Cypriniformes (18 species, 47.37% of all species) and the next is Perciformes (10 species, 26.32% of all species) and then Siluriformes (4 species, 10.53% of all species). The nine species of air-breathing fishes (*Notopterus notopterus*, *Clarias batrachus*, *Monopterus albus*, *Anabas testudineus*, *Betta smaragdina*, *Trichopodus trichopterus*, *Trichopsis pumila*, *T. vittata*, and *Channa striata*) were found and account for 23.68% of all species. Only one species of alien species *Oreochromis niloticus* has been collected from the area. This study indicated that the rice fields an important role in maintenance of biodiversity of a local area.

Keywords: rice fields, species composition of fish, That Phanom District, Nakhon Phanom Province

Effects of lactic acid bacteria Lao27 (*Lactobacillus plantalum* Lao 27) in total mix ration silage on *In vitro* digestibility, feed intake and growth performance of Lao native buffaloes

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Abstract:
The experiment aims to study the effects of lactic acid bacteria Lao27 (*Lactobacillus plantalum* Lao 27**)** in total mix Ration silage (TMRS) on chemical composition, *in vitro* digestibility, voluntary feed intake and growth performance in Lao native buffaloes (*Bubalus bubalis*) . Eight male buffaloes within 2-year old and 235 kg average live weight were randomly assigned to receive two dietary treatments as TMRS1 (TMRS without LAB) and TMRS2 (TMRS with LAB, *Lactobacillus plantalum* Lao 2**7** by 5 mg/kg of feed) according to a Completely Randomized Design. All animal were fed *ad libitum* and clean drinking water with in 120 day fattening. Animal were weighed every 14 days. The results of this experiment showed that chemical composition of TMRS1 and TMRS2 were as followings: dry matter (DM) = 22.99-23.26%, crude protein (CP) = 13.99-14.80%, nuetral detergen fiber (NDF) = 49.17-50.42%, pH value = 3.73-3.90. Feed digestibility using *in vitro* gas production technique showed that *in vitro* dry matter digestibility (IVDMD) at 12 hours of TMRS1 and TMRS2 were 37.7 and 61.33% ($p<0.05$), while IVDMD at 96 hours were non-significant different 86.69 and 91.71% ($p>0.05$) respectively. The *in vitro* organic matter digestibility (IVOMD) at 12 and 96 hours of TMRS1 and TMRS2 were non-significant different among treatments ($p>0.05$). The %BWI indicated that no significant different 1.48 and 1.66 % ($p>0.05$), There was significant difference in average daily gain between buffaloes fed TMRS1 and TMRS2 (0.90 and 1.70 kg/head/day, respectively). In conclusion, silage will be well preserved by using *Lactobacillus plantalum* Lao 27. Moreover, feeding TMRS2 is better than without TMRS1 for ADG in Lao native buffaloes.

Key words: total mixed ration silage (TMRS), lactic acid bacteria, native buffaloes, *in vitro* digestibility, growth performance

Effects of three organic materials on cadmium adsorption capacity and soil available cadmium contents

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Abstract :
There was an increasing concern about vegetable safety and heavy metal contaminated soil in China. The research was aimed to study economic and effective technology in repairing the farmland soil damaged by heavy metal contamination. Cadmium (Cd) adsorption capacity in three typical agricultural soil wastes in Yunnan Province of China namely tobacco waste (TW), bagasse sludge (BS) and rapeseed cake (RC) were studied using an isothermal adsorption method. A soil culture experiment and a biological test were carried out to investigate the adsorptive effects of three organic materials on Cd contaminated soil, cabbage biomass and Cd uptake by cabbage. The adsorption capacity of the three organic materials was ranked in order: BS>RC>TW. Compared with the control, TW, BS and RC significantly reduced Cd contents (0.6mg/kg and 1.0mg/kg) in soil. BS and RC application increased the cabbage biomass significantly, and decreased the Cd concentration significantly in cabbage. Under the application of TW, cabbage biomass was decreased. Thus applying BS and RC can decrease Cd content in soil and hence the Cd toxicity. The effect of BS on reducing soil Cd contamination was the most effective among the three organic materials.

Keywords: Cadmium; bagasse sludge; rapeseed cake; adsorption capacity; cabbage

Functional analysis of *Cis* Regulatory Elements (CREs) in pollen specific/preferential genes

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Abstract:
Promoter is a region of DNA located in 5' upstream region from the transcription start site (TSS) of gene that has been known as play a critical role in regulating gene expression and widely used as an ideal tools for crop improvement and analysis of gene functions. Recently, based on microarray data we have identified 20 pollen specific or preferred promoters from rice (*Oryza sativa* L.), including 9 early microspore (*RMP*1 through 9) and 11 late pollen specific promoters (*OsLPS1* through 11) (Nguyen et al. 2015, 2016a,b). Moreover, detailed analysis promoter sequencens revealing several *cis*-regulatory elements (CREs) involved in tissues, organs-specific or preferrential expression such as GTGANTG10, POLLEN1LeLAT52. However, not only CREs but also novel motifs or enhancer elements involved in specific expression also need to be concerned. In order to better understand the function of CREs, these promoters are being studied in detail using the method of deletion analysis in transgenic plants, rice and *Arabidopsis*. Our study will be useful for understading the roles of CREs in regulating specific expression of gene in pollen grains, and also provide new set of pollen specific promoters for plant breeders in Vietnam.

Keywords: CREs rice, pollen, promoter

Establishment of an efficient protocrom-like body proliferation system in *Ionopsis utricularioides*

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Abstract:
Ionopsis utricularioides, an Oncidium alliance, has long lasting flower and may have the potential as potted-plant in the flower market. As the pollination is not very easy, the need to establish a rapid and stable in vitro microprogation is important. This report describe the development of plantlet regeneration through protocorm-like bodies (PLBs) derived from flower stalk node cultures. The induced PLBs were cultured on Murashige and Skoog (MS) medium supplemented with different concentrations of 6-benzylaminopurine (BAP) and α-naphtaleneacetic acid (NAA). The result showed that MS medium with 0-2.0 mg L^{-1} BAP and 0.1-1.0 mg L^{-1} NAA could efficiently induce and proliferate of PLBs. Increasing the concentration of NAA decreased the proliferation of PLBs. Besides, different salt strength of either solid or liquid MS medium was compared for PLBs proliferation. The result showed that 1/2 strength MS with both solid and liquid media were more effective on PLBs proliferation

Keywords: *Ionopsis utricularioides*, protocorm-like bodies, MS medium, proliferation

Effect of hydrolyzed *Cordyceps militaris* on probiotic growth

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Abstract :
Galactomannan is a polysaccharide found in *Cordyceps militaris* which is useful for mannooligosaccharide production. This research was aimed to study the effect of hydrolyzed *C. militaris* on probiotic growth. *C. militaris* was hydrolyzed by *Bacillus methylotrophicus* KS1, at 37 ^{o}C, 150 rpm for 7 days and reducing sugar was determined. The supernatant of hydrolyzed *C. militaris* was added into de Man, Rogosa and Sharpe MRS) medium containing each probiotic (*Lactobacillus plantarum* TISTR 543 or *Lactobacillus casei* TISTR 390 or *Lactobacillus acidophilus* TISTR 1338) in 96-well culture plate and hydrolyzed copra meal was used as a positive control in triplicate. Culture plates were incubated for 48 hr. The optical density (600 nm) of probiotic was measured at before and after incubation. The result demonstrated that hydrolyzed *C. militaris* can be promoted all probiotics but the maximum promoting was observed in *L. acidophilus* TISTR 1338

Keywords : *Lactobacillus acidophilus* TISTR 1338, *Cordyceps militaris*, probiotic growth

Isolation of protein from lentil

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Abstract :
The main purpose of this research work was to combat the problem of malnutrition and to isolate the most refined form of protein from lentil bean for food processing. In this research work, lentils (*Lens culinaris* L.) was collected from Monywa Township, Sagaing Region and nutritional characteristics such as moisture content, ash content, fat content, carbohydrate content, protein content, fiber content and energy value were determined. The fat of raw bean flour was removed by bulk soaking in ethanol and also by soxhlet extraction using ethanol as solvent before isolating the protein. In addition, the fiber and starch from defatted lentil flour was removed by alkaline extraction and acid precipitation method to isolate the protein (isoelectric precipitation). Protein solubility, water and oil absorption capacity, emulsifying capacity and stability, foaming capacity and stability of lentil protein isolate have been determined. The solubility curve corresponding to the lentil protein isolate indicated the minimum solubility at pH 4 (protein solubility of 20 %) and maximum solubility at pH 12 (protein solubility of 85 %) respectively. The lentil protein isolate had water absorption capacity of 1.82 ml H_2O/g. protein and oil absorption capacity of 1.95 ml oil/g. protein. It was found that emulsion stability of isolated lentil protein was 41%with foaming capacity was 22.67 %., The foam stability was preserved up to 150 min. Isolated lentil protein improved texture appearance and taste than the lentil flour and thus it can better be used as nutrition and functional ingredients in many food products.

Keywords : Lentil flour, Defatted flour, Soxhlet extraction, Isoelectric precipitation, Lentil protein isolate

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