NEWSLETTER
Malaysian Society of Plant Physiology

(Inaugurated on 29 April 1989. Reg. No. 889 Wilayah Persekutuan)
Locked Bag No. 282, UPM Post Office, 43409 UPM, Serdang, Selangor D. E.

Website : http://www.mspp.org.my **JANUARY 2009**

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Editor : Dr. Tsan Fui Ying
Co-editor : Mr. Ahmad Nazarudin Mohd. Roseli

message from MSPP President.....

First of all allow me to wish all of you a 'Blessed New Year'. The Year of Golden Ox rolled off with many challenges linking the environment, economy and trade. The changing weather patterns have also been discussed at all levels of the society. In all these, I believe when there is challenge, there is an opportunity.

Respected members, I urge you, to play your roles as learned communities in this country to continue to be the agent of change. The role of plant physiologist is more important today especially in addressing the challenges highlighted. It is our duty to bring hope to the communities depending on plants as their livelihood. Your work in improving the yield, quality, conservation, etc would help in maintaining our rich biological diversity and cultural heritage.

The 19th MSPPC was organized successfully last year. We would like to thank UPM and USM for joining hands with us to organize this very successful conference. High quality papers and good deliberations took place during the conference. We are planning to organize our 20th MSPPC between 24 to 26 July 2009. We look forward to fellowship with all of you again.

MSPP is planning to organize two training courses this year. It is the ambition of the Society to enhance and build capacity amongst her members. Courses planned out for the year will be on the chlorophyll fluorescence and photosynthesis measurements. Look out for the details on our website, www.mspp.org.my.

The MSPP endeavors to improve her deliveries especially in the areas of dissemination of research findings. Therefore the website is enhanced for better on-line communication and reporting. The Journal of Plant Physiology will be published on-line from 2009 onwards while all other publications will also be done soon. All manuscript submission could be done on-line through the website.

The work of the Society is done by a large group of volunteers. I am grateful for the willingness of the members of the executive and the various committees to make this a vital and vibrant society.

NEWS

19TH MALAYSIAN SOCIETY OF PLANT PHYSIOLOGY CONFERENCE (MSPPC 2008)

by

Ahmad Nazaruddin Mohd. Roseli

MSPPC 2008 was successfully held on 18-20th November 2008 in Penang. The conference was jointly organized by MSPP, Universiti Putra Malaysia (UPM) and Universiti Sains Malaysia (USM). It was officiated by the President of MSPP, Dr. Elizabeth Philip.

The upgraded MSPP's homepage was also launched during the opening ceremony. On-line submission of papers and registration for MSPP conferences, and manuscript submission for Journal of Tropical Plant Physiology (JTPP) and Transactions are now available in the homepage.

Four plenary papers were delivered by Prof. Dr. Md Nasir Shamsudin from UPM (Climate change and agricultural development: economic impacts and policy responses), Dr. Abdul Rahim Nik from FRIM (Climate change impact on biodiversity and ecosystems), Mr. Azhar Ishak from JMM (The effect of climate change/variability on paddy production in Peninsula Malaysia) and Dr. Ahmad Selamat from UPM (Growth and production of rice for the increased Malaysia population as affected by global warming trends: forecast for 2058).

The conference attracted 120 participants from local universities and research institutions. There was also participation from Sudan, Guatemala, Iran, Libya and Yangon for this year's conference. A total of 17 oral papers and 66 posters were presented during the conference. The conference covered various topics of cultural practices and current techniques in production technology; effects of climate change on plant growth and development; ecophysiology and stress biology; development physiology and assimilate production; postharvest technology and quality control; pest and disease; crop production in controlled environment; biotechnology as well as papers on modeling and simulation. A total of six best poster awards for researcher and student categories, with three awards each, were also presented. Congratulations to all the winners!!!

⇑ Participants of MSPPC 2008

Post conference tour to Tropical Spice Garden and Tropical Fruit Farm was organized on 20th November 2008. These places offer a collection of herbs and spices, and a good variety of fruits. About 43 participants joined the tour.

more pictures on next page

NEWS

Congratulations *to Assoc. Prof. Dr. Hawa ZE Jaafar for being awarded the MSPP Travel Fund of year 2008/2009.*

Assoc. Prof. Dr. Hawa ZE Jaafar from Department of Crop Science, Faculty of Agriculture, UPM, received the MSPP Travel Fund of 2008/2009 to attend the ISHS International Workshop on Glasshouse Environmental Control. The conference was held at Tucson, Arizona, USA, on 19 – 25 October 2008. The theme of the conference was "Glasshouse Environmental Control & Crop Production in Semi Arid Region". The workshop was organized by the Controlled Environment Agriculture Centre, (CEAC), International Society of Horticultural Science (ISHS) and University of Arizona. She presented a paper entitled "Accumulation and Partitioning of Total Phenols in Two Varieties of *Labisia pumila* Benth. under Manipulation of Greenhouse Irradiance" at the conference. The paper was co-authored by Haris N.B.M. and Rahmat A. from UPM also. Below is the abstract of the paper.

ABSTRACT

Two varieties of *Labisia pumila* (var. *pumila* and *alata*) were exposed to four levels of greenhouse irradiance (100, 70, 50, 30% of the incoming radiation (IR); equivalent to respective 670, 630, 470, 240 µmol m^{-2} s^{-1}) in a 2-factorial Randomized Complete Block Design trial with the aim to determine the existence of varietal preferences in total phenol (TP) accumulation and their distribution to different organs (leaf, stem, root) due to manipulation in irradiance levels. TPs were determined according to Folin-Ciocalteu method and results expressed in mg Gallic acid g^{-1} dry weight (DW). Total phenolic content in red var. *alata* consistently recorded lower values ($p \leq 0.0001$) than green var. *pumila* when exposed to high irradiance (100 – 70% IR) by 4.5 – 6.6%. Reducing irradiance to 50% IR, however, increased TPs in red more than green var. by 39.2% (10.96 vs. 7.87 mg GAE g^{-1} DW) due to marked increase ($p \leq 0.0001$) in phenols partitioning to the leaf of red var. as compared to green var. (4.6 vs. 3.0 mg g^{-1}). Partitioning of phenols to the leaf in red var. *alata,* although kept increasing (6.5% over green var.), did not continue to enhance plant TPs with further decrease in irradiance to 30% IR. Instead TP partitioning to the stem and root in green var. *pumila* exceeded substantially over red var. *alata* by 11.8 - 18.4%, respectively, implying there are varietal preferences between var. *pumila* and *alata* in terms of TP accumulation and partitioning related to varying levels of irradiance. Although both varieties are shade loving, var. *alata* was more sensitive to high irradiance than var. *pumila* in accumulation of TP in the plants and manipulation of irradiance in controlled environment agriculture was able to enhance partitioning of phenols to different parts or organs of *Labisia pumila* for potential niche production of plant parts.

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MSPPC 2008 opening ceremony by the MSPP President (top left), conference participants (top centre, centre, bottom left 1), conference dinner (top right 2, top right 1, bottom right) and post conference tour (bottom left 2, bottom centre).....

NEWS – *Best Student Award by MSPP*

Congratulations to Ms. Chew Mei Kooi, graduate of Bachelor of Agricultural Science (Hons.) from Faculty of Agriculture, Universiti Putra Malaysia (UPM), Serdang. She won the Best Student Award of MSPP 2007/2008 with her final year project entitled "Betacyanin pigments and colour expression in red-fleshed pitaya (*Hylocereus polyrhizus*)". She was under the supervision of Dr. Phebe Ding from the Department of Crop Science of the Faculty of Agriculture. The project was funded by Malaysian Toray of Science Fund (MTSF).

Best Student Award of MSPP won by Ms Chew

Summary of project

The red colour of red-fleshed pitaya (*Hylocereus polyrhizus*) is due to a red colour pigment known as betacyanin. The betacyanins of pitaya have potential as food colourants and as natural antioxidant in food, cosmetics and pharmaceutical industries. Betacyanins of pitaya are highly appealing as compared to those from red beet and amaranth. Thus, the peel and flesh of pitaya fruit could be utilized for pigment extraction and this gives the fruit an additional value. To our knowledge, no work has been carried out to screen and profile the pigments pattern of this fruit. Therefore, the objectives of this study were to determine :

i) peel and flesh colour of pitaya fruit
ii) profiles and total contents of betacyanins in the peel and flesh of pitaya fruit
iii) relationships between colour measurements and concentration of betacyanins of red-fleshed pitaya at each stage of fruit development and
iv) to examine the usefulness of tristimulus colour measurements as predictors of pigment composition so that these measurements can be used instead of tedious determinations of pigment composition in red-fleshed pitaya fruits.

Red-fleshed pitaya fruits were harvested for analysis at 5 days interval beginning from 25 to 35 days after flower anthesis (DAA). Peel and flesh of pitaya fruit at each DAA were extracted and concentrated prior to analysis. The fruits were analyzed for peel and flesh colour, total betacyanins content, protein content and pigment were separated by using HPLC method. The experimental design was based on a completely randomized design with three replicates. Data obtained were analyzed by using analysis of variances. Differences within each factor were determined by least significant difference. Linear and quadratic regressions were used to analyze the relationships between DAA and each variable, whereas correlation was used to analyze the relationship between each variable.


Red-fleshed pitaya

As DAA progressed from 25 to 35 DAA, the peel colour of pitaya fruit turned from green to red, while the flesh turned from creamy white mixture with red to full purplish red. There were significant relationships between DAA and colour (L*, C* and h°), betacyanins and protein content of peel and flesh of red-fleshed pitaya fruit. The DAA and peel L*, C* and h° related significantly with R^2 = 0.56, 0.78 and 0.99, respectively. There were also significant relationships between DAA and flesh L*, C* and h° with R^2 = 0.97, 0.69 and 0.81, respectively. Significant relationships were also obtained between DAA and

betacyanins content of both peel and flesh with R^2 = 0.99, respectively. Significant relationships also occurred between DAA and protein content of both peel and flesh with R^2 = 0.75 and 0.89, respectively. A total of three types of betacyanins were separated for peel and flesh of pitaya fruit at 30 and 35 DAA as expressed by three peaks while for 25 DAA, only one type of betacyanins was separated as expressed by a single peak. The three major peaks (peak 1, 2 and 3) obtained for 30 and 35 DAA of red-fleshed pitaya eluted at about 5.7, 9.6 and 13.2 min, respectively, whereas for 25 DAA, the single peak observed at 9.6 min. Peak 3 was identified as isobetanin while peak 2 was identified as betanin. Peak 1 cannot be identified due to standard limitation. There were significance differences in total betanin concentration of peel and flesh as DAA progressed where fruit peel and flesh of 35 DAA possessed the highest content of betanin with 8.72 and 11.70 mg/ml, respectively.

This result suggested that peel and flesh of pitaya fruit at 35 DAA contain more pigments with fully developed colour and possesses highest content of betacyanins as compared to those at 25 and 30 DAA, respectively. The difference in pigment concentration between DAA might explain the differences in chromaticity and red hues of the peel and flesh colour of red-fleshed pitaya fruit. There were significant correlations between peel L*, C*, h°, flesh L*, C* and h°. There were also significant correlations between betacyanins content and peel C*, h° and flesh L*, C*, h°, respectively. Betacyanins content was positively correlated with protein and betanin content of both peel and flesh. The colour measurements (L*, C* and h°) were all significantly correlated with each other and were also significantly correlated with betacyanins content except L* values of peel colour. Therefore, C* and h° values could be used as predictor of betacyanins content for peel and flesh of red-fleshed pitaya fruit. This result suggested that tristimulus colour measurement can be adequately used to estimate the betacyanins content of red-fleshed pitaya fruit quickly, easily and nondestructively. It may also be sufficiently accurate for screening populations and could be used in the field as well.




Hylocereus polyrhizus : from field planting, inflorescence growth to harvest……………..

Updates….

VISITING FELLOW PROGRAMME

Congratulations to Dr. Phebe Ding for being sponsored by the Democratic Pacific Union (DPU) to go on a visiting fellow programme at Taiwan for 1 month in end of 2008. She was awarded NT$100,000 + 2-way flight for attachment at the Postharvest Laboratory, National Taiwan University, Taiwan, from 23 October to 27 November 2008. The project there was on the determination of ACS1 sequence of *Psidium guajava* using 5′ RACE-PCR. In this fellowship programme's research, an unknown end portion of a transcript is copied using a known sequence from the center of the transcript of LiYF guava ACS1 938R.

PROMOTION

Congratulations to Dr. Puteri Edaroyati Megat Wahab from the Department of Crop Science, Faculty of Agriculture, Universiti Putra Malaysia (UPM), for being promoted to DS52 recently. Keep up the good work………….

CAREER MOVE

Congratulations to Assoc. Prof. Dr. Umi Kalsom Md. Shah for her career move from Malaysian Agricultural Research and Development Institute (MARDI) to the Department of Bioprocess Technology, Faculty of Biotechnology and Biomolecular Sciences, Universiti Putra Malaysia effective from 2 January 2009. Her new e-mail address is umi@biotech.upm.edu.my or umiaris@yahoo.com and her new contact number is 03-89468478.

NOTES FROM MEMBER

Seed Morphology and *In-vitro* Germination of Three Selected Native Wild Orchid Species of Malaysia

by

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Introduction

Malaysia is blessed with an extraordinary abundance of natural wild orchids. *Liparis lacerata*, *Dendrobium anosmum* and *Aerides odorata* are beautiful native wild orchids found in the peat swamp forest of Malaysia (Go and Hamzah, 2008; Figure 1). These species are not only ornamentally attractive but they have pleasant scents. *In-vitro* germination can be a very important tool in the conservation of wild orchids since embryos of orchids are rudimentary and require nutrients for further development.

Figure 1. Flower of *D. anosmum* (top), *L. lacerate* (left bottom) and *A. odorata* (right bottom)

Materials and Methods

Seed morphology of *L. lacerata*, *D. anosmum* and *A. odorata* was observed by using light microscope and scanning electron microscope. Seed capsules were cleaned and prepared for germination as described by (Arditti *et al*., 1981). Benzylaminopurine (BAP) at 0.5mg/L,1.0 mg/L,1.5 mg/L and 2.0 mg/L was added into Vacin & Went media to determine the optimum concentration for growth and development of the embryos of the three species under study. Development of protocorm-like-bodies (Plb's) were observed weekly and growth illustration was recorded by using a 3-D microscope camera.

Results and Discussion

The seeds of *L. lacerata* (Figure 2:1) are pale yellow and *D. anosmum* (Figure 2:2) are yellow while those of *A. odorata* (Figure 2:3) are white or creamy. The seeds of *L lacerata* vary in their shapes from a crescent shape to the broadly ellipsoid nature. Seed size ranges from 300 µm - 350 µm in length and 250 µm wide. Testa cells are longitudinally oriented and irregular (Figure 2:1a). The blisters of testa cells are projected outwards with sharp points (Figure 2:1b). General morphology of the seeds of *D. anosmum* was almost identical. They are small and oblong (Figure 2:2a). Seed testa was intransparent, covered by very fine warts, corresponding to the *Dendrobium*-type (Dressler 1993). Testa cells are with marginal clavated ridges, which are smooth on the outer face. Their cells are longitudinally oriented and looked like twisted rope (Figure 2:2b). Ridges are elevated and surface is blunt. The length of the seeds is 200 µm and they are 60µm wide. The size of *A odorata* seeds is 160µm in length and 60µm wide. The shapes of the seeds are fusiform and narrowly ellipsoidal (Figure 2:3a). The seeds of *A odorata* had the largest diameter near the middle, narrowing toward the polar ends. All seeds have an aperture in the posterior, the micropylar pole, in one of the ends. It has longitudinal elevated ridges on the flat smooth surface of the testa cells (Figure 2:3b).

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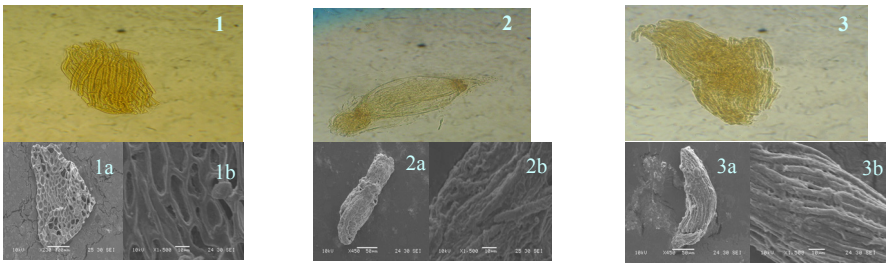


← Figure 2. Seed morphology of *L. lacerate* (left), *D. anosmum* (centre) and *A. odorata* (right) observed using light microscope and scanning electron microscope

The optimum BAP concentrations for germination of *L. lacerata* were 0.5mg/L and 1.0mg/L, 0.5mg/L for *D. anosmum* and that for *A. odorata* were 1.0mg/L and 1.5mg/L. *Liparis lacerata* germinated in 100 days which took a longer time to germinate as compared to the other two species. *Aerides odorata* seeds took 76 days to germinate as compared to *D. anosmum* seeds which germinated the earliest within 40 days. Seeds underwent a colour change when they started to germinate. The colour changed from colourless translucent to green. Seeds began to swell and further development of embryo to protocorm-like-bodies (Plb's) was observed. For *L. lacerata*, the embryo development took 140 day, while *D. anosmum* took 112 days and *A. odorata* took 161 days respectively for the same growth event (Figures 3-5).

Conclusion

Seeds of *L. lacerata* are crescent shape to the broadly ellipsoid while that of *D. anosmum* are oblong and fusiform for *A. odorata* seeds. Fastest germination occured with *D. anosmum* seeds (40 days) followed by *A. odorata* seeds (76 days) while *L. lacerata* seeds took the longest time (100 days) to germinate. The optimum BAP concentrations for germination of *L. lacerata* seeds were 0.5mg/L and 1.0mg/L, that for *D. anosmum* seed germination was 0.5mg/L and 1.0mg/L and 1.5mg/L for *A. odorata* seeds. The growth development of these seeds started with a swelling followed by greening and formation of Protocorm Like Bodies (Plb's). This was followed by further development of the protocorm to form the apical meristem and the leaf primordial. Subsequent subculture of the protocorm resulted in development of young plantlets that can be transferred to flask for further growth and development.

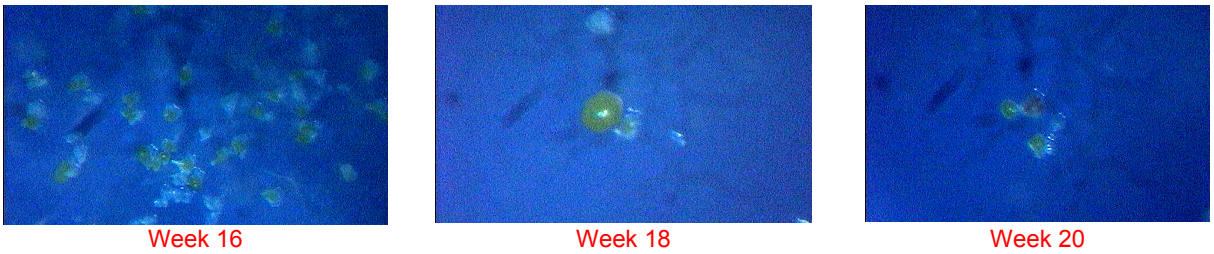
References

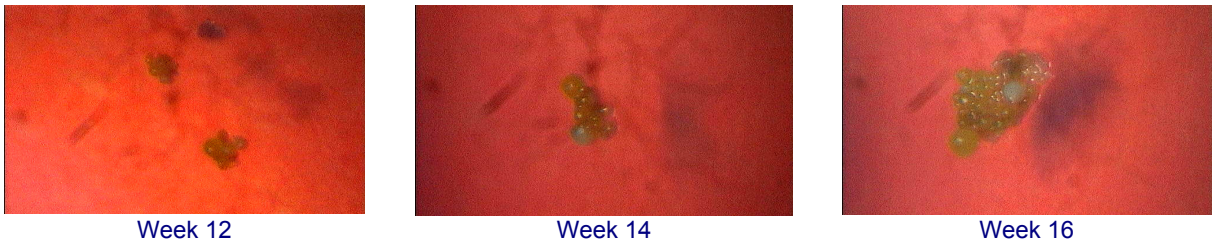
Arditti J., Michaud J.D., Oliva A.P. 1981. Seed germination of North American orchids. I: Native California and related species of *Calypso*, *Epipactis*, *Goodyera*, *Piperia* and *Platanthera*. *Bot.Gaz.* 142: 442–453.

Dressler R. L. 1993. *Phylogeny and Classifi cation of the Orchid Family*. Cambridge University Press, New York. 278 p.

Go R. and Hamzah K.A. 2008. Orchids of Peat Swamp Forest in Peninsular Malaysia. Peat Swamp Forest Project, UNDP/GEF Funded (MAL/99/G31), Ministry of Natural Resources and Environment. 136pp.

→ Figure 3. Growth and development of *L. lacerata* from seeds





← Figure 4. Growth and development of *D. anosmum* from seeds

→ Figure 5. Growth and development of *A. odorata* from seeds

Call for Papers

MSPPC 2009

Theme : Enhancing Plant Productivity and Ecosystem Services in A Challenging Environment

Date : 24-26 July 2009
Venue : Port Dickson, Negeri Sembilan

Tentative Plenary Paper

Changing environment: Malaysia perspective

Tentative Scientific sessions:

- Best practices and current techniques
- Plant production in changing environments
- Plant growth and development
- Ecophysiology and stress biology
- Developmental Physiology and Assimilate Production
- Postharvest technology and quality control
- Pest and disease management
- Biotechnology – tissue culture, plant genetics
- Seed technology and high quality planting materials
- Modeling and simulation

Deadline for submission of abstract : 31 May 2009

Registration : RM650 (for members), RM750 (for non-members),
RM350 (for students), USD300 (international participant), RM1,000 (Exhibitor)

Contact : Dr. Tsan Fui Ying (tsanfuiying@salam.uitm.edu.my) / Dr. Phebe Ding (phebe@agri.upm.edu.my)

MSPP Workshop :

MSPP Workshop on sap flow and data logger
Tentative date: August 2009
Venue : UPM, Serdang
(check out the details at http://www.mspp.org.my)

On-line JTPP:

Journal of Tropical Plant Physiology will be published on-line at http://www.mspp.org.my. You are invited to submit papers on-line for consideration to be published in JTPP.

Other forthcoming events :

11-12 May 2009
Malaysian International Cocoa Conference 2009
Theme : Enhancing Productivity, Efficiency and Quality to Sustain A Vibrant and Dynamic Cocoa Economy
Kuala Lumpur, Malaysia.
Email: micf09@koko.gov.my

14-17 May 2009
International Conference on Plant Abiotic Stress – from Signalling to Development?
Estonia
Web : http://www. ipsdis.org

22-24 June 2009
9th Agricultural Science Congress
Theme : Technological and Institutional Innovations for enhancing Agricultural Income
Srinagar, India.
Website: http://www.skuastkashmir.ac.in

22-25 June 2009
Malaysian Agriculture Conference and Industry Exhibition
Theme : Food Security : A National Agriculture Priority
Putrajaya, Malaysia.
Email: wnordin@agri.upm.edu.my

For every ton of paper made, not only are 24 trees used, but 40 thousand gallons of clean water is used during production. And among the byproducts of paper production are 5690 lbs of greenhouse gasses and almost 20,000 gallons of waste water. The byproducts don't go anywhere - they stick around and impact our planet.

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