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 2008**

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

from the desk of the President…..

As the new president of the Malaysian Society of Plant Physiology, allow me first of all to wish each member a 'Blessed Year in 2008. 2007 was welcomed with floods in Johore and 2007 bid farewell again with floods in Johore, Kedah and Eastern States of Peninsular Malaysia. 2008 is welcomed anticipating the much talked fuel and toll increase that will contribute to increased cost of living.

The floods, drought and haze are only reminder to us, plant physiologists that we play a direct role to help mitigate or ameliorate these effects. The goal of the Society at its founding was to encourage research and education in the field of Plant Physiology and its application. While the name of the society reflects this goal, the research of topics has expanded to include the use of the latest molecular and genomic tools to investigate the function of plant communities, and ecosystem approaches in addressing the various challenges faced.

We celebrate the research achievements of our members by awarding a number of prizes including fellowship to attend scientific meetings, best poster awards and best student thesis, for outstanding contributions, or for distinguished service to plant physiology.

Our annual meetings are excellent places for students and postdoctoral fellows to join professional scientists in reporting their research results. The quality of the research reported in poster and oral presentations has been consistently outstanding. Although our country is host to a large group of plants, the plant biology/physiology group in Malaysia is not much larger than a village and the Society and its activities remain excellent avenues for young scientists to make important career connections.

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 that continue to make this a vital and vibrant society. I would like to especially express my gratitude for the work that was done during the past two years by our former president, A.P. Dr Siti Hajar Ahmad and A.P. Dr Hawa ZE Jaafar in spearheading a number of the society's activities.

MSPP is a professional scientific body dedicated towards promoting research and development in tropical plant biology

NEWS

18th Malaysian Society of Plant Physiology Conference (MSPPC 2007)

by

Tsan Fui Ying

MSPPC2007 was successfully held on 21st – 23rd August 2007 in Kota Kinabalu, Sabah. The conference was jointly organized by MSPP, Universiti Putra Malaysia (UPM) and University Malaysia Sabah (UMS) with support from Ministry of Science, Technology and Innovation (MOSTI).

Y.B. Datuk Hj. Abdul Rahim Ismail, Minister of Agriculture, Sabah, officiated the conference. He also delivered a keynote paper entitled "Gearing towards being the centre for food crop production of Malaysia". He addressed the state's comparative advantages in terms of natural resources, climate suitability and reliable human capital for crop production. Agriculture is given great emphasis in "Halatuju Pembangunan Negeri Sabah". Another keynote paper was given by the Vice Chancellor of UMS. The title of his paper was "Opportunities and challenges of sustainable yield in the changing world".

The conference attracted some 106 participants from local universities and research institutes. There was also a participant from Sudan. A total of 3 plenary papers and 22 oral papers were presented during the 2-day conference on 21st – 22nd August 2008. Another 64 papers were presented as posters. The conference covered topics of plant growth, yield and production; stress physiology; modeling; pest and disease control, biotechnology and post harvest technology. The papers presented in the conference deliberated the importance of plant physiology for successful crop production. All oral presenters were given tokens of appreciation. A total of 3 best poster awards of the researcher category and another 3 best poster awards of the student participant category were also given away. Congratulations !!!

Post conference tour to the Kinabalu National Park was organized on 23rd August 2007. It is indeed a wonderful place to study the tropical flora. There was a guided tour to the Mt. Kinabalu Botanical Garden. The officer in-charge explained some of the unique and rare plants of Borneo with great enthusiasm. Unfortunately, it was raining and hence, affected the full benefits of the visit.

HQ of Kinabalu National Park

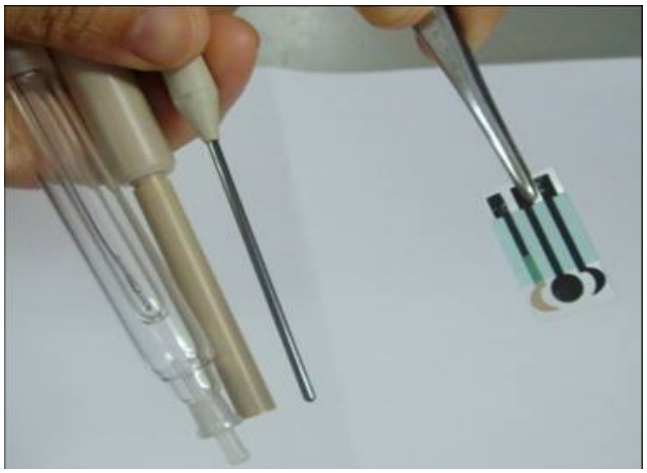
A scene of Mt. Kinabalu Botanical garden

← Rare orchid from Kinabalu National Park

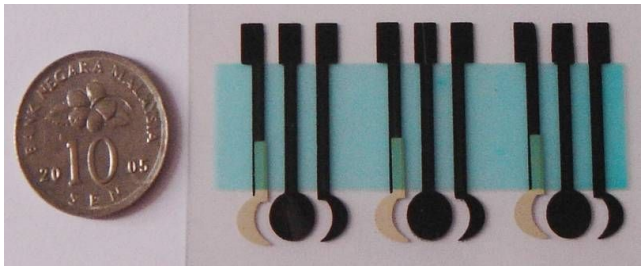
ACHIEVEMENT OF MEMBER

Congratulations to Ms. Salmah Abdul Aziz, Senior Research Officer, Biotechnology Research Centre, MARDI Headquarters, Serdang. She won the gold medal in the MARDI Science and Technology Exhibition 2007, 5-9 September 2007 at PERSADA, Johor International Convention Center, Johor Bahru for her innovation.

Miniaturized Enzyme-Based Screen-Printed Electrode for Herbicide Detection



Caption ? (Pls ask Dr. Umi to ask Pn. Salmah



Caption ? (Pls ask Dr. Umi to ask Pn. Salmah

A miniaturized enzyme-based screen-printed electrode (ESPE) has been developed by the integration of working, reference and counter electrodes on a single strip. Alkaline phosphatase (AP) enzyme was used as a bio-sensing material and deposited on the surface of working electrode using sol-gel-chitosan mixture for herbicide determination. The miniaturized electrode was characterized using cyclic voltammetric and chrono amperometric methods and tested on standard herbicide (dichlorophenoxyacetic acid,2,4-D) with a linear range of 1 to 60 ppb (r2 = 0.9359). This newly developed miniaturized enzyme-based screen-printed biosensor has a great potential to be used for herbicide screening instead of using conventional method such as HPLC as it is highly correlated (r2 = 0.9722), simple, fast and can be mass-produced.

** this is a collaborative research with UKM*

For further information, contact:
Salmah Abdul Aziz
Email: salmahaa@mardi.my
Tel: 03-8943 7293
Fax:03-8945 6037
H/p: 013-3377797

Graduation of member

Congratulations to Ms. Emmyrafedziawati Aida Kamal Rafedzi, Research Officer of Strategic Resource Research Centre, MARDI, Serdang for obtaining her M.Sc. (Biological Sciences) from University of Warwick, U.K. in June 2007

NOTES FROM MEMBER

SHORT NOTES ON GUM ARABIC

Hassan Ibrahim Ali, PhD

The Gum Arabic Company, PO Box 758, Khartoum, Sudan
e-mail: mofdal@gac-arabicgum.com

Introduction

Gums in general are wound or injury products of woody plants. In nature, gums are properly seal wounds. Chemically, all gums are polysaccharides containing acidic groups. The acidic groups interact with small amounts of minerals especially calcium, magnesium and potassium.

Sudan produces annually 60% of the world production followed by Chad and Nigeria. Around 5 million of the populations in Sudan are working in this sector in an area of 5.5 million hectares. The yearly approximate production of Sudan is around 30000 M/T of Gum Arabic.

Definition of Gum Arabic

Gum Arabic (E414 Acacia Gums) are exudates obtained from the stems and branches of *Acacia senegal* and *Acacia seyal* trees (Figure 1) and produced naturally as large nodules during a process called gummosis to seal wounds caused by taping the bark of the tree, to initiate the process of exudations.

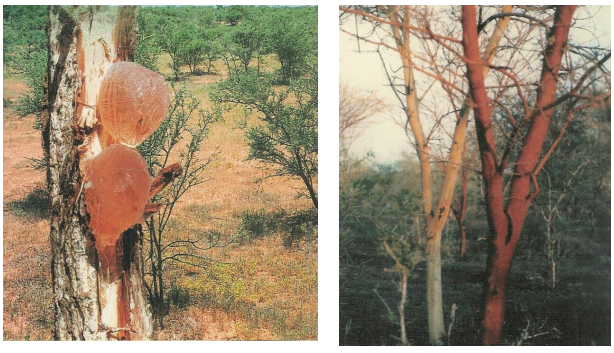


Figure 1. *Acacia senegal* (left) and *Acacia seyal* tree (right)

Gum Arabic Production

Gum Arabic producers tend and protect their very valuable trees throughout the year. At exactly the right time of year, determined by his knowledge, local conditions and expertise acquired over many years (usually around Mid October), the producers "tap" their trees and the gum exudes where the bark has been cut. Six weeks later the first gum collection is made. Up to three further collections are made at three-week intervals.

The yield varies from 250g to 5 kilograms per tree per year depending on weather conditions and on the tree's age. The best yield is typically given by trees approximately ten year-old. Tree improvement programs and better management might increase quality and production. The physiochemical and analytical data of both *A. Senegal* and *A. seyal* are presented in Tables 1 and 2 respectively.

Gum Arabic Grades

Gum Arabic exported by GAG is mainly Crude and processed of the grades:

- Hand Picked Selected (HPS),
- Cleaned Gum ,
- Kibbled and Kibbled Dust
- Mechanical Powder
- Spray Dried Powder

Gum Arabic Application

Acacia gum has long been used for its functional properties (texturisation, emulsion stabilization, film-

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forming ability, compression agent...).Thanks to its very low viscosity and its absence of taste and odor, Acacia gum can be incorporated in large amount in foodstuffs without disturbance of their organoleptic properties.

Arabic has been used widely in the confectionery industry. With most confectionery products, Gum Arabic has two important functions - to retard or prevent sugar crystallization and to emulsify the fat and keep it evenly distributed throughout the product. For prevention of sugar crystallization, Gum Arabic finds its greatest application in confections in which sugar content is high and moisture is low, e.g., in jujubes and pastilles. With theses products, the technique of incorporating the flavors is extremely important. Usually, the Gum Arabic is dissolved in water and the solution is filtered, mixed with sugar, and boiled. The flavor is added with a minimum of stirring to prevent formation of bubbles or opaque spots.

The second function, as a fat emulsifier, is essential to keeping fat distributed uniformly throughout an easily oxidizable, greasy film. This property makes Gum Arabic extremely useful as an emulsifying agent in caramels and toffees.

The emulsification properties of Gum Arabic are utilized in various liquid flavor emulsions also. Many citrus oils and other beverage flavor emulsions utilize the emulsification properties of the Gum. When used as a flavor fixative, the superior film forming ability of Gum Arabic makes it ideal for protecting the flavor from oxidation, evaporation and absorption of moisture from the air.

Table1: Analytical data for gum samples for *Aacia Senegal*.

	Samples number and year of origin														
	S1 1904	S2 1905	S3 1935	S4 1939	S5 1960	S6 1960	S7 1962	S8 1970	S9 1977	S10 1977	S11 1986	S12 1988	S13 1989	Henece Mean	S.D
Loss on drying,105"((%)	14	14	14	13	13	12	12	13	13	14	12	13	14	13	0.8
Total ash,550"((%)	3.8	3.9	3.2	3.6	3.4	3.4	4.8	3.5	4.1	3.6	0.27	0.32	0.32	0.34	0.3
Nitrogen(%)	0.38	0.34	0.36	0.38	0.32	0.36	0.36	0.31	0.38	0.36	0.27	0.32	0.32	0.34	0.03
Conversion factor	6.72	6.57	6.66	7.04	6.54	6.44	6.47	6.71	6.66	6.31	6.70	6.70	6.57	6.62	0.2
Hence protein	2.6	2.2	2.4	2.7	2.1	2.3	2.3	2.1	2.5	1.3	2.8	2.1	2.1	2.3	0.2
Methoxyl(%)	0.21	0.25	0.20	n.d.	0.33	0.22	0.28	0.25	0.32	0.39	0.18	0.21	0.29	0.25	0.06
Speiefic rotation(degrees)	-32	-31	-30	n.d	-32	-29	-31	-31	-31	-29	-28	-30	-32	-30	1.4
Intrinsic viscosily(in ml/g)	-16	17	19	n.d	19	14	14	16	15	17	17	14	20	16	2
Brook field visc.25%(cp)	85	65	85	(290)	90	60	70	80	60	85	80	75	100	78	13
pH.25%aq.soln.at 25C	4.2	4.3	4.3	4.3	4.6	4.3	4.2	4.3	4.5	4.2	4.5	4.7	4.6	4.4	0.5
Equiv.weight	1020	980	980	1200	950	1160	990	1120	1130	880	1300	875	1090	1050	95
Hence uronicanhydric	17	18	18	15	18	15	18	16	16	20	14	20	16	17	2
Sugar composition after hydrolysis (%)															
4-*O*-Methylglucuionicacid	1	1.5	1	15	2	1	2	1.5	2	2.5	1	1	2	1.5	0.5
Glucuronic acid	16	16.5	17	15	16	14	16	14.5	14	17.5	13	19	14	16	1.7
Galactose	37	33	32	45	48	50	46	45	48	43	42	50	47	44	6
Arabinose	29	34	34	29	23	23	20	23	23	22	30	17	21	25	3
Rhamnose	14	15	16	11	11	12	16	16	13	15	14	13	16	14	2

n.d not determined

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The pioneers of a warless world are the youth who refuse military service. (Albert Einstein)

The grand essentials of happiness are: something to do, something to love, and something to hope for. (Allan K. Chalmers)

Every man is a volume if you know how to read him. (William Ellery Channing)

CONTRIBUTED NOTES

EQUATIONS TO ESTIMATE THE INTERCEPTION OF DIRECT AND DIFFUSE LIGHT BY DISCONTINUOUS CANOPIES

by:

Teh, C.B.S.
Dept. Land Management, Uni. Putra Malaysia, Serdang, Selangor
E-mail: chris@agri.upm.edu.my; Fax: 603-89434419

Light is a major resource for plants as it drives several important plant processes such as photosynthesis and transpiration. Consequently, the amount of light intercepted by the plant canopies is often of great interest. The amount of light intercepted by the plant canopies, disregarding canopy reflection and light scattering, is simply the difference between the solar irradiance above and below canopies. However, in the absence of measurement, we can estimate the irradiance below canopies using Beer's law.

This study modified Beer's law to produce two simple equations to estimate the amount of light interception by discontinuous canopies. Total incoming irradiance, I_0, consists of two components: direct ($I_{0,dr}$) and diffuse ($I_{0,df}$) irradiance, which means that: $I_0 = I_{0,dr} + I_{0,df}$. Direct light comes from a single direction, whereas diffuse light comes from all directions. Consequently, the equations to estimate the amount of interception of direct and diffuse light was treated separately.

The method by Jackson and Palmer (1979) was adapted. The interception of direct light was developed as

$$I_{p,dr} = I_{0,dr}\left[1-\exp\left(\frac{0.5}{\cos\theta}\cdot\omega_0^{1-2\theta/\pi}\cdot L\right)\right]$$

where θ is the solar inclination (solar angle from vertical; radians); L is the leaf area index (m^2 leaf area m^{-2} ground area); and ω_0 is the maximum clump factor (a value between 0 and 1) and is calculated by

$$\omega_0 = -\ln\left\{\tau_b + (1-\tau_b)\exp\left[-\frac{0.5}{\cos\theta}L/(1-\tau_b)\right]\right\}\Big/\left(\frac{0.5}{\cos\theta}L\right)$$

where τ_b is the fraction of ground area not covered by the canopies, and it is determined by

$$\tau_b = \begin{cases} 1-L/3 & \text{for } L<3 \\ 0 & \text{for } L\geq 3 \end{cases}$$

(Teh, 2006).

The interception of diffuse light was developed as

$$I_{p,df} = I_{0,df}\left[1-\exp\left(-k_{df}L\right)\right]$$

where k_{df} is the canopy extinction coefficient for diffuse light, and it was calculated as

$$k_{df} = \frac{0.6936+13.2910L^2-2.3648L^4+0.1701L^6}{1+22.6522L^2-4.0257L^4+0.2674L^6}$$

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Further simplification is possible. There is a strong linear relationship between the multiplicative ($k_{df}L$) and L, where their relationship is empirically determined as $k_{df}L = 0.03 + 0.6535L$, with a degree of fit R^2 = 0.9953. Thus, the interception of diffuse light is simplified to

$$I_{p,df} = I_{0,df}\left[1 - \exp\left(-0.03 - 0.6535L\right)\right]$$

PRELIMINARY MODEL TEST

Kustas and Norman (1999) gave the dependence of clump factor on solar inclination as

$$\omega = \frac{\omega_0}{\omega_0 + (1-\omega_0)\exp\left[-2.2\theta^{\,3.8-0.46D}\right]}$$

where D is the ratio between the plant height and width; and ω_0 is as calculated previously. The equation by Kustas and Norman (1999) was tested against this study's equation, and this study's equation obtained good accuracy for various LAIs and canopy dimensions (D). Figure 1 shows the fraction of solar beams reaching the ground. Comparisons shown in Figure 4 were for a spherical leaf distribution, LAI = 1, and D = 2.

This work is still ongoing where further tests are required to measure the accuracy of the equations against field measurements.

REFERENCES

Kustas, W.P., Norman, J.M. 1999. Evaluation of soil and vegetation heat flux predictions using a simple two-source model with radiometric temperatures for partial canopy cover. Agricultural and Forest Meteorology, 94: 13-29.

Teh, C.B.S. 2006. Introduction to mathematical modeling of crop growth. How the equations are derived and assembled into a computer model. Brown Walker Press, Florida.

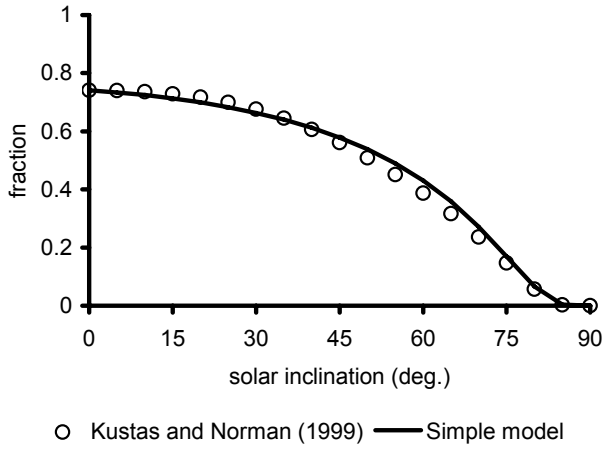

Figure 1. The fraction of direct solar beams reaching the ground using the clump factor as estimated by Kustas and Norman (1999) and by this study's equation

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Table2: Analytical data for gum samples from *Acacia Seyal*

	Niger samples				Uganda Samples			Sudan
	(A)	(B)	(C)	(D)	(G)	(H)	(J)	Sample
Less on drying	11.9	11.9	11.7	12.9	14.4	16.3	15.9	13.4
Total ash(550^{0}C)(%)	4.2	2.7	2.2	3.3	3.0	1.6	3.9	2.8
Nitrogen(%)	0.24	0.16	0.13	0.22	0.10	0.11	0.25	0.14
Methoxyl(%)	0.15	0.18	0.17	0.20	0.27	0.30	0.31	0.94
Specific rotation(gegrees)	+58	+58	+62	+54	+58	+69	+59	+51
Intrisic viscosity(ml/g)	21	15	14	19	17	17	16.5	12
Equivalent weight	1200	1260	1690	1525	1230	1275	1550	1470
Hence uronic anhydride(%)	15	14	10	11	14	14	11	12
Sugar composition after hydrolysis								
4-*O*-methylglucuronic acid	1	1	1	1	2	2	2	5
Glucuronic acid	14	13	9	10	12	12	9	7
Galactose	34	37	37	36	34	34	37	38
Arabinose	49	47	52	51	48	50	49	46
Rhamnose	2	2	<1	2	4	2	2	4

A scene of understorey vegetation

Call for Papers

Malaysian Society of Plant Physiology Conference2008

Date : 19th - 21st August 2008
Venue : Penang

Tentative Scientific sessions:

Cultural Practices in Production Technology
Crop Production in Controlled Environment
Post Harvest Technology and Quality Control
Biotechnology
Plant Growth and Development
Ecophysiology and Stress Biology
Disease and Pest Control
Modeling and Simulation

Deadline for submission of abstract : 15 June 2008

Registration : RM600 (for members), RM800 (for non-members and walk-in participants), RM350 (for students)

Contact : Assoc. Prof. Dr. Hawa ZE Jaafar (*hawazej@agri.upm.edu.my*)
Ms. Dang Lelamurni Abd. Razak (*danglela@mardi.my*)
Dr. Tsan Fui Ying (*tsanfuiying@salam.uitm.edu.my*)

Other forthcoming events :

11-12 Mac 2008
5th National Seed Symposium
Theme : Current Trends Toward Quality Planting Materials
Palm Garden Hotel, IOI Resort, Putrajaya
Email: umarani@agri.upm.edu.my

15-17 April 2008
Soil Science Conference of Malaysia 2008
Theme : Sustaining Soil Ecosystems with Emphasis on Coastal Soils
Impiana Casuarina Hotel, Ipoh, Perak
Email: asma@frim.gov.my, rosazlin@frim.gov.my

24-26 April 2008
Bangalore BIO 2008
Bangalore International Exhibitor Centre (BIEC), Bangalore, India
Web: http://www.bangalorebio.in

21-25 May 2008
7th International Scientific Symposium
Theme : National Hazards and Changing Marine Environment in the Western Pacific
Sutera Harbour Resort, Kota Kinabalu, Sabah
Email: 7th.iocwestpac2008@gmail.com

28-30 May 2008
Biodiversity and National Development : Achievements and Opportunities and Challenges
The Legend Hotel, Kuala Lumpur
Web : http://www.mardi.gov.my

3-4 June 2008
National Seminar on Science, Technology and Social Sciences 2008
Theme : Broadening Horizons through Research
Kuantan, Pahang
Email: stss2008@pahang.uitm.edu.my

17 July 2008
Transfer of Technology Seminar 2008
Malaysian Palm Oil Board, Bangi, Selangor
Web : http://www.mpob.gov.my

22 July 2008
Post Harvest Colloquium 2008
Theme : Quality Assurance : The Key to a Successful Fresh Horticulture Industry
Dewan Persidangan, Pusat Pendidikan Luar, Universiti Putra Malaysia
Email: phebe@agri.upm.edu.my

20-23 October 2008
International Rubber Conference and Exhibition 2008
Theme : Meeting Challenges and New Frontiers
Kuala Lumpur Convention Centre, Kuala Lumpur
Email: irc2008@lgm.gov.my

21-22 October 2008
Seminar on Medicinal and Aromatic Plants 2008
The Legend Hotel, Kuala Lumpur
Web : http://www.frim.gov.my