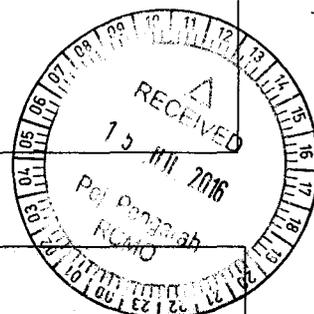


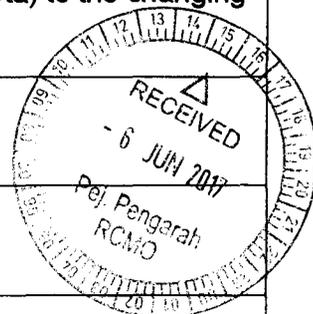


RU GRANT FINAL REPORT FORM

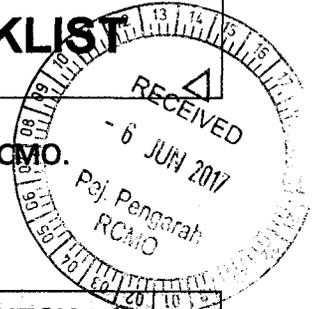


Please email a softcopy of this report to rcmo@usm.my

A	PROJECT DETAILS
i	Title of Research: Biochemical composition and genetic response of green microalgae (Chlorophyta) to the changing environmental conditions along the continental gradients.
ii	Account Number: 1001/PBIOLOGI/815082
iii	Name of Research Leader: Prof. Dr Wan Maznah Wan Omar
iv	Name of Co-Researcher: 1. Prof. Mashhor Mansor (USM) 2. Prof. Mohd Nazalan Mohd Najimudin (USM) 3. Prof. Peter Convey (BAS) 4. Prof. Dr. Latiffah Zakaria (USM) 5. Dr. Rashidah Abdul Rahim (USM) 6. AP. Wei Luo (PRIC)
v	Duration of this research: a) Start Date : 1 December 2011 b) Completion Date : 30 November 2014 c) Duration : 36 Months d) Revised Date (if any) : 31 May 2015
B	ABSTRACT OF RESEARCH
	<p><i>(An abstract of between 100 and 200 words must be prepared in Bahasa Malaysia and in English. This abstract will be included in the Report of the Research and Innovation Section at a later date as a means of presenting the project findings of the researcher/s to the University and the community at large)</i></p> <p>Abstract:</p> <p>The seasonal development of polar microalgae is mainly controlled by abiotic factors and the microalgae</p>



Please use this checklist to self-assess your report before submitting to RCMO.
Checklist should accompany the report.



NO.	ITEM	PLEASE CHECK (✓)		
		PI	JKPTJ	RCMO
1	Completed Final Report Form			✓
2	Project Financial Account Statement (e-Statement)			✓
3	Asset/Inventory Return Form (<i>Borang Penyerahan Aset/Inventori</i>)			✓
4	A copy of the publications/proceedings listed in Section D(ii) (Research Output)			✓
5	Comprehensive Technical Report			✓
6	Other supporting documents, if any			-
7	Project Leader's Signature			✓
8	Endorsement of PTJ's Evaluation Committee			✓
9	Endorsement of Dean/ Director of PTJ's			✓

growth during summer is controlled by the intensity of available light after the dark polar winter. This study was set up to determine the biochemical responses during growth phases of the Chlorophyta under different environmental conditions. We managed to isolate Chlorophyta strains which were *Chlorococcum* sp. from Antarctica and Tropics while *Chlorella* sp. from the Arctic. The strains were maintained in enriched BBM media under different environmental conditions. Arctic *Chlorella* grew well at temperature $16\pm 2^{\circ}\text{C}$ with the highest growth rate compared to the other strains. Both Antarctic and Arctic strains produced high carbohydrate content at temperature above 16°C when exposed to light. Both strains syntheses high protein at temperature $4\pm 2^{\circ}\text{C}$ in dark environment. Tropical *Chlorococcum* sp. showed slightly slow growth under low temperature condition. However, the production of protein was much higher in this range of temperature. The results obtained showed that the Chlorophyta from polar and tropical regions displayed high degree of phenotypic plasticity that enabled them to respond to changing environment by applying various adaptations mechanisms.

Abstrak:

Perkembangan bermusim mikroalga kutub adalah dikawal oleh faktor abiotik dan pertumbuhan mikroalga semasa musim panas dikawal oleh keamatan cahaya selepas musim sejuk kutub yang gelap. Kajian ini dijalankan untuk menentukan tindakbalas biokimia semasa fasa pertumbuhan Chlorophyta dibawah keadaan persekitaran yang berbeza. Strain Chlorophyta yang berjaya dipencilkan ialah *Chlorococcum* sp. dari Antartika dan tropika, manakala *Chlorella* sp. dari Artik. Strain tersebut diselenggara di dalam media BBM yang diperkaya dibawah keadaan persekitaran yang berbeza. *Chlorella* sp. dari Artik tumbuh dengan baik pada suhu $16\pm 2^{\circ}\text{C}$ dengan kadar pertumbuhan yang paling tinggi berbanding strain yang lain. Kedua-dua strain Antartika dan Artik mengeluarkan kandungan kabohidrat yang tinggi suhu $16\pm 2^{\circ}\text{C}$ apabila didedahkan kepada cahaya. Strain tersebut sintesis protein yang tinggi pada suhu $4\pm 2^{\circ}\text{C}$ dalam keadaan gelap. *Chlorococcum* sp. dari tropika menunjukkan pertumbuhan yang agak perlahan dibawah keadaan suhu yang rendah. Walaubagaimanapun, pengeluaran protein lebih tinggi pada julat suhu tersebut. Keputusan yang didapati menunjukkan Chlorophyta dari benua kutub dan tropika memaparkan tahap keplastikan fenotip yang tinggi yang membolehkan mereka untuk bertindakbalas terhadap perubahan persekitaran dengan menggunakan pelbagai mekanisma adaptasi.

Note:

Other than research on microalgae, this grant also partly supported work by Dr Rashidah Abdul Rahim (on polar psychrotrophic bacteria). She attended XXXII SCAR and Open Science Conference 2012, Oregon, USA sponsored by this grant. A paper has been published in Polish Polar Journal (refer to attachment).

C BUDGET & EXPENDITURE

i	Total Approved Budget	: RM
		<u>Yearly Budget Distributed</u>
		Year 1 : RM 81,550
		Year 2 : RM 87,200
		Year 3 : RM 81,250
	Total Expenditure	: RM 248,454.97
	Balance	: RM 1545.03
	Percentage of Amount Spent (%)	: 99.38%

Please attach final account statement (eStatement) to indicate the project expenditure