Karnataka State Council for Science and Technology

Indian Institute of Science Campus, Bengaluru - 560 012

Telephone: 080-23341652, 23348848, 23348849 ♦ **Telefax:** 080-23348840

Email: office@kscst.iisc.ernet.in, office@kscst.org.in ♦ **Website:** www.kscst.iisc.ernet.in, www.kscst.org.in

Mr. H. Hemanth Kumar
Executive Secretary

27th March 2019

Ref: 7.1.01/SPP/1333

The Principal,
Sapthagiri College of Engineering,
#14/5, Chickasandra,
Hesaraghatta Main Road,
Bengaluru – 560 057.

Dear Sir/Madam,

Sub : Sanction of Student Project (Biofuel) - 42nd Series: Year 2018-2019

Your Project Proposal Reference No. : 42S_B_BE_003

Ref : Your Project Proposal entitled " **BIOPLASTIC EXTRACTION FROM WASTE GREASE PRODUCED IN INDUSTRIES USING AS GLYCEROL AS A SUBSTRATE**

I am happy to inform that your student project proposal referred above, has been approved by the Council for "Student Project Programme (Biofuel)- 42nd Series" and has been sanctioned with a budgetary break-up as detailed below:

Student / s	Ms. Debika Chakrabarty and others	**Budget**	**Amount (Rs)**
		Materials/Consumables	3,500.00
Guide/s	Mr. Prashanth Kumar H P	Labor	-
	Ms. Shobha G	Travel	500.00
Department	Biotechnology	Analysis	500.00
		Miscellaneous	500.00
		Report	500.00
		TOTAL	5,500.00
	RUPEES FIVE THOUSAND FIVE HUNDRED ONLY		

The following are the guidelines to carryout the project work :

a) The project should be performed based on the objectives of the proposal sent by you.

b) The project should be completed in all respects and one copy of the hardbound report along with softcopy of the full report in a CD (.pdf format) should be submitted to KSCST.

c) The project report shall mention the name of **"Karnataka State Bioenergy Development Board** and **Karnataka State Council for Science and Technology"** as sponsored organisations in the title page. Project Title or the objectives can be altered only with prior permission of KSCST. Any change in the project are strictly prohibited and liable for rejection and the amount sanctioned has to be returned back to KSCST.The fund is to be utilised only for the activities to which it has been released.

d) Please quote your **project reference number printed above** in all your future correspondences.

e) **Important:** After completing the project, 2 to 3 page write-up (synopsis) needs to be sent by e-mail [biofuelcell.kscst@gmail.com] and should include following :

1) Title of the project
2) Name of the College & Department
3) Name of the students & Guide(s)
4) Keywords

Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

05/04

SCE-2016-17

Payment Voucher

No. : 1073 Dated : 7-Sep-2019

Particulars	Amount
Account : KSCST(Project Work)	5,500.00

Through :
SBI- 30263521464

On Account of :
Being funds released towards KSCST Project work on Bio Plastic Extractin of waste Grease using Glyceral as substrate

Bank Transaction Details:

Debika Chakraborty			
Cheque	499736	7-Sep-2019	5,500.00

Amount (in words) :
INR Five Thousand Five Hundred Only

₹ 5,500.00

R. S. AKASH (1SG16CB023)
Receiver's Signature

Authorised Signatory

NAS & CO. CHARTERED ACCOUNTANTS VERIFIED BANGALORE 09/09/19

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

From,

Debika.C 7019226230
Department of Biotechnology
Sapthagiri College of Engineering
Bangalore - 560057

14/08/19
Bangalore

To,
The Principal
Sapthagiri College of Engineering
Bangalore - 560057.

Respected Sir,

Subject: To release the fund sanctioned from KSCST

I, Debika C and our groupmates Disha D B, Keerthna N, B Vaishini have successfully completed the project on "Bioplastic extraction from waste grease using glycerol as substrate". We have submitted the report and CD to SPP Cordinator Ravishankar M N. I hereby request you to release the sanctioned amount for the project.

Thanking You,

Yours faithfully,

Debika.C.

14/8/19

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

The above project was funded by KSCST
The students have completed the project
and submitted the report.

14/08/19
RAVISHANKARA M.N
KSCST-SPP coordinator
SCE B'lore

DETAILS ARE FURNISHED AS BELOW:

Sl. No	Items	Cost (in Rupees)
1	Raw materials	300
2	Chemicals	1000
3	Glass wares	250
4	Demand draft	2000
5	Project Report	1200
6	Miscellaneous (Transportation, Xerox, writing materials etc.,)	750
	Total Sum	5500
Amount in words: Five thousand five hundred only		

14/08/19

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Mob : 9945754390

MAHESH CYBER WORLD

103/2, Rukmini Nagar, Nagasandra (P), Bangalore - 73

No. Date 04/11/19

M/s. Pallavi

No.	Particulars	Qnty.	Amount
1	INTERNET	1	100
2	PRINT OUT		800
3	XEROX		100
4	DTP		500
5	COMPUTER SERVICE		
6	RENT AGREEMENT		
	TOTAL		1500

MAHESH CYBER WORLD

For MAHESH CYBER WORLD

Sapthagiri Engg College

Chikkasandra, Bangalore-560057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057

TAX INVOICE

(ORIGINAL FOR RECIPIENT)

KARNATAKA FINE CHEM
(LABORATORY CHEMICALS)
C-305.9th Cross 1st Stage,
Peenya industrial estate, Near TVS cross,Bengaluru-560058,
GSTIN/UIN: 29AEVPC4088H1ZY
State Name : Karnataka, Code : 29
Contact : 080-23722671/41171671,9845162426
E-Mail : kfc_order@yahoo.com, kfcorder1967@gmail.com
www.karnatakafinechem.com

Invoice No. **0535**	Dated **17-Jul-2019**
Delivery Note	Mode/Terms of Payment **Immediate**
Supplier's Ref. **0535**	Other Reference(s)
Buyer's Order No. **Verble**	Dated **17-Jul-2019**
Despatch Document No.	Delivery Note Date
Despatched through **By Hand**	Destination
Terms of Delivery	

Buyer
Miss, Keerthana (Sapthagirl College of Engeering)
No 14/5, Chikkasandra, Heasaragatta Main Road, Bangalorre-560057
State Name : Karnataka, Code : 29

Sl No.	Description of Goods	HSN/SAC	GST Rate	Quantity	Rate	per	Disc. %	Amount
1	**Glycerine 500ml LR**	15200000	18 %	**1 nos**	317.00	nos		317.00
	Output SGST 9%				9	%		28.53
	Output CGST 9%				9	%		28.53
	Less : ***Round Off***							(-)0.06
	Total			**1 nos**				Rs. 374.00

Amount Chargeable (in words) E. & O.E

Indian Rupees Three Hundred Seventy Four Only

	Taxable Value	Central Tax Rate	Central Tax Amount	State Tax Rate	State Tax Amount	Total Tax Amount
	317.00	9%	28.53	9%	28.53	57.06
Total:	**317.00**		28.53		28.53	57.06

Tax Amount (in words) : **Indian Rupees Fifty Seven and Six paise Only**

Company's PAN : **AEVPC4088H**

Declaration
Certified that the goods on which ST has been charged have not been exempted under the CST act of the State Sales Tax Act of the rules made thereunder and the amount of ST on those goods are not more than what is payable under the provisions act or Rules made there under.
Payment shall be made within 30 days. Otherwise interest@24% will be charged.

Company's Bank Details
Bank Name : **Kotak Mahindra Bank Limited (OD)**
A/c No. : **4711774649**
Branch & IFS Code : **Peenya & KKBK0008036**

Customer's Seal and Signature

for KARNATAKA FINE CHEM

Authorised Signatory

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

SUBJECT TO BANGALORE JURISDICTION

This is a Computer Generated Invoice

Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road
Bangalore-560 057

42S_B_BE_003 Bioplastic Extraction from waste grease produced in industries using as glycerol as a substrate

COLLEGE: Sapthagiri College Of Engineering, Bangalore

DEPARTMENT: Biotechnology

GUIDE: Mr Prashanth Kumar and Mrs Shobha G

STUDENTS: Debika Chakrabarty, Disha DB, Keerthana N, B Varshini

INTRODUCTION

The used cooking oil and trap grease can contain much more than 15% FFAs. These feedstock need additional processing before they can undergo traditional alkali-catalysed transesterification to form glycerol and Biodiesel.

This process converts triacylglycerol and methanol into glycerol and fatty acid methyl esters (namely biodiesel) using alkali or acid catalysts. The amount of crude glycerol produced from this transesterification reaction accounts for approximately 10% of the final weight of biodiesel. Conversion of crude glycerol into higher-value products improves the economic viability of biofuel industry by coupling the production of value-added products to the production of biodiesel and eliminating the cost of treatment for crude glycerol disposal. Fermentation of glycerol has been reported to produce many value-added by-products, such as 1,3-propanediol, dihydroxyacetone, succinic acid, propionic acid, ethanol, butanol, hydrogen, citric acid, lactic acid, glyceric acid, bio surfactants, pigments, and PHAs. Among these by-products, 1,3-propanediol,75 succinic acid,lactic acid, and glyceric acid, have been used as bio monomers for production of plastics, i.e. polyesters, polyethers, and polyurethanes, through chemical synthesis. In the present work glycerol obtained after transesterification will be used for bio plastic formation.

Materials and methodology:

Production of Glycerol:

Transesterification of waste grease using alkaline catalyst was carried out using a two-step process. The two-step reaction utilized 100% excess methanol, 6:1 molar ratio of alcohol to oil and 1% KOH as a catalyst. In each step, 3 mol of alcohol and 0.5% KOH were used and reaction was carried out at 25 °C

for 30 min. After the first step the waste grease having a high free fatty acid formed a thick soap which interfered with the glycerol separation (Issariyakul *et al.*, 2006).

Test for Glycerol:

Acrolein test

Acrolein test is used to detect the presence of glycerol or fat. When fat is treated strongly in the presence of a dehydrating agent like potassium bisulphate ($KHSO_4$), the glycerol portion of the molecule is dehydrated to form an unsaturated aldehyde, acrolein that has a pungent irritating odour.

Dichromate test:

In a dry test tube 3 or 4 ml of glycerol solution, to it add a few drops of 5% potassium dichromate solution and 5 ml of conc. HNO_3, mix well and note that the brown colour is changed to blue.

Dunstan's test :

A drop of phenophthalein is added to approximately 5 mL of borax solution . The pink color appears. On adding 2-3 drops of glycerol, the pink color disappears on heating and disappears on cooling again.

Bioplastic production from grease:

Preparation of bioplastic was done by modifying the agar and the glycerol concentration.

1.5%, 3%, 4.5% of bioplastic was prepared. According to the concentration required amount of glycerol.

Moisture Absorption Test:

The moisture absorption test identified the ability of bioplastics to absorb water (H2O) as determined by standard ASTM D 570. Bioplastics, which had been previously dried for 24 hours in an oven at 50°C, cooled in a desiccator, and weighed, were cut into 2mm x 2mm. The moisture absorption data of bioplastics was obtained by soaking them in water for 24 hours. After that, the bioplastics were dried with a cloth and immediately weighed.

$$MoistureContent\ (\%) = \frac{(Post\text{-}BrakeWeight) - (InitialWeight)}{InitialWeight} x100$$

Biodegradability

Biodegradable behaviour of bioplastics was determined using soil burial degradation test, i.e. bioplastics were buried in the soil, so that it would be degraded completely.[Degradation testing serves to determine the extent of damage of bioplastics. The damage can be seen from the mass reduction of respective specimens buried in the ground. Bioplastics were cut into 10 mm x 10 mm. Then, they were buried into the ground at 8-cm depth; the burial duration varied (3, 6, 9, and 12 days). Prior to burial, the initial mass (mass before degradation) was determined. The final mass (mass after degradation) of the bioplastics was measured afterwards. Any changes in mechanical properties due to degradation process were observed and when the bioplastics were completely degraded, the biodegradability was measured.

$$MicrobialResistance\ (\%) = \frac{FinalMass - InitialMass}{InitialMass} x10$$

Results

Production of Glycerol:

Transesterification of waste grease was carried out and glycerol was obtained.

Test for Glycerol:

Acrolein test

Acrolein test is used to detect the presence of glycerol or fat. When fat is treated strongly in the presence of a dehydrating agent like potassium bisulphate ($KHSO_4$), the glycerol portion of the molecule is dehydrated to form an unsaturated aldehyde, acrolein that has a pungent irritating odour was observed.

Dichromate test:

In a dry test tube 3 or 4 ml of glycerol solution, to it a few drops of 5% potassium dichromate solution was added and 5 ml of conc. HNO_3, was mixed well and there was a colour change from brown colour is changed to blue.

Dunstan's test :

A drop of phenophthalein was added to approximately 5 ml of borax solution . The pink colour appears. On adding 2-3 drops of glycerol, disappearance of pink colour onaddition of glycerol.

Bioplastic production from grease:

Preparation of bioplastic was done by modifying the agar and the glycerol concentration.

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$$MoistureContent\ (\%) = \frac{(Post - BrakeWeight) - (InitialWeight)}{InitialWeight} x100$$

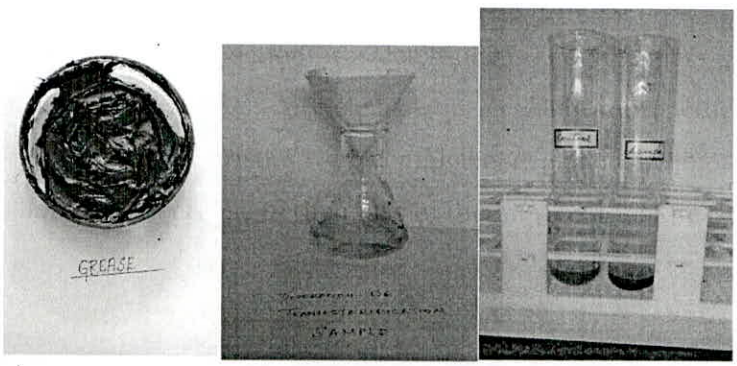
72.15% was moisture absorption was observed.

Biodegradability

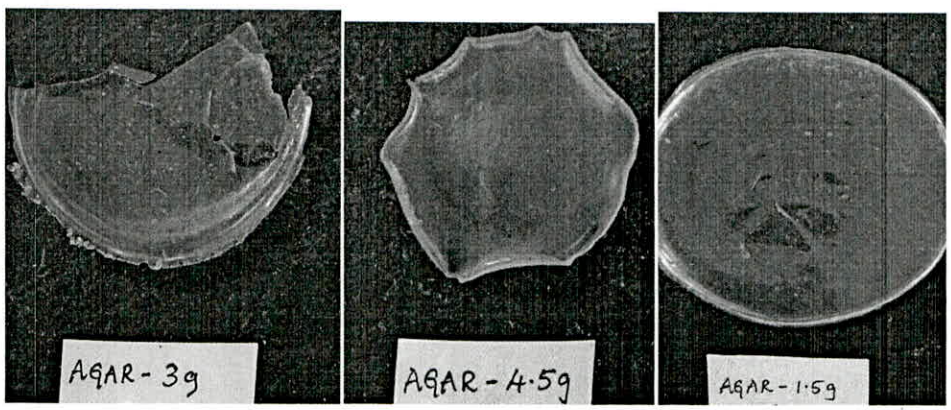
Biodegradable behaviour of bioplastics was determined using soil burial degradation test, i.e. bioplastics were buried in the soil, so that it would be degraded completely.[Degradation testing serves to determine

the extent of damage of bioplastics. The damage can be seen from the mass reduction of respective specimens buried in the ground. Bioplastics were cut into 10 mm x 10 mm. Then, they were buried into the ground at 8-cm depth; the burial duration varied (3, 6, 9, and 12 days). Prior to burial, the initial mass (mass before degradation) was determined. The final mass (mass after degradation) of the bioplastics was measured afterwards. Any changes in mechanical properties due to degradation process were observed and when the bioplastics were completely degraded, the biodegradability was measured.

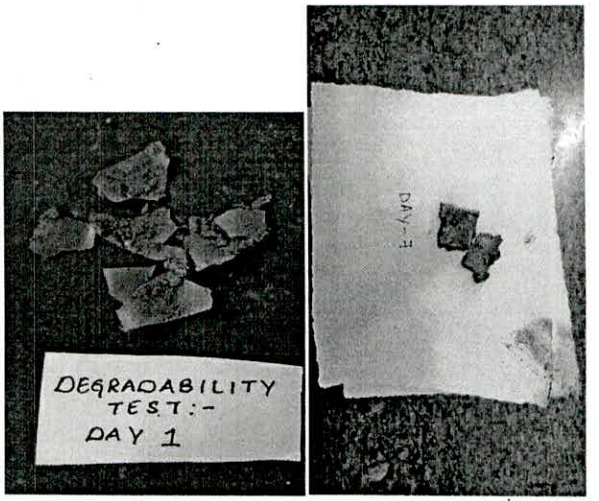
There was decrease in the mass of the bioplastic as the time was increased.



Dunstans test



Principal
Sapthagiri College of Engineering
Chikkasandra, Hesaraghatta Road,
Bangalore-560 057



SAPTHAGIRI COLLEGE OF ENGINEERING
Dept of Bio-Tech
BANAGLORE-57

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