



**GOVT.V.Y.T.PG.AUTONOMOUS COLLEGE, DURG, 491001 (C.G.)**

**(Former Name – Govt. Arts & Science College, Durg)**

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**NAAC Accredited Grade 'A+'; CPE Phase - III (UGC, N. Delhi); STAR College Status (DBT, N Delhi)**

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## **Interdisciplinary Research Activities**

We have a good ecosystem for Research activities among various research-oriented departments. There is good coordination among Physics, Chemistry, Botany, Zoology, Microbiology, Biotechnology and Sociology for research activities. The laboratories and research facilities of various departments are accessible for all researchers irrespective of the departmental disciplines, besides, we have one central instrumentation laboratory, which is open not only for members of our college but is open for outsiders also.

Some major interdisciplinary research works which have been successfully implemented, are hereby summarized below –

### **1. Between Department of Physics and Chemistry**

- a. Under interdisciplinary programme, the Department of Chemistry and Physics are working together under DST sponsored research project between India and Bulgaria on topic – Ultrahigh – Efficiency lead free Perovskite Solar Cell. This project has been implemented under India-Bulgaria Intergovernmental Programme. Dr. A.K. Singh from Chemistry and Dr. R.S. Singh of Department of Physics are collaborator for this research work.
- b. A combined research paper of Prof. A.K.Singh and Prof. R.S. Singh has been published and has been awarded as United Group Paper Award from Bangladesh.

### **2. Between Department of Physics and Microbiology**

Prof. Anjali Awadhia of Department of Physics and Dr. Pragya Kulkarni of Department of Microbiology have jointly conducted research study on – “Effect of Cross-Linking on the Toxicity of CdTeQDs in Solid/Liquid Medium, and have produced publication.

### **3. Between Department of Physics and Mathematics**

The department of Physics is cooperating in teaching process of Department of Mathematics. The faculty of Department of Physics are teaching mechanics to M.Sc. IV<sup>th</sup> Semester Maths. students.



  
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#### 4. Between Physics and Geology

The Department of Physics is characterizing geological samples provided by the geology department. Under this collaboration they have produced one research paper entitled – “Thermo luminescence studies of Band Y-Irradiated Geological materials for Environment Monitoring.” They have also produced on book for their combined work.

#### 5. Between Chemistry & Microbiology

The Chemistry Department and Microbiology Departments have performed collaborative study for evaluation of antibacterial and antifungal effect of synthesized complexes. The Chemistry Department is synthesizing complex compounds and its antibacterial & antifungal features has been examined by the Department of Microbiology.

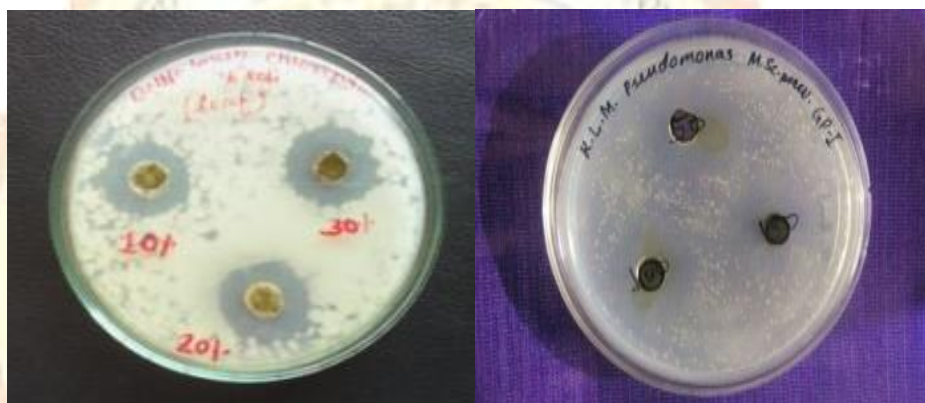


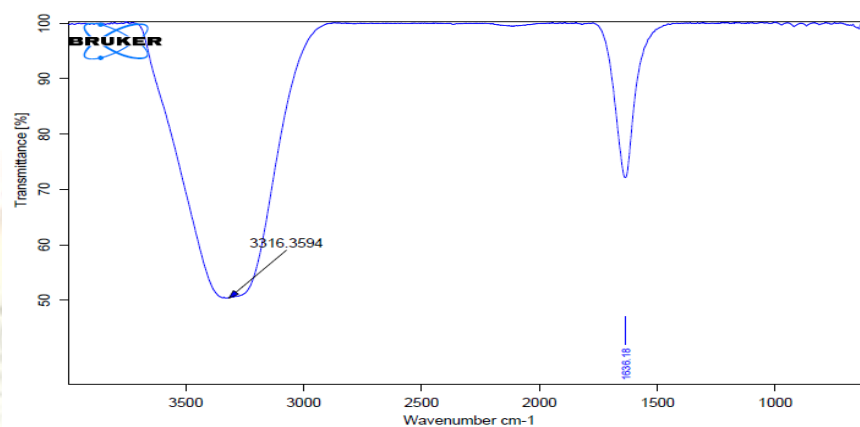
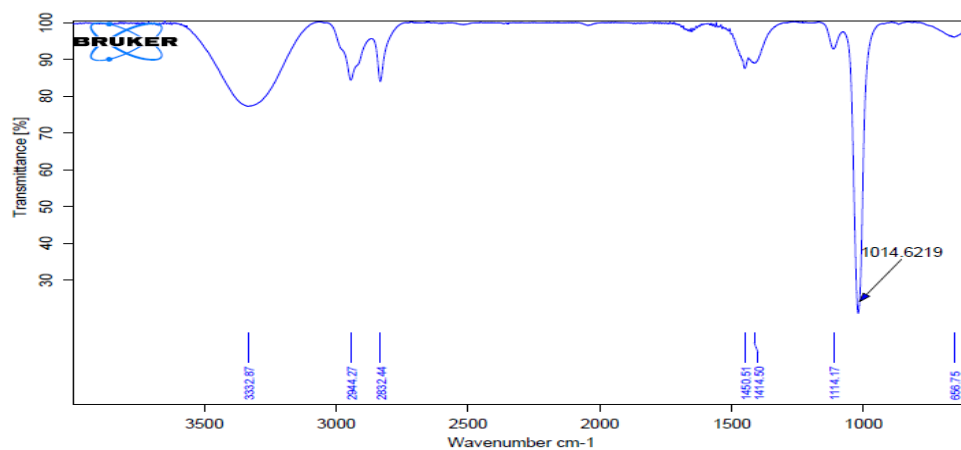
Figure – Showing result of Anti-microbial sensitivity test

#### 6. Between Chemistry and Biotechnology

Both Department are performing antimicrobial effect of various nanoparticles. The Nanoparticles synthesized by the Department of Chemistry are being tested for their antimicrobial features in the Department of Biotechnology and the green nanoparticles synthesized in the Department of Biotechnology are being characterized through FTIR by the Department of Chemistry. Besides, some heavy metals from the sample of Urine & Blood of Renal Dysfunction patients, studied by the Department of Biotechnology are being detected by the department of Chemistry through Atomic Absorption Spectrophotometry.



  
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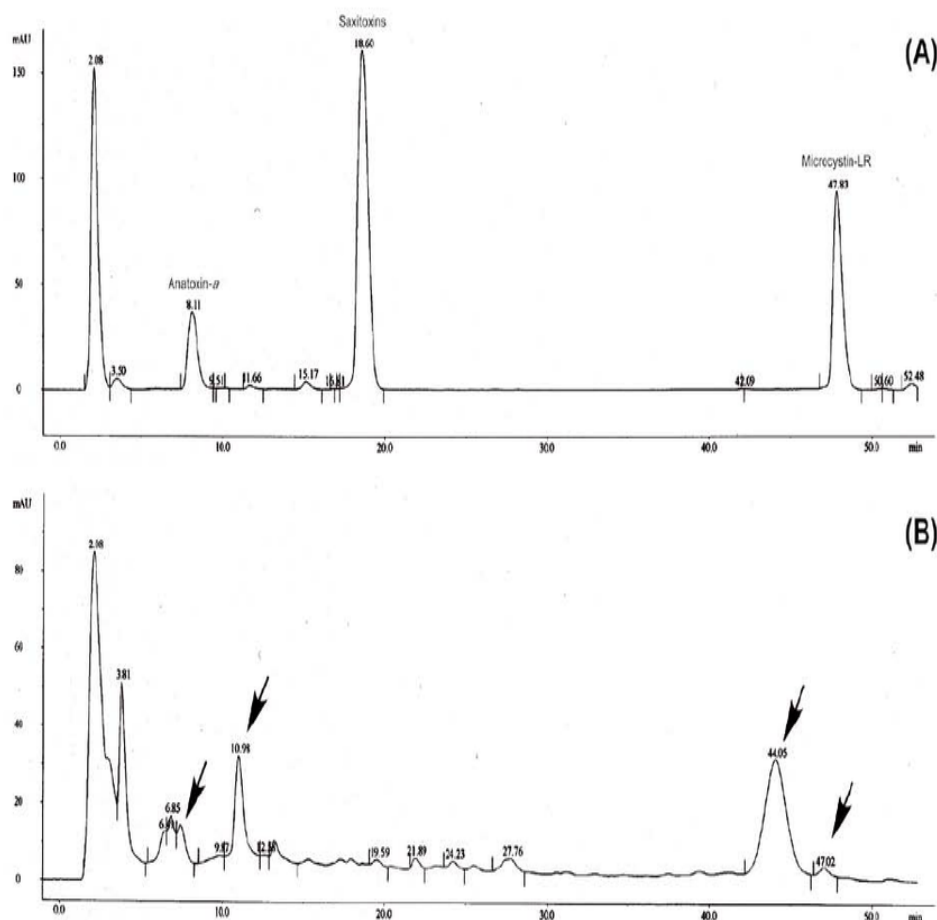
**Figure – Showing FTIR graph of Synthesized Nanoparticle**



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## 7. Between Department of Biotechnology and Microbiology

The Department of Microbiology is maintaining culture of Cyanobacteria from the field of local area and their Cyanotoxin through HPLC are being verified and characterized by the Department of Biotechnology.



**Figure – Showing HPLC Graph of Cynotoxin Standard (A) and in Sample (B)**

Department of Microbiology is being actively working on isolation of Cyanobacterial cultures from different habitats since last seven years.

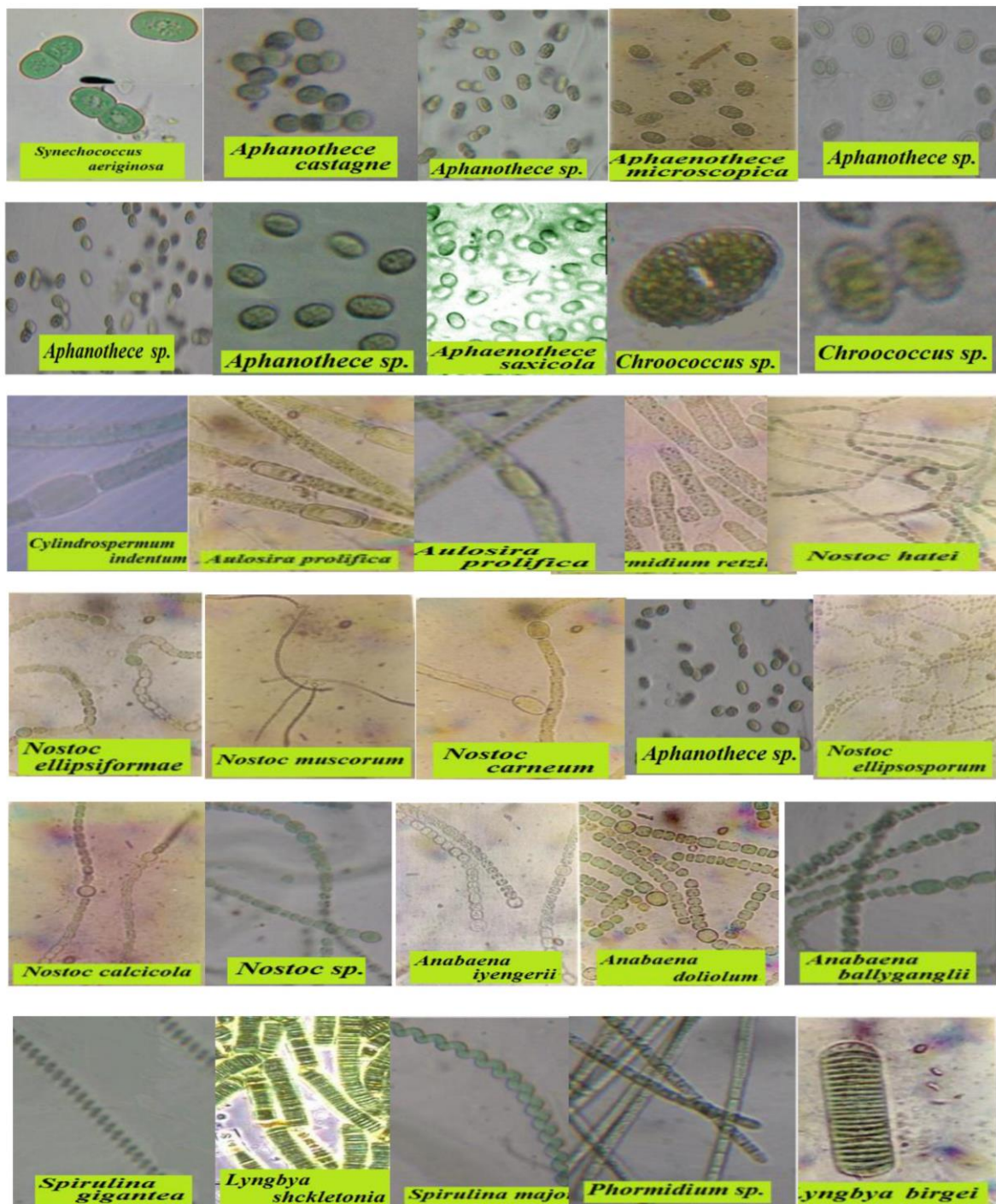
Altogether, 89 Cyanobacterial cultures were isolated so far from water bodies as well as agriculture farms of Durg and Rajnandgaon Districts of Chhattisgarh.



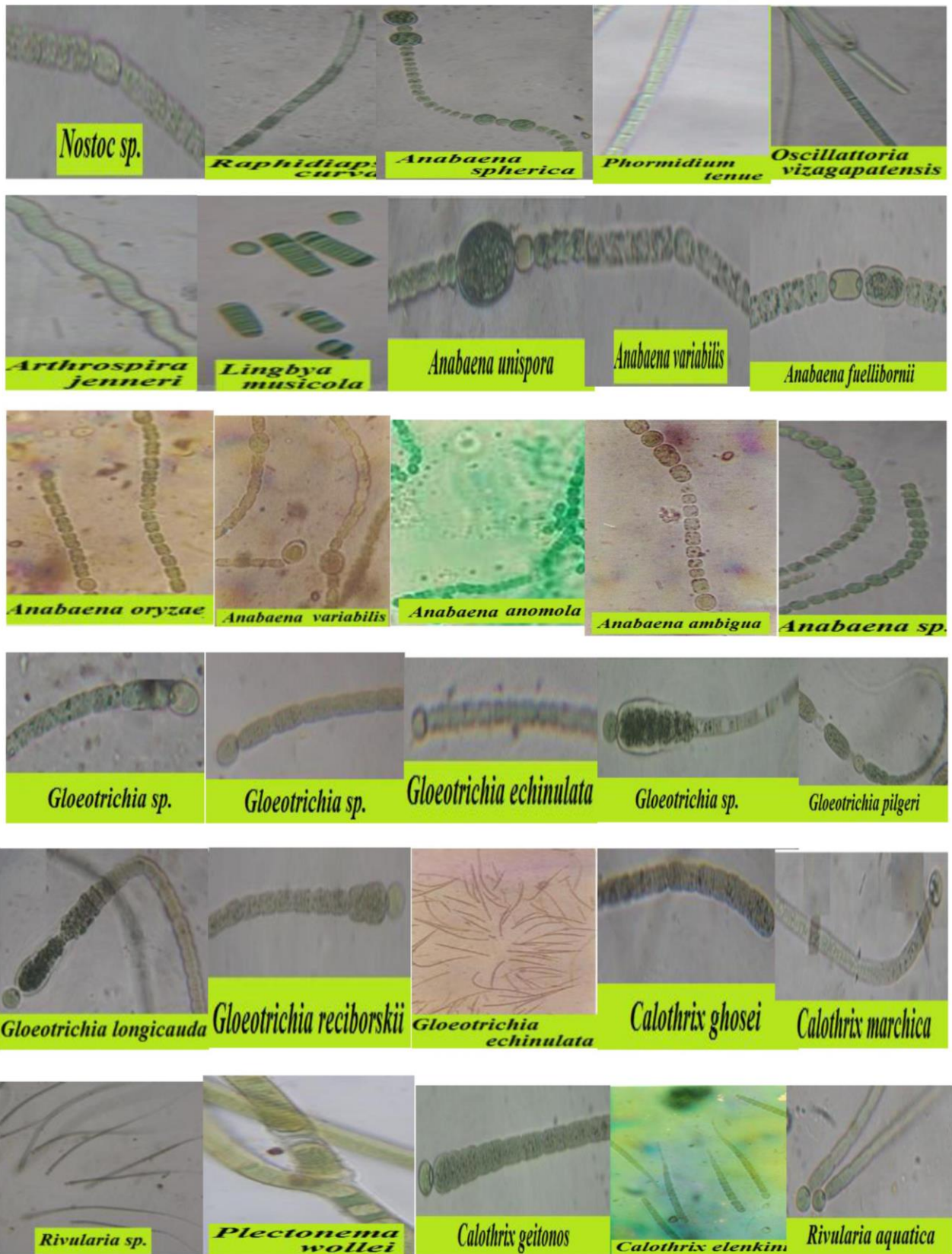
  
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# Cyanobacterial Isolates from water bodies of Durg and Rajnandgaon Districts of Chhattisgarh

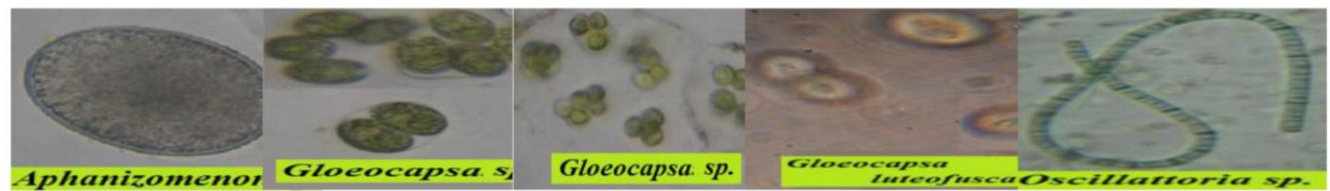
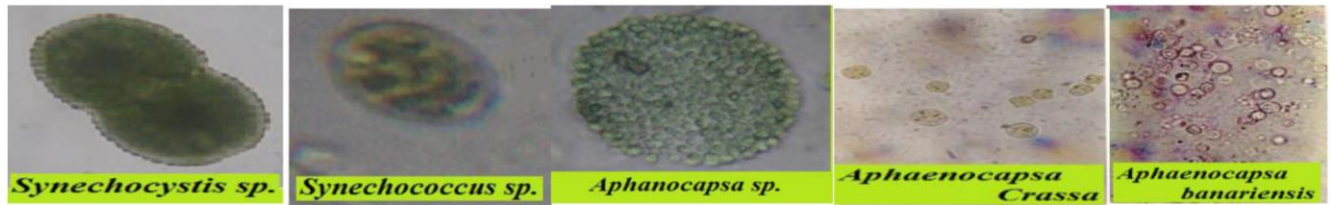


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**Table – List of Isolated Cyanobacteria**

<b>S.No.</b>	<b>Filamentous Isolates</b>	<b>S.No.</b>	<b>Single Cell/ Colonial Isolates</b>
1.	Anabaena ambigua	1.	Aphanothece sp.
2.	Anabaena anomola	2.	Aphanothece sp.
3.	Anabaena latueiji	3.	Aphanothece microscopica
4.	Anabaena mangilini	4.	Anacystis meneghini
5.	Anabaena naviculoides	5.	Anacystis nidulans
6.	Anabaena oryzae	6.	Aphanothece castagen
7.	Anabaena recta	7.	Aphanothece naegelli
8.	Anabaena sp.	8.	Aphanothece sp.
9.	Anabaena spherica	9.	Chroococcus sp.
10.	Anabaena torques regina's	10.	Chroococcus sp.
11.	Anabaena turkestanica	11.	Gleotheca linearis
12.	Anabaena unispora	12.	Gloeocapsa sp.
13.	Aphanothece sp.	13.	Gloeocapsa tuteofusca
14.	Arthrospira jenneri	14.	Gloeocapsa sp.
15.	Aulospira prolifeca	15.	Gleotheca rhodochlamys
16.	Aulospira sp.	16.	Gomphospheria aponina
17.	Calothrix castelli	17.	Microcystis ambiginosa
18.	Calothrix elenkinii	18.	Microcystis flos aquae
19.	Calothrix geitonos	19.	Microcystis robusta
20.	Calothrix ghosei	20.	Merismopedia sp.
21.	Calothrix marchica	21.	Synechococcus aquatilis
22.	Calothrix scytonemicola	22.	Synechococcus elongatus
23.	Campytonema indicum	23.	Synechocystis pevaleki
24.	Cylendrospermum indentum	24.	Synechocystis aquatilis
25.	Gloeotrichia echinulata	25.	Synechocystis aeruginosa
26.	Gloeotrichia longicauda		
27.	Gloeotrichia pilgeri		
28.	Gloeotrichia sp.		
29.	Gloeotrichia sp.		
30.	Gloeotrichia sp.		
31.	Lyngbya aeruginosa		
32.	Lyngbya birgei		
33.	Lyngbya musicola		
34.	Lyngbya shckletonia		
35.	Microcoleus lacustris		
36.	Microcoleus major		
37.	Nodularia harveyana		
38.	Nostoc calcicola		
39.	Nostoc carneum		
40.	Nostoc ellipsosporum		
41.	Nostoc hatei		
42.	Nostoc muscorum		
43.	Nostoc sp.		
44.	Nostoc sp.		
45.	Nostoc spongiaeforme		
46.	Oscillatoria acura		

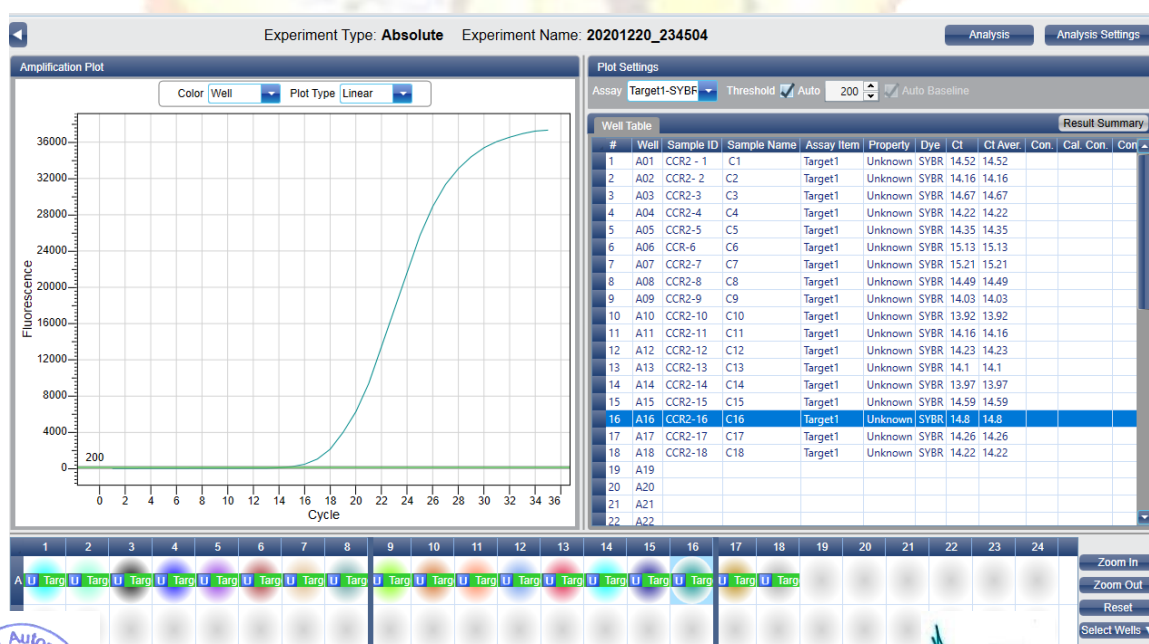


47.	<i>Oscillatoria acutissima</i>		
48.	<i>Oscillatoria animalis</i>		
49.	<i>Oscillatoria curviceps</i>		
50.	<i>Oscillatoria limosa</i>		
51.	<i>Oscillatoria principles</i>		
52.	<i>Oscillatoria proboscidea</i>		
53.	<i>Oscillatoria quadrapunculata</i>		
54.	<i>Phormidium</i> sp.		
55.	<i>Phormidium tenue</i>		
56.	<i>Plectonema wollei</i>		
57.	<i>Raphidiaopsis curveta</i>		
58.	<i>Rivileria</i> sp.		
59.	<i>Rivuleria aquatic</i>		
60.	<i>Scytonema bohmeri</i>		
61.	<i>Scytonema stuposum</i>		
62.	<i>Spirulina gigantea</i>		
63.	<i>Spirulina major</i>		
64.	<i>Tolypothrix tenuis</i>		

## 8. Between Department of Biotechnology and Zoology

The fishes fauna from polluted water are being studied by the Department of Zoology to know the survival capability of fishes in adverse condition. The Department of Biotechnology analyzing the oxidative stress (ROS) from the same fish samples to establish their antioxidant features. Besides, the GST gene polymorphism, this gene is responsible to produce antioxidant ability in fishes are being studied by the Department

**Table – List of Isolated Cyanobacteria**



**Figure – Showing RT-PCR graph of various sample**



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## 9. Between Department of Biotechnology & Sociology

Under Societal programme, the Department of Biotechnology analyzing frequency of Sickle Cell Anemia and Glucose-6-Phosphate Dehydrogenase Deficiency among population of Chhattisgarh. All scientific analysis are being carried out by the Department of Biotechnology but mass awareness programme to population are being jointly organized by the Department of Sociology and Biotechnology.



**Figure – A Joint mass awareness program to villagers for genetics disease organized by Department of Biotechnology and Sociology**

## 10. Between Department of Biotechnology and Botany

The Department of Biotechnology and Botany are involved in interdisciplinary research work of two folds –

- Antifungal Study of Medicinal Plants,
- Antibacterial Study of Medicinal Plants.

The Department of Botany is performing taxonomic and ethno botanical work related to medicinal plants and Department of Biotechnology have performed their Phytochemical Analysis, Antifungal Study and Antimicrobial Study.

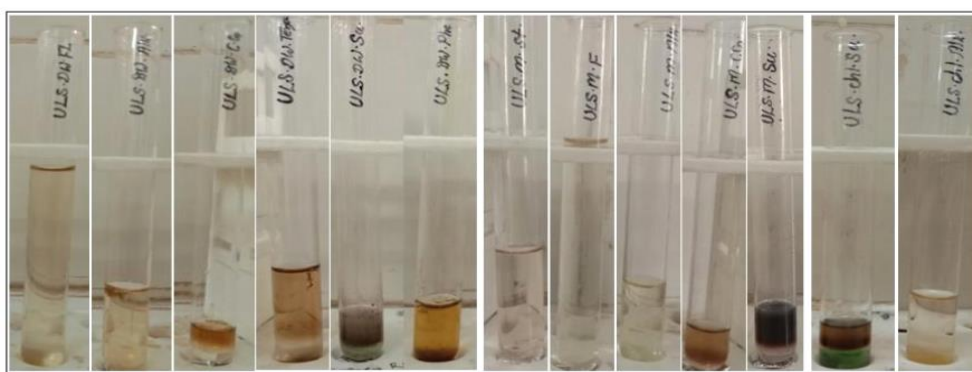


  
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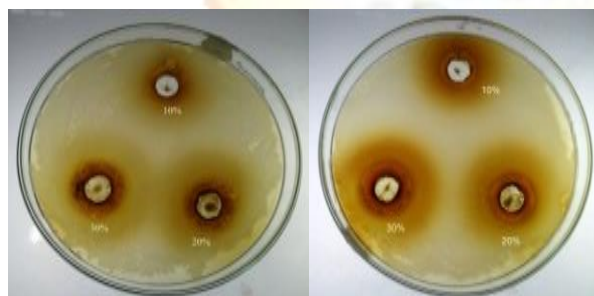
**Table 1. – Representing phytochemical group present in *Urena lobata***

Test group	Leaf extract			Stem extract			Root extract		
	D.W.	MeOH	CHCl <sub>3</sub>	D.W.	MeOH	CHCl <sub>3</sub>	D.W.	MeOH	CHCl <sub>3</sub>
<b>Tennin</b>	+	-	-	+	-	-	-	-	-
<b>Flavonoid</b>	+	+	+	-	+	-	+	-	-
<b>Steroid</b>	+	+	-	+	+	+	+	+	-
<b>Alkaloid</b>	+	-	-	-	-	-	+	-	-
<b>Saponin</b>	+	-	-	-	-	-	+	+	-
<b>Cardiac Glycoside</b>	+	+	-	+	+	-	+	+	-
<b>Terpanoid</b>	+	+		+	+	+	+	+	-
<b>Sugar</b>	+	-	-	+	+	-	+	+	-
<b>Phenol</b>	+	-		+	-	-	-	-	-

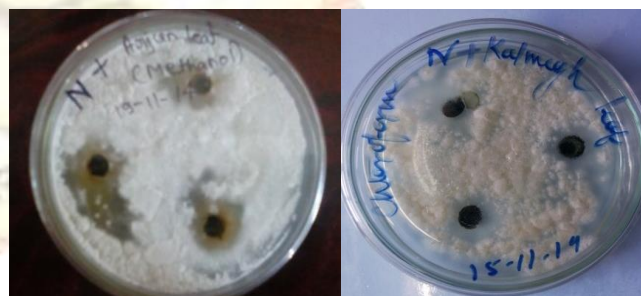
D.W. = distill water, MeOH = methanol, CHCl<sub>3</sub> = chloroform



(A)



(B)



(C)

**Figure – (A) Pictorial representation of various phytochemical group test, (B) Antibacterial Test and (C) Anti-fungal test of plant extract sample.**



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