

मिट्टी परीक्षण



क्यों

- मिट्टी के पोषक तत्व की मात्रा ज्ञात हो सके तथा आवश्यकतानुसार खेतों में उर्वरकों की मात्रा डाल सके ।
- उर्वरकों की उपयोग क्षमता में वृद्धि करना ।
- उर्वरकों की संतुलित मात्रा का उपयोग कर आर्थिक बचत करना ।

नमूना लेने की विधि

- खेत की स्थिति (ऊँची, नीची, समतल, ढलान) एवं मिट्टी के किस्म के अनुसार बाटे ।
- एक एकड़ के क्षेत्र में 6 से 8 स्थानों से नमूना 6 से 9 इंच की गहराई से लें ।
- नमूना स्थान से घास फूस साफ कर लें, खुरपी या फावड़े की सहायता से व्ही (V) आकार का 15 से.मी. गहरा गड्ढा करें ।
- नमूना लेते समय पानी के बंधान, नाले के पास, मेढ़ नालिया, पेड़, खाद गड्ढे के पास से नमूना न लें ।
- व्ही (V) आकार से प्राप्त मिट्टी को अच्छी तरह मिला कर उसमें से एक मुट्टी साफ बर्तन में रखें ।
- इस प्रकार प्रत्येक गड्ढों से प्राप्त 1-1 मुट्टी मिट्टी को अच्छी तरह से मिला कर चित्रानुसार भाग (अ एवं ब) को लेकर फिर मिलायें । इसके पश्चात् भाग (क एवं ग) को थैली में भरें ।
- यदि मिट्टी में नमी हो तो उसे छाया में सुखाकर साफ थैली में भरें ।
- थैली के साथ सूचना पत्र (किसान का नाम, खसरा नं., खेत की पहचान, पता नमूना, दिनांक जमीन की स्थिति, मिट्टी का प्रकार, लगाई जाने वाली फसल का नाम, गत वर्ष ली गई फसल का नाम एवं उपयोग की गई खाद/उर्वरक की मात्रा) स्पष्ट लिखकर रखें ।
- क्षेत्रीय ग्रामीण कृषि वि. अधिकारी के माध्यम से एकत्रित नमूने को निकटतम मिट्टी परीक्षण प्रयोगशाला भेजें तथा प्राप्त परिणाम के अनुरूप अनुशंसित मात्रा में उर्वरक का उपयोग करें ।



मिट्टी परीक्षण जिसने कराया ।
वह उन्नत किसान कहलाया ॥



उप संचालक कृषि, कृषि विभाग, जिला - जांजगीर-चापा (छ.ग.)



छत्तीसगढ़ शासन

कृषि विभाग, जिला जांजगीर (चापा)-495668

फोन नं. : 07817-222282

मिट्टी परीक्षण प्रयोगशाला



मृदा स्वास्थ्य पत्रक

कृषक का नाम शाखडीय ली. सी. शुभ.

मिस्त्र का नाम कालेज जांजगीर

ग्राम खोखरा पो.अ. विकासखंड नवागढ़

तहसील जांजगीर जिला जांजगीर-चापा

नमूना लेने की तिथि 18/3/2021 पंजीयन क्र. T.C. - 1

खसरा क्रमांक 170/2 प.ह.न.

अक्षांश..... रेखांश.....

भूमि का स्थायी नाम भोठा सिंचित/असिंचित

नमूना प्रक्षेत्र का क्षेत्रफल..... कुल रकबा 1.619 हे.

सबके साथ, सबका विकास


मिट्टी परीक्षण परिणाम एवं मिट्टी का मूल्यांकन

विवरण	परीक्षण	स्तर का विवरण	
पी एच	5.5	5.5 से कम	अति अम्लीय
		5.5 से 6.5	मध्यम अम्लीय
		6.5 से 7.5	उदासीन
		7.5 से 8.5	कम क्षारीय
		8.5 से अधिक	क्षारीय
विद्युत चालकता (डे.सा/मी.)	0.5	1.0 से कम	सामान्य
		1.0 से 2.0	अल्प लवणीय
		2.0 से 3.0	मध्यम लवणीय
		3.0 से अधिक	अति लवणीय
उपलब्ध नत्रजन (किलो/हे.)	175.62	280 से कम	निम्न
		280 से 560	मध्यम
		260 से अधिक	उच्च
उपलब्ध स्फुर (किलो/हे.)	12	12 से कम	निम्न
		12 से 24	मध्यम
		24 से अधिक	उच्च
उपलब्ध पोटैस (किलो/हे.)	159	135 से कम	निम्न
		135-335	मध्यम
		335 से अधिक	उच्च
सल्फर (किलो/हे.)	15	22 से कम	निम्न
		22 से 35	अधिक
		35 से अधिक	उच्च
सूक्ष्म पोषक तत्व		क्रांतिक स्तर	
जिंक (मि.ग्रा./कि.ग्रा.)	0.65	0.6 से कम	
काँपर (मि.ग्रा./कि.ग्रा.)	0.76	0.2 से कम	
आयरन(मि.ग्रा./कि.ग्रा.)	13.20	4.5 से कम	
मैंगनीन(मि.ग्रा./कि.ग्रा.)	19.24	3.5 से कम	
बोरान (मि.ग्रा./कि.ग्रा.)	2	0.5 से कम	
मालिब्डेनम(मि.ग्रा./कि.ग्रा.)	-	0.2 से कम	

क्रांतिक स्तर से सूक्ष्म पोषक तत्वों की मात्रा कम होने पर संबंधित तत्व की अनुशंसा आवश्यक रूप से की जाती है।
नोट: लक्षित उपज एवं अनुशंसित पोषक तत्व के साथ साथ कीट रोग, नौदा नियंत्रण एवं पानी प्रबंधन पर निर्भर है।

मिट्टी परीक्षण परिणाम आधारित उर्वरक सिफारिश (कि.ग्रा./एकड़)

फसल का नाम एवं किस्म	उपज लक्ष्य (किं./एकड़)	सिफारिश पोषक तत्व		उर्वरक उपयोग		प्राप्त उपज किं./एकड़
		तत्व	मात्रा (कि.ग्रा./हेक्टर)	उर्वरक	मात्रा (कि.ग्रा./हेक्टर)	
		नत्रजन				
		स्फुर				
		पोटाश				
		सल्फर				
		जिंक				
		घूना				
		काँपर				
		नत्रजन				
		स्फुर				
		पोटाश				
		सल्फर				
		जिंक				
		घूना				
		काँपर				


 सहायक मिट्टी परीक्षण अधिकारी
 मिट्टी परीक्षण अधिकारी
 जलियाँ,

टीप - मिट्टी का स्वास्थ्य बनाये रखने हेतु 2 से 4 टन प्रति एकड़ गोबर की खाद अथवा हरी खाद का प्रत्येक 1-2 वर्ष के अंतराल से उपयोग करें।

मिट्टी परीक्षण



छत्तीसगढ़ शासन

कृषि विभाग, जिला जांजगीर (चाम्पा)-495668

फोन नं. : 07817-222282

मिट्टी परीक्षण प्रयोगशाला



मृदा स्वास्थ्य पत्रक

कृषक का नाम शासकीय सी.बी.एल.
 पित्त का नाम कालेज जांजगीर
 ग्राम खोखरा पो.अ. विकासखंड नवागढ़
 तहसील जांजगीर जिला जांजगीर-चाम्पा
 नमूना लेने की तिथि 18.03.2022 पंजीयन क्र. T.C.L-2
 खसरा क्रमांक 169/2 प.ह.न.
 अक्षांश..... रेखांश.....
 भूमि का स्थायी नाम भाठा सिंचित/असिंचित
 नमूना प्रक्षेत्र का क्षेत्रफल..... कुल रकबा 4.4510 हे.

क्यों

- मिट्टी के पोषक तत्व की मात्रा ज्ञात हो सके तथा आवश्यकतानुसार खेतों में उर्वरकों की मात्रा डाल सके ।
- उर्वरकों की उपयोग क्षमता में वृद्धि करना ।
- उर्वरकों की संतुलित मात्रा का उपयोग कर आर्थिक बचत करना ।

नमूना लेने की विधि

- खेत की स्थिति (ऊँची, नीची, समतल, ढलान) एवं मिट्टी के किस्म के अनुसार बाटे ।
- एक एकड़ के क्षेत्र में 6 से 8 स्थानों से नमूना 6 से 9 इंच की गहराई से लें ।
- नमूना स्थान से घास फूस साफ कर लें, खुरपी या फावड़े की सहायता से व्ही (V) आकार का 15 से.मी. गहरा गड्ढा करें ।
- नमूना लेते समय पानी के बंधान, नाले के पास, मेढ़ नालिया, पेड़, खाद गड्ढे के पास से नमूना न लेवें ।
- व्ही (V) आकार से प्राप्त मिट्टी को अच्छी तरह मिला कर उसमें से एक मुट्टी साफ बर्तन में रखें ।
- इस प्रकार प्रत्येक गड्ढों से प्राप्त 1-1 मुट्टी मिट्टी को अच्छी तरह से मिला कर चित्रानुसार भाग (अ एवं ब) को लेकर फिर मिलायें । इसके पश्चात् भाग (क एवं ग) को थैली में भरें ।
- यदि मिट्टी में नमी हो तो उसे छाया में सुखाकर साफ थैली में भरें ।
- थैली के साथ सूचना पत्र (किसान का नाम, खसरा नं., खेत की पहचान, पता नमूना, दिनांक जमीन की स्थिति, मिट्टी का प्रकार, लगाई जाने वाली फसल का नाम, गत वर्ष ली गई फसल का नाम एवं उपयोग की गई खाद/उर्वरक की मात्रा) स्पष्ट लिखकर रखें ।
- क्षेत्रीय ग्रामीण कृषि वि. अधिकारी के माध्यम से एकत्रित नमूने को निकटतम मिट्टी परीक्षण प्रयोगशाला भेजें तथा प्राप्त परिणाम के अनुरूप अनुशंसित मात्रा में उर्वरक का उपयोग करें ।



मिट्टी परीक्षण जिसने कराया ।
 वह उन्नत किसान कहलाया ॥



उप संचालक कृषि, कृषि विभाग, जिला - जांजगीर-चापा (छ.ग.)

सबके साथ, सबका विकास

मिट्टी परीक्षण परिणाम एवं मिट्टी का मूल्यांकन

BOTANICAL GARDEN NO-02 (IN FRONT OF CENTRAL LIBRARY)

विवरण	परीक्षण	पार का विवरण	
पी एच	5.2	5.5 से कम	अति अम्लीय
		5.5 से 6.5	मध्यम अम्लीय
		6.5 से 7.5	उदासीन
		7.5 से 8.5	कम क्षारीय
		8.5 से अधिक	क्षारीय
विद्युत चालकता (डे.सा/मी.)	0.6	1.0 से कम	सामान्य
		1.0 से 2.0	अल्प लवणीय
		2.0 से 3.0	मध्यम लवणीय
		3.0 से अधिक	अति लवणीय
उपलब्ध नत्रजन (किलो/हे.)	150.53	280 से कम	निम्न
		280 से 560	मध्यम
		260 से अधिक	उच्च
उपलब्ध स्फुर (किलो/हे.)	10	12 से कम	निम्न
		12 से 24	मध्यम
		24 से अधिक	उच्च
उपलब्ध पोटस (किलो/हे.)	165	135 से कम	निम्न
		135-335	मध्यम
		335 से अधिक	उच्च
सल्फर (किलो/हे.)	14	22 से कम	निम्न
		22 से 35	अधिक
		35 से अधिक	उच्च

सूक्ष्म पोषक तत्व		क्रांतिक स्तर
जिंक (मि.ग्रा./कि.ग्रा.)	0.4	0.6 से कम
काँपर (मि.ग्रा./कि.ग्रा.)	1.5	0.2 से कम
आयरन (मि.ग्रा./कि.ग्रा.)	18.24	4.5 से कम
मैंगनीज (मि.ग्रा./कि.ग्रा.)	15.03	3.5 से कम
बोरान (मि.ग्रा./कि.ग्रा.)	2	0.5 से कम
मालिब्डेनम (मि.ग्रा./कि.ग्रा.)	-	0.2 से कम

क्रांतिक स्तर से सूक्ष्म पोषक तत्वों की मात्रा कम होने पर संबंधित तत्व की अनुशंसा आवश्यक रूप से की जाती है।

नोट: लक्षित उपज एवं अनुशंसित पोषक तत्व के साथ साथ कीट रोग, नैदा नियंत्रण एवं पानी प्रबंधन पर निर्भर है।

मिट्टी परीक्षण परिणाम आधारित उर्वरक सिफारिश (कि.ग्रा./एकड़)

फसल का नाम एवं किस्म	उपज लक्ष्य (किं./एकड़)	सिफारिश पोषक तत्व		उर्वरक उपयोग		प्राप्त उपज किं./एकड़
		तत्व	मात्रा (कि.ग्रा./हेक्टर)	उर्वरक	मात्रा (कि.ग्रा./हेक्टर)	
नम्रजन स्फुर पोटाश सल्फर जिंक चूना काँपर नम्रजन स्फुर पोटाश सल्फर जिंक चूना काँपर		नम्रजन				
		स्फुर				
		पोटाश				
		सल्फर				
		जिंक				
		चूना				
		काँपर				
		नम्रजन				
		स्फुर				
		पोटाश				
सल्फर						
जिंक						
चूना						
काँपर						

सहायक मिट्टी परीक्षण अधिकारी, जिला, जयपुर
 जिला, जयपुर
 जयपुर

टीप - मिट्टी का स्वास्थ्य बनाये रखने हेतु 2 से 4 टन प्रति एकड़ गोबर की खाद अथवा हरी खाद का प्रत्येक 1-2 वर्ष के अंतराल से उपयोग करें।

Govt. T.C.L. PG College, Janjgir

Distt. – Janjgir-Champa (C.G.)



Green Audit Report



Table of contents

S. No.	Topic	Page No.
1	Executive summary	1
2	Introduction	2
3	Objectives of green audit	4
4	Target areas of green auditing	5
5	Methodology adopted	9
6	Green Audit Report	9
7	Suggestions and Recommendations	12

Executive Summary

Eco campus is a concept implemented in many educational institutions, all over the world to make them sustainable because of their mass resource utilization and waste discharge in to the environment. Waste minimization plans for the educational institute are now mandatory to maintain the cleanliness of the campus.

Govt. T.C.L. PG College has its own green campus, with a huge land covering of 15 acres with different good sustainable practices. The green auditing of the college, enables to assess the life style, action and its impact on the environment. This is the first attempt to conduct green auditing of this college campus. This audit was mainly focused on greening indicators like quality of soil and water, vegetation, waste management practices and carbon foot print of the campus etc. Extra efforts have been taken by the college to create environmental consciousness among students. One major step in this regard is the extensive plantation program organized by NSS and NCC.

Initially a questionnaire survey was conducted to know about the existing resources of the campus and resource consumption pattern of the students and staffs in the college. In order to assess the quality of water and soil, water and soil samples were collected from different locations of the college campus and analyzed for its parameters. Collected data was grouped, tabulated and analyzed.

Finally a report pertaining to environmental management plan with strength, weaknesses and suggestions on the environmental issue of campus are documented.



Introduction

About College

The fundamental aim of the college is to impart sound learning to young students under circumstances congenial to their all-round development. It encourages the students to aim at excellence not only in academic pursuits, but also in every aspect of human endeavor to achieve perfection. The students are prompted to strive for academic excellence so that in course of time they may take up suitable careers for the betterment of their lives and also of their families and society at large. The various co-curricular activities of the college especially the extension programmes provide them with a rare social consciousness that motivates them to reach out to their fellowmen particularly the needy and the marginalized one.

The College has a green campus of 15 acres with a main building including 03 Hall, 06 Laboratories, One library, Office, Principle's chamber, Girl's common room, 21 Class rooms, One girl's hostel, Indoor stadium and Play ground.

Vision Statement of the College

‘The perfect human nobly planned’.

To create self-reliant and liberated human with traditional cultural values and moral integrity, who will be agents of social transformation in their families and society.

Mission Statement of the College

To equip our students with deep knowledge and globally acceptable skills.

To develop values of self-respect, tolerance, discipline, hard work and patriotism. To promote learning that will serve the regional youth by providing them easy access to higher education and job opportunities.

Courses offered by the College

Under Graduate Programme

Sl. No.	Subject Group	No. of Seats
1	B.Sc. (Bio)	220
2	B.Sc. (Math)	210
3	B.A.	250
4	B.Com.	80
5	LLB (3Yrs)	220
6	DCA	60
7	Add-on course I, II, III- Electronics, Computer Application, Industrial Chemistry, Clinical Pathology	25-25

Post-Graduation Programme

College is offering PG courses in 16 disciplines. College also offers Job oriented Postgraduate Course PGDCA.

Sl. No.	Subject	Combinations	No. of Seats
1	M.Sc.	Chemistry	30
2		Math	35
3		Physics	35
4		Zoology	30
5		Botany	20
6		Microbiology	10
7		Biotechnology	10
8	M.A.	Hindi	60
9		Sociology	60
10		Political Science	60
11		History	60
12		English	60
13		Economics	60
14		Philosophy	20
15	M.Com.		40
16	LLM		20
17	PGDCA		60

The student and faculty strength of the college is listed below:

No. of students	2609
No. of teachers	38
No. of Non-teaching staff	17
Total	2664

Physical Structure

Departments	20
Laborateries	6
Hall	3
Classrooms	21
Auditorium	01

The college is located in about 15 acres of land.

The built-up area of the college is approx. 6 acres.

Objectives of Green Audit

The main objectives of this green audit is to assess the environmental quality and the management strategies being implemented in this college.

The specific objectives are:

1. To assess the quality of the water and soil in the college.
2. To quantify the liquid and solid waste generation and management plans in the campus.
3. To assess the carbon foot print of the college.
4. To assess whether the measures implemented by the college have helped to reduce the carbon footprint.
5. To impart environment management plans to the college.
6. Providing a database for corrective actions and future plans.
7. To assess whether extracurricular activities of the Institution support the collection, recovery, reuse and recycling of solid wastes.
8. To identify the gap areas and suggest recommendations to improve the Green Campus status of the college.

TARGET AREAS OF GREEN AUDITING

Green audit forms part of a resource management process. Although they are individual events, the real value of green audit is the fact that they are carried out, at defined intervals, and their results can illustrate improvement or change over time. Eco-campus concept mainly focuses on the efficient use of energy and water; minimize waste generation or pollution and also economic efficiency.

In this auditing we have focused on reduction of contribution to emissions, procure a cost effective and secure supply of energy, encourage and enhance energy use conservation, reduce energy and water consumption and reduce wastes. Target areas included in this auditing are water, waste, green campus and carbon footprint.

Auditing for Water Management

Water is a precious resource, and although it flows freely from the tap, it's not infinite. As major institutions, colleges are serious users of water. Groundwater depletion and water contamination are taking place at an alarming rate. Providing safe drinking water is a challenge for twenty first sanctuaries. Hence it is essential to examine the quality and usage of water in the college. Water auditing is conducted for the evaluation of facilities of raw water intake and determining the facilities for water treatment and reuse. All the taps are routinely monitored to trace if any leakage is there. Drought tolerant plants like *Oleander*, *Calotropis* have been put in place. Coolers and others equipments using once-through water cooling systems are being replaced with ones that reuse cooled water, saving not only water, but electricity and gas as well. More recently college have opted for smart irrigation system that watering during the evening or early morning hours, save evaporation as well as overspray.

Auditing for waste management

Waste is defined as unwanted and unusable material and is regarded as a substance which is of no use. The waste is categorized into three types-biodegradable, non-biodegradable and hazardous waste. Biodegradable waste are the wastes that include food remains, garden remains etc. It is also known as moist waste. These wastes decompose themselves over a period of time depending on the material. Biodegradable waste are decomposed and converted into organic matter by filling it in the compost pits. Non-biodegradable wastes include what is usually thrown away in colleges such as plastic, tins and glass bottles etc. Hazardous waste is the waste that is likely to be a threat to health or the environment like cleaning chemicals and acids. Unscientific management of these wastes such as dumping in pits or burning them may cause harmful discharge of contaminants into soil and water supplies, and produce greenhouse gases contributing to global climate change. Special attention should be given to the handling and management of hazardous waste generated in the college. Non-biodegradable waste can be utilized through recycling and reuse. Thus the minimization of solid waste is essential to a

sustainable college. The auditor diagnoses the prevailing waste disposal policies and suggests the best way to combat the problems.

Auditing for Green Campus Management

Trees are an important part of every community. Trees contribute to their environment by providing oxygen, improving air quality, climate amelioration, conserving water, preserving soil and supporting wildlife. According to US Department of Agriculture, one acre of forest absorbs six tons of carbon dioxide and puts out four tons of oxygen. Trees, Shrubs and turf also filter air by removing dust and absorbing other pollutants like carbon dioxide, sulphur dioxide and nitrogen dioxide. Both above and below ground, trees are essential to ecosystem, in which they reside. Far reaching roots hold soil in place and fight erosion.

Routine Green Practices

Every year college celebrates World Environment Day, World Water Day, and Ozone day in the campus. The main focus of these programmes was to provide awareness to the students about the importance of the environment, its conservation and sustainable use of environmental resources. The programmes are conducted through seminars, poster presentation, debates etc.

Students and staff are actively engaged in plantation events. List of the plant of the college campus are given below.....

S. No.	Botanical Name	Common Name	Family	Number
1	<i>Acalypha wilkesiana</i>	Copperleaf	Euphorbiaceae	03
2	<i>Albizia lebeck</i>	Siris	Mimosaceae	01
3	<i>Anthocephalus cadamba</i>	Kadamb	Rubiaceae	01
4	<i>Azadiracta indica</i>	Neem	Meliaceae	23
5	<i>Calotropis procera</i>	Aak, Madar	Asclepiadaceae	06
6	<i>Canna sp.</i>	Keli	Cannaceae	10
7	<i>Caryota urens</i>	Fishtail palm	Arecaceae	02
8	<i>Cassia fistula</i>	Amaltas	Caesalpiaceae	6
9	<i>Cissus alata</i>	Grape ivy	Vitaceae	02
10	<i>Coleus sp.</i>	Coleus	Lamiaceae	10
11	<i>Cycas sp.</i>	Sago palm	Cycadaceae	02
12	<i>Distylium racemosum</i>	Isu tree	Hamamelidaceae	02
13	<i>Dracaena</i>	Dragon tree	Asparagaceae	02
14	<i>Dyopsis lutescens</i>	Areca palm	Arecaceae	02
15	<i>Eucalyptus citridora</i>	Safeda, Nilgiri	Myrtaceae	03
16	<i>Ficus benghalensis</i>	Bargad	Moraceae	11
17	<i>Ficus elastica</i>	Rubber Plant	Moraceae	02

18	<i>Ficus religiosa</i>	Peepal	Moraceae	17
19	<i>Hyophorbe lagenicaulis</i>	Bottle palm	Arecaceae	01
20	<i>Hibiscus rosa-sinensis</i>	Gurhal	Malvaceae	05
21	<i>Ixora coccinea</i>	Rugmini	Rubiaceae	01
22	<i>Juniperus sp</i>	Juniper	Cupressaceae	02
23	<i>Lantana camara</i>	Putrus	Verbenaceae	03
24	<i>Leucaena leucocephala</i>	Wild Tamarind, Subabul	Mimosaceae	10
25	<i>Millingtonia hortensis</i>	Neem Chameli, Akash Chameli	Bignoniaceae	02
26	<i>Murraya paniculata</i>	Kamini	Rutaceae	10
27	<i>Mussaenda luteola</i>	Bedina	Rubiaceae	01
28	<i>Nerium indicum</i>	Kaner	Apocyanaceae	13
29	<i>Nerium oleander</i>	Kaner, Oleander	Apocynaceae	01
30	<i>Nyctanthes orbor-tristis</i>	Parijat	Oleaceae	01
31	<i>Peltophorum pterocarpum</i>	Yellow Flame	Fabaceae	10
32	<i>Pinus sp.</i>	Chir	Pinaceae	02
33	<i>Plumeria rubra</i>	Champa	Apocyanaceae	04
34	<i>Polyalthia longifolia</i>	Ashoka	Annonaceae	02
35	<i>Polyscias scutellaria</i>	Plum aralia	Araliaceae	01
36	<i>Pongamia pinnata</i>	Karanj	Fabaceae	71
37	<i>Psidium guajava</i>	Amrood	Myrtaceae	01
38	<i>Quisqualis indica</i>	Rangoon creeper, Madhu Malti	Combretaceae	01
39	<i>Saraca indica</i>	Ashoka	Caesalpinaceae	10
40	<i>Tecoma stans</i>	Yellow bells	Bignoniaceae	03
41	<i>Tectona grandis</i>	Teak, Sagaun	Verbinaceae	10
42	<i>Terminalia arjuna</i>	Arjun, Kauha	Combretaceae	05
43	<i>Tridescantia sp.</i>	Spiderwort	Commelinaceae	03
44	<i>Turnera ulmifolia</i>	Yellow alder	Passifloraceae	03
45	<i>Wodyetia bifurcata</i>	Foxtail palm	Arecaceae	02



Auditing for Carbon Footprint

Carbon footprint is the total amount of greenhouse gases that are generated by our actions. Globally the average carbon footprint for a person is closer to 4 tons. To have the best chance of avoiding a 2° rise in global temperatures, the global carbon footprint per year need to drop under 2 tons by 2050. Lowering individual carbon footprints does not happen overnight. By making small changes to our actions, we can start making a big difference. The release of carbon dioxide gas into the Earth's atmosphere through human activities is commonly known as carbon emissions. Vehicular emission is the main source of carbon emission in the campus, hence to assess the method of transportation that is practiced in the college is important. Most of the students in our college prefer bicycles as a mean of transportation. The four wheelers get pollution certificates from the proper agency.

METHODOLOGY ADOPTED

The methodology adopted to conduct the Green Audit of the Institution had the following components. The team visits all the areas fortnightly taking care of the proper planning and implementation. The key focus of the visit was on assessing the status of the green cover of the

Institution, their waste management practices and energy conservation strategies etc. The college has been constantly engaged in efforts to reduce its carbon footprints. The centric location of college promotes the use of public transportation by the faculty and students.

The sample collection (water, soil) was carried out during the visits. The water samples from bore and tap water sources and soil samples from two different places of the campus was collected. The sample collection, preservation, and analysis were done in the scientific manner as prescribed by the standard procedures.

Green Audit Report

Water Quality Assessment

Water samples from four different locations were collected and analyzed for its quality parameters. The samples include two bore and two drinking water sources which are the main water source of the college. The samples were collected and analyzed for its various parameters. The different parameters analyzed include dissolved oxygen, acidity, alkalinity, hardness, pH, conductivity, total dissolved solid and salinity. The results were presented in the table 1. The results are comparable with the values of drinking water standards prescribed by different agencies.

Table1. Result of water quality Test

Parameter	Bore 1	Bore 2	Drinking Water Source 1	Drinking Water Source 2
Dissolved Oxygen (mg/l)	6.70	6.3	6.8	6.85
Acidity (mg/l)	45	25	19.25	23.39
Alkalinity (mg/l)	17	22	18	19
Hardness (Total)	NIL	NIL	NIL	NIL
Conductivity (µs)	144.2	98.5	119	133.2
pH	4.8	5.01	5.02	5.6
Total Dissolved Solids (ppm)	101	72	91	88
Salinity (ppt)	0.096	0.065	0.114	0.068
Total coliform	NIL	NIL	NIL	NIL
Fecal coliform	NIL	NIL	NIL	NIL

Soil Quality Assessment

Soil samples were collected from two different locations of the campus and analysed for the basic parameters. The results are tabulated and presented in the table 2.

Table 2. Result of Soil Quality Test

Parameter		Location 1 (Botanical Garden, In front of main building)	Location 2 (Botanical Garden, In front of Central Library)
pH		5.5	5.2
Electrical Conductivity (dc/m)		0.5	0.6
Nitrogen(kg/h)		175.62	150.53
Phosphorus (kg/h)		12	10
Potassium(kg/h)		159	165
Sulphure(kg/h)		15	14
Micronutrients (mg/kg)	Zn	0.65	0.4
	Cu	0.76	1.5
	Fe	13.20	18.24
	Mn	19.24	15.03
	Bo	2	2
	Mo	NIL	NIL

Courtsey: Soil Testing Laboratory, Department of Agriculture, Govt. of Chhattisgarh, Janjgir, District- Janjgir-Champa, Phone No. 07817-222282

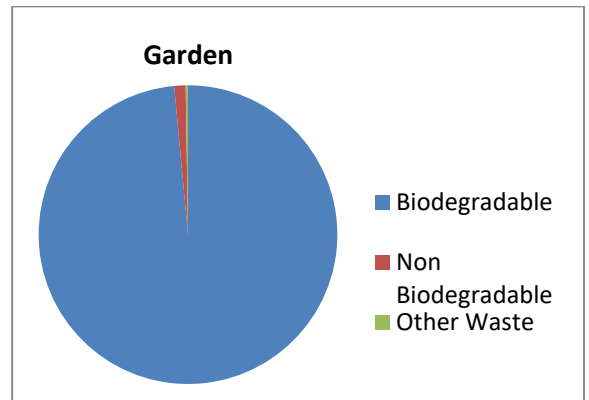
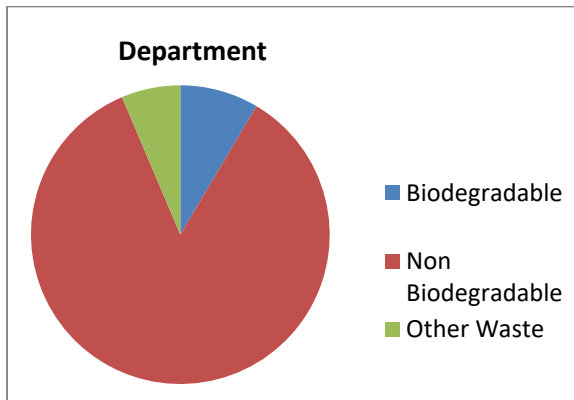
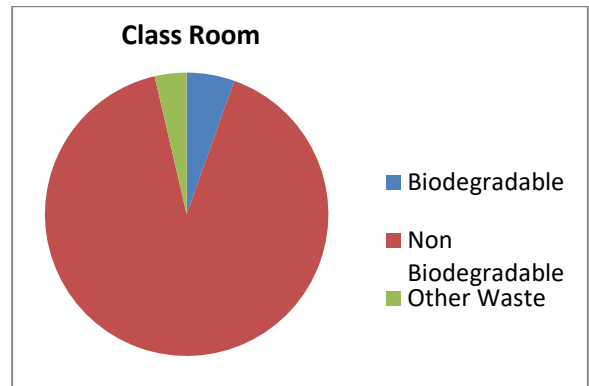
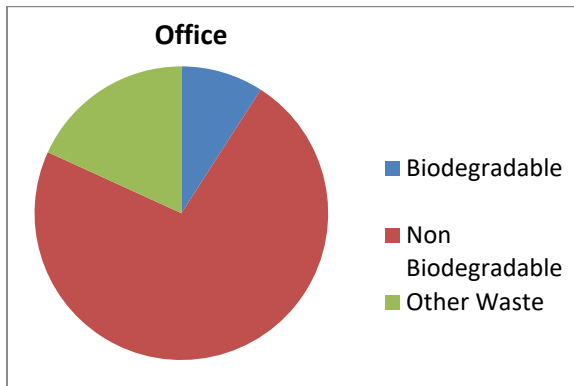
Waste Management

For the last few years, college is following zero organic waste protocol throughout the campus. The food waste generated by the students and staffs are taken by them to their own home, so that, minimum waste is generated inside the campus. Vegetable waste and other plant litters were used to fed in the compost pit and the resulting compost is used as manure in the garden. The chemicals from the laboratories are disposed in a sealed tank along with water, so that they undergo neutralization with the water. Waste management is important for an eco-friendly campus. In a college different types of wastes are generated. Its collection and management are very challenging. The following data provided the details of the waste generated and the disposal method adopted by the college.

Different types of waste generated in the college and their disposal

Types of waste	Particulars	Disposal Methods
Waste Water	Laboratory, Washrooms	Soak pits
Plastic waste	Plastic water bottles, Pen, and wrappers	Direct selling
Solid Wastes	Paper wastes, damaged furniture	Reuse after maintenance
e waste	Computers, electrical and electronics parts	By following the procedure of Govt. of Chhattisgarh for disposal and recycling
Glass waste	Broken glass from Laboratories	Direct selling

Per day waste generation in office, class rooms, departments and garden



Suggestions and Recommendations

Water Management

The students are taking back the food waste as per the zero waste strategy of the college. It helped in reducing the consumption of water for washing. There is the need for a rain water harvesting system that collect and store rainwater for multiple uses. The rain water from harvesting tank can be used as source water as well as coolant for the distillation unit. Water cooler should be cleaned regularly to avoid any type of contamination.

Green Campus

In order to increase the greenery it is recommended to plant more trees in the campus. There is a lot of ground on which plantation can be done but due to lack of protection from animals and also from people it is not easy to take care of plants for long time. Since college has no boundary, strong fences are required around the ground. There should also be provision for irrigation at every ground.

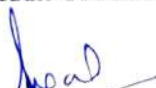
Waste Management

There should be complete ban for plastics in the campus. Number of composting pits should be increased. There should be more recycling bin for waste. Burning of wastes should be avoided as it produces carcinogens like dioxins and furans and black carbon, a short lived climate pollutant that contributes to climate change and numerous health issues. Paper recycling and reuse should be practicized, since a lot of paper become waste in the college. Recycling keeps the carbon locked up for longer and out of the atmosphere.

Name and signature of members (Green Audit Committee)



Dr. A. P. Goswami
Professor (Physics)
Govt. Bilasa Girls PG
College, Bilaspur



Dr. C. P. Nand
Asstt. Professor (Geography)
Govt. Girls College, Janjgir



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Mrs. Pratibha Chandel
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Mrs. Rashmi Sharma
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Energy Audit Report



Preface

In the contemporary scenario, Energy has been identified as a crucial and balancing factor in the indices for sustainable development. The heavy and unbalanced energy consumption adversely affects energy price and economic growth.

The Energy Conservation Act, 2001, defines Energy auditing as “the verification, monitoring and analysis of use of energy including submission of technical report containing recommendations for improving energy efficiency with cost benefit analysis .It facilitates a systematic approach to the energy management in a system, trying to balance the total energy input with its use. It identifies all the energy streams in a system and quantifies the use of energy according to its discrete functions.

Energy conservation is the effort made to reduce the consumption of energy by using less of an energy service. This can be achieved either by using energy more efficiently or by reducing the amount of service used. Energy conservation is a part of the concept of eco-sufficiency. Energy conservation measures in building/offices reduces the need for energy services and can result in increased environmental quality and higher saving.

Table of contents

1. Preface
2. Introduction
3. Objective
4. Energy Saving Measures
5. Major Findings and future plans
6. Recommendations

Introduction

About College

The fundamental aim of the college is to provide quality education, while equipping students with knowledge and skills in their chosen stream, inculcate values, identify hidden talents, provide opportunities for students to realize their full potential save them in to future leaders, entrepreneurs and above all good human beings.

The various co-curricular activities of the college especially the extension program provide them with a rare social consciousness that motivates them to reach out to their fellowmen particularly the needy and the marginalized one.

The Govt. TCL PG college was established in the year 1958. The college offers admission in various courses like BA, BSc, B.COM, LLB, LL.M, MA, M.COM, MSc, PGDCA, DCA and having post graduate in 19 subjects. The total student strength of the college more than 2500.

This audit was undertaken in order to verify how effective these steps were, and also to identify loop holes, if any, in the existing practices, along with outlining measures for enhancing energy utilization.

Objectives

The Energy Audit Manual of the Energy Management Centre, Government of Chhattisgarh, defines the primary objective of any energy audit as determining “ways to reduce energy consumption per unit of product output or to lower operating costs”. The recommendations of the study will become a basis for future schemes of better energy consumption and preservation throughout the organization.

Specific objectives of the study are:

- Verify the steps adopted for energy management in the campus.
- Spot the inefficient or inadequate practices, if any.
- Improve the energy preserving measures and methods.
- Identify potential energy saving opportunities.
- Formulate Possible steps and measures to be adopted in the campus

ENERGY SAVING MEASURE

Session 2015 -2016

Power consumption of system:

Computers have a maximum wattage on their power supply unit (PSU) which is usually well over 300 Watts. The power consumption of desktop computers ranges from 5 to 250 Watts for PCs without monitors (there are models outside of this range, but this is an average). In this session, the CRT monitors were used in the computer lab and all the system of the colleges, which were consuming more electricity. These monitors employ **CRT** technology, which was used most commonly in the manufacturing of screens. This type of monitor required more power and electronics to operate. A lot of the analog circuitry was cumbersome and took up a lot of space. In addition to that, the CRT itself requires a certain distance between the screen area and the electron guns located at the end of the neck. So apart from being heavy, bulky and harsh on our eyes, they actually have a decent viewing angle.



CRT MONITOR

Future Plans:

Since CRT monitor were consuming more electricity and also it is being heavy, bulky and harsh to our eyes, So, in the future we will try to replace the CRT monitor with LCD monitor.

Power consumption of daily appliances:

Incandescent bulbs were in use in all departments including office. An incandescent light bulb also known as an incandescent lamp is an electric light with a wire filament which produces light when current passes through it. Incandescent lighting is cheap to produce but is very inefficient, converting only 5% of the energy into light. A 60-watt incandescent bulb uses 60 watts of energy; we bill for energy in kilowatt hours which is 1,000 watts continuously for 1 hour. So, a 60-watt bulb uses 60 watts hours or 06 kilowatt hours of energy for each hour it's on. Similarly the simple ceiling fans come with speeds varying from 1 to 5 and can adjust through regulator, which were used in all the departments and office. An average size ceiling fan has rated power of 70 watts and for 12 hours of operation they consume 0.84 kWh of power which translates to less than Rs 12 in your electricity bill.





Future Plans:

Incandescent bulbs are not terribly efficient and they don't last long. A 100-watt, classic light bulb running for a full year would use up 876 kWh of energy. This means a full year of running one incandescent bulb would cost \$131.40. And we'll need to replace that bulb regularly (about 12 times over the course of the year). Hence in further session, these bulbs will be replacing by energy efficient light bulbs. In the next session we will try to arrange standard ceiling fans so that we have low power consumption.

Power consumption of laser Printer and Photocopy machine:

An average laser printer and photocopy machine can consume anywhere 300 to 550 watts of power, when it is printing. The laser printer's cartridges are more expensive. Another limitation of a laser printer is that they only really print on certain kinds of paper. If we want to print out photographs then a laser printer is not for you as they are not yet capable of printing high-resolution images.

Future Plans:

Since laser printer has so many limitations with power loss, we will try to replace this printer with new technology.

Session 2016 -2017

Power consumption of system:

In this session CRT monitor were replaced by LCD monitors. By replacing CRT monitors with LCD monitors, the power consumption was reduced. Initially, they had performance issues to do with response times, but eventually, those problems were solved. Liquid crystal molecules are placed between two electrodes. The amount of light that can pass through the liquid crystal molecules is determined by the amount of electrical charge applied to the electrodes. LCD Monitors require backlighting in order to illuminate the image for us to see. This backlighting technology has also undergone some revolutionary changes. In this session also laser printers were used.



Future Plans:

LCD uses fluorescent tubes to lighten the picture, but can't provide the clearer picture as LED delivers. It consumes less power and more reliable. But we will be still looking for better technology.

Power consumption of daily appliances:

In this session, incandescent bulbs were stepwise replaced by tube lights, which reduced the power consumption at least by 30 percent. Similarly simple ceiling fans were replaced by standard ceiling fan in all the departments including office. A standard ceiling fan without the BEE star rating has rated power of 75 watts. If we use a 75 watt fan for 12 hours it will consume 900 watt hour (75×12) of electricity. Hence if we calculate the power consumption of a 75 watt running 12 hours a day for a month (30 days) it will consume 27 kWh of electricity, which translates to a monthly electricity bill of Rs 270.



Future Plans:

In further session tube light and standard ceiling fans were replace by more energy efficient lights and fans.

Session 2017 -2018

Power consumption of system:

In this session also, LCD monitors were used, due to its less power consumption and more reliability. But LCDs are usually thicker and lack energy efficiency compared to LEDs. In this session also laser printer were used.

Future Plans:

Since LCDs are usually thicker and lack energy efficiency compared to LEDs. We will be looking further for advanced technology, such as LED which have much more energy efficiency.

Power consumption of daily appliances:

In this session tube lights were replaced by CFL. CFL lamps or compact fluorescent lights are made to make lighting more energy efficient. It started replacing the incandescent bulbs and tube lights. The power consumption of CFL ranges from 10 watts to 50 watts depending on its extraction rate. CFLs use 1/3rd to 1/5th the electrical power of incandescent lighting and can last 8 to 15 times longer. An average CFL bulb which provides 800 lumens will use only 13 to 15 watts compared to a similar incandescent bulb which uses 60 watts. Similarly some standard ceiling fans were replaced by star rated ceiling fans in some department. Higher the rating more energy efficient it is which means it will consume lesser electricity.



Future Plans:

Later a long way in energy-efficient light bulb technology will be used and in further session we will try to arrange more star rated ceiling fans.

Session 2018 -2019

In this session, Some LCD monitors were replaced by LED monitors. An LED monitors uses less power, provides a brighter display with better contrast, a thinner panel, and lesser heat dissipation than a conventional LCD monitors. So, some of the LCD were being replaced with LED monitors. In this session also laser printer were used.



Future Plans:

In further session we will try to arrange more LED monitors for our computer lab.

Power consumption of daily appliances:

In this session CFL were replaced by LED lights. LED bulbs are very energy efficient, but they still maintain the style and look of the classic incandescent bulb. The energy usage of LED lamps is much lesser than that of

CFL lamps or fluorescent lamps or incandescent bulbs. It can produce 80-100 lumens/ watts which is almost 5 times higher than lumens/ watts capacity of incandescent bulbs (16 lumens per watt). By using LED lamps we can reduce electricity usage. Moreover, LED bulbs have a life span of 25000hrs which is 50 times that of incandescent bulbs. The 5-Star rated ceiling fans consume about 70% of the electricity than the regular ceiling fans do at the highest speed. Naturally, it results in the lowering of your electricity consumption bill. So, in this session also some star rated ceiling fans were used in two or three departments. The regular ceiling fans consume 75 watts whereas the consumption of the 5-star rated fans is 50 watts. It is a definite savings of more than 30%. Some of the latest generation 5-star rated fans have a rating of 45 watts.



Future Plans:

Later the use of LED lights is being increased, Since LEDs lights are much cooler than incandescent lights, reducing the risk of combustion or burnt fingers.

Session 2019 -2020

LED is a type of LCD that actually accompanies the advancement of technology. This replaces the fluorescent tube with backlight technology, which produces a clearer picture than the LCD. LED has very long life. It requires low maintenance. LED doesn't produce heat and is highly efficient. Due to its all benefits, we still use LED monitors and in further session, we will try to arrange more LED monitors for computer lab and also for office work. The use of LED leads to the low power loss. In this session, we have multifunction printer that serves several functions, like printing, scanning and copying.



Future Plans:

In further session, we will try to arrange more functional printer for departments and also for office use. This will lead to low power loss and save more electricity.

Power consumption of daily appliances:

In this session also, Mostly LED lights were being used, which is saving 20 percent electricity further. To cool the departments and office star rated and standard ceiling fans were used. Hence energy conservation is important and beneficial for many reasons. We can save money, increase our property value, and protect the environment all through simple energy-saving measures. We are planning to install a small renewable energy system to make our own electricity, such as a solar electric system, green house effect, which reduces the electricity loads and also save our environments.



There are many ways by which we can reduce electricity use in our institutions:

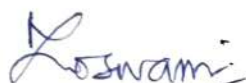
- **Appliances and electronics:** By Purchase energy-efficient products and operate them efficiently. Use an advanced power strip to reduce "vampire loads"--electricity that is wasted when electronics are not in use.
- **Lighting:** Purchase energy-efficient products, operate them efficiently, and incorporate more day lighting using energy-efficient windows and pans.

- **Electric space heating and cooling:** Purchase energy-efficient electric systems and operate them efficiently. Incorporate passive solar design concepts , which include using energy-efficient windows. Properly insulate and air seal the departments and office.. Select an energy-efficient heating system that doesn't use electricity.
- **Take advantage of smart meters:** Many electricity providers are moving to smart meters, a tool that not only makes it easier for them to take readings but helps you save money also and, can help us to figure out what appliances or habits are spiking usage during costly times of the day or increasing electricity usage overall.
- **Use the hibernation feature of computers and laptops -** Hibernate feature in laptops and desktops allows you to save your existing work as it is, and you can continue from the same point the next day. Schedule your workstation to switch to hibernate mode after working hours and during weekends.
- **Reduce Paper Wastage:** Print only when necessary. This will not only reduce paper wastage but also helps to cut the energy required to run the printer.
- **Switch off equipment when not in use:** Switch off all printers, scanners, microwaves, lights, fans during weekends or holidays. They continue to draw power even if they are plugged in. Switching them off after working hours will conserve energy and reduce your energy bill.
- **Upgrade all outdated equipment with energy star appliance:** By Replacing old lights fans and other electronic equipments with energy star ones, we can consume our electricity.
- **Consider installing solar panels:** Solar energy is free, clean and renewable source of energy. Solar panels might cost expensive initially, but that cost can be recovered within a few years if solar energy is used up to full strength. Solar panels last longer and have few maintenance problems. This will help to bring down our monthly electricity bill.
- **Plant shady trees outside the office:** Shady landscaping outside the office can protect it from intense sun during summers and chilly winds during winters. The tree and its leaves will protect the institutions from the sun's rays, and less cooling would be required.

Apart from these rain water harvesting system is used to recharge the ground level water. We will also have planned for awareness programmed in nearby villages in which teachers and students of our institution visit nearby villages and schools to popularize & promote use of renewable energy sources, especially Solar Energy. During the visits,

awareness is created about the pollution & climate change, efficient use of electrical home appliances & renewable energy utilizing devices .With the help of demonstrations, people are trained in using solar energy utilizing devices such as solar cooker, solar drier, solar lantern and solar water heaters. This will lead to one of the unique social activities of our institution.

**Name and signature of members
(Energy Audit Committee)**



Dr. A. P. Goswami
Professor (Physics)
Govt. Bilasa Girls PG
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Dr. C. P. Nand
Asstt. Professor (Geography)
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Mrs. Pratibha Chandel
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Mrs. Rashmi Sharma
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