



**R. L. TAWDE FOUNDATIONS
SAROJINI COLLEGE OF PHARMACY,
KOLHAPUR**

Clean and Green Campus Initiatives



Prepared by
Department of Environmental Science,
Shivaji University, Kolhapur- 416004

2022-23



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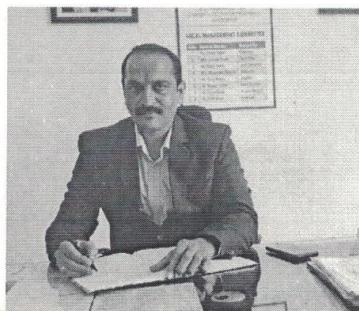


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Principal Message

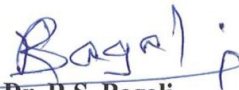
Today the universe is facing problem like global warming, deforestation. There are several aspects responsible for climate change. Safe drinking water scarcity, drought, flood are hot cake now a days. All these environmental issues are only discussed, at the global level but the true fact is that regional and local activities are responsible to make such issues global.



In the dire need to protect our planet from environmental pollution, it is the responsibility of everyone not to contribute activities which may harm the environment. College is the entity where students, faculty and staff gather every day to run teaching and learning process. This process require use of infrastructure, energy, water, chemical and support facilities. College has to look after optimum and economical use of these things. It is necessary to conserve the energy by non-traditional source also it is necessary to avoid entry of monoxide and other gaseous pollutants in the environment. Scarcity of water and its pollution are the hot topics. We must save the available water and keep it free from pollution. The waste generated through laboratories, kitchen of hostel must be properly treated and disposed off. Campus must be clean and green to have pleasant atmosphere for the teaching learning process. We must take maximum efforts towards carbon neutrality. In this direction along with plantation, origination of other of other nature related activities and creation of awareness among the peoples is necessary.

In this direction to be environmentally conscious, it is necessary that every college must undertake green audit of the premises and facilities. I am very happy to state that department of environmental science, Shivaji University Kolhapur under the guidance of green audit team and they have conducted the green audit of our college vey keenly. their suggestions are certainly helpful for us for the improvement.




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Certificate

This is to certify that the Department of Environmental Science, Shivaji University, Kolhapur has assessed detailed "Clean and Green Campus Initiatives" of "Sarojini College of Pharmacy, Rajendranagar, Kolhapur" during the academic year 2022-2023. This report was evaluated in accordance with the applicable standards prescribed by the Indian Institute of Remote Sensing, Dehradun, India, Ministry of Environment, Forest and Climate Change, New Delhi and Intergovernmental Panel on Climate Change (IPCC) and Central Pollution Control Board (CPCB), New Delhi. The report involves Solid waste generation, safe waste disposal practices, green inventory, biomass estimation, carbon sequestration potential of the campus. 'Environmental Management Plan', is also included in the report which can be followed to minimize environmental impacts. The performance of college was found to have good quality with respect to sustainable Clean and Green Practices. Even though ample amount of work can be done in this area.

The opportunities of sustainable green practices and well consideration of suggested Environmental Management Plan can make the college role model to other institutions as well. In an opinion and to the best of our information and according to the information given to us, said Clean and Green Initiatives gives a true and fair view in conformity with environmental auditing principles accepted in India.



Head

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1.1 Clean campus initiatives:

Waste management is very important issue to solve many environmental problems. It is a process of regular identification, quantification, documenting, reporting and monitoring of environmentally important components in a specified area. Through this process is the regularly monitored within and outside of the concerned sites which have direct and indirect impact on surroundings. It can be one of the initiative for such institutes to account their energy, water resource use as well as wastewater, solid waste, E-waste, hazardous waste generation.

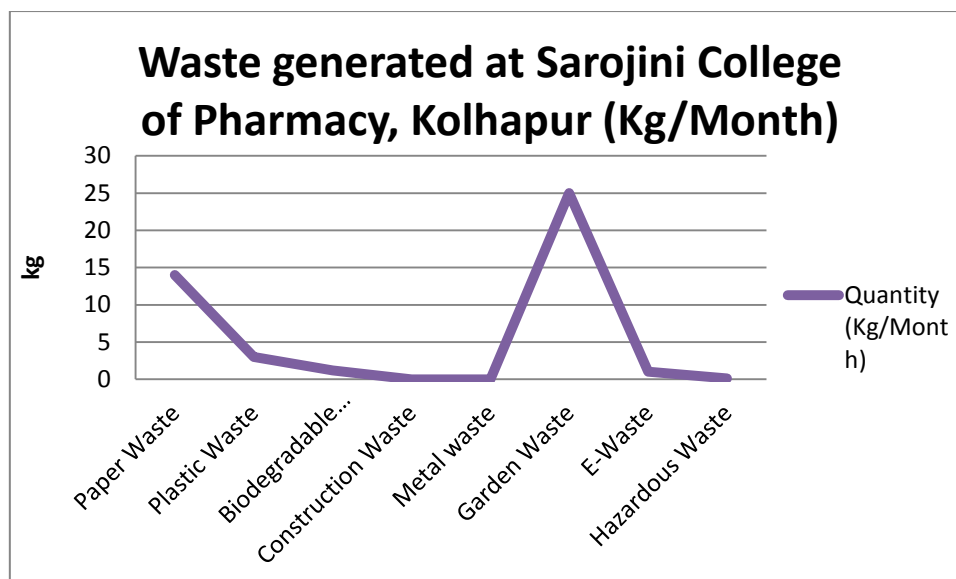
Solid waste management is a term that refers to the process of collecting and treating solid wastes. As long as people have been living in settlements, garbage and solid waste has been an issue. In recent years, it is observed that per capita waste generation has increased due to the changing life style. Improper disposal of solid waste is responsible for pollution of air, water and soil. Disposal of solid waste on open area leads to develop bad odour in the surrounding also it may develop unhygienic conditions. Improper waste disposal is root cause for spreading the infectious diseases among the human and animal. So, it is important to take some steps for the proper management of solid waste followed by reduce, reuse and recycle 3R principle. The intention of this inventory is to find out the quantity of waste generation and disposal methods which are currently followed at Sarojini College of Pharmacy, Kolhapur.

Solid waste audit of college was conducted by grouping the college into Main building and college premises. Different types of waste are generated in the college campus. Dustbins are fixed in the building which is used for collection of waste.

1.1.1 Generation of solid waste in college:

Table No.1.1.1: Category wise solid waste generation in college (kg/month)

Waste type	Paper Waste	Plastic Waste	Biodegradable Waste	Construction Waste	Metal waste	Garden Waste	E-Waste	Hazardous Waste
Quantity (Kg/Month)	14	3	1.2	0	0	25	1	0.1
Quantity (Kg/ Year)	140	30	12	0	0	250	10	1



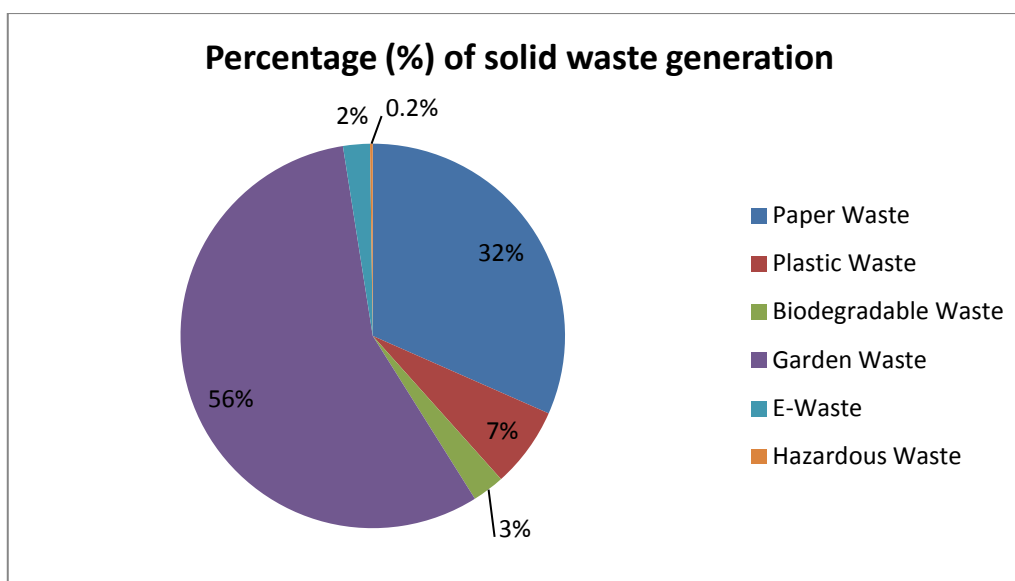
Graph No. 1.1.1: Category wise solid waste generation in college (kg/month)

The average amount of solid waste generated per month in Sarojini College of Pharmacy, Kolhapur is approximately 44.3 kg/month. On the basis of observations, the highest quantity of solid waste generated is Garden waste which is about 25 kg/month. This waste is produced because of leaf litter and other garden waste.

Besides, the above mentioned waste, plastic waste is generated in the form of plastic wrappers of food items. Approximately 14 kg/ month paper waste is generated in the institution and that is given to the vendor.

Table No. 1.1.2: Percentage of category wise solid waste in the college (kg/month)

Category	Paper Waste	Plastic Waste	Biodegradable Waste	Construction Waste	Metal waste	Garden Waste	E-Waste	Hazardous Waste
Percentage (%)	31.6	6.8	2.7	0.0	0.0	56.4	2.3	0.2



Graph No. 1.1.2: Percentage of solid waste generation in the college (kg/month)

Percentage wise distribution of different sources of solid waste is shown in the above graph. The maximum percentage of solid waste generated is of garden waste which is approximately 56 % and minimum percentage of hazardous waste generated is about 0.2 %.

1.1.3 Plastic Waste:

Table No. 1.1.3: Plastic waste generation and its distribution in the college

Category	Plastic Kg/month				Total
	Hard	Soft	Carry Bags and Water bottles	Other	
Quantity	0.5	0.8	1.4	0.3	3
Percentage	16.7	26.7	46.7	10.0	100

Plastic waste in the form of packaged food wrappers, carry bags etc. is approximately 1.4 kg/ month. Plastic wastes are difficult to dispose because it is non-biodegradable waste or it takes many years to degrade naturally. It can cause adverse impacts on environment.

1.1.4 Hazardous waste audit of the college:

Hazardous waste is waste that has substantial or potential threats to public health and environment. The sources of hazardous waste in the college are very less. Very less quantity of hazardous waste generated through Sanitary napkins. For disposal of sanitary napkins incinerator is provided in college.

1.1.5 E-waste generation in the college:

Generation of e-waste is found in every educational institute. All discarded electronic appliances are called as E-waste. This waste requires special treatment for disposal. So it is also called as special waste. It is observed that the e-waste generated at College is of Schedule II category. Computers, printers, scanners, CPU's, UPS, fused bulbs and tubes are used for administrative work. The wire required for the network connectivity and for electricity also gets included in the E-waste.

1.4 Eco-friendly solid waste management practices:

The college follows following eco-friendly solid waste management practices.

1. Paper waste recycling:

Paper waste is handed over to the vendor for recycling. This waste includes newspapers as well as office work paper.

2. Collection of waste:

For waste collection dustbins are provided wherever required on the campus, different dustbins are provided according to nature of waste such as, dry waste, wet waste and biomedical waste. In classrooms also dustbins are provided.



Figure1: Dustbins are provided for waste collection

3. Hazardous waste disposal:

For the disposal of sanitary napkins incinerator is installed in college. Total 3 incinerators are installed.



Figure 2: Incinerator

4. Composting of garden waste:

Garden waste is utilized in composting unit which is present on campus. Leaf litter mixed with cow dung and it is allowed for composting in beds. Produced compost is again used in the garden.



Figure 3: Vermicomposting unit

Key Observations:

- The average waste generated in the college is app.44.3 Kg /month
- Highest quantity of solid waste is garden waste which is around 25 Kg/month.
- Over all the waste generated in the college is handed over to Municipal Corporation.
- Paper waste is given to the vendor for recycling to Nilesh Traders.
- Cleanliness is maintained at college.
- E-waste is stored at site.
- Solid waste is disposed instead of burning it on campus.
- Incinerator is in operating condition.

2.1 Green Campus Initiatives of Sarojini College of Pharmacy, Rajendranagar, Kolhapur

Many students are working hard to persuade their administrations to act favourably because they believe that college campuses are excellent test sites for environmental change. The initiatives that are taking off are role models for society at large, and the students who are spearheading them will be bringing these lessons with them when they graduate and join the workforce. Global warming is currently the top concern among environmentally conscious students, and many of them are working together to convince their universities to update their regulations and streamline their operations so that their campuses may contribute to the solution. The environment is affected by the emission of greenhouse gases into the atmosphere as a result of the burning of fossil fuels during stakeholder transactions (such as petrol). So, planting trees inside the campus or outside the campuses by the colleges can be a great and effective way to combat all these issues namely climate change, therefore, having a green campus or creating another carbon offset site by colleges will change students as well as common peoples` attitudes towards the environment.

Sarojini College of Pharmacy, Rajendranagar, Kolhapur is situated in Kolhapur district Maharashtra at longitude 74°14'48.71"E and latitude 16°40'3.41"N the elevation of the institute from the sea level is 620 m. The Institute's campus is 1.27 acres in size.

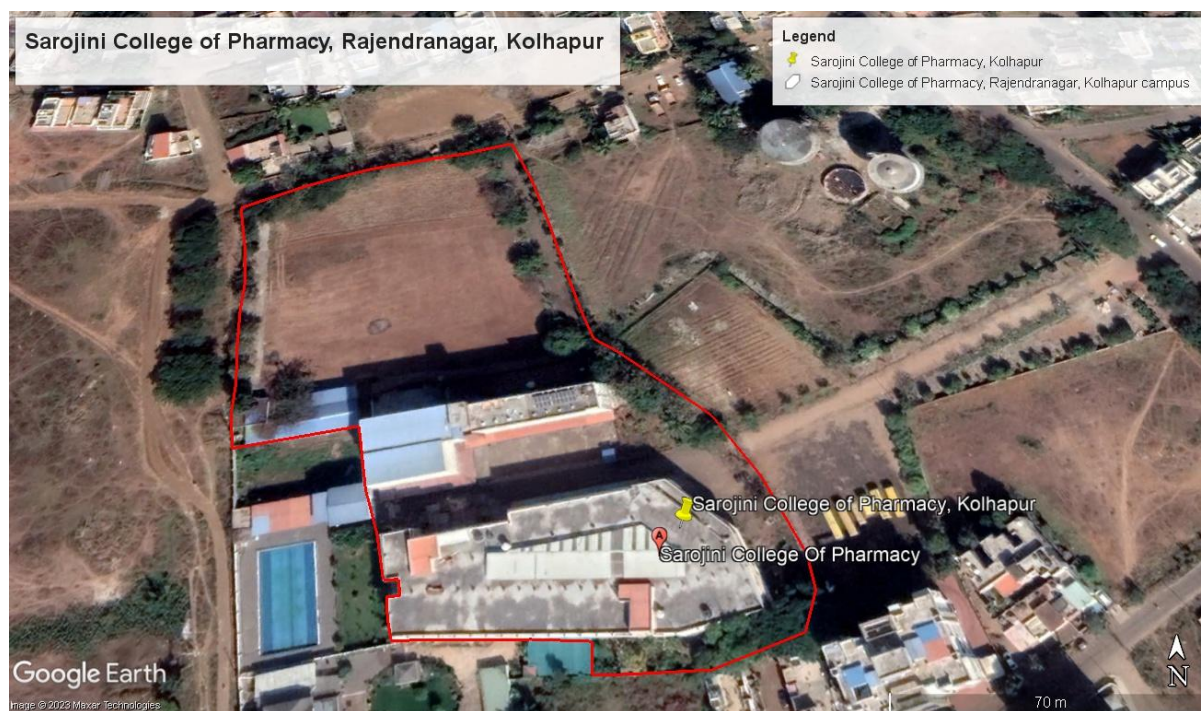


Figure 4: Google Earth Image Sarojini College of Pharmacy, Rajendranagar, Kolhapur
(Source: Google Earth)

The climate in the area is ideal for the cultivation of a wide variety of plants. A total of 104 trees were counted, each having a girth of more than 10 cm and a height of more than 4 ft. Based on data supplied by the Institution, a total of 23 species of woody trees were recognized during the visit. The campus has a higher concentration of native woody tree species, which is good for biodiversity. During the inventory, *Dypsis lutescens* and *Tectona grandis* was discovered the most on campus. Sarojini College of Pharmacy, Rajendranagar, Kolhapur has planted trees that have a better capability for carbon sequestration. The Institute took the initiative to plant native plants, which is the best way to protect the area's biodiversity.

2.1.1 Total number of trees enumerated on Sarojini College of Pharmacy, Rajendranagar, Kolhapur campus: 104

Total 104 numbers of trees with more than 10 cm girth and height more than 4 feet have been enumerated. Girth and height of every tree has been measured.

2.1.2 Total No. of species identified on Sarojini College of Pharmacy, Rajendranagar, Kolhapur campus: 23

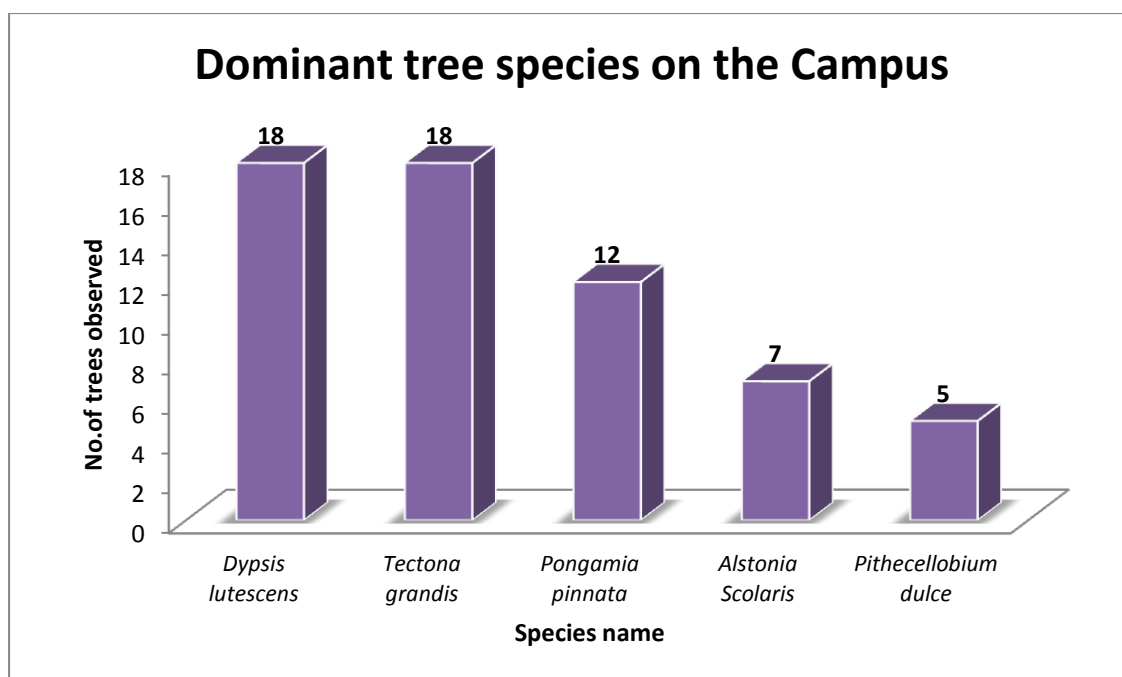
About 23 species have been identified during the census. It shows a comparatively good diversity of tree species on the campus.

2.2 Species with the highest population:

Table No.2.1: Species with the Highest Population

Sr.No.	Species name	Common Name	No. of trees observed
1	<i>Dypsis lutescens</i>	Areca palm	18
2	<i>Tectona grandis</i>	Sagwan	18
3	<i>Pongamia pinnata</i>	Karanj	12
4	<i>Alstonia Scholaris</i>	Satvin	07
5	<i>Pithecellobium dulce</i>	Vilayati Chinch	05

During the inventory, *Dypsis lutescens* and *Tectona grandis* were discovered to have the greatest population on campus, followed by *Pongamia pinnata* and *Tectona grandis*. The species *Dypsis lutescens* and *Tectona grandis*, which has a population of 18 individuals, is the most populous species on campus. The *Pongamia pinnata* contributes 12 trees on the campus. *Tectona grandis* and *Pithecellobium dulce* make a total of 12 trees and contributed with 7 and 5 trees respectively on the campus.



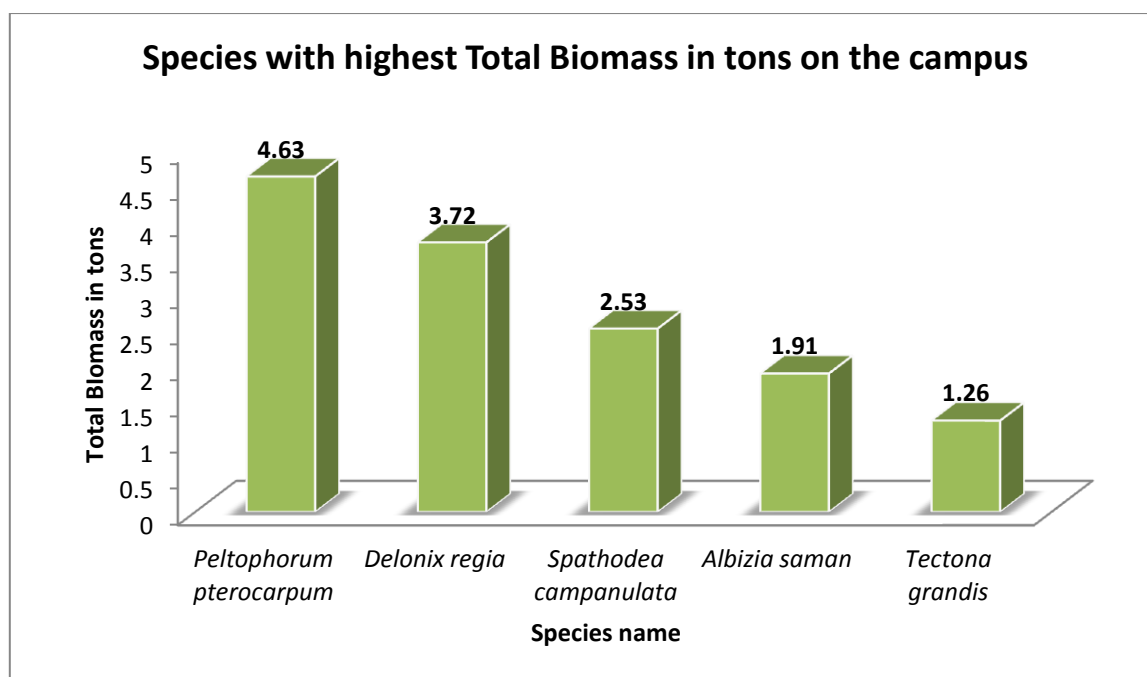
Graph No.2.1: Dominant tree species on campus

2.3 Total Biomass:

Biomass, in ecology, is the mass of living biological organisms in a given area or ecosystem at a given time. Biomass can refer to *species biomass*, which is the mass of one or more species, or to *community biomass*, which is the mass of all species in the community. It can include microorganisms, plants or animals. The mass can be expressed as the average mass per unit area, or as the total mass in the community. 22.72 tones of total biomass of woody vegetation have been recorded in Sarojini College of Pharmacy, Rajendranagar, Kolhapur campus during the current tree census.

Table No.2.2: Total biomass of trees in tons on the campus

Sr. No.	Botanical Name	Common Name	Total Biomass in tons
1	<i>Peltophorum pterocarpum</i>	Peltophorum	4.63
2	<i>Delonix regia</i>	Gulmohar	3.72
3	<i>Spathodea campanulata</i>	Pichakari	2.53
4	<i>Albizia saman</i>	Raintree	1.91
5	<i>Tectona grandis</i>	Sagwan	1.26



Graph No.2.2: Species with highest total biomass in tons on the campus

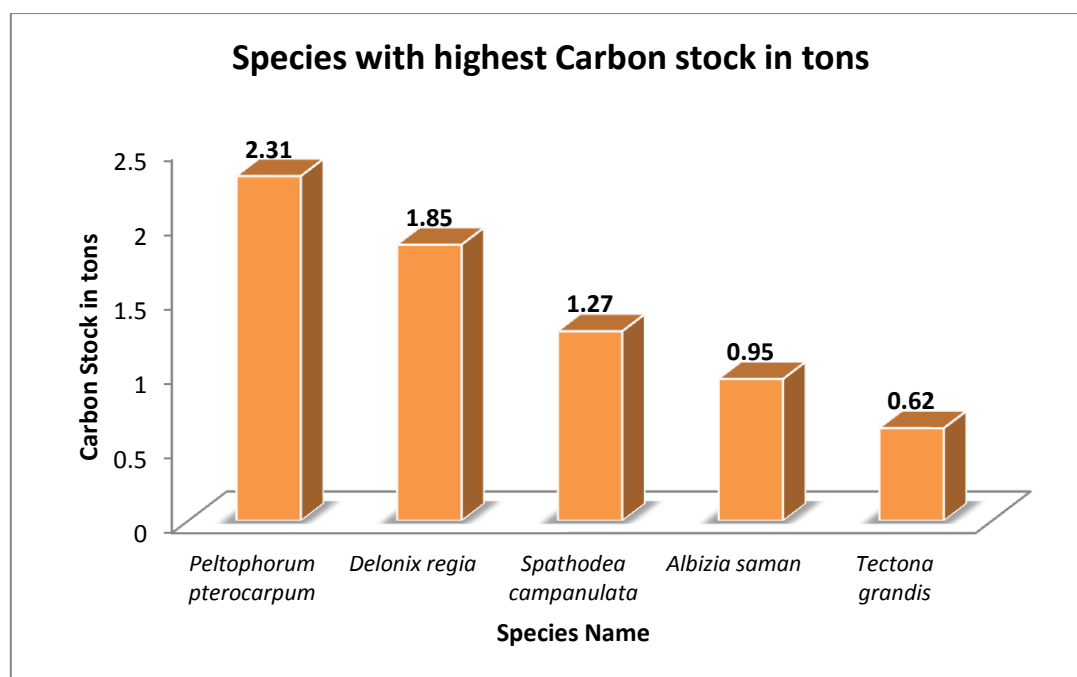
Peltophorum pterocarpum shows the highest biomass on the campus. Followed by *Delonix regia* and *Spathodea campanulata* are ranked at second and third place.

2.4 Carbon stock:

Forests and trees act as natural carbon stores, but this carbon is released when the trees are fallen and the area deforested. The amount of carbon stored within an area of land varies according to the type of vegetation cover. 11.36 tones of total carbon stock are present on the campus.

Table No.2.3: Carbon stock of trees in tons on the campus

Sr. No.	Botanical Name	Common Name	Carbon stock in tons
1	<i>Peltophorum pterocarpum</i>	Peltophorum	2.31
2	<i>Delonix regia</i>	Gulmohar	1.85
3	<i>Spathodea campanulata</i>	Pichakari	1.27
4	<i>Albizia saman</i>	Raintree	0.95
5	<i>Tectona grandis</i>	Sagwan	0.62



Graph No.2.3: Species with highest carbon stock in tons on the campus

2.5 Carbon Sequestration:

Carbon sequestration describes long-term storage of carbon dioxide or other forms of carbon to either mitigate or defer global warming and avoid dangerous climate change. It has been proposed as a way to slow the atmospheric and marine accumulation of greenhouse gases, which are released by burning fossil fuels. Vegetation carbon pool having the potential of 560 Pg (Pg: Petagram= billion ton) of carbon storage globally. In the current study the focus is given on the assessment of existing carbon stock stored Sarojini College of Pharmacy, Rajendranagar, Kolhapur campus in the form of woody vegetation by enumerating every tree species. Overall 41.70 tons of CO₂ has captured and stored by the woody plants present in the college campus. A single tree consumes 0.0218 tons of CO₂ approximately annually consequently, as the campus possess 104 mature woody plants 2.27 tons of CO₂ is consumed yearly by all woody vegetation on the college campus.

2.6 Oxygen released :

The greenery on the grounds of Sarojini College of Pharmacy, Rajendranagar, Kolhapur has liberated 111.33 tonnes of oxygen. The ratio of 32:12 between released oxygen and CO₂ sequestration indicates a direct relationship. It will therefore only release oxygen once a year. It is believed that a single tree may supply two people's needs for oxygen for the remainder of their lives. Thus, the 104 trees on the college campus provide shade for almost 208 people who live on and around the campus

2.7 List of tree species observed on campus:

Sr. No.	Name of species	Botanical Name
1	<i>Albizia saman</i>	Raintree
2	<i>Alstonia Sclaris</i>	Satwin
3	<i>Araucaria columnaris</i>	Christmas tree
4	<i>Azadirachta indica</i>	Neem
5	<i>Callistmon</i>	Bottle Brush
6	<i>Casia fistula</i>	Bahava
7	<i>Cassia siamia</i>	Kassod
8	<i>Cocos nucifera L.</i>	Coconut
9	<i>Delonix regia</i>	Gulmohar
10	<i>Dypsis lutescens</i>	Areca palm
11	<i>Ficus benamina</i>	Weeping fig
12	<i>Grevillea robusta</i>	Silver oak
13	<i>Muntingia Calabura</i>	Cherry
14	<i>Peltophorum pterocarpum</i>	Peltophorum
15	<i>Pithecellobium dulce</i>	Vilayati Chinch
16	<i>Plumeria alba</i>	Chafa
17	<i>Pongamia pinnata</i>	Karanj
18	<i>Psidium Guajava</i>	Peru
19	<i>Santalum album</i>	Chandan
20	<i>Spathodea campanulata</i>	Pichakari
21	<i>Sterculia foetida</i>	Jungli badam
22	<i>Tectona grandis</i>	Sagwan
23	<i>Terminalia catappa</i>	Badam

Key Observation:

- Institute has common campus with other school and college.



Figure 5: Common campus

- The Institute takes good initiative for green cover by planting trees on the campus as well as outside the campus.
- Well-maintained vegetation on campus.



Figure 6 :Well maintained campus

- The college have established medicinal plant garden on the campus.



Figure 7: Medicinal Plant Garden on campus

CONCLUSION

In the academic year 2022-23, Sarojini College of Pharmacy, Rajendranagar, Kolhapur had a Green Audit by the Department of Environmental Science at Shivaji University, Kolhapur. The process of discovering and evaluating whether institutional policies are sustainable and environmentally friendly is known as "green audits." The major goal of the college's green audit is to examine the green practices that are being used in the institution and to carry out a well-planned audit to determine where we stand on a scale of environmental soundness.

- **Conclusions:**

The following are some findings from the team's green audit that can be used to improve the college campus and make it more environmentally friendly:

1. The institute has made attempts to keep the campus green.
2. The campus's tree biodiversity is particularly strong.

- **Recommendations:**

The primary recommendations for enhancing the campus environment are listed below.

1. The institute needs to put up a report on flora.
2. It is possible to start drip irrigation for gardens and botanical gardens.
3. Events involving human-made fire should be avoided on campus.
4. In order to prevent fire occurrences on campus, fire lines should be getting ready.

ENVIRONMENT MANAGEMENT PLAN:

We have created an Environment Management Plan (EMP) for the Sarojini College of Pharmacy, Rajendranagar, Kolhapur, Maharashtra by comprehending the dynamics of the current scenario of resource usage and current practises of green inventory. This strategy will not only outline the advantages, disadvantages, and solutions for maintaining a green and clean campus, but it will also prioritise the areas in which the college needs to make greater environmental improvements.

Environment Management Plan 2022-23

Sector	Strengths	Weakness	Suggestions	Priority
Tree Vegetation	There is lots of space for plantation	-	Avoid monoculture, variety of species should be planted in campus area	Medium
Paper waste	Paper waste is disposed through vendor.	-	Use paper less policy	Medium
Plastic waste	-	-	Segregation of plastic waste should be done at source by using designated dustbin.	Medium
Garden waste	Garden waste is used for the composting.	-	-	High
E-waste	-	There is no authorized vendor for disposal of E-waste	E-waste should be disposed properly through authorized vendor only.	High