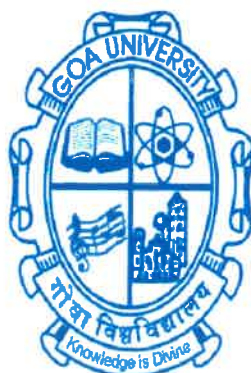


# **SBSI 2023 FINAL PROJECT REPORT**



## **Submitted by**

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## **Under the guidance of**

Dr. Aditi Naik

Assistant Professor

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Goa University

**2022-2023**

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# **DECLARATION**







We have carried out the SBSI 2023 Internship under the guidance of -

**Dr. Aditi Naik**

Assistant Professor of Botany

Goa University

The contents of this report are original and are reporting the 100 hours of work carried out by us during this internship.

NAME	ROLL NUMBER	SIGNATURE
Pranali Premanand Naik	22P0480015	
Austina Barbosa	22P0480002	
Dikshita Satyawar Naik	22P0480006	
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# CERTIFICATE

This is to certify that the following SBSI Interns:

- 1) Pranali Premanand Naik (22P0480015)
- 2) Austina Barbosa (22P0480002)
- 3) Dikshita Satyawar Naik (22P0480006)
- 4) Renuka Malgatti (22P0480010)
- 5) Mauli Yeshwant Shirodkar (22P0480011)
- 6) Nifa Colaco (22P0480018)
- 7) Rupesh Ratnakar Velip (22P0480024)
- 8) Siddhi Ramesh Naik (22P0480032)
- 9) Fedrick Joseph Vas (22P0480036)

Have satisfactorily completed 100 hours of activities related to Swachhata.


During this internship period, it was noticed that the interns acquired and enhanced the following skills -

- 1) Strong organizational skills
- 2) Time management skills
- 3) Teamwork
- 4) Leadership skills
- 5) Collaborative skills


This report is submitted to SBSI 2023 University Nodal Officer, in partial fulfilment for the completion of the SBSI course during the Academic Year 2022-2023.

  
30/05/2023  
DR. ADITI NAIK


Name and signature of SBSI Mentor

  
30/5/2023  
(B.F. Rodrigues)

Name and signature of SBSI Co-ordinator

  
10/8/2023  
(B.F. Rodrigues)

Name and signature of Head of the Department

  
Dr. Rupali Bhandari  
NAME & SIGNATURE OF  
PROGRAM DIRECTOR

## **ACKNOWLEDGEMENTS**

This internship would not have been possible without the guidance and the help of several individuals who in one way or another contributed and extended their valuable assistance in the completion of this internship programme.

We would like to express our gratitude to Goa University for including this internship program as a two credit course which has provided us an opportunity to gain practical working experience in Swachhata. We would also like to express our special thanks to Dr. Aditi Naik, our mentor, for her constant guidance and support and helping us in every way possible during the internship time. We thank Prof. Dr. Bernard F. Rodrigues for his advice and encouragement while we undertook the various projects. We extend our grateful thanks to all the faculty members and non-teaching staff of the Botany Discipline, SBSB for their support and help in every little way.

We extend our heartfelt thanks to Dr. Jyoti Pawar, Dr. Savita Kerkar and Dr. Siddhi Jalmi for their guidance and words of encouragement.

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Our special Thanks to the Village Panchayat, Carambolim and also JCI Mapusa for allowing us the opportunity to engage with the villagers and conduct the program.

We are thankful to the RFO Prakash Naik (Range Forest Officer, Quepem) for providing us with the saplings for distribution. We are also thankful to the Chemistry faculty of Goa University for allowing us to do the sapling distribution drive in the Block E. We also thank the staff of Little Flowers Kidzee Preschool, Fatorda for giving us an opportunity to engage with the students there. We thank the organizing committee of the Rosary Summer Camp at Caranzalem for giving an opportunity to engage with the children and do activities for them.

Finally, we would like to express our special thanks to our batch-mates for helping us in all aspects and appreciating us for all the activities during our internship time.

# **1. INTRODUCTION**

‘We won’t have a society if we destroy environment’ said Margaret Mead, an American cultural anthropologist. Truly the society bases its identity and existence itself on the environment it is surrounded by. Being the students of Botany Discipline and driven by the desire to conserve the environment we enrolled ourselves for this internship program so that we can contribute to the conservation of nature especially the flora. We derive abundant resources from the environment, and seldom we contemplate on this fact that nature provides for our sustenance and thus we fail to repay for its goodness. Dennis Weaver, an American actor, once said “ we don’t have to sacrifice a strong economy for a healthy environment”.

Based on these words we the SBSI Interns of Part I Botany Discipline, SBSB have moved forward to conserve the environment and help others to do the same. It is a great pleasure for us to work under the Swachh Bharat Student Internship program, which has given us an platform to physically manifest our zeal towards environmental conservation and sustainability. The above students under the mentorship of Dr. Aditi Naik have undertaken the various projects under the Swachh Bharat Student Internship program.

We named our group “Green Mutagens” with a motive to bring about a green change. The objective of our project is “To influence individuals to appreciate and value nature and aid in its conservation”(Fig.1.1). With this objective in our mind we started undertaking various projects for our internship program. Some of the major activities that we did was a mega sapling distribution drive cum sale of handmade items by young entrepreneurs at the University campus, organization of an event named “Colours of Science” on the occasion of the National Science Day on 28th February 2023 and outreach activities. These and other activities we carried out by us with great enthusiasm and support of our mentor and other faculty members (Fig.1.3)

We interacted with the masses through our Instagram account ‘green\_mutagens’ and also through our personal mobile numbers and Whatsapp (Fig.1.2). Through these social media platforms we could reach out to as many people within the scope of our projects.

## **2. FREE MEGA SAPLING DISTRIBUTION DRIVE CUM SALE OF HANDMADE ITEMS**

The free sapling distribution drive was conducted by Part I students of the Botany Discipline under the SBSI Student Internship program. *The aim of this activity was to compel people to grow plants and to enlighten them about the various benefits of plants.* It was held from 27th February to 6th March 2023. The plant saplings were provided by RFO Prakash Naik, Goa Forest Department nursery located at Quepem (Fig. 2.1). A total of 750 plants were provided by the same which included 26 types of plants ranging from categories like medicinals, ornamentals, hedge plants, fruit trees and avenue trees (Fig. 2.2) Awareness regarding the same was created through posters on social media and in different departments and schools of the Goa University. The distribution was formally inaugurated on 27th February 2023 at the Chemistry Auditorium on the occasion of the *Botanica*, an inter-college event, organized by the Botany Discipline of the School of Biological Sciences and Biotechnology. The guest faculty members who had attended the *Botanica* event were given plant saplings as tokens (Fig.2.3).

There were students from University as well as other colleges, faculty members, non-teaching staff, and locals who availed of this drive. Posters of all the different types of plants available were prepared. This included the scientific name, local name and the importance and uses of the plant (Fig.2.7). There was a great response on the first day of distribution (Fig.:2.4). The Distribution drive continued on the next day i.e. 28th February 2023, outside the Faculty and Student Enclave (Canteen). Many faculty members, non-teaching staff, students and locals came to take the plants. About 500 plant saplings were distributed and around 240 individuals availed of this opportunity. The sapling stock was exhausted by the second day. Based on demand, we were motivated to order for new stock of saplings from Forest Department Nursery, Quepem. A total of 250 plants were ordered and distributed to around 134 people on the following days, i.e. from 29th February 2023 till 6th March 2023, outside the Faculty and Student Enclave (Canteen) (Fig.2.10, 2.11). Many people also requested for saplings through our social media handle i.e. "@green\_mutagens" on Instagram (Fig.2.5, 2.9). With this drive we were able to help people grow more plants, know more about their benefits and uses, and we also created

awareness regarding the growth and maintenance of the plants with respect to the different categories they belonged. A total of 750 plants were distributed at the end of the drive. *The distribution drive was a great success and many people were sensitized about the importance of plants in our life. Many people became aware of the uses of certain plants that they were not aware as informed by the beneficiaries.* We have also requested the people who have taken the saplings to send us a picture of them taking care of the plant so that we know that the sapling has been planted and taken care of and people have heeded to this request and have kept us updated on the health of the sapling they have taken (Fig. 2.12, 2.13). *This was a great move to encourage masses to plant more trees and become aware of the benefits of various plants.* This sapling distribution drive was also paired with a sale of handmade items by young entrepreneurs (students of Botany Discipline, SBSB). Some of the items on sale were: *stone and bottle paintings, bracelets, sketches, crochet arts, key-chains, etc.*(Fig. 2.6). Many faculty members bought the items from them and appreciated them for their art. The list of the types of plants distributed is as follows:

Sr.No.	Scientific names	Local Name
1	<i>Murraya koenigii</i>	Kadipatta
2	<i>Psidium guajava</i>	Peru
3	<i>Aloe barbadensis miller</i>	Aloevera
4	<i>Bougainvillea spectabilis</i>	Bougainvillea
5	<i>Tabernaemontana divaricata</i>	Anant
6	<i>Almandia cathartica</i>	Conno
7	<i>Codiaeum variegatum</i>	Croton
8	<i>Duranta repens</i>	Duranta
9	<i>Michelia champaka</i>	Chafa
10	<i>Cassia fistula</i>	Bayo
11	<i>Bauhinia racemosa</i>	Apto
12	<i>Caesalpinia pulcherrima</i>	Shankar
13	<i>Cymbopogon citratus</i>	Ganjan
14	<i>Azadirachta indica</i>	Neem
15	<i>Garcinia indica</i>	Bhirand
16	<i>Aegle marmelos</i>	Bel
17	<i>Punica granatum</i>	Dalim
18	<i>Emblica officinalis</i>	Awla
19	<i>Santalum album</i>	Chandan
20	<i>Mesua ferrea</i>	Nag Chafe
21	<i>Rosa sinensis</i>	Rose
22	<i>Hibiscus sabdariffa</i>	Hibbiscus
23	<i>Annona squamosa</i>	Sitafal
24	<i>Mimusops elengi</i>	Oval
25	<i>Lagerstroemia flosreginae</i>	Taman
26	<i>Citrus limon</i>	Lemon



### **3. ORGANIZED ‘COLOURS OF SCIENCE’ EVENT**

On 28<sup>th</sup> February 2023 we the SBSI interns of Part I Botany Discipline of SBSB organized 'Colours of Science' event on occasion of National Science Day celebration (Fig. 3.1). Here we had organized different competitions like *Rangoli Competition*, *Bouquet Making* (wild flower arrangement competition), *Sketching/Painting Competition*, *Digital Poster Making Competition*. All the competitions were open for all. Rangoli Competition and Bouquet Making competition was on that day itself but digital poster making (online submission) and painting competition was submission of their work on any prior day. There was great response from the participants from across various schools of the university. The participants turned up with a lot of flair and creativity. *The main purpose of having this event was to make the students aware of the importance of our biodiversity which is getting eroded day by day, to appreciate its beauty and to influence them to conserve it.*

The event started at 9.30 am in the Faculty Block A in the different classes, lab and outside the Botany Department Office. The participants were given participation certificates after the competition and winners were given hampers. The various competitions organized were:

#### **3.1. Rangoli Making Competition**

The theme for this competition was '*Earth is our Home*'. *This competition aimed at making the participants realize that earth is our only home and we need to conserve it.* A total of fourteen participants were seen. The participants had to work in pairs. The judges for the competition were: **Dr. Mridini Gawas** (Assistant Professor of Mathematics, SPAS, Goa University) and **Dr. Rupali Bhandari** (Assistant Professor of Botany, SBSB, Goa University), who judged the competition based on Colour Combination, Neatness and Overall Participation (Fig.3.2,3.3) The winners of this competition were: 1<sup>st</sup> Place- **Ms. Mahima Naik** and **Ms. Geeta Mestry** (Fig. 3.4), 2<sup>nd</sup> Place- **Ms. Flory Nunes** and **Ms. Sanketa Gawande**.

### 3.2. Bouquet Making Competition

The theme for this competition was '*Local Beauty*'. *The motive behind this competition was to make the students become aware of the natural beauty that is present around us. That they may know how beautiful our natural environment is and appreciate it.* The flowers had to be collected from the surroundings and not bought from shops. There were three participants for this competition (Fig. 3.5, 3.6) The judges for the competition were: **Dr. Shanti N. Dessai** (Assistant Professor of Zoology, SBSB, Goa University) and **Prof. Dr. Vijaya U. Kerkar** (Professor of Botany, SBSB, Goa University), who judged the competition based on: Neatness, Choice of Flowers and Overall Presentation. The winner of this competition was **Ms. Shristi Chahal** (Fig. 3.7).

### 3.3. Sketching/Painting Competition

The theme for this competition was '*Colours of Nature*'. *The motive for this competition was to make the participants appreciate the natural beauty and influence them to conserve it.* There were eight entries for this competition (Fig. 3.8). The judges for this competition were: **Dr. Narayan Parab** (Assistant Professor of Financial Services, GBS, Goa University) and **Prof. Dr. Bernard F. Rodrigues** (Professor of Botany, SBSB, Goa University), who judged the competition based on Portrayal of the theme, Neatness and Overall Presentation. The participants had sent beautiful painting based on natural beauty. The winners for this competition we: 1<sup>st</sup> Place- **Ms. Sanketa Gawande** (Fig. 3.9), 2<sup>nd</sup> Place- **Ms. Sarvashi Naik**.

### 3.4. Digital Poster Making Competition

The theme of this competition was '*Global Science for Global Well Being*', which was the theme for this year's National Science Day. *The motive behind this competition was to increase awareness on the various nature manipulation techniques and the role of science in natural conservation.* A total of four entries were received for the competition (Fig. 3.10) The judges for the competition were **Prof. Dr. Prabhat Kumar Sharma** (Professor of Botany, SBSB, Goa University) and **Dr. Aniketh Gaonkar** (Assistant

Professor of Electronics, SPAS, Goa University). The posters were judged based on: Editing Skill and Portrayal of the Theme. The winners for the competition were: 1<sup>st</sup> Place- **Ms. Dicema Dias** and 2<sup>nd</sup> Place- **Ms. Sahaja Pednekar** (Fig.3.11).

The program ended at 1:00 pm with the distribution of prizes to the winners. It was a successful event wherein we were able to convey the message to the participants about the importance of environmental conservation in the current time.

## 4. OUTREACH ACTIVITIES

### 4.1. Awareness and planting session for children at Caranzalem, Goa

A summer camp was held at Souto Maior Community Centre, Caranzalem, Goa. We were given a time slot during the camp to educate the children on the importance of plants and how they can be grown and taken care of. We gave this session on 16<sup>th</sup> May 2023 at 10:15 am at the Souto Maior Community Centre (Fig. 4.1). There were 42 children who participated for the same. The children prior to our session had a pot painting session, so we utilized the same pots to teach them how to plant and take care of the plants. *The children were enlightened on the immense role that plants play in our life through an interactive talk with them.* The children participated with enthusiasm and were also given some inputs on the scientific processes of the plant, in learning which they showed great interest as this was more of a doing and learning session rather than a classroom setup. The children were from the age group of 8 to 14 years. *We know that this is the age group at which children are very receptive and anything thought to them at this time is retained in their mind for a very long time.* Keeping in mind these things we had organized this session, so that *these children who are the future may be eager and zealous towards the protection of the environment.*

### 4.2. Recycling paper and plastic along with planting session for children at Majorda, Goa

Children from the locality of Majorda were gathered together at the Shree Damodar temple premises on 20<sup>th</sup> May 2023 at 4:00 pm (Fig. 4.2). There were around 10 children who participated from the area. *They were taught to prepare recycled paper using old newspaper (making paper mache).* Old newspapers were torn into small pieces and using water a mache was prepared, the mache paper was placed on the plastic sheet and kept for drying, this same paper mache was *used to prepare seed bombs by covering the bombs with wildflower seeds.* Old plastic bottles were cut into half, the bottom half was used to fill water and the upper half was used to plant the sapling. In the upper half there were 3 holes punched near the neck of the bottle and the bottle cap was punched in with a hole so that

we can pass an absorbable thread through it and this upper part where sapling is planted was placed upside down on the lower part with water, *this is how self-watering planters were prepared using discarded plastic bottles*. The children were from the age group of 7 to 15 years. *It was conducted to educate the children about the importance of recycling and reusing* used newspapers along with reusing plastic bottles to prepare pots which could self-water due to absorbing thread underneath. The children were excited and performed all the activities enthusiastically. *It was a great opportunity to inculcate in the children the culture of recycling and influencing them to work towards environmental conservation.*

#### **4.3. Enlightening the young minds by creating awareness on the importance of growing trees and managing and recycling waste at Fatorda, Goa**

The Little Flower Kidzee, Fatorda Branch, a reputed pre-primary school held a summer camp for the children of age group 6 to 12 years (Fig. 4.3). We the SBSI interns requested the organizers a specific day to conduct certain activities for these children with the aim *to enlighten their young minds by creating awareness on the importance of growing trees, managing and recycling waste*. On 26th May 2023, we performed three activities for the 24 children gathered for the camp.

*The first activity was growing and maintaining the plant potters.* For this activity 30 waste plastic bottles were collected from various local shops. These bottles were washed with clean water and cut into two equal parts. A small hole was made for all the 30 bottle caps through which a thick twine (jute ‘*sutli*’) of appropriate length was passed. The upper part of the bottle along with the prepared bottle caps fixed to it was placed inverted into the bottom part of the bottles. These set up was done by us, the SBSI interns, and was only demonstrated to the children how it was done by explaining all the precautions to be taken while doing it. All the 30 waste plastic bottles set up prepared were given to each child. Each child was made to come forward in a line to pour mud into their upper part of the bottle also saplings were given to them. They were made to plant the given saplings into their upper part of the inverted bottle and also water them. The bottom parts of the bottles were then filled with water. They were explained that the twine will absorb the water from

the bottom part of the bottle and transfer the water to the upper part of the bottle. In this way the plant will be self-watered and there won't be any wastage of water.

***The second activity was preparing seed bombs.*** Old newspapers were collected and torn into small bits. With this, paper pulp was prepared by soaking it in water overnight. Each child was given handful of it and was told to squeeze a little and make a small depression in the centre to place the seeds in it. They were given tomato seeds. They were made to make a ball shape of it with the seeds inside it. These prepared seed bombs were kept to dry in the sun. After they were dried they were told to take it home and grow them in their gardens. The basic principle behind the seed bomb was explained, that is once the seed bombs get wet the outer layers start to disintegrate as the seeds inside start to germinate.

***The third activity was 'Happy earth and Sad earth'.*** In this activity each child was given a cut out of a picture of various kinds of trees and materials like paint can, plastic packets, plastic bottles etc that cause harm to the earth. Each child was made to come forward and identify their picture and was asked whether it made the earth happy or sad. They were given glue to apply to their picture and stick it under the picture of happy earth or under sad earth as per the picture the child had. In this way they were made aware of all the bad things that caused harm to the earth and thereby affecting us humans.

By conducting these three activities the children present for the camp were *made aware of the importance of growing trees, managing and recycling the wastes like plastic bottles, newspaper, etc.* The children were very enthusiastic and everyone participated actively in all the activities conducted by us.

#### **4.4. Creating awareness on uses of locally available plants and few tips on how to take care of plants with a small group of villagers and children in Poruti, Karnataka**

An awareness activity was conducted on 26<sup>th</sup> May 2023 in the village Poruti near Guledgud, North Karnataka with a group of women and teenagers who work on small plots of cultivating seasonal flowers like Marigold and Jasmine and some vegetables (Fig. 4.4). First we went around the place and looked out for locally available dominant plants and trees like Neem (*Azadirachta indica*), Castor (*Ricinus communis*), Red Hibiscus (*Rosa*

*sinensis*), White Hibiscus (*Dainty white*), Chaff - flower (*Acyranthus aspera*) and Aloevera (*Aloe barbadensis miller*), and collected few samples.

Later an interaction session was conducted with the locals. The group was first shown the collected samples and asked about their knowledge about those plants. Some people shared their knowledge and said that Neem was used for healing wounds, few leaves were consumed once a year during the festival 'Udagi' and sometimes the small twigs and the coal powder of Neem wood was used to brush teeth and maintain oral hygiene. The Neem seeds were also collected and sold during their grandparents time and the practice is reduced and hardly anyone collects the seeds. And they said the white hibiscus petals were consumed and even some Aloevera was edible and the castor seeds were crushed and the oil was applied on wounds.

Later we provided them with more information and uses of the same plants like,

***How to prepare and use Neem leaves aqueous extract as a organic insecticide and pesticides for their crops instead of using chemical pesticides.*** It can be prepared by collecting Neem leaves washing them and boiling with water in a vessel for 30-40 minutes till a decoction is produced, cool it and fill the spray bottle or spray can. The prepared spray was sprayed on the plants, which is easy to prepare as the material is easily available and is cost effective. Children can collect the seeds and sell them to extract oil and earn some pocket money. The addition of few drops of Neem oil in bathing water or Neem leaves in hot water and bathing may help reduce the chances of getting fungal and bacterial infections as Neem contains compounds showing antimicrobial and anti-fungal properties. Consuming few 2-3 leaves or consuming aqueous extract of Neem leaves significantly decreases blood sugar levels. ***Hibiscus Rosa sinensis (white and red hibiscus flowers) tea, drying the hibiscus petals in the sun and storing and using as tea (added a tea spoon and dried petals powder in hot water, strain and consume).*** It is rich in antioxidants and anti-diabetic properties and antibacterial properties. We also suggested that the children can make cold drinks and sell during summers. Preparation procedures and precautionary measures were also explained to children in order to prepare hygienic local products and also avoid over utilization of plant resources. The aqueous extract can be prepared and used for hair growth. Information on how to identify edible Aloevera species and how to effectively consume it was provided as it is rich in vitamins and antioxidants and nutrition

improving the immunity and anti-inflammatory agents, its anti-fungal and antiseptic properties makes it useful in healing wounds.

Castor seed oil can be used to grow healthy hair, when applied on skin helps reduce infection and dark spots and on wounds as it possesses anti-inflammatory properties. *We suggested the kids to start collecting the seeds of the castor plant and sell and earn some pocket money.*

*We also encouraged them to plant more Neem trees, Hibiscus, Aloe vera and other fruiting and flowering plants near their house, locality and borders of their field to increase more greenery and more opportunities.* We also explained them mulching process and asked them to use this method in their locality and to save water and improve the soil. The group was very enthusiastic and interactive. They were also ready to share their knowledge and curious to know more. The kids came along with us to collect plant samples. They also said they will try some of things mentioned above and will tell if there is any difference or not. It was fun experience of knowledge sharing and learning new things. We learnt and encouraged the ladies and children to learn more about plants and their uses.

#### **4.5. Demonstration on Oyster Mushroom Cultivation and Plant Distribution at Carambolim Village Panchayat**

This programme was organised by the JCI (Junior Chamber International), Mapusa in collaboration with the Carambolim Panchayat and Goa University. The programme began at 10:30 am at the panchayat venue with a brief introduction and a warm welcome to all the respective dignitaries and the village people. The respected Sarpanch introduced the SBSI interns and their guide to the crowd present and extended a warm welcome. This was followed by the demonstration activity. The individuals present for the same got to witness on a full step wise Oyster mushroom cultivation (Fig.4.5). In addition to this, the panchayat committee had also planned on a free sapling distribution for the village people. Through this outreach the interns got an *opportunity to interact and socialize with people from a different village, know about their values and beliefs on environment, it's conservation and applications of natural resources in the best ways possible.*



## **5. PARTICIPATED VARIOUS SEMINARS CENTERED AROUND ENVIRONMENT**

### **5.1. 15<sup>th</sup> Conference on Vectors and Vector Borne Diseases**

The 15<sup>th</sup> Conference on Vectors and Vector Borne Diseases was held in the Goa University from 15<sup>th</sup> to 17<sup>th</sup> February 2023 (Fig. 5.1). We the SBSI interns had participated and volunteered for this conference. It was organized by Goa University along with Indian Council of Medical Research and National Institute of Malaria Research. There were oral presentation, poster presentations and exhibition of novel biological malaria and its vector control products. We had volunteered for all the arrangements of the conference hall prior to the commencement of the conference and also after the conference. It was a great experience of interacting with various resource persons who enlightened us on topics such as: Integrated Management for Dengue in India (by Baruah K), The Status of Vector Borne High-Risk Pathogens in India (by Yadav PD), Natural Products for Control of Mosquito Vectors of VBDs (by Shinde PB) and many more. From PB Shinde's paper we could understand how *halophytes and seaweeds could be used as mosquitocidal agents* which are environmentally safe and should not have any adverse effects on humans or animals. *These and other inputs helped us to learn how we can utilize the flora present, to fight against malaria which can also be a great start-up idea. The exhibitions also helped us to extend our horizon of botanical knowledge in the horizon of entrepreneurship.*

### **5.2. Workshop on Marine Farming**

A one day workshop on Marine Farming and Society Engagement in Coastal State- Goa was organized by Unnat Bharat Abhiyan and School of Biological Sciences and Biotechnology, Goa University in collaboration with Madkai Gram Panchayat on 4<sup>th</sup> February 2023 beginning at 10:00 am at the panchayat hall (Fig. 5.2). We had participated and also volunteered for this workshop. The demand for the mussels increases in the market in which the tourism and hotel industry has a major role. Increase in demand for mussels, there should be alternate options for the large scale production of the mussels to meet the market demands. With this thought Dr. Lata Gawade (local resident of Aksan ward,

Madkai) initiated the mussels cultivation involving some of the local ladies in the village, in 2014.

The program started at 10:00 am with the presence of sarpanch of Madkai Shri.Shailendra Panajikar, Dr. Lata Gawade (the Convenor), Dr. Harip Khanapuri (co-convenor), Dr. Joyti Pawar (Chairperson SBSI Advisory Committee), Dr. Savita Kerkar (Dean of SBSB), locals and students. Dr. Gawade talked about the importance of mussel culture and the way of doing the culture. The main point noted was the increase in the market demand and the need to scale-up the production. Dr. Khanapuri talked on how seaweeds are important in nutritional supplement production. Seaweed is rich in various chemicals, he said, such as Iodine, Tyrosine, Vitamin A, C, E and K, Antioxidants, and Collagen. He further spoke about the process and importance of seaweeds culture, due to their high nutritional demand in the market.

Mussel culture and seaweed culture can be the alternate source of income, entrepreneurship, that will lead to contributing to rural economic development. There were inputs and also demonstration by various resource persons on mussel and seaweed cultivation. *This was a great opportunity for us to see how botanical knowledge on seaweeds can be applied to cultivation and sale of the same.* Cultivation of these and sale can be a great start-up idea.

### **5.3. Goa Sustainability Conclave 2023**

The National Productivity Council, Department for promotion of Industry and International Trade, Ministry of Commerce and Industry and Goa Business School, Goa University with Indian Potash Limited (IPL) as the industry partner jointly organized the Goa Sustainability Conclave 2023 on the theme 'Productivity and Green Growth'(Fig. 5.3). It was held at Cidade de Goa, Panaji. There were various resource persons for the conclave. Mr. Rajeev Ranjan, the director of IPL Centre for Rural Outreach, enlightened us on the fact that productivity and green growth are the two essential components of sustainability. Prof. Purva Hegde Dessai, Goa Business School, gave a message on how corporates need to report sustainability developments. Prof. Pranab Mukhopadhyay, Goa Business School, enlightened us on how industrial expansion has greatly affected the environment. There is a change on dependence on conventional agricultural industries, he said, and people are moving towards home grown food that they grow. Mr. Sundeep Kumar Nayak, Director

General of National Productivity Council, enlightened us on how we can reduce the emission of green houses through green finance. Dr. Puneet Kumar Goel, IAS, Chief Secretary- Govt. of Goa, shared his thoughts on green growth. Shri K D Bhardwaj, Director Environment, NPC, also shared his thoughts on how renewable energy can be utilized in green growth and productivity. We have learned from this conclave that sustainability is supported by the four pillars namely: ***Governance, Profit, People and Planet. In our SBSI projects we have, most prominently, targeted the later two pillars i.e. People and Planet, where we have interacted and sensitized the people in environmental conservation. The plant distribution drive was itself an manifestation of sustainability and thus helping to save the planet.***

## 6. COMPOSTING

The Goa University has been working towards the project entitled “Accelerating the Composting Process of Goa University Campus” under the waste management theme, Green Energy Audit of Goa University. This was coordinated by Miss. Dviti Mapari (Assistant Professor, Biotechnology Discipline, SBSB, Goa University) and Dr. Bhakti Salgaonkar (Assistant Professor, Microbiology Discipline, SBSB, Goa University). We attended the demonstration session on 13<sup>th</sup> April 2023 (Fig. 6.1). On 28<sup>th</sup> April the pots for composting were given to us (there were four pots) which we gave to the Faculty and Student Enclave (Canteen) manager Mr. Ravi, and we made sure that the pots were filled with any vegetable waste that was generated in the canteen (Fig. 6.2). After the pots were filled we transferred the pots to the composting chamber behind the Microbiology Department on 6<sup>th</sup> May 2023 (Fig. 6.4). Prior to this we also transferred some unused pots and barrels from the chamber (Fig. 6.3).

## 7. MUSHROOM CULTIVATION

The Educational Outreach Cell (ECO) and Social Entrepreneurship, Swachhata and Rural Engagement Cell (SES-REC), Goa University organized Mushroom cultivation activity. *With the objective to create awareness and encourage the student community towards skill development and entrepreneurship opportunity in this sector.*

A workshop on "Mushroom cultivation: Scientific Techniques and Challenges" co-ordinated by Dr Milind Naik (Assistant Professor of Microbiology, SBSB, Goa University) and Dr. Diptesh Naik (Assistant Professor of Physical Chemistry, Goa University) was held on 1<sup>st</sup> April 2023, where Dr. Milind Naik gave a talk on Mushroom Science, Cultivation and Challenges and the sharing of the journey of mushroom cultivation program by SBSI champion of 2022 (Fig. 7.1). This was followed by demonstration of mushroom cultivation techniques, demonstration of substrate design and sterilization techniques and visit to the Mushroom Cultivation and Incubation Centre (MCIC).

On 3<sup>rd</sup> April 2023, 4 groups of 10 interns each was created and activities were planned day wise. On 4<sup>th</sup> and 5<sup>th</sup> April 2023 the cleaning of dark room and light room for mushroom cultivation and incubation centre was done using detergents and IPA solutions (Fig. 7.2). On 6<sup>th</sup>, 7<sup>th</sup> and 8<sup>th</sup> April 2023 cleaning of the plastic curtains with ethanol solution was done and on 8<sup>th</sup> fumigation of light and dark room was done with the formaldehyde solution. Simultaneously around 2-5 kg different substrates were collected by different groups, which were cut into small pieces approximately 1-2 cm, soaked and autoclaved on 12<sup>th</sup> April 2023. On 13<sup>th</sup> April 2023 hands on training of filling the bags with substrate and spawn inoculation, layering, pinning and sealing of the bags was done at MCIC from 3:00 pm onwards (Fig. 7.3). Later we were asked to collect substrate again and prepare more bag for mushroom cultivation.

On 18<sup>th</sup> April 2023, 8-10 kg of sugarcane substrate was collected by our group, cut into small pieces and soaked overnight and autoclaved. The autoclaved bags were shifted to MCIC and bags were filled with substrate and inoculated with spawn and kept for incubation in the dark room on 20<sup>th</sup> April 2023 for mycelium formation (Fig. 7.4). On 9<sup>th</sup> 2023 May the the incubated bags were shifted to the light room for further growth (Fig. 7.5,

7.6) Here the bags were sprayed with water 2 times a day. Different groups were assigned different day's to irrigated the mushrooms.

***This has been a great learning experience with hands on experience and the ease of the mushroom cultivation and to take up it as a small scale business and also to educate others about the same.***

## 8. TAKEAWAYS FROM THE INTERNSHIP PROGRAM

In this internship program the most important thing that we have learned is how to work as a team with collaboration and consideration of each one's ideas. The brainstorming sessions that we did while sitting down and discussing about how we should go about with the various activities and the projects. The immense understanding between us with regards to some issues arising within the group has helped us to learn the value of collaborative work. We have learned faster problem solving, enhanced creativity and faster execution of ideas. Through this internship program we have acknowledged the truth in the words of Helen Keller "Alone, we can do so little; together, we can do so much."

*This internship program was a great opportunity for us to learn from and collaborate with various people involved in the conservation of environment.* One of such persons was RFO Prakash Naik (Range Forest Officer, Quepem), he is a charming personality who is very enthusiastic with regards to the environment and plants. He has been a great help for us to acquire saplings for distribution. Instantly he heeded to our request and provided us with the saplings for distribution. We also came across various personalities at the various seminars we attended who enlightened us on various topics regarding conservation and the value of natural resources.

*The internship program has equipped us with the ability to interact with people and also improved our public speaking skills through the outreach activities we have done.* Interactions with the children and other locals helped us to understand their stand on environmental conservation and also helped us to think of ways in which people belonging to various strata of the society can be influenced towards natural conservation. We specifically targeted children for our outreach activities because they are very receptive and at this age they are also very curious. The children are the future of the nation and thus enlightening them on environmental issues and its conservation is very much essential so that they grow in love of the environment and value every natural resource.

*By interaction with the locals we learnt that people had some indigenous knowledge about the local plants,* some which we didn't know and they were very enthusiastic to learn new things and open to discussion especially the kids they would come along with us

collect samples and also asked lot of questions. We have also learnt that our small efforts could make a bigger difference by sharing the knowledge we have. We have also learned leadership. The competitions we organized we learned how to organize events at a small scale.

*We have gained hands on training in mushroom cultivation, composting, mussel cultivation and seaweed cultivation.* This knowledge that we have gained we have also shared with others and will be also applicable in our own lives.

*Overall we have learnt that small steps toward a particular aim can be very useful in the long-run.* Our small project might bear fruits in the lives of many people and encourage them to take care of the environment, value it and adopt a lifestyle that goes hand in hand with natural conservation.



## 9. FIGURES OF ACTIVITIES

### CHAPTER- 1:- INTRODUCTION





**Fig: 1.3. WORKING AS A TEAM WITH COLLABORATION, DETERMINATION AND CONSIDERATION OF EACH ONE'S IDEAS**



**CHAPTER- 2:- MEGA PLANT DISTRIBUTION DRIVE CUM SALE  
OF HAND MADE ITEMS.**



**Fig: 2.1. VARIOUS TYPES OF PLANTS LIKE MEDICINAL, ORNAMENTAL, FRUITING TREES, AVENUE TREES AND HEDGE PLANTS RECEIVED FROM THE FOREST DEPARTMENT, QUEPEM**



**Fig: 2.2. UNLOADING AND TAKING CARE OF THE SAPPLINGS**



**Fig: 2.3. INAUGURATION OF THE 'MEGA PLANT DISTRIBUTION DRIVE CUM SALE OF HANDMADE PRODUCTS' AT THE BOTANICA EVENT 2023**



**Fig: 2.4. DISTRIBUTION OF THE SAPLINGS AT THE CHEMISTRY DEPARTMENT DURING THE BOTANICA EVENT ON 27<sup>TH</sup> FEB 2023 (DAY1 )**



**Fig: 2.5. PROMOTION DONE ON SOCIAL MEDIA PLATFORMS**





Fig: 2.6. **VARIOUS HANDMADE ITEMS SOLD BY THE BUDDING ENTREPRENEURS DURING MEGA SAPLING DISTRIBUTION DRIVE**

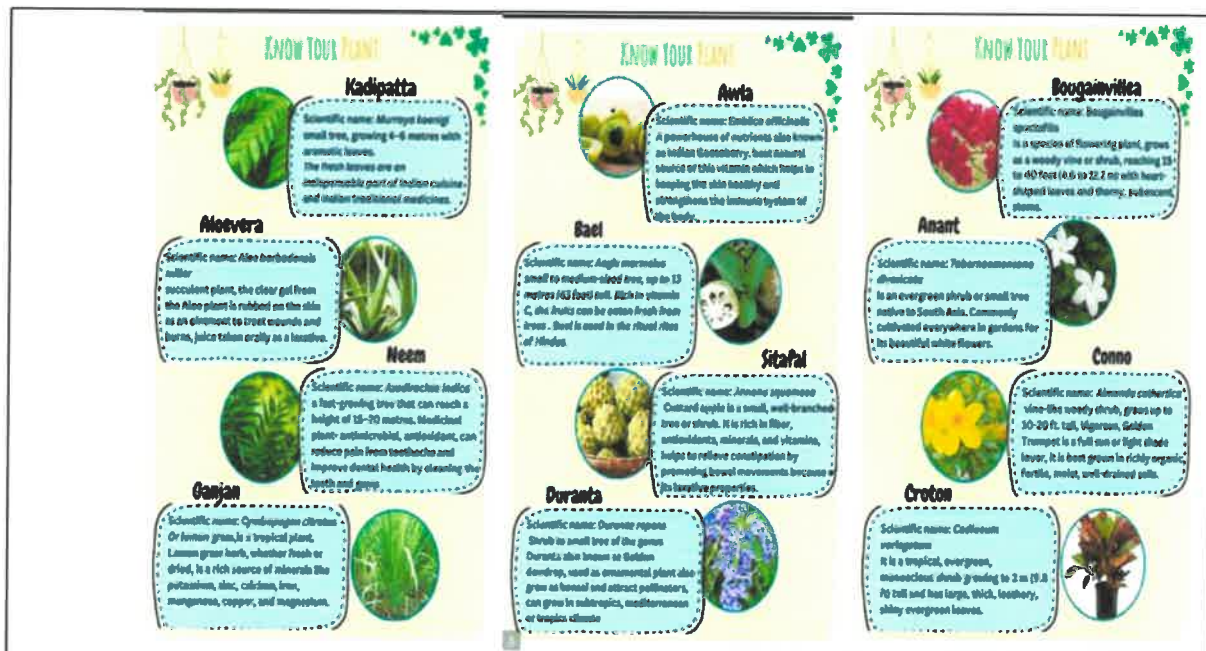
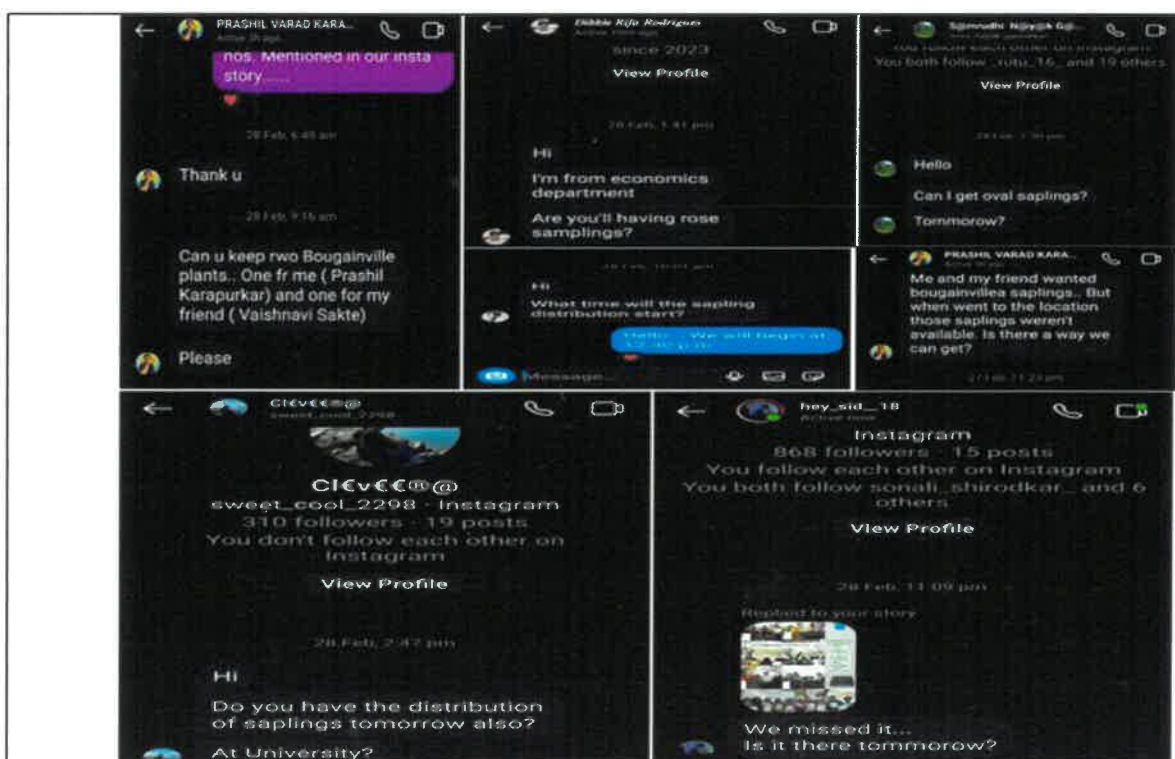


Fig: 2.7. **DISPLAY OF SOME INFORMATIVE POSTERS OF THE SAPPLINGS DISTRIBUTED**

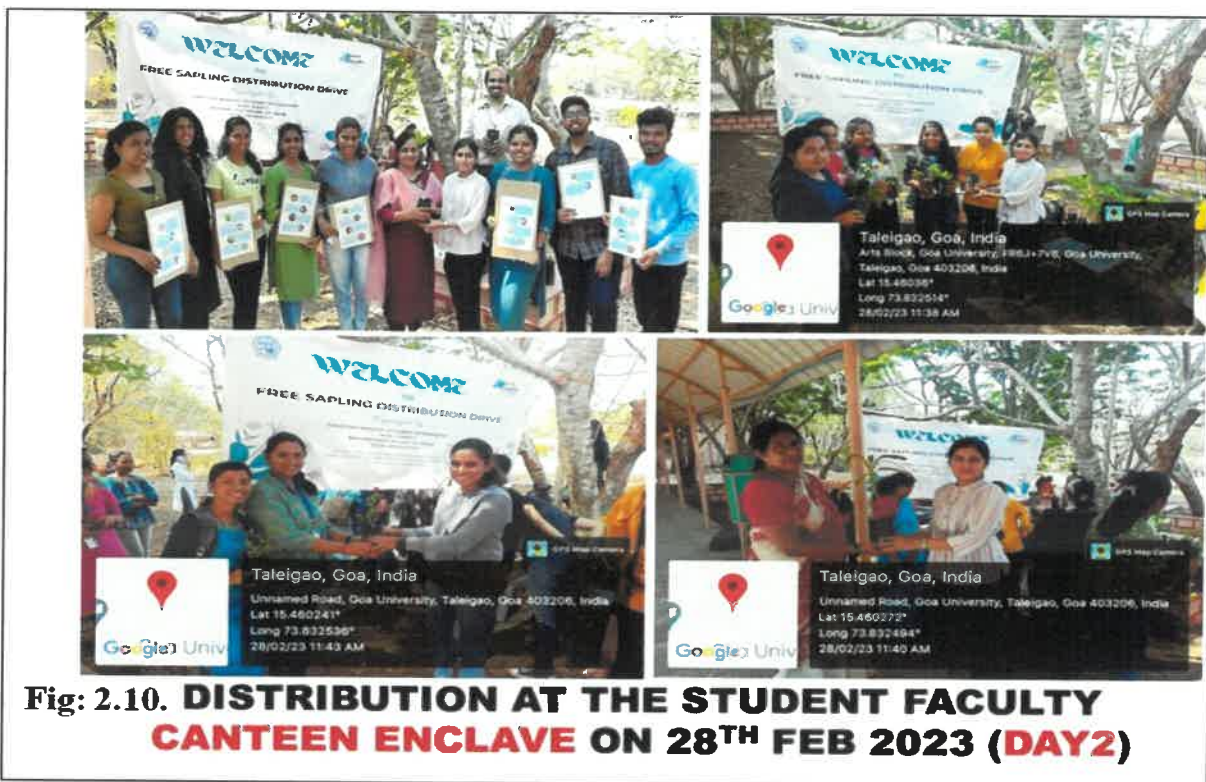


**Fig: 2.8. BACKGROUND POSTER DISPLAYED AT THE SITE OF SAPLING DISTRIBUTED**



**Fig: 2.9. RESPONSE FROM THE PEOPLE ON INSTAGRAM SOCIAL MEDIA APP**







**Fig: 2.12. MAINTAINING THE RECORDS OF THE SAPLINGS DISTRIBUTED**



**Fig: 2.13. ESTABLISHED SAPLING PICTURES SENT BY PEOPLE**



## CHAPTER 3:- 'COLOURS OF SCIENCE' EVENT

**SCIENCE DAY CELEBRATION**  
An initiative by  
**GREEN MUTAGENS**  
(Swachh Bharat Student Internship of M.Sc part I)

**Organised by**

**COLOURS OF SCIENCE**

**28th February 2023**  
from 9:30am to 12:30pm

**VENUE:- BOTANY DISCIPLINE PREMISES, BLOCK A**

**Registration:- Open till 28th February 2023, till 10:59 pm**

**REGISTRATION LINK:-**  
<https://forms.gle/9p3m3m3m3m3m3m3m>

**RANGOLI COMPETITION**  
Theme:- Earth is our home  
INSTRUCTIONS:  
• One Two participants per team  
• Use your own material  
• 1m x 1m space will be provided  
Judgement criteria:  
• Colour Combination  
• Neatness and overall presentation  
• The theme should be clearly portrayed  
• Complete within time limit

**TIME LIMIT 2 HOURS**

**SKETCHING/PAINTING COMPETITION**  
Theme:- colours of nature  
INSTRUCTIONS:  
• Individual participants  
• No restriction on size  
• Good quality paper to be used (minimum 200 GSM)  
• No restriction on colours  
• Name of the participant and discipline should be mentioned behind the drawing  
Judgement criteria:  
• Theme should be clearly portrayed  
• Neatness and overall presentation

**NOTE:- Has to be done at home and sent, the Entries should be submitted on or before the day of competition i.e. 28th Feb 2023 by 10:00 am to the mentioned in-charge**

**BOUQUET MAKING COMPETITION**  
Theme:- Local Beauty  
INSTRUCTIONS:  
• One Two participants per team  
• No using market flowers/leaves  
• Use your own requirements including the base foam if needed.  
Judgement criteria:  
• Use of local flowers/leaves  
• Neatness and overall presentation

**DIGITAL POSTER MAKING COMPETITION**  
Theme:- Global science for global wellbeing  
INSTRUCTIONS:  
• It should be original work  
• The message/theme should be clearly portrayed  
• No restriction on size  
The digital posters will be displayed on screen in the class room  
Judgement criteria:  
• Skill of editing  
• Theme should be clearly portrayed  
• Overall presentation

**NOTE:- The poster has to be made at home and the entries should be emailed to [greenmutagens@gmail.com](mailto:greenmutagens@gmail.com) before or on the day of competition i.e. 28th Feb. 2023 by 10:00 am**

**Fig: 3.1.BROCHURE OF THE COMPETITIONS ORGANIZED**



**Fig: 3.2. RANGOLI COMPETITION- THEME: EARTH IS OUR HOME**



**Fig: 3.3. PARTICIPANTS PUTTING RANGOLI DESIGNS**

**Fig: 3.4. WINNERS OF RANGOLI COMPETITION**



**1st place - Miss Mahima Naik  
and Miss Geeta Mestry**



**2nd place - Miss Flory  
Nunes and Miss Sanketa  
Gawande**





**Fig: 3.5. PARTICIPANTS MAKING THEIR BOUQUET**



**Fig: 3.6. BOUQUET MAKING COMPETITION -THEME: LOCAL BEAUTY**

**Fig: 3.7.WINNER OF BOUQUET MAKING COMPETITION**



**1st place - Miss Shristi Chahal**



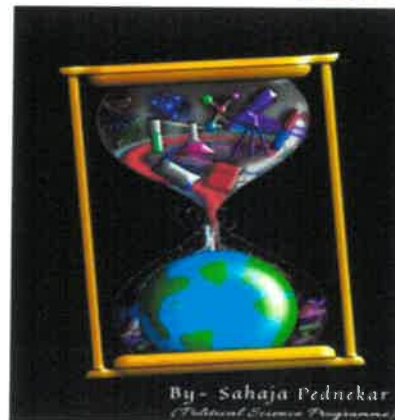
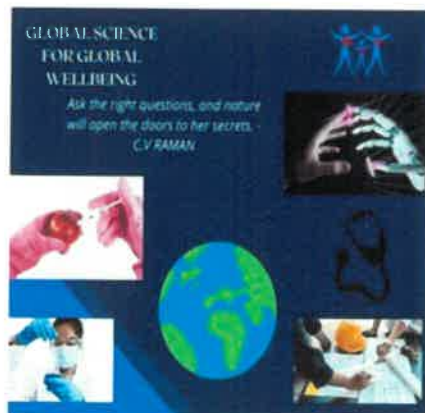
**Fig: 3.8. SKETCHING/PAINTING COMPETITION –THEME:  
COLOURS OF NATURE**



**Fig: 3.9. WINNERS OF SKETCHING/PAINTING COMPETITION**



**1st place - Miss Sanketa Gawande**

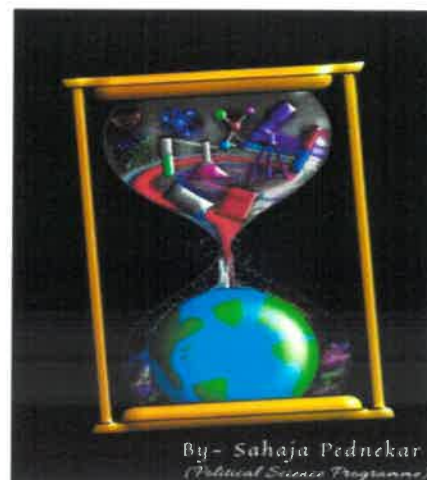


**Fig: 3.10. DIGITAL POSTER MAKING COMPETITION-  
GLOBAL SCIENCE FOR GLOBAL WELLBEING**

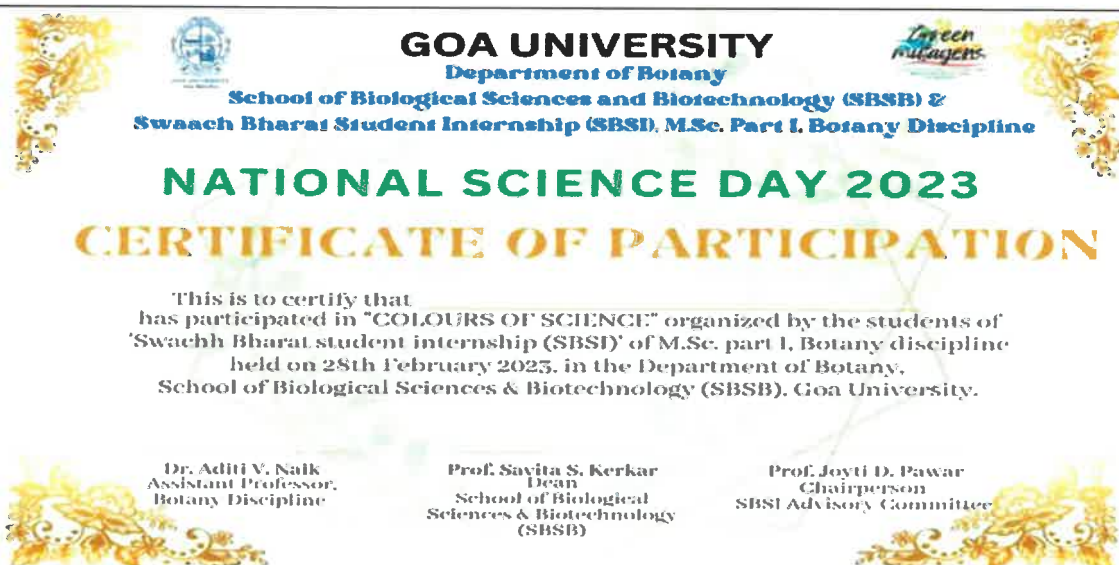
**Fig: 3.11. WINNERS OF DIGITAL POSTER MAKING COMPETITION**



**1st place - Miss  
Dicema Dias**



**2nd place - Miss  
Sahaja Pednekar**



**Fig: 3.12. CERTIFICATE OF PARTICIPATION WERE GIVEN TO ALL THE PARTICIPANTS OF 'COLOURS OF SCIENCE '**



## CHAPTER 4:- OUTREACH ACTIVITIES



**Fig: 4.1. AWARENESS AND PLANTING SESSION FOR CHILDREN AT CARANZALEM, GOA**



**Fig: 4.2. RECYCLING PAPER AND PLASTIC ALONG WITH PLANTING SESSION FOR CHILDREN AT MAJORDA, GOA**





**Fig: 4.3. ENLIGHTENING THE YOUNG MINDS BY CREATING AWARENESS OF THE IMPORTANCE OF GROWING TREES, MANAGING AND RECYCLING WASTE - HELD AT **FATORDA, GOA.****



**Fig: 4.4. CREATING AWARENESS ON THE IMPORTANCE OF LOCALLY AVAILABLE PLANTS FOR A GROUP OF VILLAGERS IN **BAGALKOT, KARNATAKA.****





**Fig: 4.5 DEMONSTRATION OF OYSTER MUSHROOM CULTIVATION AND PLANT DISTRIBUTION AT THE VILLAGE PANCHAYAT, CARAMBOLIM, GOA**

## CHAPTER 5:- ATTENDED VARIOUS SEMINARS CENTERED AROUND ENVIRONMENT



**Fig: 5.1. ATTENDED AND VOLUNTEERED FOR THE MARINE FARMING SESSION HELD AT MADKAI, PONDA-GOA**



**Fig: 5.2. PARTICIPATED THE 15<sup>TH</sup> CONFERENCE ON VECTORS AND VECTOR BORNE DISEASES HELD IN GOA UNIVERSITY**



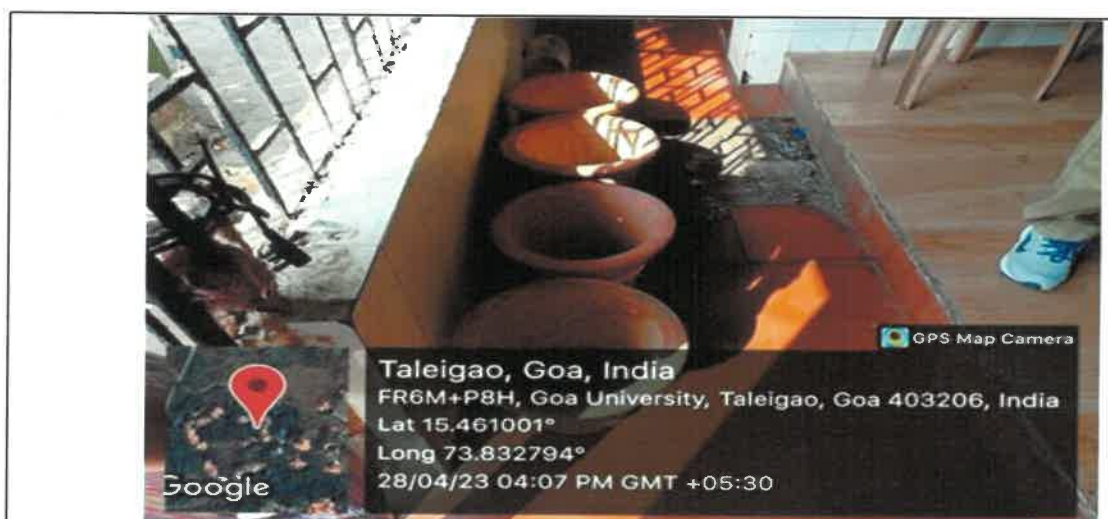


**Fig: 5.3. ATTENDED THE INTERACTIVE SEMINAR ON THE TOPIC ‘PRODUCTIVITY & GREEN GROWTH’ ORGANIZED BY THE NATIONAL PRODUCTIVITY COUNCIL, DPIIT, MINISTRY OF COMMERCE & INDUSTRY & GOA BUSINESS SCHOOL, GOA UNIVERSITY IN COLLABORATION WITH THE GOA SUSTAINABILITY CONCLAVE HELD AT CIDADE GOA, VAINGUINIM, PANAJIM.**

## **CHAPTER 6:- COMPOSTING**



**Fig: 6.1. DISCUSSION HELD ON HOW TO GO ABOUT WITH THE COMPOST PREPARING ACTIVITY**



**Fig: 6.2. FOUR MUD POTS WERE GIVEN TO THE STUDENT FACULTY CANTEN ENCLAVE TO FILL THEIR VEGETABLE WASTE IN IT.**



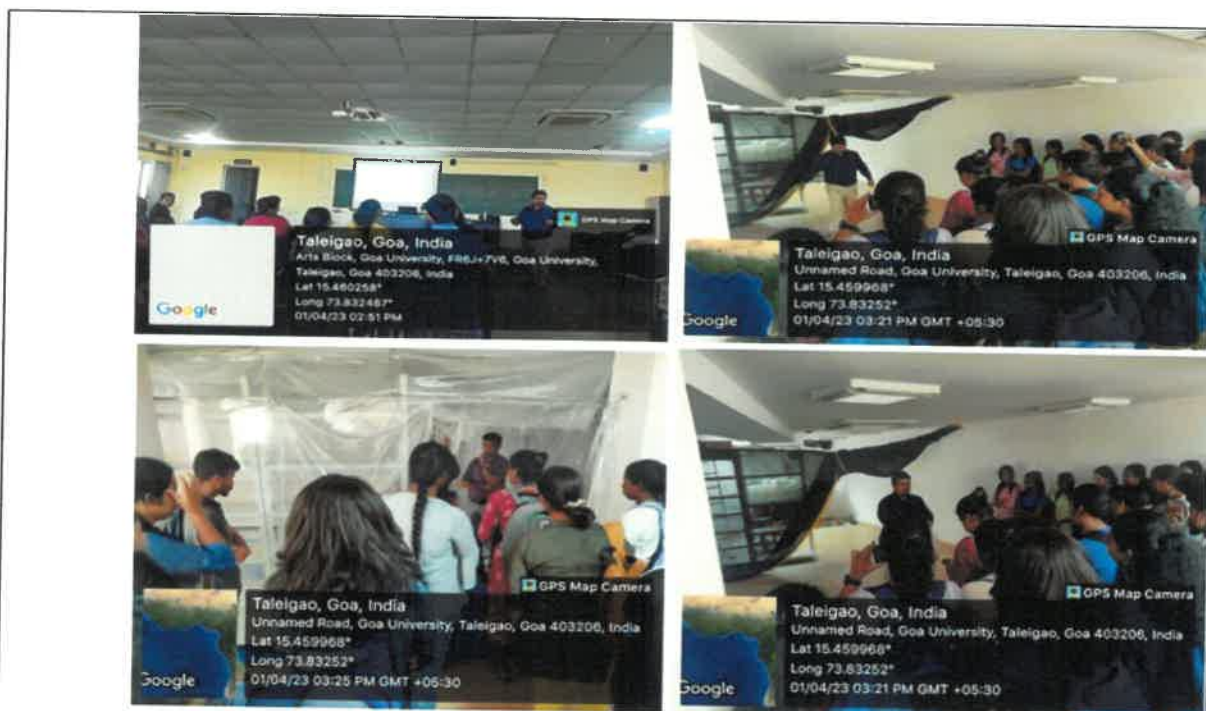


**Fig: 6.3. TRANSFERRING THE MUD POTS TO BE USED TO PREPARE THE COMPOST**



**Fig: 6.4. TRANSFERRING THE FILLED MUD POTS FROM STUDENT FACULTY CANTEEN ENCLAVE TO THE 'E' BLOCK**

## CHAPTER 7:-MUSHROOM CULTIVATION



**Fig: 7.1. EXPLANATION AND DEMONSTRATION OF HOW TO DO MUSHROOM CULTIVATION**



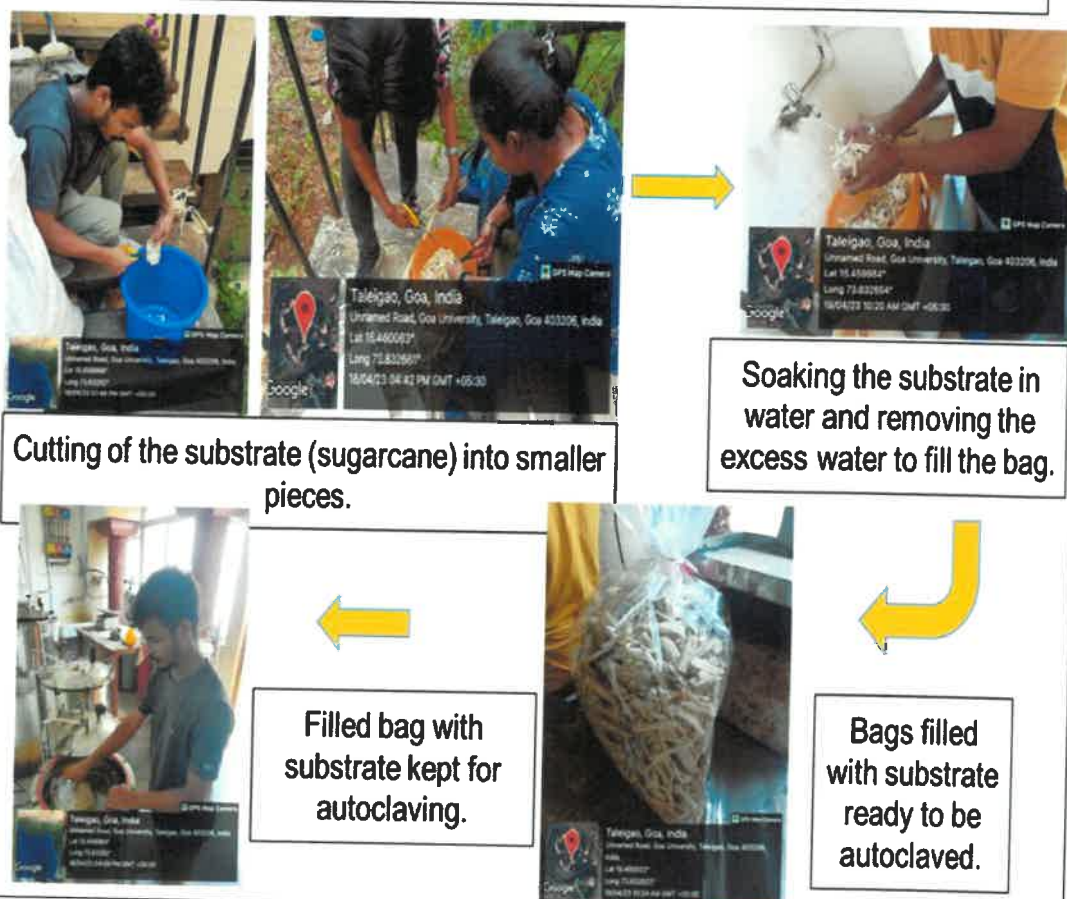
**Fig: 7.2. STERILIZATION OF THE SHELVES, PLASTIC CURTAINS AND FLOOR WITH ETHANOL SOLUTION**





**Fig: 7.3. EXPLANATION AND DEMONSTRATION OF FILLING AND PINNING THE BAGS**

**Fig: 7.4. PREPARATION OF THE SUBSTRATE BAGS**



**Fig: 7.5. FILLING OF THE AUTOCLAVED SUBSTRATE WITH SPAWN**



Spreading the substrate on clean, sterilized sheet and squeezing out excess water



Filling the bags with a layer of substrate and a layer of spawn.



Bags with spawn are pinned for aeration.



Bags ready to be kept for incubation

**Fig: 7.6. BAGS KEPT FOR INCUBATION IN DARK ROOM**



Bags filled with substrate and spawn kept in dark room for incubation on 19th April 2023