

**Dr. Ramachandra Naik. M**  
Head of the Department of Botany  
S B Arts and KCP Science College  
Vijayapur-586103

To

**The Principal**  
S B Arts and KCP Science College  
Vijayapur-586103

**Subject: Request for the permission to visit College of Agriculture Science,**  
Vijapur

Sir,

As per the Curriculum a visit to Laboratory for B.Sc Ist Sem CBZ students of Department of Botany on on 21/12/2021 Tuesday along with Staff members Dr. Ramachandra Naik.M, Miss Akshata kannur, Miss Bhuvaneshwari patil are accompanying the students

Kindly permit the staff and students to visit the Department of Microbiology lab, Hittanalli, Vijapur

The absence of students from College on 21/12/2021 may be treated as on field exercise this is for your kind information and necessary action

Copy Forwarded to

The HOD, Department of Zoology- For information and necessary action

The HOD, Department of Chemistry- For information and necessary action



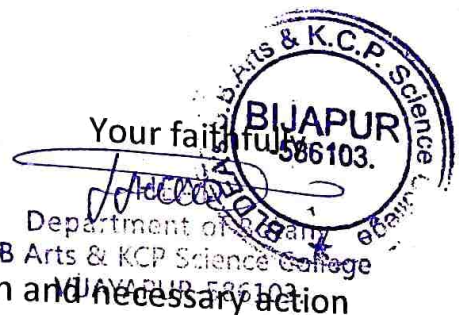
**PRINCIPAL,**  
**S.B.ARTS & K.C.P. SCIENCE COLLEGE,**  
**VIJAYAPUR.**



**HEAD**  
Department of Botany  
SB Arts & KCP Science College  
VIJAYAPUR-586103.



**IQAC, Co-ordinator**  
S.B.Arts & K.C.P.Science College  
Vijayapur.





**B.L.D.E. ASSOCIATION'S  
S. B. ARTS AND K. C. P. SCIENCE COLLEGE  
VIJAYAPUR**

RE – ACCREDITED AT THE 'A' LEVEL  
Phone: (08352) – 261766, (08352) 262770 Extn. 2223, 2224  
Fax: 08352 – 261766 E-mail: bldesbkcp@gmail.com



To,

The DEAN (Agri.)

College of Agriculture Science,

Hittanalli, Vijaypur- 580101

**Subject: Request for permission to visit College of Agriculture from Vijayapur**

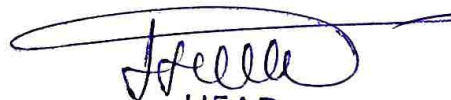
Sir,

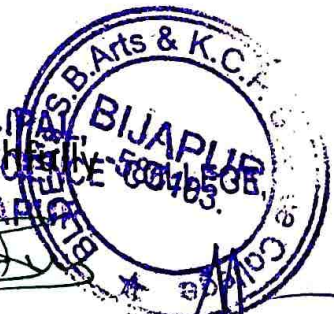

As per the curriculum, one day microbiology lab visit is organized for B.Sc 1sem CBZ Students of Botany department, SB Arts and KCP Science College, Vijayapur on 21<sup>st</sup> December 2021 Tuesday. Our staff members Dr.Ramachandra Naik M, Miss Akshata kannur, Miss Bhuvaneshwari patil are accompanying the students

So please give the permission to visit the Department of Microbiology lab, College of Agriculture and provide expert to about it

Thanking you

  
**Principal,  
Arts and KCP Science College  
VIJAYAPUR**

  
**HEAD  
Department of Botany  
SB Arts & KCP Science College  
VIJAYAPUR-586103.**

  
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B.L.D.E.A.'S

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DEPARTMENT OF BOTANY

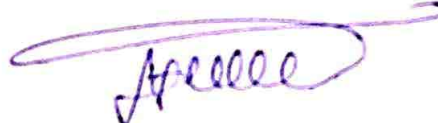
18/12/2021

**NOTICE**

All the students are here by informing you that as per B.sc 1<sup>st</sup> sem syllabus A visit to microbiology lab and to understand the role of microbes in day today life, so we are taking you for the visit on 21/12/2021 to Agriculture college Hittinhalli Vijayapur. We have arranged the transport facilities and some snacks will be provided to you all, Its compulsory for all the students for the visit.

  
Principal,

S.B.Arts and KCP Science College  
VIJAYAPUR



HEAD

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SB Arts & KCP Science College  
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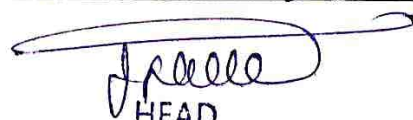


VISIT TO AGREECULTURAL COLLEGE, MICROBIOLOGY LAB HITTINHALLI.

STUDENT ATTENDANCE LIST

SI NO	STUDENT NAME	ROLL NUMBER	SIGNATURE
15	Shakuntala Huddar	97	<i>Shakuntala Huddar</i>
27	Rakshita, Nesur	82	R.P.NESUR
37	Bhuvaneshwari, Utagi	75	<i>Bhuvaneshwari Utagi</i>
47	Sonu, Rajput	108	<i>Sonu Rajput</i>
57	Bhanu, Rajput	111	<i>Bhanu Rajput</i>
67	Bhavani, Hadapad	16	<i>Bhavani</i>
77	Anjali, Hopli	115	A.S.Hooli
87	Ramya, Kadakol	03	<i>Kadacol</i>
97	Radhika, Rattal	30	<i>Rattal</i>
107	Danamma, M	128	J.P.M
117	Sanketa, Kalajagi	72	<i>Sanketa</i>
127	Bhagyashree, Havinal	57	<i>Bhagyashree</i>
137	Harshita, Mallur	116	<i>Harshita</i>
147	Ashwini, Guddodagi	145	<i>Ashwini</i>
157	Akanksha, Mahendrabai	63	<i>Akanksha</i>
167	Nitya, Gongadi	70	<i>Nitya</i>
177	Lingadevi, Hatti	51	<i>Lingadevi</i>
187	Ashu, Lamani	164	<i>Ashu</i>
197	Amit, Pujan	151	<i>Amit</i>
207	Siddangoud, Bigadar	43	<i>Siddangoud</i>
217	Praveen, Rathal	234	<i>Praveen</i>
227	Aditya, Waghmare	52	<i>Waghmare</i>
237	Dinesh, Changanol		
247	Bhronika, Borad	394	<i>Bhronika</i>
257	Megha, Pujari	195	<i>Megha</i>
267	Sakshi, Ambure	425	<i>Sakshi</i>
277	Shweta, Koth	493	S.J.Khol
287	Arshita, Raddabai	481	<i>Raddabai</i>
297	Aspita, Solapur	78	A.L.S
307	Anjana, Bigadar	80	A.L. Bisadar
317	Kartik, Kosabu		
327	Charan, Umarani		
337	Sureshsingh, Rajput		
347	Hirunath, Nishaga	332	<i>Hirunath</i>
357	Renuka, Mali	364	<i>Renuka</i>
367	Sahana, Honakamale	308	<i>Sahana</i>

  
Principal,  
Arts and KCP Science College  
VIJAYAPUR

  
HEAD  
Department of Botany  
SB Arts & KCP Science College  
VIJAYAPUR-586103.

  
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Vijayapur.



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VISIT TO AGREECULTURAL COLLEGE, MICROBIOLOGY LAB HITTINHALLI.

STUDENT ATTENDENCE LIST

SI NO	STUDENT NAME	ROLL NUMBER	SIGNATURE
37	Laxmi, Kasikabbi	392	
38	Sunil, Kanani		
39	Pratibha, Patil		
40	Mattibha, Kumbhar	215	
41	Manoj, Kulakarni		
42	Shobha, Kokatane	67	
43	Vijayalakshmi, Vatsrad	310	
44	Abhaya, Kralaba	183	
45	Nalini, Pol	477	
46	Napeesa, Mulla	314	
47	Sandhya, Kumbhar	229	
48	Renuka, Bagali	68	
49	Sumati, Pittavalli	462	
50	Ankita, Salotagi		
51	Radhika, Hali	446	
52	Vinayak, Sheshodari	467	
53	Vishal, Math	440	
54	Bhoomshankar, Maslyal	249	
55	Ashwarya, Biradar	473	
56	Apeksha, Badadi		
57	Prabhavati, Shirshayad		
58	Sangeeta, Dashavant	433	
59	Poojanka, Biradar	432	
60	Parvita, Mendegar	430	
61	Priyanka, Chavan	293	
62	Keertana, Jayakhanwal	297	
63	Pratibha, Biradar		
64	Mehboob	306	
65	Agun, Chavan	487	
66	Renuka, Kundaregi	403	
67	Akhata, Jain	103	
68	Bhagyashree, Biradar		
69	Ankita, Pol	377	
70	Sagar, Bhosale		
71	Abhishek, Budhal	313	

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**VISIT TO AGREECULTURAL COLLEGE, MICROBIOLOGY LAB HITTINGHALLI.**

**STUDENT ATTENDENCE LIST**

SI NO	STUDENT NAME	ROLL NUMBER	SIGNATURE
71	Shreyash K	441	[Signature]
72	Abhilek Bhudihal	313	[Signature]
73	Channasiddi	341	[Signature]
74	Samath Chandakavati	235	[Signature]
75	Manjunath Uppur	472	[Signature]
76	Gowli Jagannavar		[Signature]
77	Bkshata Kadi		[Signature]
78	Rohini S. Kumbhar		[Signature]
79	Anusha. Paji. Angadi	449	[Signature]
80	Sujata Rathod	384	[Signature]
81	Bhagyashree Angadi	451	[Signature]
82	Bhagyashree Malabinal	462	[Signature]
83	Shreelhti Siddhadi	392	[Signature]
84	Priyanka Nidoni	366	[Signature]
85	Subhadra Sanaki	386	[Signature]
86	Prasenakumar haregazi	187	[Signature]
87	Prashant Inganai		[Signature]
88	Prema Mulwad		[Signature]
89	Shreelhti Indri		[Signature]
90	Nikita Nad	274	[Signature]
91	Usha Rathod		[Signature]
92	Smithi mukhihal	442	[Signature]
93	N Ramya	434	[Signature]

**Principal,**

**S.B. Arts and KCP Science College  
VIJAYAPUR**

**HEAD**

**Department of Botany  
SB Arts & KCP Science College  
VIJAYAPUR-586103.**

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21/12/2021


NOTICE ON


UNDER TAKING LETTER FOR ONE DAY VISIT TO AGRICULTURE COLLEGE  
VIJAYAPUR HITTINHALLI

The students of BSC 1st semester 2021-2022, as enclose the names of students in next page do here by undertake that we are going on one day microbiology laboratory visit to agriculture college vijaypur on Tuesday 21/12/2021

We are aware of the risks involved and the institution , Head of the institution faculty and staff members incharge will not be held responsible for any unforeseen happenings or eventualities during the study tour.

  
Principal,  
S.B. Arts and KCP Science College  
VIJAYAPUR

  
HEAD  
Department of Botany  
S.B Arts & KCP Science College  
VIJAYAPUR-586103.

  
IQAC, Co-ordinator  
S.B.Arts & K.C.P.Science  
Vijayapur.



BLDEA'S

**S.B.ARTS AND K.C.P. SCIENCE COLLEGE, VIJAYAPUR  
DEPARTMENT OF BOTANY**



21/11/2021

**REPORT ON**

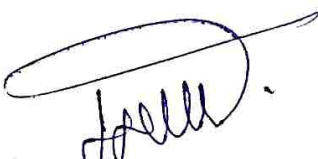
**VISIT TO MICROBIOLOGY LABORATORY**

Department of Botany has organized a visit to AGREECULTURAL COLLEGE HITINHALLI MICROBIOLOGY LAB. As per curriculum for B.SC Ist sem students on 21/11/2021 wednesday at 9 :30am Dr Shrinivas sir head of the department and the colleagues Dr. Deepa mam have explained about different microorganisms, culture media and there type. Explained about Mushroom cultivation, Sheetal mam have shown the equipments and explained about procedure. Like incubator chamber, hot air oven. Laminar air flow , autoclave.

Many students were actively participated in the interactions by asking questions regarding microorganisms and mushroom cultivation, this visit was usefull for students for both practical and theory purpose.

This visit was attended by 97 students of B.SC Ist sem BOTANY students along with staff members of botany department HOD Dr. RAMCHANDRA NAIK.sir. MISS. BHUVANESHWARI PATIL .mam . and MISS. AKSHATA KANNUR. mam

  
**Principal,**  
S.B. Arts and KCP Science Col'  
VIJAYAPUR

  
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Department of Botany  
SB Arts & KCP Science College  
VIJAYAPUR-586103.

  
**IQAC, Co-ordinator**  
S.B.Arts & K.C.P.Science College  
Vijayapur.





B.L.D.E. Association's

**S.B.ARTS & K.C.P.SCIENCE COLLEGE,**

Bangaramma Sajjan Campus, BLDE Road, Vijayapur-586103.



# STUDY TOUR REPORT ON

Visit to Agricultural College Hittanalli Vijayapur

B Sc 1<sup>st</sup> Sem Students

Submitted By

Name : Akshata R. Jain.

Reg.No : U15KM24S0400.

Submitted To



Department of Botany

2021-2022

B.L.D.E. Association's  
S.B. ARTS & K.C.P SCIENCE COLLAGE, VIJAYAPUR



**DEPARTMENT OF BOTONY**

**CERTIFICATE**

THIS IS TO CEERTIFY THAT KUMAR / KUMARI : Akshata, R, Jain.

STUDING IN B.SC. 1 SEM ROLL NO : 103.

DURING THE YEAR 2021 - 22 HAS COMPLETED THE STUDY REPORT ENTITLED " **VISIT TO MICROBIOLOGY LABORATORY** " THE STUDY REPORT SATISFIES PARTIAL FULLFILLMENT OF THE REQUIREMENT PRESENTED IN THE CURRICULUM OF " **RANI CHANNAMMA UNIVERSITY, BELGUM**".

DATE: 22-01-2022

Danner Spate  
22/01/22 22/01/22

STAFF IN-CHARGE

Helle  
HEAD

Department of Botony  
SB Arts & KCP Science College  
HEAD OF THE DEPARTMENT  
VIJAYAPUR-586103.

Examiners : 1. \_\_\_\_\_ 2. \_\_\_\_\_

## Aim and Objective of the Study Visit

**AIM :** To study different Micro-organisms in Food, Air, and Water and their role in day to day life.

**Objective :**

1. To observe the different micro-organisms, their structure & role
2. TO know the cultivation of mushrooms.

# INTRODUCTION

**Visit To Microbiology Laboratory Of Agriculture Collage Vijayapur**

This study visit has helped us to gain practical knowledge by learning and by observing various kinds of Equipments and Mushrooms distributed in the Microbiology laboratory.

As per the curriculum a study visit was organized for B.Sc 1 semester C BZ students. According to the plan, on 21st December 2021, we along with our lecturers/professors visited the above mentioned place

# MICROBIOLOGY

Micro-organisms and their activities are vitally important to virtually all processes on Earth. Micro-organisms matter because they affect every aspect of our lives – they are in us, on us and around us.

Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'. These microbes play key roles in nutrient cycling, biodegradation/biodeterioration, climate change, food spoilage, the cause and control of disease, and biotechnology. Thanks to their versatility, microbes can be put to work in many ways: making life-saving drugs, the manufacture of biofuels, cleaning up pollution, and producing/processing food and drink.

Microbiologists study microbes, and some of the most important discoveries that have underpinned modern society have resulted from the research of famous microbiologists, such as Jenner and his vaccine against smallpox, Fleming and the discovery of penicillin, Marshall and the identification of the link between *Helicobacter pylori* infection and stomach ulcers, and zur Hausen, who identified the link between papilloma virus and cervical cancer.

Microbiology research has been, and continues to be, central to meeting many of the current global aspirations and challenges, such as maintaining food, water and energy security for a healthy population on a habitable earth.

Father of Microbiology: Antonie Van Leeuwenhoke

## MICROBES IN SOIL

There are different types of soil microbes.

Soil micro-organisms can be classified as Bacteria, Actinomycetes, Fungi, Nematodes and Protozoa. Each of these groups has characteristic that define them and their function in soil. Upto 10 billion Bacterial cell inhabit each gram of soil in and around plant root a region known as Rhizosphere.

**Bacteria** : It is the crucial workforce of soils they are the final stage of breaking down nutrients and releasing them to the root zone for the plant. In fact the food and agriculture organization once said "Bacteria may be the most valuable of life forms in the soil".

**Ex: Bacillus, Clostridium**

**Actinomycetes** : They were once classified as fungi and act similarly in the soil. However some of them are predators and will harm the plant while other living in the soil can act as antibiotics for the plant.

**Fungi** : Like bacteria, Fungi also living in the rootzone and helps make nutrients available to plants. Ex; Mycorrhizae is a fungi that facilitate water and nutrient uptake by roots and plants to provide sugars, aminoacids and other nutrients.

**Protozoa** : They are larger microbes that love to consume and be surrounded by bacteria. In fact nutrients that are eaten by bacteria are released when protozoa in turn eat the bacteria.

**Nematodes** : They are microscopic worms that live around or inside the plant. Some of them are predators while others are beneficial, eating pathogenic nematodes and secreting nutrients to the plants.

## MICROBES IN FOOD

Nature uses micro-organisms to carry out fermentation process and for thousands of years mankind has used yeast, moulds and bacteria to make food products such as bread, beer, wine, vinegar, yoghurt and cheese as well as fermented fish, meat and vegetables.

Fermentation is one of the oldest transformation and preservation techniques for food. This biological process allows not only the preservation of food but also improves its nutritional and organoleptic quality. A well conducted fermentation will favour useful flora, to the detriment of undesirable flora in order to prevent spoiling and promote taste and texture.

Ex.: E.coli, Listeria, Norovirus, Salmonella

## SERIAL DILUTION TECHNIQUE

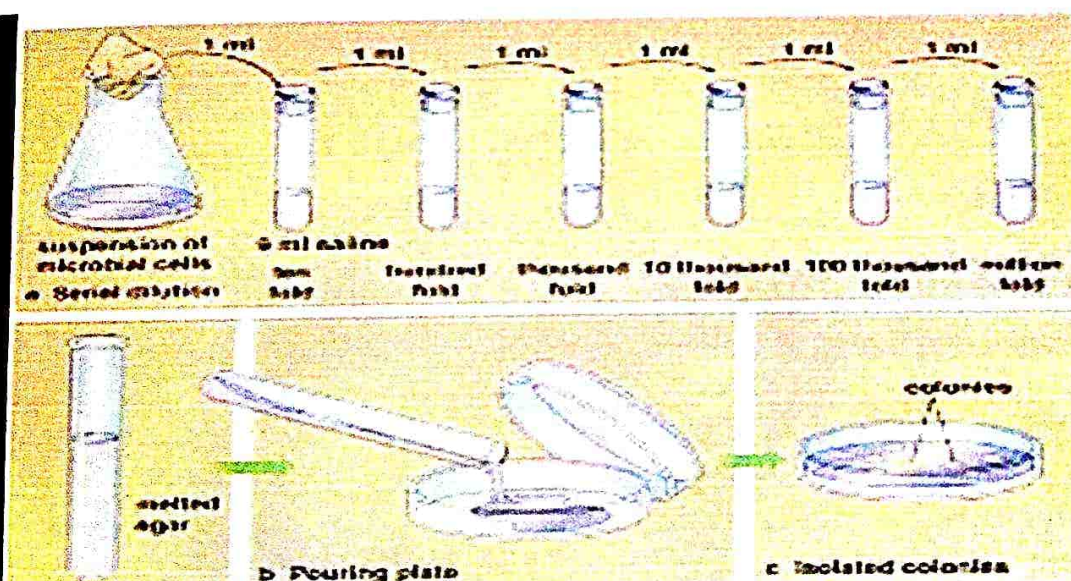
Enumeration of soil microorganisms by serial dilution technique.

Soil is a variable environment with diverse microbial community consisting of bacteria, actinomycetes, molds, yeast, algae and protozoa. It is necessary to use different types of culture media due to differences in dietary requirements for each type of microorganism to be isolated. Culture media used the following according to the type of microorganisms to be isolated. Enumeration of bacteria using Nutrient Agar.

Enumeration of Actinomycetes used Jensen's media, characterized by Actinomycetes isolated in dishes as a dry and dusty or chalky. Also characterized by a distinctive odor similar to that of earth after rain.

Enumeration of Fungi used sabouraud media. The serial dilution technique consists on evenly spreading the diluted sample over an agar plate. Using this method yields Colonies that form on the surface of Agar

Make a serial dilution of micro-organisms sample in series of tubes containing distilled water. Add one gram of soil sample to first test-tube containing 9 ml of distilled water and make serial dilution from one to another tube upto 10-15 times. then put agar media in waterbath in 45 oC to liquified. Pour Melted agar in sterial petriplate. transfer one 1ml from last dilution/test-tube from micro-organism culture by pipeting and put it on the center of an Agar plate. Moist spreader with alcohol and sterilize by flaming. Spread the sample on Agar plate by spreader and sterilize it again. Incubate the plate at 37 oC for 12-24 hours. Then examine the present colonies distributed throughout the agar.





# Mushrooms

Mushrooms are fast growing basidiomycetes fungi which produce fleshy fruit bodies or basidiocarps called mushrooms. These fungi live as saprophytes in dead organic matter in the form of a mat of intertwined hyphae. The hyphae produce white tiny balls of hyphae called buttons. The buttons consist of a short stalk and cap called pileus. The buttons get opened towards maturity and form mature fruit bodies or mushrooms.

## Types of Mushrooms

1. White button
2. Crimini
3. Portabella
4. Shiitake
5. Oyster
6. Enoki
7. Maitake
8. Beech

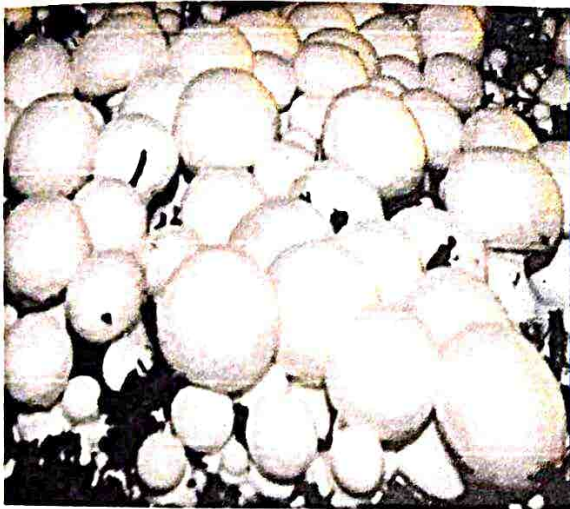
## Edible Mushrooms

Edible mushrooms are consumed by humans for their nutritional value and they are occasionally consumed for their supposed medicinal value. Edibility may be defined by absence of poisonous effects on humans and desirable taste and aroma.

Ex: *Agaricus bisporus* (White button)

Commercially cultivated mushrooms in India

1. Paddy-straw
2. Oyster
3. White Button
4. Milky



## Poisonous Mushrooms

They look like edible mushrooms in their morphology and life cycle. However they can be distinguished by following features.

Brightly color fruit bodies. Greenish ting on gills and yellow-green spores. Pink colour spores in gills presence of volva and annulus on the stalk. Unpleasant odour.

EX : Amanita phalloides

## Nutritional value of Mushrooms

**Protein:** Most mushrooms have a high protein content, usually around 20-30% by dry weight.

**Fibers:** Helps lower cholesterol and is important for the digestive system.

**Vit D:** Essential for the Absorption of calcium.

**Copper:** Aids in helping the body absorb Oxygen and create Red blood cells.

**Potassium :** An extremely mineral that regulates blood pressure and keeps cells functioning proper

## **Advantages of Mushrooms**

These are cultivated in Agro-wastes, blacksoils, Paperwastes and so on. They can be cultivated in a small space without sophisticated instruments, fermenters and complicated chemicals. Simple guidance is enough for mushroom culture.

Farmers can grow mushrooms in their own land without much skill. Mushrooms can be substituted for conventional protein sources such as Fish, Meat and Eggs. Mushroom cultivation converts Agro-wastes into a good quality manure to enrich the fertility of the soil.

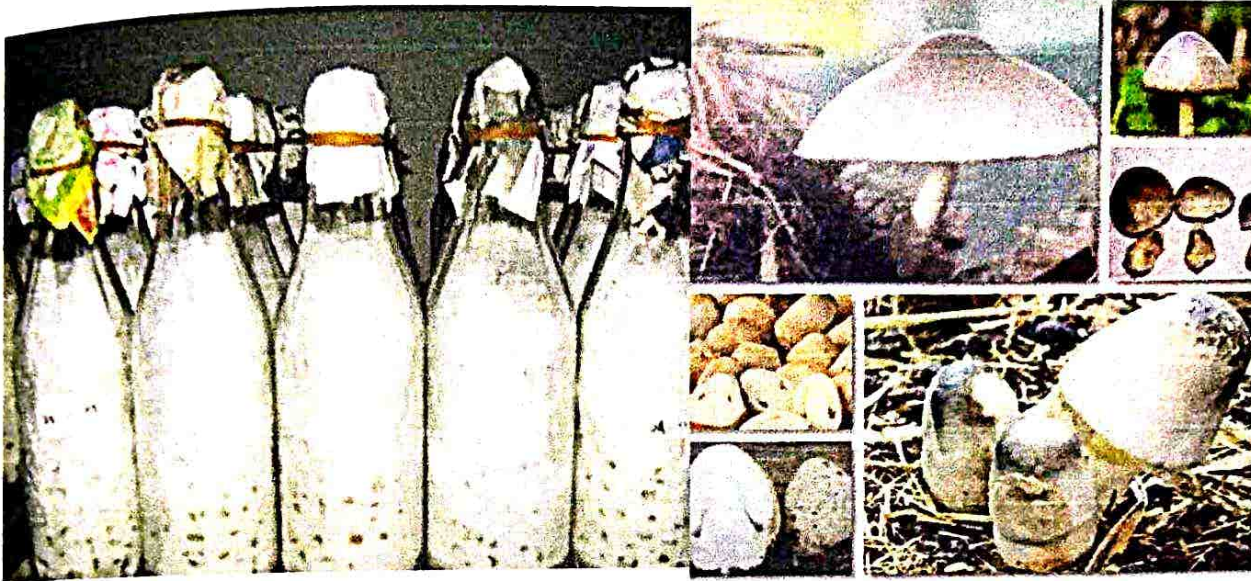
## **CULTIVATION OF MUSHROOMS**

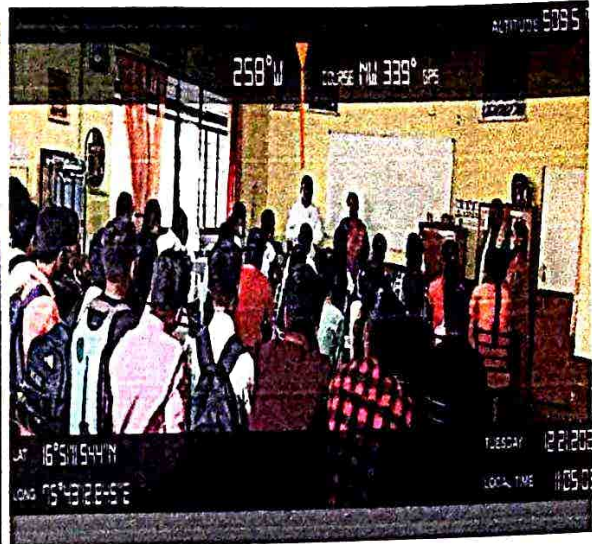
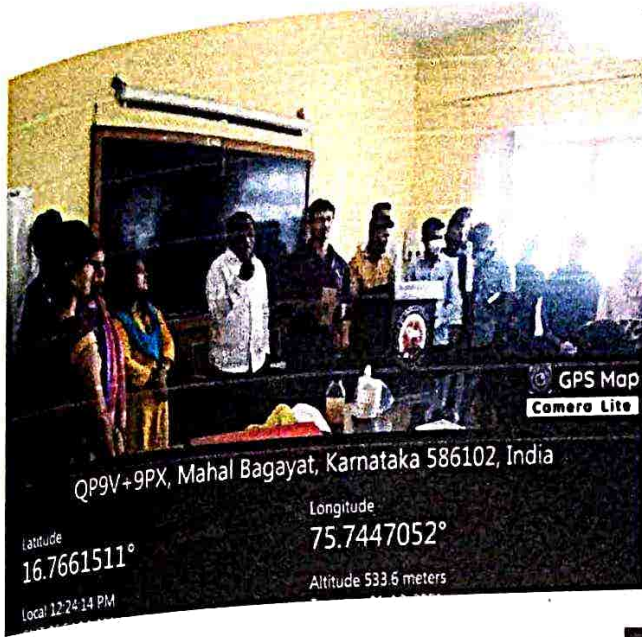
**Spawn:** it is a seed of Mushrooms (Spores of mushrooms). The fungal micelia of a mushroom grown on suitable grain is called Spawn. It is used as inoculum to grow the mushroom. It is often called as seed

1. The grain such as sorgum, wheat, rice and rye are used to make spawn.
2. The seed are washed well and soaked in water over night. The grains are cooked in water until they swell but firm. The cooked grains are spread on cheese cloth in a sterile room for decanting the excess of water.
3. The grains are mixed with 2%  $\text{CaCO}_3$  powder.
4. About 200 gm of grain is filled in a glass bottles and mouth of the bottles are plugged with cotton. The bottles are Autoclaved at  $121^\circ\text{C}$  30 min and then cooled down.

5. pure mycelial growth of the mushroom or spore is Aseptically inoculated into the bottles to make spawn.

6. The bottles are incubated at 25°C for 10-20 days. During incubation the mycelium grows and infests numerous grains to form a dense growth of mycelia.






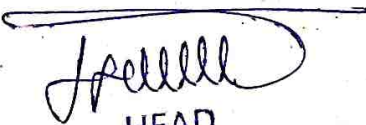
## CONCLUSION

By this study visit we gained a lots of knowledge about different kind of Micro-organisms and their important role in Agriculture, Industries And Medicinal field at the same time we have enjoyed a lot with friends.

According to me conducting this kind of tour will surely help to improve our practical knowledge and understanding about various things in detail in their own Micro-organism habitat as compared to the things we study in our lab

I am also thankful to our Botany department for organizing this study visit and accompanied us and gave us lot of information about different Micro-organisms. As this study visit being last official study visit of our HOD sir .Hope we have successfully completed and made it as memorable one

  
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**IQAC, Co-ordinator**  
S.B.Arts & K.C.P.Science College,  
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B.L.D.E. Association's

**S. B. ARTS & K.C.P. SCIENCE COLLEGE,**

Bangaramma Sajjan Campus, BLDE Road, Vijayapur - 586 103.

Re-accredited at "A" Level by NAAC

Affiliated to Rani Channamma University, Belagavi.



# STUDY TOUR REPORT ON

Visit to Agricultural College Hittanalli Vijayapur

B Sc 1<sup>st</sup> Sem Students

## Submitted By

Name: Sudeep S Bhandari

Reg.No : U15KM21S0268

## Submitted To

Department of Botany



2021-2022

B.L.D.E. Association's

S.B. ARTS & K.C.P SCIENCE COLLAGE, VIJAYAPUR



## DEPARTMENT OF BOTANY


### CERTIFICATE

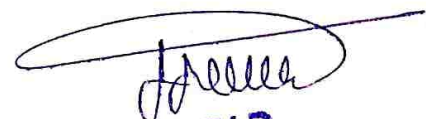
THIS IS TO CEERTIFY THAT KUMAR / KUMARI: **Sudeep S Bhandari**

STUDING IN B.SC. 1 SEM ROLL NO: 450

DURING THE YEAR 2021 - 22 HAS COMPLETED THE STUDY REPORT ENTITLED "**VISIT TO MICROBIOLOGY LABORATORY**" THE STUDY REPORT SATISFIES PARTIAL FULLFILLMENT OF THE REQUIREMENT PRESENTED IN THE CURRICULUM OF "**RANI CHANNAMMA UNIVERSITY, BELGUM**".

DATE: 22/01/22

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STAFF IN-CHARGE

  
HEAD  
Department of Botany  
S.B. Arts & K.C.P Science College  
VIJAYAPUR  
HEAD OF THE DEPARTMENT

Examiners: 1. \_\_\_\_\_

2. \_\_\_\_\_



## **Aim and Objective of the Study Visit**

AIM : To study different Micro-organisms in

Food, Air , and Water and their role in day to day life.

Objective :

1. To observe the different micro-organisms, their structure & role
2. TO know the cultivation of mushrooms.

## INTRODUCTION

### **Visit To Microbiology Laboratory Of Agriculture Collage Vijayapur**

This study visit has helped us to gain practical knowledge by learning and by observing various kinds of Equipments and Mushrooms distributed in the Microbiology laboratory.

As per the curriculum a study visit was organized for B.Sc 1 semester CBZ students .According to the plan, on 21st December 2021, we along with our lecturers / professors visited the above mentioned place

# MICROBIOLOGY

Micro-organisms and their activities are vitally important to virtually all processes on Earth. Micro-organisms matter because they affect every aspect of our lives – they are in us, on us and around us.

Microbiology is the study of all living organisms that are too small to be visible with the naked eye. This includes bacteria, archaea, viruses, fungi, prions, protozoa and algae, collectively known as 'microbes'. These microbes play key roles in nutrient cycling, biodegradation/biodeterioration, climate change, food spoilage, the cause and control of disease, and biotechnology. Thanks to their versatility, microbes can be put to work in many ways: making life-saving drugs, the manufacture of biofuels, cleaning up pollution, and producing/processing food and drink.

Microbiologists study microbes, and some of the most important discoveries that have underpinned modern society have resulted from the research of famous microbiologists, such as Jenner and his vaccine against smallpox, Fleming and the discovery of penicillin, Marshall and the identification of the link between *Helicobacter pylori* infection and stomach ulcers, and zur Hausen, who identified the link between papilloma virus and cervical cancer.

Microbiology research has been, and continues to be, central to meeting many of the current global aspirations and challenges, such as maintaining food, water and energy security for a healthy population on a habitable earth.

Father of Microbiology: Antonie Van Leeuwenhoke

# MICROBES IN SOIL

There are different types of soil microbes.

Soil micro-organisms can be classified as Bacteria, Actinomycetes, Fungi, Nematodes and Protozoa. Each of these groups has characteristics that define them and their function in soil. Up to 10 billion Bacterial cells inhabit each gram of soil in and around plant root a region known as Rhizosphere.

**Bacteria** : It is the crucial workforce of soils they are the final stage of breaking down nutrients and releasing them to the root zone for the plant. In fact the food and agriculture organization once said "Bacteria may be the most valuable of life forms in the soil".

**Ex: Bacillus, Clostridium**

**Actinomycetes** : They were once classified as fungi and act similarly in the soil. However some of them are predators and will harm the plant while other living in the soil can act as antibiotics for the plant.

**Fungi** : Like bacteria, Fungi also living in the rootzone and helps make nutrients available to plants. Ex; Mycorrhizae is a fungi that facilitate water and nutrient uptake by roots and plants to provide sugars, amino acids and other nutrients.

**Protozoa** : They are larger microbes that love to consume and be surrounded by bacteria. In fact nutrients that are eaten by bacteria are released when protozoa in turn eat the bacteria.

**Nematodes** : They are microscopic worms that live around or inside the plant. Some of them are predators while others are beneficial, eating pathogenic nematodes and secreting nutrients to the plants.

# MICROBES IN FOOD

Nature uses micro-organisms to carry out fermentation process and for thousands of years mankind has used yeast, moulds and bacteria to make food products such as bread, beer, wine, vinegar, yoghurt and cheese as well as fermented fish, meat and vegetables.

Fermentation is one of the oldest transformation and preservation techniques for food. This biological process allows not only the preservation of food but also improves its nutritional and organoleptic quality. A well conducted fermentation will favour useful flora, to the detriment of undesirable flora in order to prevent spoiling and promote taste and texture.

Ex.: E.coli, Listeria, Norovirus, Salmonella

## SERIAL DILUTION TECHNIQUE

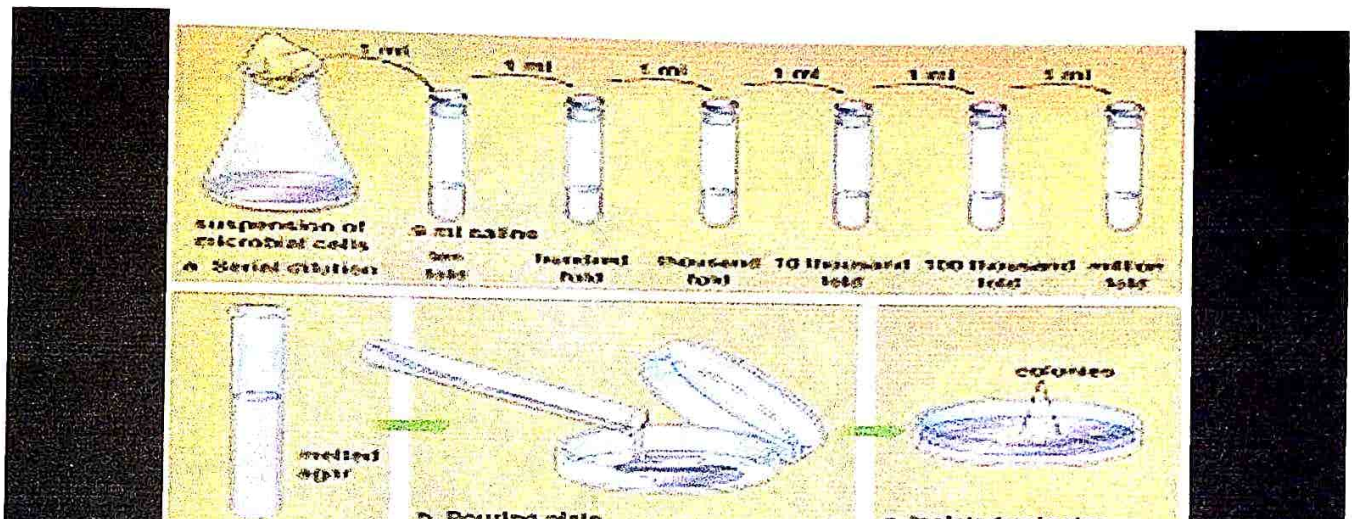
Enumeration of soil microorganisms by serial dilution technique.

Soil is a variable environment with diverse microbial community consisting of bacteria, actinomycetes, molds, yeast, algae and protozoa. It is necessary to use different types of culture media due to differences in dietary requirement for each type of microorganisms to be isolated. Culture media used the following according to the type of Microorganisms to be isolated. Enumeration of bacteria using Nutrient Agar.

Enumeration of Actinomycetes used Jensen's media, characterized Actinomycetes isolated in dishes as a dry and dusty or chalky. Also characterized dishes distinctive odor similar to odor of earth after rain.

Enumeration of Fungi used Sabouraud media. The serial dilution technique consists on evenly spreading the diluted sample over an agar plate. Using this method yields colonies that form on the surface of Agar

Make a serial dilution of micro-organisms sample in series of tubes containing distilled water. Add one gram of soil sample to first test-tube containing 9 ml of distilled water and make serial dilution from one to another tube upto 10-15 times. then put agar media in waterbath in 45 oC to liquified. Pour Melted agar in sterial petriplate. transfer one 1ml from last dilution/test-tube from micro-organism culture by pipeting and put it on the center of an Agar plate. Moist spreader with alcohol and sterilize by flaming. Spread the sample on Agar plate by spreader and sterilize it again. Incubate the plate at 37 oC for 12-24 hours. Then examine the present colonies distrubited throughout the agar.



# Mushrooms

Mushrooms are fast growing basidiomycetes fungi which produce fleshy fruit bodies or basidiocarps called mushrooms. These fungi live as saprophytes in dead organic matter in the form of a mat of intertwined hyphae. The hyphae produce white tiny balls of hyphae called buttons. The buttons consist of a short stalk and cap called pileus. The buttons get opened towards maturity and form mature fruit bodies or mushrooms.

## Types of Mushrooms

- |                 |             |
|-----------------|-------------|
| 1. White button | 2. Crimini  |
| 3. Portabella   | 4. Shiitake |
| 5. Oyster       | 6. Enoki    |
| 7. Maitake      | 8. Beech    |

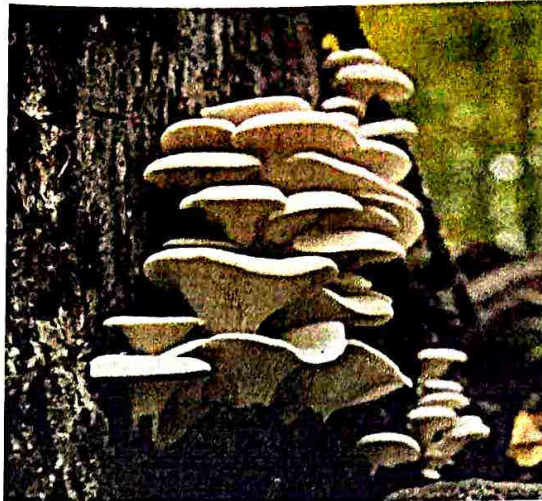
## Edible Mushrooms

Edible mushrooms are consumed by humans for their nutritional value and they are occasionally consumed for their supposed medicinal value. Edibility may be defined by absence of poisonous effects on humans and desirable taste and aroma.

Ex : *Agaricus bisporus* (White button)

Commercially cultivated mushrooms in India

- |                 |           |
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| 1. Paddy-straw  | 2. Oyster |
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## Poisonous Mushrooms

They look like edible mushrooms in their morphology and life cycle. However they can be distinguished by following features.

Brightly color fruit bodies. Greenish ting on gills and yellow-green spores. Pink colour spores in gills presence of volva and annulus on the stalk. Unpleasant odour.

EX : *Amanita phalloides*

## Nutritional value of Mushrooms

**Protein:** Most mushrooms have a high protein content, usually around 20-30% by dry weight.

**Fibers:** Helps lower cholesterol and is important for the digestive system.



**Vit D:** Essential for the Absorption of calcium.

**Copper:** Aids in helping the body absorb Oxygen and create Red blood cells.

**Potassium :** An extremely mineral that regulates blood pressure and keeps cells functioning proper

## **Advantages of Mushrooms**

These are cultivated in Agro-wastes, black soils, Paper wastes and so on. They can be cultivated in a small space without sophisticated instruments, fermenters and complicated chemicals. Simple guidance is enough for mushroom culture.

Farmers can grow mushrooms in their own land without much skill. Mushrooms can be substituted for conventional protein sources such as Fish, Meat and Eggs. Mushroom cultivation converts Agro-wastes into a good quality manure to enrich the fertility of the soil.

## **CULTIVATION OF MUSHROOMS**

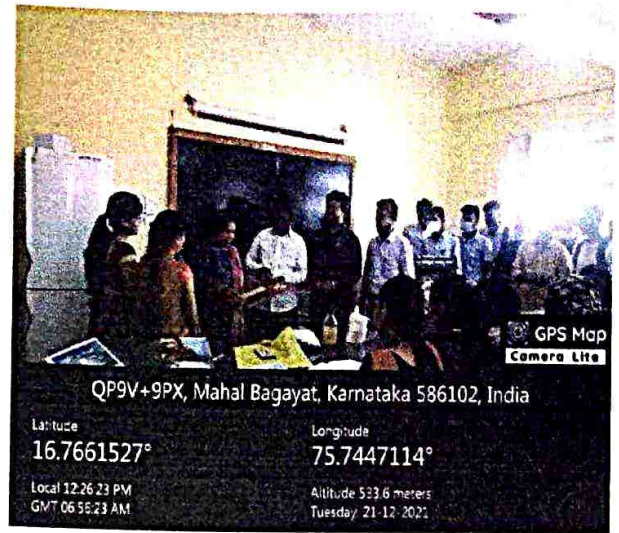
**Spawn:** it is a seed of Mushrooms (Spores of mushrooms).The fungal micelia of a mushroom grown on suitable grain is called Spawn. it is used as inoculum to grow the mushroom.it is often called as seed

1. The grain such as sorgum, wheat, rice and rye are used to make spawn.
2. The seed are washed well and soaked in water over night. The grains are cooked in water until they swell but firm. The cooked grains are spread on cheese cloth in a sterile room for decanting the excess of water.
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4. About 200 gm of grain is filled in a glass bottles and mouth of the bottles are plugged with cotton.The bottles are Autoclaved at  $121^\circ\text{C}$  30 min and then cooled down.

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6. The bottles are incubated at 25° C for 10-20 days. During incubation the mycelium grows and infests numerous grains to form a dense growth of mycelia.





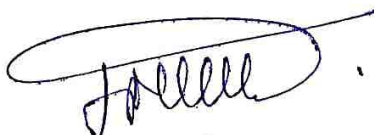
## CONCLUSION

By this study visit we gained a lots of knowledge about different kind of Micro-organisms and their important role in Agriculture, Industries And Medicinal field at the same time we have enjoyed a lot with friends.

According to me conducting this kind of tour will surely help to improve our practical knowledge and understanding about various things in detail in their own Micro-organism habitat as compared to the things we study in our lab

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Reg.No : U15KM2150449

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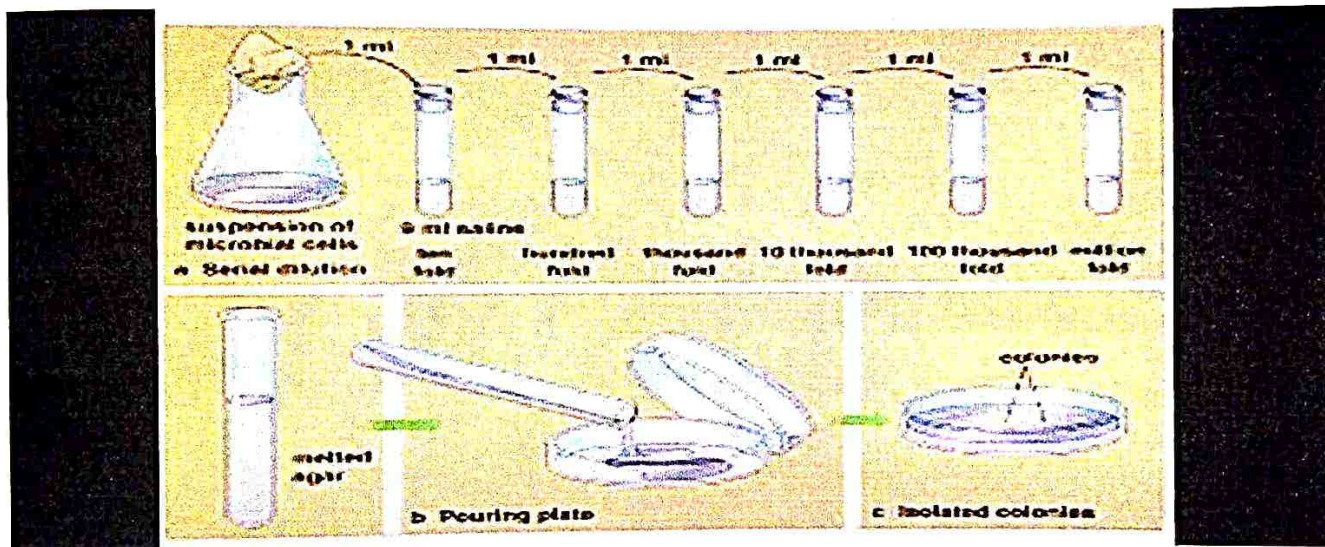
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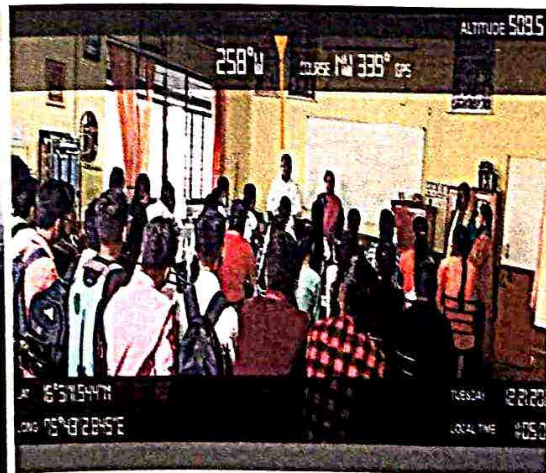
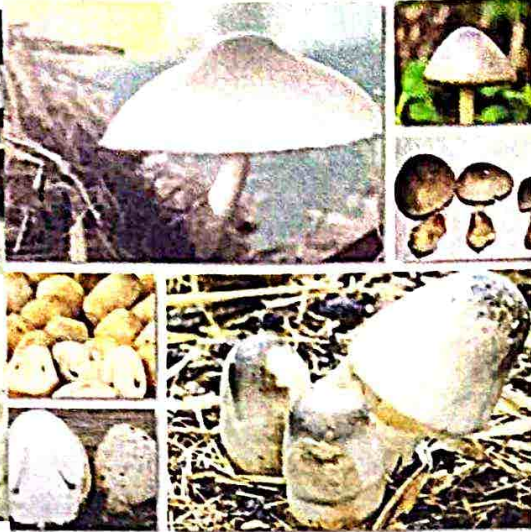
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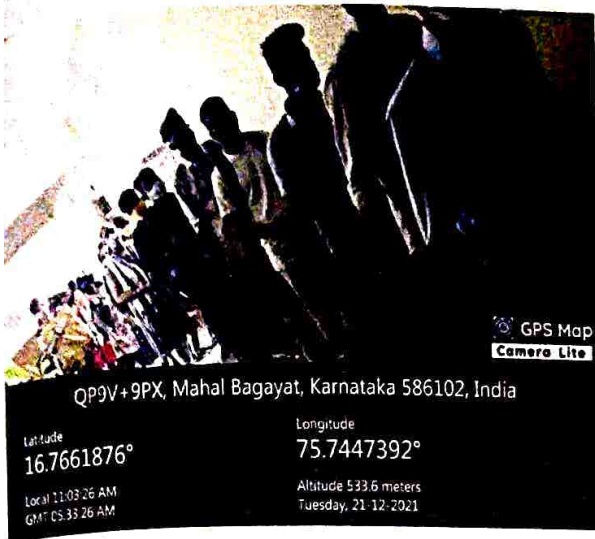
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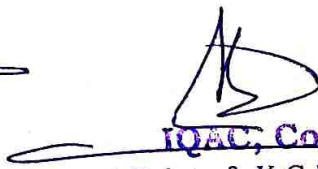
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