

A PROJECT REPORT
ON
DETERMINATION OF SEED VIABILITY AND RATE OF SEED
GERMINATION OF ECONOMICALLY IMPORTANT TREE SPECIES



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viability and rate of seed germination of some economically important tree species**” in
partial fulfillment of the award of the Degree of Bachelor of Science, Nagaland University
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Introduction

Germination and dormancy of seed :

Germination is the process by which an organism grows from a seed or similar structure. The most common example of germination is the sprouting of seedlings from a seed of an angiosperm or gymnosperm. In addition, the growth of a sporeling from a spore, such as the spore of hyphae from expanding into greater being from a small existence or a germ.

Germination is usually the growth of a plant contain within a seed; it results in the formation of seedlings, it is also the process of reactivation of metabolic machinery of the seeds resulting in the emergence of radical and plumule. The seed of a vascular plant is a small package produce in a fruit or cone after the union of male and female reproductive cells. All fully developed seeds contain an embryo and in most plant species some store food embryos; this is called empty seeds and never germinates. Dormant seeds are ripened seeds that do not germinate because they are subjected to environmental conditions that prevent the initiation of metabolic processes and cell growth. Under proper condition the seeds begin to germinate and the embryonic tissues resume growth developing towards a seedling.

Seed germination depends on both internal and external conditions. The most important factor includes right temperature, water, oxygen and air and sometimes light or darkness. Various plants require variables for successful seed germination. Often this depends on the individual seed variety and is closely linked to the ecological conditions of a plants natural habitat. For some seeds, their future germination respond is affected by environmental conditions during seed germination; most often these respond are type of seed dormancy. The rate of germination can be calculated by using the formula

$$\text{Rate of germination} = \frac{\text{total no. of seeds germinated}}{\text{total no. of seeds sown}} \times 100$$

Seed dormancy can originate in different parts of the seed, for example within the embryo; in other cases the seed case is involved. Dormancy breaking often involves changes in membrane, initiated by dormancy breaking signals. This generally occurs only within hydrated seeds. Factors affecting seed dormancy includes the presence of certain plants hormones notably abscisic acid, which inhibit germination, and gibberellins which ends seed dormancy. In brewing, barley seeds are treated with gibberellins to ensure uniform seed germination for the production of barley malt.

In forestry and agriculture, the germination rate describes how many seeds of a particular plant species, variety are likely to germinate over a given period. It is a measure of germination time course and is usually expressed in percentage. The germination rate is useful for calculating the seed requirement for a given area or desired number of plants. In seed scientist and seed physiology, germination rate is the reciprocal of time taken for the processes of germination to

complete starting from the time of sowing. On the other hand, the number of seeds that are able to completely germinate in a population is referred as germination capacity.

Viability test :

The viability of the seed accession is a measure of how seeds are alive and could develop into plants which will reproduce themselves, given the appropriate conditions. Viability will need to be determined at the start of storage and at regular intervals during storage to predict the correct time for generation of the accession.

There are many techniques to check the viability of a seed but the two most commonly used viability test is the float test and germination test.

Float test: It is the quickest method to determine the viability of the seeds. Take the seeds and put them in a glass or jar of warm water. Let them sit for 15- 20 minutes. Then if the seeds sink, they are still viable for planting; if they float, they most likely will not sprout. The float test works well only for large seeds because smaller seeds tend to float no matter what you do.

Germination test: The germination test is made under controlled and favorable conditions to find out how many seeds will germinate and produce normal seedlings which could develop into normal reproductively mature plants.

Quercus sp.

Review of literature:

Classification :

Division	: Angiosperm
Kingdom	: Plantae
Order	: Fagales
Family	: Fagaceae
Genus	: <i>Quercus sp.</i>

Description

The common name of *Quercus sp.* is Oak tree. They belong to the beech family and are broad-leaved, deciduous trees. There are approximately 600 extant species of oaks. Oak trees are considered one of the best shade trees and produce fruit in the form of acorns. They reach a mature height of 50 to 70 feet and the majority of Oak tree adapt well to a wide range of soil conditions. Oak trees are generally free from pests and disease. Through galls often appear on the leaves and stem; they are not harmful to the tree.

They are native to Europe, Asia, and Africa and they have deep roots in English culture. They are a symbol of strength and survival, and their woods are still praised for its resilience. Different species of the *Quercus* genus originated in Europe, western Asia, and northern Africa, and they later evolved into different species. Today, Oak is highly valued in the timber industry, and also offers nutritional and medicinal value.

Physiological characteristics of the oak tree :

Quercus sp. is characterized by alternate, simple, deciduous or evergreen leaves with lobed, toothed or entire margins. The male flowers are borne in pendant yellow catkins, appearing with or after the leaves. Female flowers occur on the same tree, singly or in two to many flowers spikes; each flower has a husk of overlapping scales that enlarges to hold the fruit or acorn.

Oaks can be separated into white oaks and red or black oaks. White oaks have smooth, non-bristle tip leaves, occasionally with glandular margins, their acorn mature in one season, have sweet tasting seeds, and germinate within a few days after their fall. Red or black oaks have bristle- tipped leaves, hairy line acorn shells and bitter fruits which mature at the end of the second growing season. Oak wood has a density of about 0.75 g/cm³ creating great strength and hardness. The wood is very resistant to insect and fungal attack because of its high tannin content.

Structure of acorn and physiology of germination:

The acorn consists of the seed and its enclosing fruit coat or pericarp called the shell, which is the ripened ovary wall. The pericarp is a hard, somewhat bony or coriaceous covering consisting of four tissue layers varying in thickness in the different species:

1. A cutinized epidermal layer of small cuboidal cells with their outer walls much thickened.
2. A single layer of sometimes discontinuous, thin-walled colorless parenchyma cells.
3. Several series of long thick-walled sclerotic cells.
4. Numerous layer of parenchyma cells with slightly thickened pitted walls and minute air spaces interspersed with groups of stone cells which comprise the greater part of the thickness of the acorn shell in the species of the white oak group
5. The inner epidermis, which is usually indistinct in the mature acorn, consists of a single layer of somewhat elongated cells.

The seed proper fills the cavity within the fruit coat. It consists of a very thin seed coat, or testa, and the kernel or embryo. The seed coat in most species is a light brown or yellowish membrane, consisting of only a few rows of thin-walled cuboidal parenchyma cells. The embryo in a ripped acorn is actually a developing plant. Before the mature acorn is shed from the tree the young plant already consist of the plumule .The radicle is embedded between the cotyledons near the apex of the seed at the pointed end of the acorn. The plumule lies between two thin narrow pieces of tissue which, on germination, elongate into two short stalk or petioles. The reserve food materials required by the young plant during germination are stored in the cotyledons.

Physical factors affecting germination of oak :

1. Water-needed for the seed to swell and burst open.
2. Temperature-influences the percentage and rate of seed germination.
3. Compactness of the surface soil.
4. Cover conditions such as affects of leaf litter, grass and other herbaceous or shrubby vegetation.
5. Light- stimulates germination.

Economic importance of oak :

1. Traditional use in herbalism -
 - i. Treating diarrhea
 - ii. Alleviating respiratory illness
 - iii. Relieving hemorrhoids
 - iv. Relieving skin inflammations
2. It is used for furniture making and flooring, timber frame buildings.
3. Used in making wine barrels.
4. Used as fuel wood, timber and agricultural implements.
5. The bark of the cork oak is used to produce wine stoppers.
6. The leaves are used as fodder during lean period and bedding for livestock.
7. Acorns are used for making flour or roasted for coffee.

Observation tables:

Float test :

Number of seeds subjected to float test	Number of seeds floated	Number of seeds sank	Percentage%
35	-	35	100%

Germination test :

Types of medium	Number of seed sown	Number of seed germinated	Percentage%
Soil with manure(shade)	10	9	90%
Soil without manure (direct sunlight)	10	7	70%
Soil without manure (shade)	5	4	80%
Water medium	10	1	10%
Total	35	21	60%

Calculation:

$$\begin{aligned}\text{Rate of germination in soil medium with manure (shade)} &= 9 \div 10 \times 100 \\ &= 0,9 \times 100 \\ &= 90\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in soil without manure (direct sunlight)} &= 7 \div 10 \times 100 \\ &= 0,7 \times 100 \\ &= 70\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in soil without manure (shade)} &= 4 \div 5 \times 100 \\ &= 0,8 \times 100 \\ &= 80\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in water medium} &= 1 \div 10 \times 100 \\ &= 0,1 \times 100 \\ &= 10\%\end{aligned}$$

$$\begin{aligned}\text{Overall rate of germination} &= 21 \div 35 \times 100 \\ &= 0,6 \times 100 \\ &= 60\%\end{aligned}$$

Result :

35 seeds were sown in order to determine the germination rate out of which 21 seeds germinated and the rate of germination is found to be 60%.

Photo Gallery



Soil with manure (shade)



Soil without manure (direct sunlight)



Soil without manure (shade)



Water medium

Phyllanthus emblica

Review of literature:

Classification:

Division	: Angiosperm
Kingdom	: Plantae
Class	: Eudicots
Family	: Phyllanthaceae
Genus	: <i>Phyllanthus</i>
Species	: <i>emblica</i>

Description:

It is also known as emblic or Indian gooseberry. It belongs to the family phyllanthaceae. Gooseberry is native to Europe. The species is also sparingly naturalized in scattered locations in North America. It is an edible fruit and are grown on both a commercial and domestic basis. It's native distribution is unclear since it may have escaped from cultivation and become naturalized. For example :- In Britain, some sources consider it to be native, others to be an introduction.

The plant is also found abundantly in the home gardens of Manipur, Mizoram and other Northeastern states of India.

Physiological character gooseberry tree :

The tree of gooseberry is small to medium in size which reaches 1-8 metres in height. The branchlets are not glabrous or finely pubescent, 10-20 cm long, usually deciduous. The leaves are simple, sessile and closely set along branches, light green, resembling pinnate leaves. The flowers are greenish yellow.

Structure and physiology of seed:

The fruit is nearly spherical, light greenish-yellow, quite smooth and hard on appearance with six vertical strips or furrows. The seeds are found within the hardened endocarp of the fruit known as stone. The seed do not germinate easily owing to seed coat related dormancy and the germination rate is also very poor, necessitating pre treatments before sowing. However, the seed can remain viable for a longer period under natural condition.

The taste of Indian gooseberry is sour, bitter, astringent and is quite fibrous. The berries are harvested by hand and ripens in autumn.

Physical Factors affecting germination-

1. Salinity : Soil salinity and poor quality water used to irrigate the seeds prevent germination
2. Pathogenic organisms: pathogenic organisms on the seed surface, in the germinating medium, in the irrigation water may cause low germination and rotting of seedlings.
3. Aeration: germinating seeds respire at a very high rate, thus adequate supply of oxygen is necessary for germination to take place and the seedlings to grow.

Economic importance or benefits:

1. Indian gooseberry is an important medicinal plant in the traditional Indian system of Ayurvedic medicine.
2. It helps in boosting the immune system, slowing down ageing, treating throat infections, reducing blood sugar levels and improving heart health.
3. The fruit increases vitality, aids in vision care and improves muscle tone.
4. It relieves diarrhea and dysentery.
5. It also improves appetite.

Observation tables:

Float test:

Number of seeds subjected to float test	Number of seeds floated	Number of seeds sank	Percentage%
44	4	40	90%

Germination test:

Types of medium	Number of seed sown	Number of seed germinated	Percentage%
Soil medium (shade)	20	3	15%
Water medium	20	7	35%
total	40	10	20%

Calculation:

$$\begin{aligned}\text{Rate of germination in soil medium (shade)} &= 3 \div 20 \times 100 \\ &= 0.15 \times 100 \\ &= 15\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in water medium} &= 7 \div 20 \times 100 \\ &= 0.35 \times 100 \\ &= 35\%\end{aligned}$$

$$\begin{aligned}\text{Overall rate of germination} &= 10 \div 40 \times 100 \\ &= 0.25 \times 100 \\ &= 25\%\end{aligned}$$

Result:

40 seeds were sown in order to determine the rate of germination out of which 10 germinated and the rate of germination is 25%.

Photo Gallery



Soil medium (shade)



Water medium

Cryptomeria sp.

Review of literature:

Classification :

Kingdom	: Plantae
Division	: Pinophyta
Class	: Pinopsida
Order	: Pinales
Family	: Cupressaceae
Genus	: <i>Cryptomeria sp</i>

Description :

Cryptomeria is a very large evergreen tree; it is a monotypic genus of conifer in the cypress family cupressaceae, formerly belonging to the family taxodiaceae. It is considered by some to be endemic to Japan, where it is known as sugi. The tree is also called Japanese cedar or Japanese redwood in English. It is extensively used in forestry plantation in Japan, China, and is widely cultivated as an ornamental tree in other temperate areas including Europe, North America and eastern Himalayan regions of Nepal and India.

Physiological characteristics of cedar tree :

The plant is monoecious, both female and male cones develop on different parts of the same plant. The tree is evergreen, growing up to 50 meter tall and up to 300 diameter with a conical crown and a straight, slender trunk. Bark is reddish brown to dark gray, fibrous, peeling off in strips. Branches are whorled, horizontally spreading or slightly pendulous; branchlets cm in usually pendulous, those of first year green. Shoots are green, glabrous. The leaves with their clasping bases are arranged spirally on the stem. They are linear, awl-shaped, curving inwards and keeled on both the surfaces. They are spiny with pointed tip and entire margin.

Structure and physiology of germination of the pollen cones:

A cluster of 8-18 male cones called the pollen cones arise in the axial of a bract. Generally these are terminal in position. A small male cone axis bear 18-25 microsporophylls, each microsporophyll is a peltate structure. On the lower end of the abaxial surface of each microsporophyll are present three or four microsporangia. Each female cone bears 26-30 spirally arranged scales. Out of them the upper 9 or 10 scales are small and sterile. At the distal end of each sterile scale is present 3-5 spine like structures. Except at the tip, the major part of the ovuliferous and bract scales remain fused lengthwise. The free part of the bract scales appears as a recurved process. The arrangement of the ovules is such that the micropyles point away from the excess of the female cone. The seeds are triangular or rhomboidal in shape. They are dark brown in colour. A rudimentary wing is present in each seed. The seeds prefer rich, moist, well-drained, acidic soil but are also adaptable to other soil types. It does well in conditions from sun to partial shade. This tree is resistant to damage by deer and is slightly salt tolerant.

Factors affecting seed germination :

1. 'In *Cryptomeria sp.* Germination factor is mostly affected by temperature and light.
2. Germination is adversely affected by higher temperature of 30°C, contributing to poorly germinating seeds
3. Seeds germination rate under dark conditions are higher than those observed under light conditions.
4. Soil: It also plays a major factor in affecting seed germination as it prefers to grow well in deep rich moist alluvial soil. It can even tolerate very acid to somewhat alkaline soil, but becomes chlorotic on shallow soils.
5. Climate: It is a fast growing tree in warm, moist climate but intolerant in cold and drier climates.

Economic importance :

1. The leaves are very aromatic and are used as incense sticks.
2. A fairly wind – tolerant tree, it can be used in shelterbelt plantings.
3. The wood is strongly rot resistant, easily worked, and is used for buildings, bridges, ships, lamp posts, furniture, utensils and paper manufacture.
4. Old wood that has been buried in the soil turns a dark green and is then much esteemed.
5. Oil or resin from the plant is depurative and also used in the treatment of gonorrhoea.

Observation tables:

Float test:

Number of seeds subjected to float test	Number of seeds floated	Number of seeds sank	Percentage%
100	40	60	60%

Germination test:

Types on medium	Number of seed sown	Number of seed germinated	Percentage%
Soil medium (direct sunlight)	20	18	90%
Soil medium (shade)	20	15	75%
Water medium	20	15	75%
Total	60	48	80%

Calculation :

$$\begin{aligned}\text{Rate of germination in soil medium (direct sunlight)} &= 18 \div 20 \times 100 \\ &= 0.9 \times 100 \\ &= 90\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in soil medium (shade)} &= 15 \div 20 \times 100 \\ &= 0.75 \times 100 \\ &= 75\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in water medium} &= 15 \div 20 \times 100 \\ &= 0.75 \times 100 \\ &= 75\%\end{aligned}$$

$$\begin{aligned}\text{Overall rate of germination} &= 48 \div 60 \times 100 \\ &= 0.8 \times 100 \\ &= 80\%\end{aligned}$$

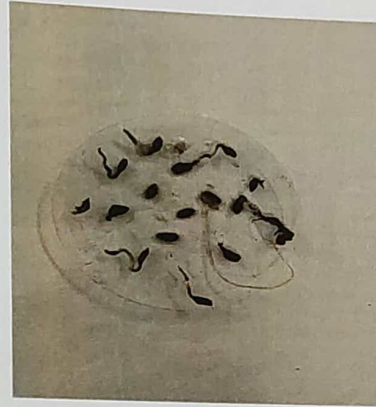
Result:

60 seeds were sown in order to determine the rate of germination out of which 48 germinated. The rate of germination is 80%.

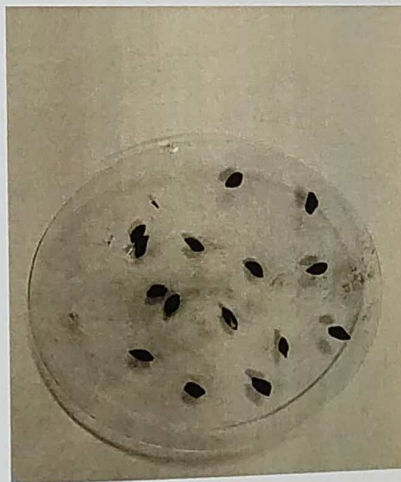
Photo Gallery



Soil medium (direct sunlight)



Soil medium (shade)



Water medium

Thuja sp.

Classification:

Kingdom	: Plantae
Class	: Pinopsida
Family	: Cupressaceae
Genus	: <i>Thuja sp.</i>

Description :

Thuja sp., commonly known as Arbor Vitae or White Cedar, is indigenous to Eastern North America and is grown in Europe as an ornamental tree. *Thuja* are evergreen conifers, or cone-bearing trees. The name "*Thuja*" was given to this group of trees by the Swedish botanist Linnaeus in 1753; it comes from Greek word *thuo*, which means "to sacrifice", as Cedar wood was often burned with animal sacrifices by the ancients to add a pleasing aroma to the fire. The plant was first identified as a remedy by Native Indians in Canada during a 16th century expedition and was found to prove effective in the treatment of weakness from scurvy.

Physiological characters of *Thuja* :

Thuja are evergreen, small and slow-growing trees, reaching 50-65 feet (15-20m) in height, with a trunk about 20 inches (0.5m) in diameter. Extremely old trees can reach 100 feet in height with a spread of 75-80 inches in diameter and may grow multiple trunks with stringy-textured reddish-brown bark. The shoots are flat, with side shoots only in a single plane, branchlets in fan-shaped, flattened spray. The leaves are oblique, flattened scale like 1-10 mm long, except young seedlings in their first year, which have needle-like leaves. The scale leaves are arranged in alternating decussate pairs in four rows along the twigs.

Physiological structure of the cone-

Cones of *Thuja* consist of 3-4 decussate pairs of cone scales, preceded by 1-2 pairs of which is formed by the tip of the cone axis and an incompletely developed pair of cone scales. Usually three of the ovules of the basal fertile cone scale are developed earlier as the distal ones. In smaller cones only two. The number of ovules develop in the axils of the basal cone scales, in smaller cone only two. The number of ovules per cone scale decreases in the more distal scales. If three ovules are developed in a row, the outer ones develop first (centripetal). The development of a second row of ovules is found in some young plants of *Thuja koraiensis*.

At pollination time, cones are slightly downwards pointed. After pollination they change the position significantly and turn about 90 degrees in an upright position. Mature cones are elongated and ovate, with a tiny prickle on the abaxial side in distal parts of the cone scales. The cone scales do not get as strongly lignified but they are leathery and remain more or less flexible.

The cones ripen in pairs of scale that are about 3/8 inch and end in a hooked point. The cone split open at maturity, allowing two wingless seeds about 1/8 inch to fall out. Old open

cones remain on the tree at least a few months. The seed cones produce 1 to 3 seed per scale, the seeds are lenticular in shape and equally two winged. Seedlings produce two cotyledons.

Factors affecting in germination-

1. Water stress:

Water is required for germination. The seed of *Thuja* needs enough water to moisten the seed which leads to the swelling and the breaking of the seed coat.

2. Salinity:

Soil salinity and poor quality water used to irrigate the seed beds often retard or prevent germination. Salinity problems become severe when germination medium is lightly and frequently watered.

3. Temperature:

Moderate warmth is necessary for the seed germination of *Thuja*. The optimum temperature for *Thuja* seed is around 25-30C.

Economic importance or benefits:

1. They are widely grown as ornamental trees and extensively used for hedges.
2. The wood of *Thuja plicata* is commonly used for guitar sound boards.
3. *Thuja* is used for respiratory tract infections such as bronchitis, bacterial skin infections and cold sores.
4. It is used in traditional herbal medicine to remove warts on the hands and feet.
5. It is used as an ointment for treatment of ringworm and thrush.

Observation tables:

Float test:

Number of seed subjected to float test	Number of seed floated	Number of seed sank	Percentage
358	268	90	25%

Germination test :

Types of medium	Number of seed sown	Number of seed germinated	Percentage%
Soil medium (direct sunlight)	30	8	26%
Soil medium (shade)	30	5	16%
Water medium	30	12	40%
Total	90	25	27%

Calculation:

$$\begin{aligned}\text{Rate of germination in soil medium (direct sunlight)} &= 8 \div 30 \times 100 \\ &= 0.26 \times 100 \\ &= 26\%\end{aligned}$$

$$\begin{aligned}\text{Rate of germination in soil medium (shade)} &= 5 \div 30 \times 100 \\ &= 0.16 \times 100 \\ &= 16\%\end{aligned}$$

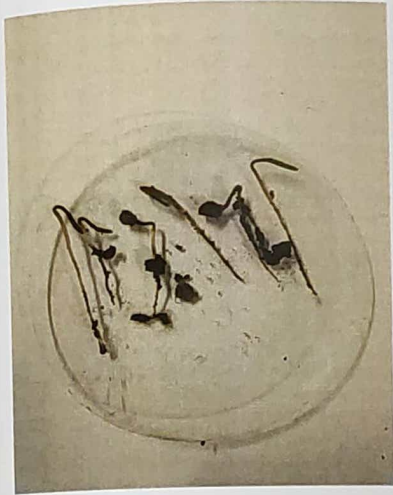
$$\begin{aligned}\text{Rate of germination in water medium} &= 12 \div 30 \times 100 \\ &= 0.4 \times 100 \\ &= 40\%\end{aligned}$$

$$\begin{aligned}\text{Overall rate of germination} &= 25 \div 90 \times 100 \\ &= 0.27 \times 100 \\ &= 27\%\end{aligned}$$

Result:

90 seeds were sown in order to determine the rate of germination out of which 25 germinated and the rate of germination is 27%.

Photo Gallery



Soil medium (direct sunlight)



Soil medium (shade)



Water medium

Procedure

Quercus sp.

1. The matured seeds are collected either directly from the parent or from those found detached and fallen around the plant.
2. Seeds are removed from the seed cupules and they are subjected to float test. The viable seeds are soaked in water for 24 hours. This is done to ensure high success rate of germination.
3. Preparation of nutrient medium – two pots of soil without manure, one pot with manure (cow dung) and one jar of water medium just enough to cover all the seeds is prepared.
4. The seeds are sown in each of the nutrient medium, it must be noted that the seeds should not be sown very deeply. The pot without the manure is placed under direct sunlight while the rest of the medium are placed in shade. The water medium used must be changed regularly. The seeds should be kept constantly moist.
5. The seeds were then monitored everyday to see any sign of germination.

Phyllanthus emblica

1. The matured seeds are collected directly from the parent or from those found detached and fallen around the parent plant.
2. The seeds are separated from the edible part and the hardened endocarp also called the stone. The separated seeds are subjected to float test.
3. The viable seeds are soaked in water for 24 hours.
4. The seeds separately are sown in soil medium and water medium and placed in shade.
5. The seeds were then monitored everyday to see any sign of germination.

Cryptomeria sp. and Thuja sp.

1. The matured seeds are collected and subjected to float test.
2. The viable seeds are soaked in water for 24 hours
3. The seeds are then sown in soil and water medium.
4. One pot with soil is placed in direct sunlight and the other pots are placed in shade.
5. The seeds were then monitored everyday to see any sign of germination.

Comparative chart

Tabulation for germination of seeds under different environmental conditions:

Sl. No.	Name of the species	Total no. of seeds sown	Number of seeds germinated in different nutrient medium			
			Soil with manure (in shade)	Soil without manure (in shade)	Soil without manure (direct sunlight)	Water medium
1	<i>Quercus sp.</i>	35	7/10	4/5	9/10	1/10
2	<i>Phyllanthus emblica</i>	40	-	3/20	-	7/20
3	<i>Cryptomeria sp.</i>	60	-	15/20	18/20	15/20
4	<i>Thuja sp.</i>	90	-	8/30	5/30	12/30

Tabulation for overall rate of germination :

Sl. No.	Species	Total no. of seeds sown	Total no. of seeds germinated	Rate of germination
1.	<i>Quercus sp.</i>	35	21	60%
2.	<i>Phyllanthus emblica</i>	40	10	25%
3.	<i>Cryptomeria sp.</i>	60	48	80%
4.	<i>Thuja sp.</i>	90	25	27%

Conclusion

Germination is one of the most important criteria of seed quality, because it affects establishment and therefore the yield and quality of the future harvest. It is a complex physiological mechanism. It has been studied for many years and more and more studies are being conducted at the molecular level in order to more fully understand the succession of events leading to germination. Depending on the species, mechanisms are more or less complex due to many factors influencing seed production, seed dormancy, and seed health quality and storage ability.

From the experiment conducted we have found out that the rate of germination for the plants *Quercus sp.*, *Phyllanthus emblica*, *Cryptomeria sp.*, and *Thuja sp.* is 60%, 25%, 80%, 27% respectively. Although majority of the seed germinated, some failed to germinate maybe due to some of the following factors:

- Temperature- extremely low or cold temperature is not favorable for seed germination.
- Water or moisture-dry seeds does not germinate when the soil are not kept moist.
- Soil-during growth the seeds requires mineral element for further growth which is obtained from the soil.

It has been observed that the rate of germination in *Quercus sp.* is highest in soil with manure as well as without manure when kept in shade as compared to other nutrient medium because shade provides a better ability for the soil to retain moisture, which is one of the most important factors for germination.

The rate of germination in *Phyllanthus emblica* is higher in water medium as compared to soil medium. The seed coat in *Phyllanthus emblica* is comparatively very thin and this result in the easy breakage of the seed dormancy under high moisture condition as in water medium, on the other hand the moisture content in soil is lower though enough.

The rate of germination in *Cryptomeria sp.* is highest in soil medium kept under direct sunlight compared to other nutrient medium. This result is however fluctuating from the expected result i.e., shade condition. This may be due to change in external environmental conditions such as climate.

The rate of germination in *Thuja sp.* is highest in water medium compared to other nutrient medium which is a result of smaller seed and higher moisture content of the medium.

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NAME OF THE ACTIVITY: Innovative undertaking on mushroom spawn cultivation

DATE: 25th April, 2022

VENUE: Botany Lab, Science Block.

1. PARTICIPANTS DETAILS:

PARTICIPANTS DETAILS		TOTAL NUMBER OF PARTICIPANTS
NUMBER OF MALE PARTICIPANTS	NUMBER OF FEMALE PARTICIPANTS	48
28	20	

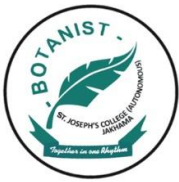
2. NAME OF THE TEACHER IN CHARGE: Dr. THEJASENUO JULIA KIRHA

3. OBJECTIVE OF THE PROGRAM:

- To enable students to develop skills and acquaint themselves with the techniques involved in production of mushroom spawns.
- To enable the students to explore the vast potentials of mushroom cultivation for future income generation and employment.

4. OUTCOME OF THE PROGRAM:

- The students learnt the detailed process of mushroom spawn preparation.
- They could also identify the numerous prospects of mushroom cultivation in the food industry as well as to take it up as a career option in the future.



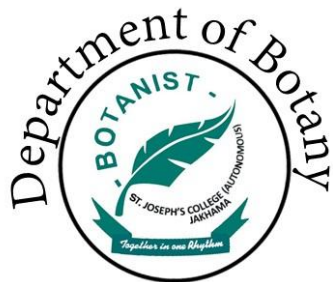
DEPARTMENT OF BOTANY
ST. JOSEPH'S COLLEGE (AUTONOMOUS),
JAKHAMA, NAGALAND

Email: deptofbotsjac@gmail.com
Phone: 8731065074



St. Joseph's College (A), Jakhama

INNOVATION



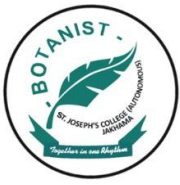
Mushroom Spawn Production



Zakhama, Nagaland, India
H4JF+2P7, Zakhama, Nagaland 797005, India
Lat 25.580125°
Long 94.124636°
25/04/22 01:15 PM



Zakhama, Nagaland, India
H4JF+2P7, Zakhama, Nagaland 797005, India
Lat 25.58013°
Long 94.124643°
25/04/22 01:13 PM



Mushroom Spawn Cultivation

An Innovative undertaking on Mushroom Spawn production by the Department of Botany

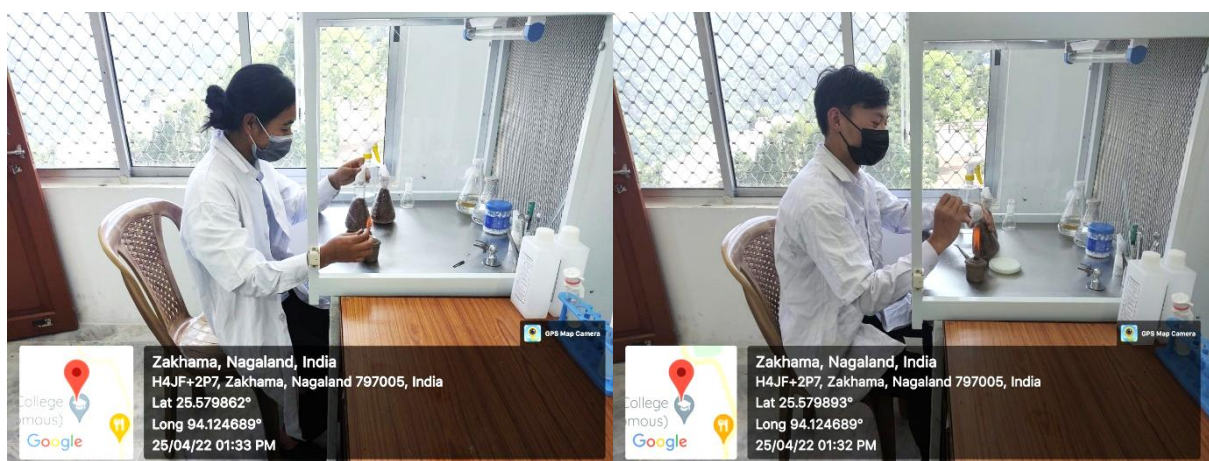
Mushroom cultivation, an environmentally friendly farming has played an integral part in agriculture. Being one of the ideal food items, mushroom needs to be explored for its impact in the economy, medicinal and nutritional properties and in the maintenance of health. There are about 2000 species of mushroom and only a small percent has been exploited the world over. Role of mushroom in sustainability and food security makes mushroom cultivation an important area to be discussed and practiced in a large scale.

Oyster Mushroom

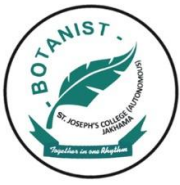
The *Pleurotus* spp. derives their name due to the oyster-like shape. It has a wide range of temperature adaptability making it resilient to climatic conditions and therefore, available almost round the year.

Spawn production

Spawn comprises of mycelia of the fungus profusely multiplying on a substrate such as wheat or paddy grains. For the production of good quality spawn, supplies such as paddy grains, sterile laboratory conditions with laminar air flow and storage temperature of about $25\pm 2^{\circ}\text{C}$ were taken into considerations to avoid any contamination.



Students inoculating mycelium from pure culture media

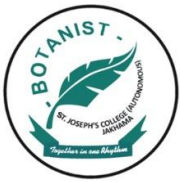


Pure culture preparation

Pure culture of Oyster mushroom was obtained using Potato Dextrose Agar (PDA) media. The mycelia plug is placed on the petri plates containing the media and incubated at a temperature of $25\pm 2^{\circ}\text{C}$. In about a week or two mycelium is observed on the entire surface of the media ready to be inoculated.

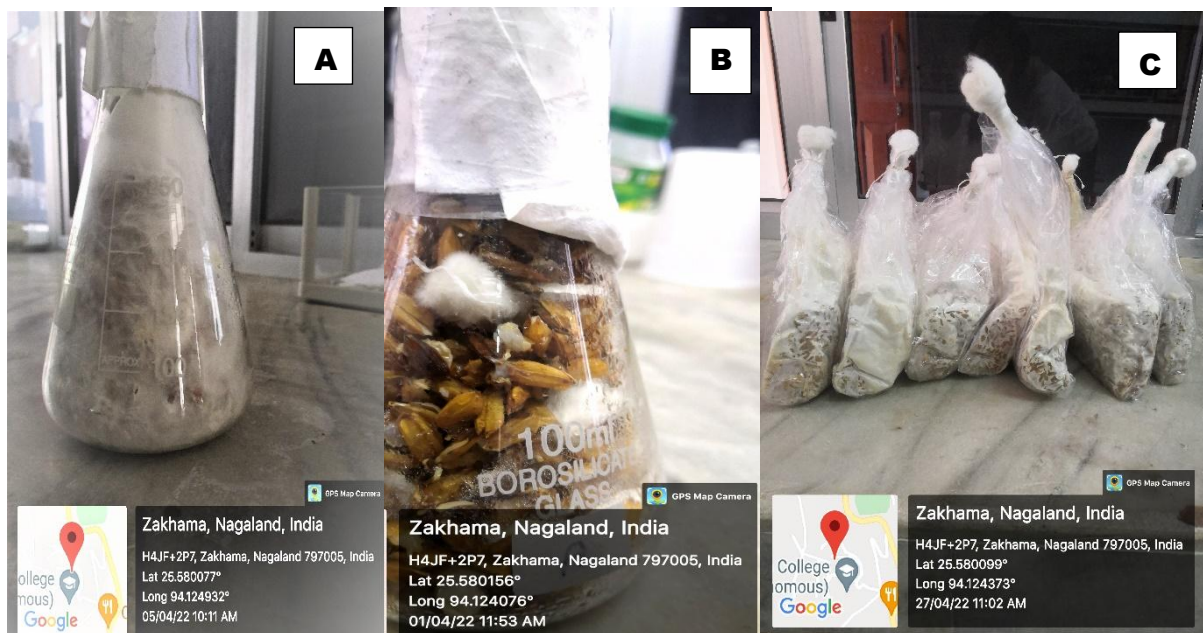


Mycelium growth of Oyster mushroom in PDA media

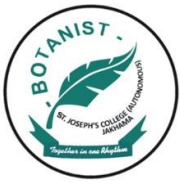


Spawn preparations

Paddy grains as a suitable substrate is washed and pressurized to open the husk grains. After excess water is drained, about 20g of calcium carbonate (CaCO_3) is mixed with per kg of grains to increase the pH suitable for the rapid growth of spawn. The mixture of about 200g is filled in a polypropylene bag and plugged with cotton plugs, autoclave for about 1 or 2 hours. Once the polypropylene bags were cooled, mycelium from pure culture media and tissue taken aseptically from the stalk were inoculated inside the laminar air flow and stored in a dark room. Mycelium were observed in about a week.



A. Mycelium observed in paddy grain. B. Tissue culture. C. Spawn of Oyster mushroom.



PROSPECT

The opportunities mushroom cultivation holds can open ample doors for the benefit of people in need of employment and people in general. As food demand increases, mushroom cultivation can decrease burden on other food produce due to its inexpensive and easy availability of requirements needed for cultivation. For the health conscious, it serves as a great dietary food. The medicinal and nutritional properties can be explored creating more avenues. Production of good quality spawn in itself is a promising endeavor, which is the key factor for the success of mushroom cultivation.



Julia

Dr. Thejasenuo Julia Kirha
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Angela

Ms. Neithongunuo Angela Belho
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Report on the Field trip to Kaziranga National Park, Assam

Name of the Paper ; Natural Resource Management

Paper code ; BTD 5.4

Submitted by,

Hakkhumla

19BOT011

B.Sc 5th Semester

Botany Department

St.Joseph's College(A),Jakhama

Submitted to,

Miss.Angela Belho

Head of the Deptment(HOD)

Botany Department

St.Joseph's College(A),Jakhama

CERTIFICATE



This is to certify "Hakkhumla (19BOT011)" of B.Sc 5th Semester, Botany department that she has successfully completed her Botany(BTD 5.4) Field Report on their field trip to Kaziranga National Park, Golaghat, Assam dated 14th October to 16th October 2021, under the guidance of Miss. Neithongunuo Angela Belho, Head of the Department(HOD), Botany Department, St. Joseph's College(A), Jakhama.

Hakkhumla
08/11/21
(Student's signature)

Hakkhumla
19BOT011
B.Sc 5th sem

Angela
21/11/21
(Teacher's signature)
H.O.D.
Dept. of Botany
St. Joseph's College, Jakhama

Miss. Neithongunuo Angela Belho
Head of the Department(HOD)
Botany Department

Peter Solo
18/11/21
(Signature of Dean of Science)

Fr. Peter Solo
Dean
St. Joseph's College (Autonomous)
Jakhama : Nagaland

ACKNOWLEDGEMENT

In the accomplishment of this report successfully, many people have best owned upon me their support, guidance and time. I am utilizing this time to thank all the people who have been concerned with this field work.

Primarily i would like to express my deep sense of thanks to my subject teacher, Miss. Neithongunuo Angela Belho, Head of the Department (HOD), Botany Department SJC(A) Jakhama, for her enormous guidance and instruction, which has sustained my efforts in the completion of this report. I also would like to thank our Assistant professors, Dr. Thejasenuo Julia Kirha and Miss. Asha Kumari Singh and Sir. Antidong from Physics department for supporting and guiding us immensely throughout the field trip.

Through this column, i extend my heartfelt gratitude to our guides who imparted us the information and showed us the beauties and richness and diversity of Kaziranga National Park.

Although, this Report has been prepared with utmost care and deep routed interest, even then i accept respondent and imperfection .

Hakkhumla

19BOT011

B.Sc 5th Semester

Botany Department

St. Joseph's College(A), Jakhama

Table of contents;

1	Objectives
2	Introduction
3	Kaziranga National Orchid and Biodiversity Park;Dominant Flora
4	Photo gallery
5	Kaziranga National Park;Dominant Fauna
6	Conclusion

OBJECTIVE OF THE FIELD TRIP

The main objective of this field trip was to impart our knowledge further about the environment through experience and interaction with the environment physically and to grasp a clearer picture of what we have been studying.

The need for the study is that at the current scenario, most biodiversity rich areas are being exploited and it has become a necessity to understand the system and element present moreover to identify the flora and fauna species and put it on record. Through this field trip we learn that nature has indeed much to offer us, it just depends on how we look at it.

INTRODUCTION

Kaziranga National Park lies partly in Golaghat District and partly in Nagaon District of Assam. It is the oldest park in Assam covers an area of 430 Sq kms along the river Brahmaputra on the North and the Karbi Anglong hills on the South. The National Highway 37 passes through the park area and tea estates, hemmed by table-top tea bushes. One can even see the rhinos and wild elephants straying near the highway.

Kaziranga National Park a world heritage site is famous for the Great Indian one horned rhinoceros, the landscape of Kaziranga is of sheer forest, tall elephant grass, rugged reeds, marshes & shallow pools. It has been declared as National Park in 1974. Kaziranga National Park is one of the last areas in eastern India undisturbed by a human presence. It is inhabited by the world's largest population of one-horned rhinoceroses, as well as many mammals, including tigers, elephants, panthers and bears, and thousands of birds

Kaziranga National Park is solitary among the foremost national parks in the earth and also famous as the pleasure of the North East India. Situated in the intense geographical place, the park presents a massive range of natural beauty. Kaziranga national park is located fairly in the Golaghat and Nagaon regions of Assam in India. It is also placed beside the Brahmaputra River on the North and the Karbi Anglong mounts on the South India. Edged by fertile tea bushes, Kaziranga National Park offers a splendid scenic sight. Kaziranga National Park is the abode of 37 highways which is passes through the park.

Further , it is a mixture of natural world view such as Rhino, elephants, wild water buffalo, and swamp deer with Important Bird Area by Birdlife International for conservation of avifaunal species.

The past of Kaziranga national park The kaziranga national park, in the starting of 19th century was not well placed and well-known for wildlife animals, frequent floods. The remarkable modifications were drowned by Brahmaputra River. The title Kaziranga adopts its name to Karbi, which is the name of a woman who ruled here in ancient time. The title Kaziranga adopts its name to Karbi, which is the name of a woman who ruled here in ancient time. Geographical vicinity of the park Kaziranga National Park place is a heaven for nature's fan. It has different biological biomixture of worldwide value. It is the ancient park in Assam which wraps a vast region of 430 Sq km.

Kaziranga National Orchid and Biodiversity Park; Dominant Flora

During our visit to Kaziranga National Orchid and Biodiversity Park on 15th October 2020, we observed that the park is very well maintained and has different sections exhibiting nature and Assamese culture. A dedicated area displaying a large variety of Orchids explained by a guide, a nature walk, a museum displaying artefacts and products of daily use in Assamese lifestyle and culture and live Assamese dance programmes.

As soon as you enter, you are welcomed with the fresh fragrance of Orchids. We had a guided tour of the orchids which are the State Flower of Assam and Meghalaya. The guide introduced us to many varieties of Orchids, some examples are ;

1. *Taeniophyllum glandulosum* ; This is the world's smallest known orchid. The plant is just 2.1 mm wide. Since mini orchids are more compact than their full-size counterpart, they often have smaller blooms, though these blooms retain a vibrant color equal to that of larger orchid blooms.



2. *Vanilla planifolia*; The word Vanilla, derived from the diminutive of the Spanish word Vaina meaning Sheath or Pod, simply translates as little pod. The flowers are self-fertile but need pollinators to perform this task. Hand pollination is the most reliable method in commercially grown vanilla. It is the only orchid widely used for industrial purposes in flavouring such products as foods, beverages and cosmetics.



3. *Dentrobium bracteosum*; This species orchid has a bloom duration of 4-6 months and can bloom from the spring to autumn. These plants make dense clusters of bright pink flowers twice a year.



4. *Tacca chantrieri* (Black bat flower or Cat's whiskers); These flowers are bat-shaped and are up to 12 inches across and have long whiskers that can grow up to 28 inches. This species has been thought to be pollinated by flies seeking decaying organic matter. This hypothesis was tested for *T. chantrieri*, but the populations studied were found to be self-pollinating.



Other than the above mentioned orchid plants, we also observed several other orchids like *Brassia caudate* (Spider orchid flower), Venus flytrap, Dancing lady orchid, and many more.

Photo gallery of some Orchids;



Some Ancient tools used by locals from different parts of North Eastern's States.



Kaziranga National Park; Dominant Fauna



The sanctuary, which hosts two-thirds of the world's great one-horned rhinoceroses, is a World Heritage Site. According to the census held in March 2018 which was jointly conducted by the Forest Department of the Government of Assam and some recognized wildlife NGOs, the rhino population in Kaziranga National Park is 2,413. It comprises 1,641 adult rhinos ,387 sub-adults and 385 calves.

Kaziranga has been the target of several natural and man-made calamities in recent decades. Floods caused by the overflow of the river Brahmaputra, leading to significant losses of animal life. Encroachment by people along the periphery has also led to a diminished forest cover and a loss of habitat.

Kaziranga contains significant breeding populations of 35 mammalian species, of which 15 are threatened as per the IUCN Red List. The park has the distinction of being home to the world's largest population of the Greater One-Horned Rhinoceros (2,401), wild Asiatic water buffalo (1,666) and eastern swamp deer (468). Significant populations of large herbivores include indian elephants (1,940), gaur (1300) and sambar (58). Small herbivores include wild boar, and hog deer. Kaziranga has the largest population of the Wild water buffalo anywhere accounting for about 57% of the world population. The One-Horned rhinoceros, Royal Bengal Tiger, Asian elephant, wild water buffalo and swamp deer are collectively known as 'Big Five' of Kaziranga.

Although we couldn't see all the animals during our safari ride, we were able to spot some from the distance. Eg; One-horned Rhinoceros ,White Cranes etc.



CONCLUSION

Kaziranga National Park is the name to exemplify the most popular conservation efforts to save the endangered species like one-horned Rhinoceros and many more. They primarily protect those endangered species of birds and animals and plants that are under the threat of becoming extinct.

Therefore, we conclude by saying that, "One touch of nature makes the whole world kin." So we as a member of the society, can take more efforts like creating awareness with the little knowledge we have about the need to conserve and protect our natural resources and wildlife species.



B.Sc 5th Semester, Botany Department (Batch of 2019-2022), St. Joseph's College (Autonomous), Jakhama.

ST. JOSEPH'S COLLEGE (AUTONOMOUS)

JAKHAMA,

KOHIMA; NAGALAND

BOTANICAL FIELD REPORT



SUBMITTED TO

MA'AM. ASHA KUMARI SINGH

DPT. OF BOTANY

SJC(A) JAKHAMA,

KOHIMA: NAGALAND

SUBMITTED BY

PUTUSENLA LONGCHAR

ROLL NO:20BOT042

DEPARTMENT: BOTANY

SJC(A) JAKHAMA,

KOHIMA: NAGALAND

Contents

- ❖ Certificate
- ❖ Acknowledgement
- ❖ Objectives
- ❖ Introduction
- ❖ Summary
- ❖ Study areas
- ❖ Conclusion

ST. JOSEPH'S COLLEGE (AUTONOMOUS)

JAKHAMA : NAGALAND



CERTIFICATE

Certified That This Project On
COLLECTION AND STUDY OF PLANT SPECIES IN SHILLONG
IS A BONAFIDE RECORD WORK OF

Mr/Ms. *Pitusenda Longchen* bearing Roll No. *20B07042* and registration No. *200.11.335*
of *2020* under my supervision and submitted to the department of Botany,
St. Joseph's College (Autonomous) Jakhama ; Nagaland in partial fulfilment of B.SC (Botany honours)
4th Semester Syllabus (BTC 4.2).

Date *26-03-22*

Pitusenda
(Signature of candidate)

Name of the Student

Pitusenda Longchen

Asha Singh
(Signature of Teacher)

Ma'am Asha Kumari Singh

Assistant Professor

Department of Botany

SJC (A), Jakhama

Acknowledgement.

The success and final outcome of this field trip required a lot of guidance and assistance from many people and I am extremely privileged to have got this along the completion of my field trip. All that I have done is only due to such supervisions and assistance and i would like to thank them.

I would like to express my special thanks to our tour guide for his guidance throughout the trip. His guidance has made this field trip possible.

I would like to thank our teachers Ma'am Asha and Dr. Julia Kirha whose valuable guidance and instructions has served as the major contributors for the completion of this field trip.

Lastly I would like to thank my parents and the college Management for sponsoring and supporting me.

Objectives.

- ❖ The main objective of the trip is to gain ore knowledge about plants.
- ❖ To know about the importance of herbarium and to identify the plant species and evaluate their uses.
- ❖ To conserve the plant biodiversity and to develop a positive sense towards nature.
- ❖ To identify the progress and appreciate the rich culture heritage in our region.

Introduction

Shillong , the capital of Meghalaya, is one of the most pristine and picturesque hill stations in India, it is also known as “The Abode of Clouds”. The name Shillong is derived from U-Shyllong, a powerful deity and is situated at an altitude of 1,491m above sea level. It is the headquarters of East Khasi Hills district. The British referred this state as “Scotland of the East”.

Apart from the natural beauty, Shillong also act as the gateway to Meghalaya, the state famous for heavy rainfall, tallest waterfall, beautiful landscape and amazing people and their culture.

Summary

The trip began on 3rd March in the afternoon, with a total number of 44 students along with 2 teachers and a tour guide. The journey started around 5:00pm in the afternoon and reached the Dimapur train station around 8:30pm. We departed from Dimapur in Guwahati Express 15670 around 9:30pm and reached Guwahati train station around 4:00am in the morning i.e. 4th March. From Guwahati we took bus to Shillong and reached the Hotel JK International at around 8:00am.

On the first day, we move out to the first destination Botanical Survey of India, Eastern Regional Centre (BSI) and later on visited the wards lake in the evening.

On the second day i.e. 5th March, after our lunch, we check out of the hotel and visited Cathedral, followed by Air force Museum and lastly Elephant fall after which we travelled back to Dimapur.

Study Areas.

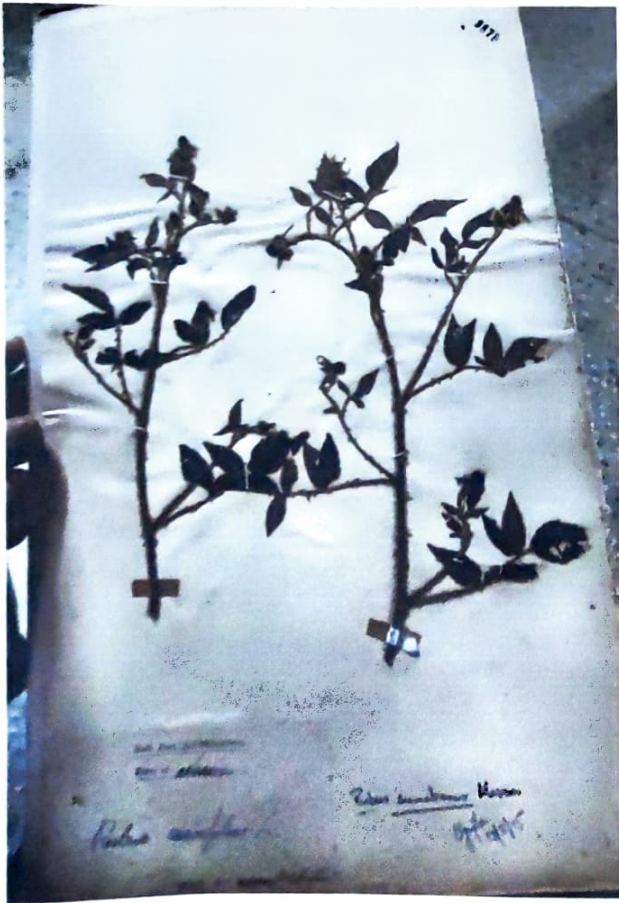
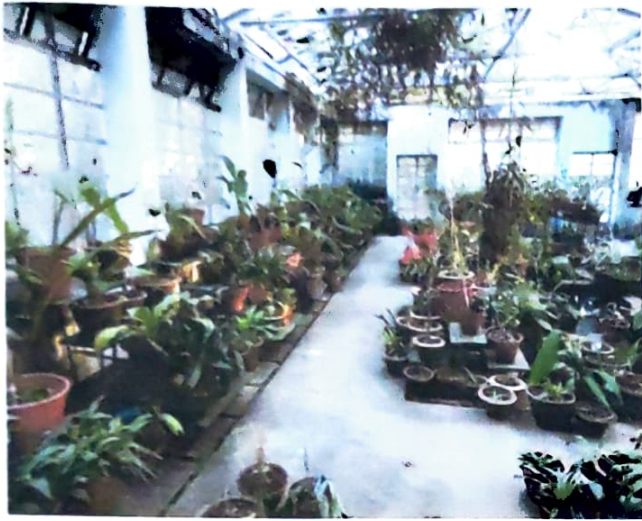
- ❖ Botanical Survey of India (BSI), Shillong
- ❖ Wards Lake, Shillong
- ❖ Cathedral of Mary Help of Christian, Shillong
- ❖ Air-force Museum, Shillong
- ❖ Elephant Fall, Shillong

GALLERY

Day1

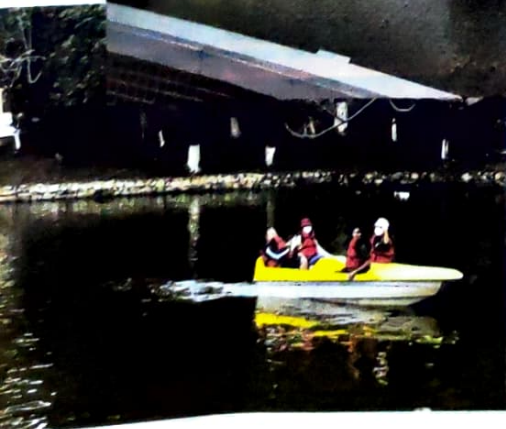
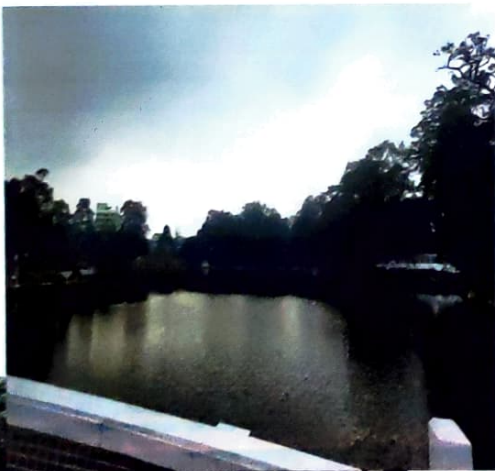
- Botanical Survey of India (BSI)







• Wards Lake



Day 2

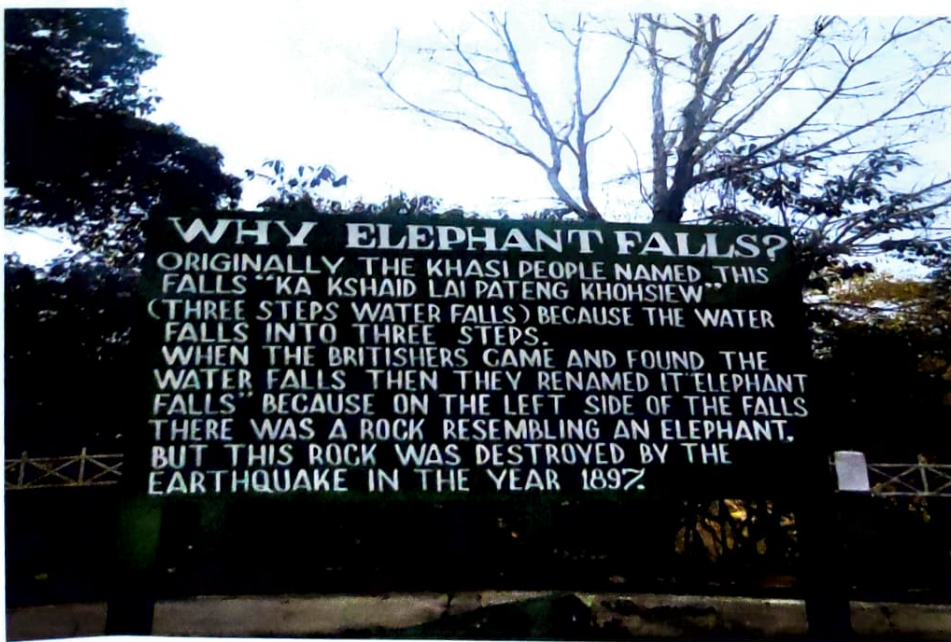
- Air-force Museum



- Cathedral of Mary Help of Christians



- **Elephant Fall**



Conclusion

Shillong, the capital city of Meghalaya is the world's wettest place. It is one of the important tourist destinations in the northeast. The weather, lakes, hills gives pleasant and true nature paradise.

Shillong, market is full of tribal art products. Be it table-top, showpieces or hanging decor etc made up of bamboo and cane, which are eco-friendly dimension. The city is very rich in biodiversity and also culture.

REPORT ON FIELD TRIP

TO

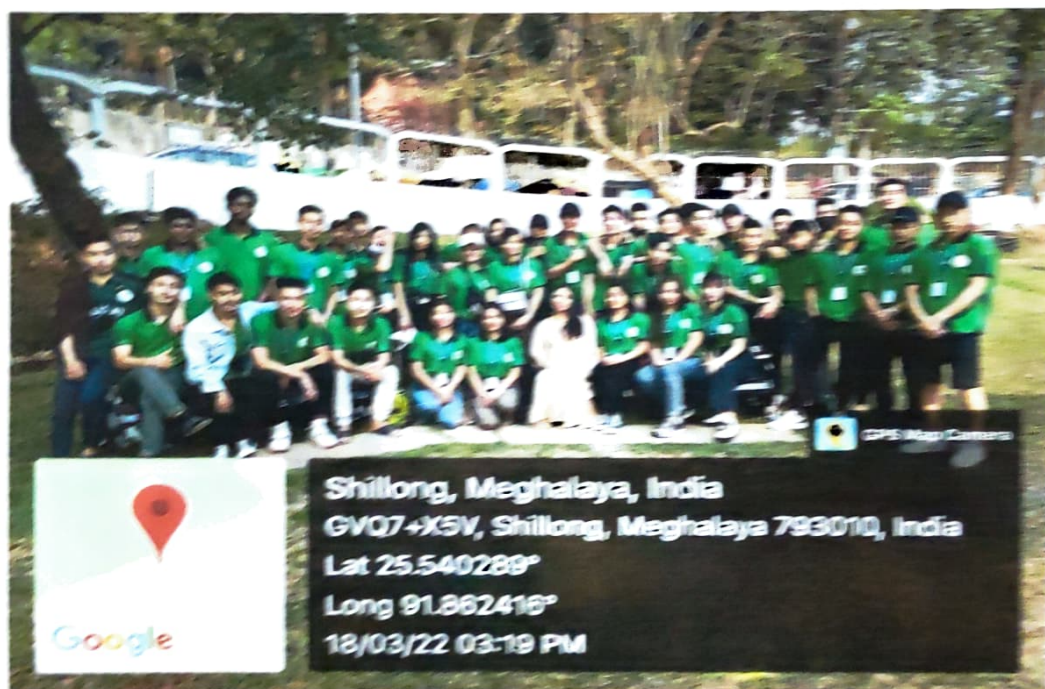
SHILLONG

(MEGHALAYA, INDIA)

DATED: 17TH -21ST MARCH 2022

ST. JOSEPH'S COLLEGE (AUTONOMOUS) JAKHAMA

PAPER NAME: HORTICULTURAL PRACTICES AND POST-HARVEST TECHNOLOGY
(ETD E3)



SUBMITTED TO:

MA'AM PAYAL BOSE

ASST. PROFESSOR

DEPT. OF BOTANY

ST. JOSEPH'S COLLEGE(A) JAKHAMA

SUBMITTED BY:

VERONICA SAZA

19BOT150

B.SC 5TH SEMESTER

DEPT. OF BOTANY

ACKNOWLEDGEMENT

Under the prescribed syllabus of St. Joseph's college(A) Jakhama, students of Bachelor in Science (6th Semester) we were required to visit field programme under the subject of Botany to broaden our educational values.

I would like to express my sincere thanks and gratitude to Department of Botany of St. Joseph's College (autonomous), Jakhama for providing such an opportunity to make our batch familiar with the different species and their uses.

I would like to thank Ma'am Payal Bose (subject teacher) asst. professor department of Botany department and Sir Imtipong Longkumar Asst. professor department of Business administration, Dr. Ramita Singh, Ma'am Bendangsangla Asst. professor department of Zoology for their support and their guidance as well as providing necessary information regarding this report and also for accompanying us through the trip.

Further I would like to express my gratitude to our college administrative for upholding the said field trip keeping the norms of the college.

OBJECTIVES

- ✓ The main objective of this field trip is to have a wide knowledge of our physical environment that surrounds us.
- ✓ It provides us better view and understanding of the nature.
- ✓ To have better idea on the information regarding the different types of plant species associated also to have a better knowledge of the particular visited area.
- ✓ To study the identification of new species and evaluate their information.
- ✓ To have a broader and wider knowledge about the particular visited area and to have a better interaction with the surroundings

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VISITED PLACES (DAY 1: 18TH MARCH)

1. WARD'S LAKE

We moved out around 2 o'clock from the hotel by foot at Ward's lake. Lying in the centre of Shillong city, the Ward's lake, an artificial lake surrounded by a prolific green gardens, is amongst the popular tourist attractions of Shillong and indeed this is the Core architectural design element around which the Shillong city has been planned. It is also known as Pollock's lake (Nan Polok). This ward's lake is named after William Ward, Chief commissioner from the British era. Fitzwilliam Thomas Pollock was famous engineer in the pre independence era who had a great role in planning/designing the lake.

Liton purchased the entry tickets and the group entered the premises of the ward's lake. There we were able to see a charming wooden bridge and grassy slopes providing a serene lakeside resting places. A stone path encircling the small lake and an immaculately maintained flower gardens. We also went for paddle boating and enjoyed the profuse beauty all around. There are big ancient trees inside the garden and other floral species.

FIELD OBSERVATION



Iberis sempervirens



Antirrhinum



Callistephus chinensis



Phlox drummondii



Pine tree

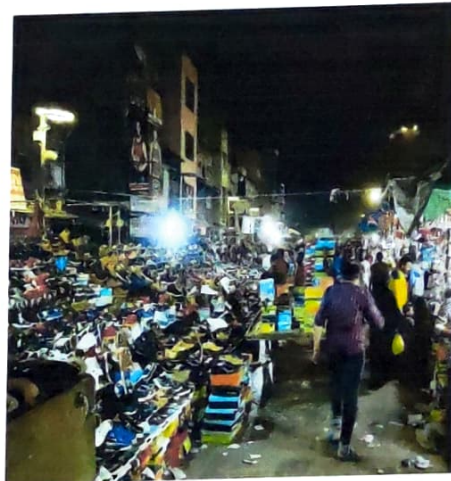


WARD'S LAKE BRIDGE



2. POLICE BAZAR

Next we visited the Police bazar which was a few minutes walk from the Ward's lake. Police bazar of Shillong is a famous shopping haunt, which is on the priority list of locals as well as tourists. It is a modern market that has a number of hotels, shops and eating joints, catering to varied needs of every visitor. The bazar was quite crowded but we could find its most vivid products and food items. This market helps in increasing the economy of the state and thus providing job to the populations.



DAY 2(19TH MARCH)

1. Mawlynnong – Asia’s cleanest village

We headed for Mawlynnong around 7:30 and reached the destination by Bus. The bus drivers took everyone on a careful ride as some parts of the roads were bumpy.

Mawlynnong, located in Meghalaya, is called “God’s own Garden”. It was awarded the title “cleanest village in Asia” by Discover India in 2003 which certainly makes it one of the most popular tourists destination in Indian state. Mawlynnong village is a community- based ecotourism initiative where the entire community made collective efforts in making and maintaining the cleanliness of the village. It was so beautiful to see how the residents of this tiny village make a collective effort of keeping the village neat and clean. The first thing we saw in the village is the parking lot for tourist vehicles which is surrounded by little shops selling curios, small and homely restaurants.



2. BALANCING ROCK, MAWLYNNONG

Next we went to see the balancing rock of Mawlynnong locally known as Maw Ryngkew Sharatia which is 1km from Mawlynnong bus stop. The balancing rock is actually a huge boulder that stands peculiar angle on another rock. How the gigantic rock support itself at such an odd angle remains a mystery. Enclosed by a wired fence, the structure has remained like that for ages and no storm or cyclone has been able to disturb the formation. Surrounded by bamboo plantations.



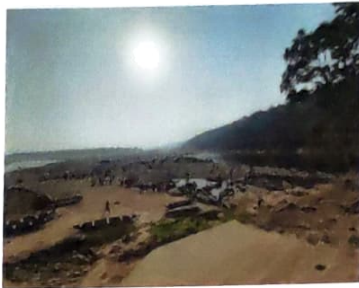
3. LIVING ROOT BRIDGE, MAWLYNNONG

Next we went to see the Living Root bridge which was close to Mawlynnong, across a busy mountain stream built by intertwining the roots of a living rubber tree. There were two large India rubber trees on opposite banks of the river have met to form the bridge. The tree-a relative of the banyan-sends out aerial roots. These roots were directed, in their slow growth over the decades, towards each other, until finally they joined to form the 30 metre long bridge.



4. DAWKI

Next we went to visit the Dawki river also known as the Umngot River. This river marks the natural separation between the Khasi and Jaintia Hills. The river can be forded by a suspension bridge that connects India to Bangladesh and facilitates trade between the two nations. Dawki lake is so clear and pristine that even rocks, pebbles and fish swimming in it can be clearly seen. The river flows into the Bangladesh through Dawki.



DAY 3 (20TH MARCH)

1. ORCHIDARIUM

We headed to orchidarium the next day 20th March.

In a major move towards enhancing the growth of eco-tourism, the Institute of Bio-Resources and Sustainable Development (IBSD) opened state-of-the-art orchidarium in Upper Shillong. The orchidarium which was constructed within a span of three months has over 20 varieties of orchids which are found in Meghalaya and its neighbouring states. There are also a variety of species of orchids which are found in full abundance in the state. Of 17,000 species of orchids in the world, about 1,250 occur in India, of which nearly 300 are found in Meghalaya.



SOME IMAGES OF ORCHID VARIETIES AND OTHER PLANT SPECIES OBSERVED



Zygonesia murasaki komachi
(hybrid)



Vanda



Cryptanthus fosterianus

Enhipopsis chamaecereus



Paphiopedilum hirsutissimum



Paphiopedilum venustum



Coelogyne flaccida



Cymbidium



Oncidium altissimum



Nepenthes

2. Air force museum

Next we went to visit one of the popular museum in Meghalaya i.e the Air force museum which is located in upper- Shillong of Meghalaya.

The Air Force Museum forms a part of the Indian Air Force's Eastern Command in Shillong. This museum is a tribute to the glorious past of the defence of our nation. It hosts aircraft models, actual machines and technology demonstrations used by the IAF Eastern Command. The museum displays the uniforms worn by the air force pilots, missiles, rockets, pictures of Indo-China War and Indo-Pakistan War, medals and miniature models of air crafts.

The huge MI 4 helicopter, played a central role in the 1971 war, is displayed in the museum lawn and makes for a remarkable sight. Another attraction is the Streak Shadow Microlight that's a part of the famous Microlight series. This splendid aircraft took its first flight in 1988. Caribou DHC 4, the fighter plane used for bombings in eastern Pakistan during the war of 1971, is the highlight of this place. The museum has a special section that houses a collection of several musical instruments. We also saw Python's skin in the museum. There was also a souvenir shop inside the complex to buy gifts.





3. Elephant fall

Next we headed to the elephant falls which is undoubtedly one of the main tourist attractions, situated just 12 km away from the state capital.

The name might suggest a water-body of elephantine proportions, but that really isn't the case. The name came up due to a rock that shared a likeness with the animal, a rock that incidentally isn't there anymore. Elephant Falls is more a collection of numerous falls that finally flow into a small lake, a series that you can walk along as you trace the flow of the water. Aided and abetted by the greenery of the Khasi Hills, where it is located, the Falls make for a lovely walk while being serenaded by the sound of the gushing and falling water.

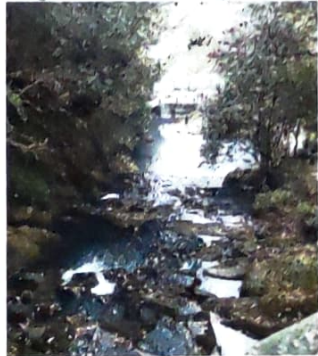
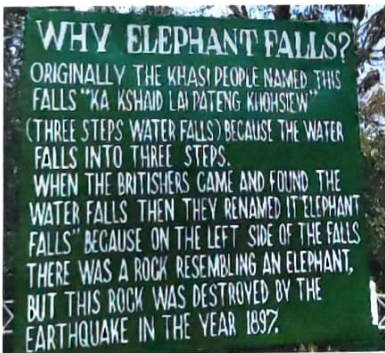


PHOTO GALLERY



CONCLUSION

In conclusion, the field trip to Shillong has been a beneficial experience which has helped us gain more knowledge on biodiversity, culture, places, tourism etc. We got to explore the abundant variety of plant species situated on sites made for preserving and conserving them and also about the indigenous local mysticism in Shillong. It was a remarkable trip which boosted our knowledge on things beyond our immediate surrounding.

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NAME OF THE ACTIVITY: Field Trip to Kaziranga National Park, Assam

DATE: 13th October, 2021-16th October, 2021

VENUE: Kaziranga National Park, Assam

1. PARTICIPANTS DETAILS:

PARTICIPANTS DETAILS		TOTAL NUMBER OF PARTICIPANTS
NUMBER OF MALE PARTICIPANTS	NUMBER OF FEMALE PARTICIPANTS	44
29	15	

2. NAME OF THE TEACHER-IN-CHARGE: Ms. NEITHONGUNUO ANGELA BELHO

3. PURPOSE OF THE ACTIVITY:

- To fulfill the CBCS syllabus requirement for the Discipline Specific Elective Paper i.e. BTD 5.4: Natural Resource Management.
- To enable the students understand and experience the various types of biodiversity as well as the importance of conservation of our natural resources.

4. OUTCOME OF THE ACTIVITY:

- The students learned about the various types of floral and faunal inter dependency that exists among all living organisms in nature.
- They understood the need for maintaining an optimum balance in nature for the survival and continuity of life on earth.
- They also gained knowledge on the existence of various plants and animal species living together in a given area and their role in nature.



Report on Field Trip (B.Sc 5th Semester) to Kaziranga National Park

The Department of Botany, St. Joseph's College (Autonomous), Jakhama organized a field trip to Kaziranga National Park, Assam from the 13th October, 2021 to 16th October, 2021 for the B.Sc 5th Semester Botany Honours Students To fulfill the CBCS syllabus requirement for the Discipline Specific Elective Paper i.e. BTD 5.4: Natural Resource Management.

A total of 40 students went for the field trip. The students were accompanied by 4 faculties viz; Ms. Neithongunuo Angela Belho, Ms. Kumari Asha Singh, Dr. Thejasenuo Julia Kirha and Mr. Antidong Jamir.

The places visited were:

1. Kaziranga National Orchid and Biodiversity Park

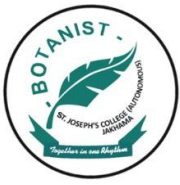
The Kaziranga National Orchid and Biodiversity Park is located at the distance of 2 km from the Central Range of Kaziranga, Kohora Chariali. The park is sprawling in the area of around 6 acres in the Durgapur village and is considered as the largest orchid park in the Northeast belt of India. The park has multiplied the glory of the Kaziranga in many folds. The Orchid Park boasts of having more than 500 varieties of wild orchids, 132 species of sour fruits and leafy vegetables, 46 species of bamboo, 12 species of cane and many other plants along with various species of local fishes.

The students got to witness many different species of orchids, rare endemic plants, ornamental plants etc.

The Kaziranga Orchid National park is an abode of more than 600 species of wild orchids collected from all across the north-east India region. This beautiful orchid have been placed amidst wild state in order to give complete natural ambience taking visitors as close to nature as possible. The whole variety is preserved in a greenhouse together with some hybrid varieties; some of them have been exclusively collected from local region of the state.

2. Kaziranga National Park

One of the most sought after wildlife holiday destinations in India, Kaziranga National park's 430 square kilometer area sprinkled with elephant-grassy meadows, swampy lagoons, and dense forests is home to more than 2200 Indian one-horned rhinoceros, approximately 2/3rd of their total world population.




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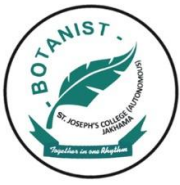
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Phone: 8731065074

The students were taken for safari jeep ride through the park where they observed animals like elephants, one-horned Rhinos, birds, fishes, wild boars etc.

Undoubtedly, the park is known for its good population of animals but more than that it's the wildlife conservation initiatives that take place in the park which are more popular. With its amazing wildlife conservation activities, the park has successfully managed to grow the population of Greater one-horned rhinoceros, an endangered species.

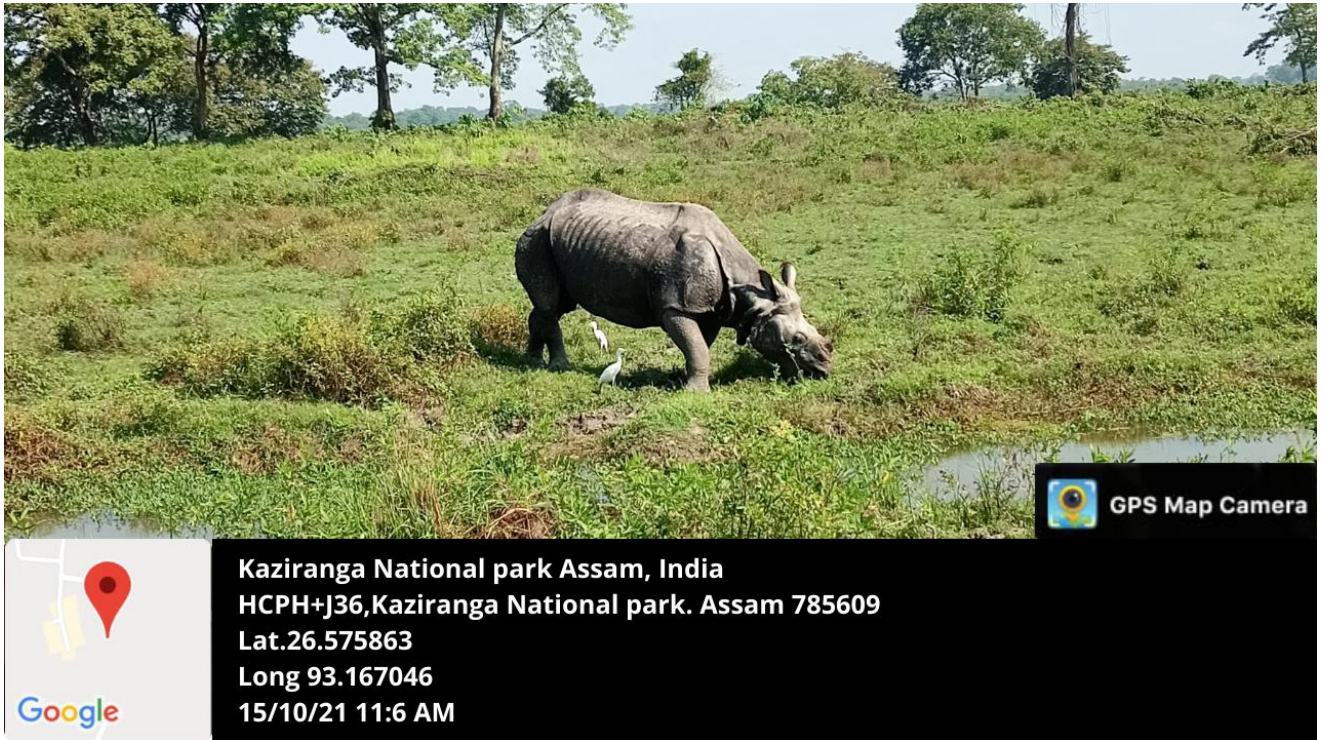


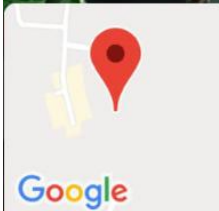
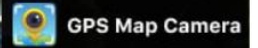
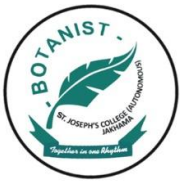
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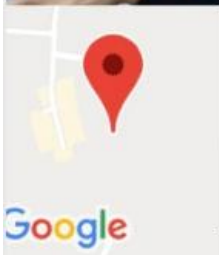
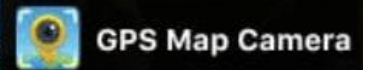
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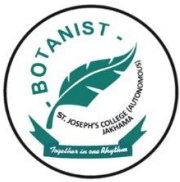




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Report by

Angela

Ms. Neithongunuo Angela Belho
Head Department of Botany
St. Joseph's College (Autonomous)
Jakhama.



NAME OF THE ACTIVITY: Field trip to study the Ecology of different sites in Shillong, Meghalaya.

DATE: 03.03.2022 to 06.03.2022

VENUE: Botanical Survey of India, Ward's Lake, Cathedral of Mary Help of Christians, Elephant Falls, Air Force Museum and Umiam Lake.

1. PARTICIPANTS DETAILS:

PARTICIPANTS DETAILS				TOTAL NUMBER OF PARTICIPANTS
NUMBER OF MALE PARTICIPANTS	NUMBER OF FEMALE PARTICIPANTS	PARTICIPANTS FROM SJC(A)	PARTIPANTS FROM OUTSIDE	
32	21	30	2	53

2. NAME OF THE TEACHER-IN-CHARGE: Mrs. Kumari Asha Singh

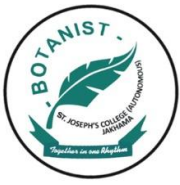
3. NAME OF THE RAPPOTEUR: Dr. Thejasenuo Julia Kirha

4. OBJECTIVES OF THE ACTIVITY:

- a) To educate students on the rich biodiversity available taking Shillong as the example.
- b) Observation comparison among different ecologies.
- c) Awareness on diverse biodiversity.

5. OUTCOMES OF THE ACTIVITY:

Field trip such as this has an impactful insight on students as well as people visiting it as it broadens our understanding of different ecologies around us. Reports were prepared by students on the site visited and gave the students a better understanding of how important ecology can give identity to an area. Report analysis showed students' curiosity to explore more area not only in our state but also venture out for more study and observation of different flora and fauna.



DEPARTMENT OF BOTANY
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The Department of Botany, St. Joseph's College(A),4thsemester paid a field trip to Shillong, Meghalaya on the 3rd to 6th of March,2022 under the supervision of Mrs. Kumari Asha Singh and Dr. Thejasenuo Julia Kirha to study the ecology of six different sites namely Botanical Survey of India (BSI), Wards Lake, Cathedral of Mary Help of Christians, Elephanta Falls, Air Force Museum and Umiam Lake. On the 4th of March students along with the guides visited BSI and Ward's Lake. Many important rare plants *Nepenthes khasiana*, *Ginkgo biloba*, *Curcuma aurantiaca* planted around the area as well as huge collection of orchids in the National orchidarium. Demonstration and technique on preservation of specimen through herbarium method were also conveyed and we are thankful to the BSI authority for their dedication and hospitality shown to our department. The Botanical Garden in Wards Lake adorn the lake with exotic plants with lush greenery surrounding it. Visit to Elephanta Falls and Umiam lake also known as Barapani on the 5th of March showed a wide range of flora harbouring many algal and phytoplankton. Additional trip to Air Force Museum also made the trip worthwhile for the students to get a better understanding of Meghalaya's rich history.



Image 1: 4th Semester,2022,(BSI)

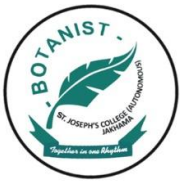


Image 2: Orchidarium(BSI)



Image 3: Wards Lake



Image 4: Cathedral



Image 5: Library (BSI)



Image 6: Botanical Survey of India

Report by

Julia

Dr. Thejasenuo Julia Kirha
Assistant Professor
Department of Botany
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Jakhama.

Angela

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