Field-Based *Botanical* Education and Student Enrichment: A Retrospective Analysis of Excursions Conducted Between 1994 and 2026

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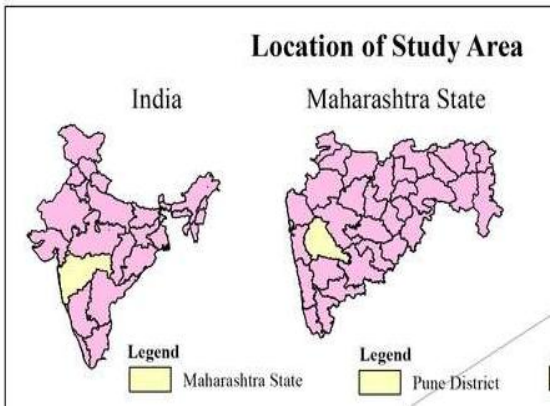
***Abstract*—Botany is fundamentally a field-based science, and effective understanding of plant diversity, taxonomy, ecology, and conservation requires direct interaction with plants in their natural habitats. Since 1994, botanical study tours have been regularly organized for undergraduate students to provide experiential learning opportunities beyond classroom and laboratory instruction. The excursions covered numerous botanically significant destinations, beginning with the Botanical Survey of India (1994–95) and extending to ecologically diverse regions such as Tamhini Sacred Grove, Diveagar, and Harihareshwar (2025–26). Institute has arranged NSS camps in different villages in the last 30 years at different villages of Pune district. Investigator was NSS Program officer during 2000 to 2005. Plant diversity surveys were performed by Investigator along with Botany students since 1994 to till date.**

The study employed field-based methodologies involving plant collection, identification, documentation, photography, and herbarium preparation. A range of field, laboratory, and library tools were utilized, including vasculum's, field presses, secateurs, eco-friendly collection bags, field diaries, cameras, GPS devices, binoculars, vials, scalpels, hand lenses etc. Students were trained in standard methods of plant description based on vegetative and reproductive characters and were instructed to prepare comprehensive tour reports incorporating geographical, meteorological, botanical, and ecological observations supported by maps and photographs. Strict guidelines are followed to ensure discipline, safety, ethical conduct, and responsible collection practices during excursions.

Over the three-decade study period, the excursions proved academically enriching, scientifically informative, and culturally rewarding. They provided valuable exposure to diverse ecosystems, including forest, coastal, and marine habitats. Conventional herbarium specimens have been systematically maintained in the departmental herbarium since 1994, while digital herbarium records have been developed since 2000. All specimens are organized according to Bentham and Hooker's Natural System of Classification and serve as important teaching and reference resources.

The longitudinal experience demonstrates that botanical excursions significantly contribute to student enrichment by integrating theoretical knowledge with practical field experience, thereby strengthening botanical education and promoting appreciation of plant biodiversity and conservation.

***Index Terms*—experiential learning, field studies, biodiversity conservation, student enrichment, taxonomy, digital herbarium.**



Photoplate: 1. Map of India and Maharashtra

I. INTRODUCTION

Botany is a science of plants. Botanical science cannot be studied in the classroom or laboratory only. In order to enhance the value of important educational activity, adequate pre-trip planning, defining of clear-cut objectives and sufficient funding

is required. To study plant science, one has to go in the nature/field/natural habitat. It is essential to go on field trips to explore new habitats, identify and know new species, learn necessary practical skills and gain understanding of new facets of learning and experiencing science. The study tours were organised for undergraduate students at various locations where there was great plant diversity to have a practical experience as 'Experience is also our best teacher'. The primary objective of these excursions is to explore regional vegetation and enhance students' understanding of biodiversity, taxonomy, ecology, and conservation through hands-on learning. Biologists all over the globe suggest that excursions and visits during field visits are effective in making Life science an interesting learning experience.

According to Fiddo and Gayford (1982), excursions help in inculcating interest and love for nature in youngsters and turn many students into naturalists. C. Darwin, G. Mendel, J. Hutchinson, A. Taktajan and R. Hooker gained mastery in their disciplines because of their frequent visits, explorations and experiences they had on their field trips. Raunkier, the famous ecologist, who is known for giving the concept of the life forms and phytosociological studies generated these concepts on the basis of elaborate field data which they collected during his field visits (Monika Kaul et.al 2012).

Haribhai Desai College has organized excursions at numerous botanically significant destinations, beginning with the Botanical Survey of India (1994–95) and extending to ecologically diverse regions such as Tamhini Sacred Grove, Diveagar, and Harihareshwar (2025–26). Institute has arranged NSS camps in different villages in the last 30 years, such as at Bevalade, Bhalgudi, Javlgaon, Savargaon in Mulshi Tehsils of Pune districts. Camps were also organized in the Maval region, in the Jambhul, Kanhe, and Wadivale group gram panchayats villages and at Rajgad, Kolwadi, Rule, Male, Khanapur, In Purandar tehsil at Singapur, Narayanpur, as well as at Wagholi (Ahilyanagar road, Bakori Phata, Pune). Investigator was NSS Program officer during 2000 to 2005. Plant diversity surveys were performed by the Investigator along with Botany students since 1994 to till date in the villages where NSS camps were organized. Plant lists of every destination are preserved.

Table 1: Destination of Botanical Interest and Year of Excursion organization:

Destination and Year	Destination and Year
Botanical Survey of India (1994-95)	17. Empress garden: (2003-04) and (2006-09)
2. Agriculture College, Pune (1995-96	18. Raireshwar (2006-07) and (2009-10)
3. Department of Botany, SPPU (1995-96)	19. Kaas Plateau (2010-11)
4. Sinhagad fort (1995-96)	20. Pateshwar (2011-12)
5. Lonavla and Khandala (1995-96)	21. Kundmala (2012-13)
6. Katraj Ghat (1996-97)	22. Malvan and Amboli (2014-17)
7. Ganpatipule (1997-98)	23. Karnala fort(2014-15 and (2015-16)
8. Dapoli, Ratnagiri (1998-99)	24. Thoseghar waterfalls, Chalkewadi (20116-17)
9. Malshej ghat (1999-2000)	25. Tamhini (1996-2014 and (2017-2019)
10. Pashan lake (2000-2001)	26. Harihareswar (1996-2014 and (2017 -2019)
11. Chaturshringi Hill (2001-02)	27. Taljai Hill: (2014-19)
12. Vetal Tekdi (2002-03)	28. Naneghat, Junnar(2017-18)
13. Temghar Dam Area (2002-03)	29. Biodiversity Park, Gurheghar, Mahabaleshwar (2018-2024) Except Covid 19 Period
14. Bhatghar dam area (2003-04)	30. Diveagar and Harihareshwar (2024-25)
15. Girivan (2001-02 and 2003-04)	31. Tamhini Sacred grove, Diveagar and Harihareshwar (2025-26)
16. Panshet Dam (2004-05)	

II. MATERIALS AND METHODS

In a Botanical excursion, variety of tools are used in collection and for further processing (herbaria) of plants. These tools are broadly classified into 3 categories. Field tools, Laboratory tools and Library tools. These are primarily used during the collection of plant specimens and photography of plant species. Tools are used in preparing herbarium specimens. (both conventional and e herbaria). Most commonly used tools are Vasculum, Eco-friendly bags, Field press, Field diary, tags, Pen, Knife, old newspapers,

Camera, GPS., Binocular, Scale, Scalpel, Biconvex lens, Vials, Field guide, Floras etc

III. RULES OF EXCURSIONS

A consent form signed by the parents and medical certificate from a doctor is collected and records are maintained with details of addresses, contact phone numbers. During the excursion period the participants are not allowed the intake of tobacco or alcohol in any form (i.e. chewing, smoking, drinking etc) Any kind of vandalism, severe irregularities, intolerable behaviour with other students / staff members or common people lead to punishable act as enumerated in the one of the points above. Maximum care is taken in all respects, in conducting a study tour. However, in case of any mishap/injury no claim or compensation is entertained. Any kind of untoward activity involving risk is not permitted during the currency of excursion. Every participant has to carry the requisite collection material i.e. vials, secateurs, polythene bags, old newspapers etc. for the collection of plant specimen. Every participant has to carry with them a diary/ notebook, College Identity card. Every student is required to submit within 10 days a tour report covering the exhaustive details vis. Geographical, Metrological, Botanical and ecological data with maps and photographs. Also ensured that the list of plants must be arranged in a suitable manner (e.g. Alphabetically, as per Bentham and Hookers Natural system of Classification).

Photoplate: 2. Showing Plant image Sheets,

IV. EQUIPMENT'S TOOLS REQUIRED DURING EXCURSION

Field Tools include- Secateur: It is a metallic device used for cutting the twigs/ branches of the plants. Sickle: It is used to dig out the terrestrial rhizomatous plant parts. Field Press: It consists of two-ply boards fixed in the form of a frame. The frames can be fitted together by using adjustable screws. Its size is generally 35x50 cms.. Field Press: It is primarily used in quick drying of the freshly collected plant specimens by applying pressure with nut and screw arrangement. The collected specimens are initially properly placed in the newspapers avoiding crumpling of the plant parts. The newspapers absorb moisture present in the plants.

Laboratory Tools: These are used in the microscopic examinations of the parts of the plant. It includes dissecting and compound microscopes, bigger glass lens, herbarium sheets for mounting the plant specimens etc.

Library tools: These are used in the identification and classification of plant species. This includes Floras, Monographs, Check lists, Herbaria, taxonomic Keys, Dictionaries, Glossaries, Encyclopedia's, Reference books, Manuals, Maps etc. Flora: An inventory of plants taxa of a given area usually accompanied by keys and descriptions.

Table 2: Method of description of a flowering plant / Terminology:

Habit: , herb/shrub/ tree/climber, wild-/cultivated, annual/biennial/perennial/ephemeral
Vegetative Characters: Root: tap/fibrous, aerial/underground, modification if any
Stem- erect/prostrate, cylindrical /quadrangular, branched/unbranched, solid/fistular, hairy/glabrous, modification if any
Leaves: stipulate/exstipulate, petiolate/sessile, Simple/compound, alternate/opposite/whorled, apex, base, lamina, venation pattern etc
Reproductive Characters: Inflorescence: racemose/cymose/special (mixed type)
Flower: bracteates/ebracteate, bracteolate/ebractiolate, pedicillate /sessile, complete/incomplete, actinomorphic/zygomorphic, unisexual/bisexual, epigynous/hypogynous/perigynous, small/large, edible/non edible, aromatic/non aromatic, color.
Calyx: No. of sepals, gamo/polysepalous, Modification if any, aestivation type- valvate, imbricate, twisted, quincuncial, vexillary
Corolla: No. of Petals, Gamo/polypetalous, Modification if any, aestivation type- valvate, imbricate, twisted, quincuncial, vexillary
Perianth: No. of tepals, Gamo/polytepalous, Modification if any, aestivation type- valvate, imbricate, twisted,

quincuncial, vexillary.
Androecium: No. of stamens, free/fused, if fused: monoadelphous/diadelphous/polyadelphous, fixation of the filaments to the anthers: basifixed/dorsifixed/versatile/adnate, filaments long/short, cohesion if any: epipetalous/epiphyllous
Gynoecium: No. of carpels, apocarpous/syncarpous, Placentation type: marginal/free central/parietal/axile/superficial.
Fruit type: Simple/Aggregate.

The main objective of the study tours is to explore the vegetation. The science faculty, (Dept. of Botany) Haribhai V. Desai College of Arts, Science and Commerce Pune 411002 has started organizing visits and study tours since 1994.

Botanical Survey of India (1994-95): The Western Regional Centre is one of the oldest centre, its premises is at Koregaon Road, Pune. The jurisdiction of this regional centre included, entire state of Maharashtra, Karnataka, Goa and Union territories of Daman, Diu, Dadra and Nagar- Haveli. The herbarium forms the basis of Cooke's Flora of Bombay presidency. The collections of this centre mainly showcase the biodiversity of Western Ghats, including the adjoining regions of Rajasthan and Kerala. It is a recognized centre for the research in Plant taxonomy and has been recognized by universities of Pune, Mumbai, A. P. and Chennai for P.G. research leading to doctorate degree in Botany. BSI is having three functional units i.e. Botanical Garden, Museum and updated Library.

Agriculture College, Pune (1995-96): It is one of the first five agri. Colleges established in India. Is the constituent of Mahatma Phule Krishi vidyapeeth located at Shivaji nagar. Its peculiarity is the Hi-tech Floriculture and Vegetable Project. It houses Polyhouse units, Biofertilizer units, Vermi compost units, Mushroom Cultivation department, MITCON (Maharashtra Industrial and Technical Consultancy Organization) etc.

Department of Botany, SPPU (1995-96):It is one of the leading Departments of SPPU in the field of teaching and research in plant sciences. Botanical Garden-The Botany Department has an impressive Botanical garden which include a collection of palms, threatened and endangered ferns, gymnosperms, medicinal plants and plants of special botanical interest. Museum-The department has exquisite museum, which depicts the changes in flora along the geological time scale. Its special features include fossil specimens besides wet and dry specimen of the plant kingdom.

Sinhgad fort (1995-96): It has unique geographical position of 4300 ft. altitude and has a habitat diversity. IT has a rich biodiversity which include 150 plants endemic to western ghats (for e.g. Ceropegia species). The excessive tourism and spread of exotic weeds posing a threat to the diversity and wildlife.

Lonavla and Khandala (1995-96): Are twin hill stations in the Sahyadri ranges that demarcate the Deccan Plateau and the Konkan coast. A very popular place for trekking, valley crossing, rock climbing & rappelling. Hilly landscapes, dense flora and crystal-clear lakes make the tours an ideal spot for exploration.

Katraj Ghat (1996-97): It is a mountain pass located on the southern outskirts of the city of Pune. The Katraj ghat locality has a rich floristic diversity with typical dry-deciduous species. The Cochlospermum religiosum (Ganer) dominated community is a characteristic feature of this region. The road widening activities are detrimental to the environment as a whole. The Katraj ghat locality is facing severe habitat degradation due to urbanization.

Ganpatipule (1997-98): It is a town on the Konkan Coast of western India. It's known for its beaches, such as Ganpatipule Beach and nearby Aare Ware Beach. Prachin Konkan is an open-air museum with models depicting traditional Konkan life. Ganpatipule consists coconut and fruit trees on a very large scale. MTDC (Maharashtra Tourism Development Corporation) Rest house is very close from the Ganesha temple caters the tourists.

Dapoli, Ratnagiri (1998-99): Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, formerly Konkan Krishi Vidyapeeth, is an agri. University. It is known as Konkan Krishi Vidyapeeth, Its research centre has developed some patented varieties of rice. Its major focus areas are rice and horticulture. Harne beach is close to Dapoli. Kisaan house caters to the tourists. Ratndurg fort is hardly 2 km's from S.T. Stand.

Malshej ghat (1999-2000): A mountain pass in the Western Ghats range in the Thane-Pune Road of Maharashtra. The site is nestled in the lofty rugged hills of the Western Ghats. The site is home to hundreds of different kinds of flora and for the nature

lover there are gushing waterfalls. Lenyadri, Ozar and Shivneri fort are the nearer popular places to be visited. Bracteantha bracteata flowers in a dried form (garland) are sold at Ozar and Lenyadri.

Pashan lake (2000-2001): It is an artificial lake near the suburb of Pashan. The lake was built in the British era to accommodate the water requirement of the neighbourhood. The main inlet of the lake is a small rivulet (Ram Nadi). It is a man-made lake, built to accommodate the water requirements. PMC has built a bamboo plantation and a wall alongside the lake to protect it. Ipomea carnea (Behsarm), a major cause of lake's deterioration as it prohibits the growth of other plants.

Chaturshringi Hill (2001-02) : There is a famous temple of goddess Chatushringi (also known as Goddess Ambareshwari) at the top of the hill. It is close to the intersection of University Road (SPPU), Baner, Pashan , Aundh. Pune is called as city of hills. Other than the interesting wild plants, plantation of Gliricidia sepium (Giripushp/Undirmari) is very common here.

Vetal Tekdi (2002-03): It is a prominent hill in the city limits of Pune. The hill is the highest point within the city limits, with an elevation of 2600 ft. There is a temple of Vetala located on the top of the hill from which the hill derives its name. The forest type in this area is dry-deciduous as that of hills around Pune. Some parasites like Dendropthoe sp and Striga sp are also reported in the area. One important characteristic of the area is total absence of epiphytic species. The dominant plant community in the area is Boswellia serrata- Anogeissus latifolia. Dalbergia melanoxylon is one interesting example for spread of exotic species. This species was planted by Britishers in Pune University (SPPU) area. This species was totally absent on other areas of Pune. Some examples of the endemic species found here are Jatropha nana, Cissus woodrowii, Mussanda laxa, Indoneesiella echioides, etc.

Temghar Dam Area (2002-03): It is an earth fill and gravity dam on Mutha river near Mulashi, Pune. It is a very high potential land, In winter, Pulicaria wightiana (Sonki) bloom luxuriantly here.

Bhatghar dam area (2003-04): It is a gravity dam on Yelwanti river near Bhor, One of the oldest dams in Maharashtra constructed by British. It is famous for Lake view and Necklace view point of river. Among the 5 divisions of Pune district, Bhor is one of the forest divisions.

Panshet Dam (2004-05): It is also called Tanajisagar Dam, it is a dam on the Ambi river about 50 km. southwest of the city of Pune. The dam was constructed in late 1950s for irrigation and, along with three other dams nearby, it supplies drinking water to Pune. Panshet Dam burst in its first year of storing water on 12th July 1961. The surrounding area is rich in flora. Torna is the closest fort in Khanapur region. Torna fort is named after the toran plant: Zizipus rugosus.

Girivan (2001-02 and 2003-04) : It is a private hill station in Hotale village near Kolvan of Mulshi taluka of Pune district. It is approximately at 2400 feet above sea level and making the climate cool and refreshing. Many native trees having medicinal value, are retained here. Terminalia chebula, (Hirda) T. belerica (Behda) trees are present in a great number here.

Empress garden: (2003-04, 2006-09) The Garden covers a sprawling 39 acres, and is home to many rare species of trees and flowers. The Agri. Horticulture Society organizes annual flower shows and arranges various programs throughout the year to create environmental awareness among people. The well landscaped garden consists of lush green lawns, abundant flora. The park has a quaint stream of water flowing throughout the garden, and is a delight for nature lovers. Adansonia digitata (Gorkhchinch), Acacia concinna (Shikekai) are the unique plants present here.

Raireshwar (2006-07 and 2009-10): It is a place of historical importance that is located towards the south west of Pune near Bhor. This is a beautiful place to visit during the monsoon or winter season. The breath-taking views and the feeling of untouched nature is just mind blowing. Ideal fort for trekking. The most abundant species present on the fort Plateau is wild Curcuma species.

Kaas Plateau (2010-11): It is also known as the Kaas Pathar, is a plateau situated 25 kilometres west from Satara. It falls under the Sahyadri sub cluster of the western ghats and it became a part UNESCO Natural world heritage site in 2012. It is a Biodiversity hotspot known for various types of seasonal wild flowers. The plateau is approximately 10 square kilometers in area. Kaas has 850 different orchids, shrubs such as the Carvia callosa and carnivorous

plants such as Drosera indica. The flora of kaas i.e. the entire flowering plants and their related plants are typically restricted to that particular locality only (Endemic).

Pateshwar (2011-12): It is a village in Satara district known for rock-cut caves with shrines of Lord Shiva. Pateshwar is located about 11.26 Km South East of Satara. It has 8 ancient caves and many ancient stone carved deities of Lord Shiva and other deities. The place is known for having more than 1000 Shiva-lings (Also known as Pinds). Most important amongst these is the Maha Shiva Lingam which has intricate carvings. Delphinium malbaricum (Nilambari), a height indicator plant is present here.

Kundmala (2012-13): It is a place close to Begdewadi Railway Station. This place is famous for Ranjankhalage. These are naturally created potholes in the bedrock of river. Ranjankhalge are natural phenomena, when flowing water of river cuts the rock and forms spherical domes inside rocks. The structures are very beautiful and one can realize the power of water. It may take thousands of years to form these structures. These potholes contain a variety of algal forms like Spirogyra, Oscillatoria, Nostoc and many others. Our undergraduate students (Botany) performed project work on the algal forms and achieved gold medal in an Intercollegiate competition.

Malvan and Amboli (2014-17): Tarkarli is a small town in Malvan Taluka in Sindhurug district. It is tourist destination and attractive beach. It has states only Scuba diving centre. It is situated 6 km. south of Malvan. It sits at the mouth of Karli River as it enters the Arabian sea. It is renowned for its virgin beaches that open to sparkling blue waters. It is a paradise of tiny Islands and hamlets, imposing Casuriana equisetifolia (Suru) trees and rich blue skies. Amboli: It is the last station before the coastal highlands of Goa and is relatively unexplored. It lies in the Sahyadri hills of western India, one of the worlds 'Eco Hot-Spot' and it therefore abounds in a variety of fairly unique flora and fauna. Memecylon umbellatum (Anjani), Wagatea spicata indicate that the present forest is very thick. The main attraction is the incredible high rainfall and numerous waterfalls.

Karnala fort (2014-15 and 2015-16): It is a hill fort in Raigad district about 10 km from Panvel city. Currently it is a protected place lying within the Karnala Bird Sanctury. It was a fort of strategic importance as it overlooked the Bor pass which connected the Konkan coast. The interior of Maharashtra (Deccan Plateau) and it was the main trade route between these areas. It is rich in diversity. The fungal forms are found in abundance. Flowering plants also found in a variety. Helecterus isora (Murudsheng) plants are abundant here.

Thoseghar waterfalls, Chalkewadi (20116-17): These are scenic spots located near the small village of Thoseghar, 20 km from Satara city at the edge of the Konkan region. There are a series of waterfalls, some of them 15 to 20 metres and one of approx. 200 metres in height. Heavy rain falls during rainy season, and because of this the falls have more water and are more spectacular. The immediate area is calm and quiet, with a clean lake and dark woods in a hilly area. The other nearer places are Chalkewadi, famous for windmills. Sajjangad fort is also not very far.

Tamhini (1996-2014 and 2017-2019) : It is a megadiversity centre of India. Angiosperms and a Gymnosperm (Gnetum ula) are present here. Students learn habit, occurrence, phenology of different plants. In tamhini ghat, students studied few fungal forms like Ganoderma, Polyporus etc.

Harihareswar and Srivardhan (1996-2014 and 2017 - 2019): Hareshwar is called 'Dakshin Kashi' of Maharashtra. Honey comb withering is quite common. Due to continuous water tides, such structures are formed. The unique rocky coastline, honeycomb weathering patterns, and the confluence of the Arabian Sea with rocky formations provided valuable geological insights. Halophytes: Some plants grow and complete their life cycle in the habitats with a high salt content. Halophytes are found near sea shores where mesophytes and fresh water hydrophytes cannot thrive well. These plants cope up with salinity in various ways, some of these avoid salinity, some resists it and few others tolerate salinity. The various mangroves species are found at the sea shore. Presence of Pneumatophores and vivipary are their significant features. Cheladi beach is so great, joyful, exciting place, where Arabian ocean meets to rocky place. The algal forms like Gracilaria, Padiana, Sargassum and Ulva are found here.

Taljai Hill: (2014-19) It is locally called as taljaai pathar, biodiversity rich hill at the south of Pune city that has been designated as a wildlife reserve. The tree species shrubs and climbers present here are

Palas/Flame of the forest, Pangara, Son-savar, Babul, Hivar, Maharukh, Pandharasiris, Kadi-limb/Neem, , RaktKanchan, Apta, Katesavar, Rui, Karvand, Ganer, Utanti/Kate-chendu, Dudhi, Umbar, Giripushp, Shivan, Garvel, Ash tree, Tantani/Ghaneri, Winchwi/Wag-nakhi, Bakan, Singapore cherry, Ambushi/Tipani, Parkinsonia, Chandan, Nirgudi,Nivdung, Ain/Arjunsadada, Gulmohor, Neelgiri,Hirandodi, Vasanvel, etc

Naneghat, Junnar (2017-18): It is in the Western Ghats, an ancient stone laid hiking trail to the Nane ghat plateau. The pass was the fastest key passage that linked the Indian west coast seaports of Sopara, Kalyan and Thane. It was a part of an ancient trading route, and is famous for a major cave with Hindu Sanskrit inscriptions in Brahmi script. The climate is so pleasant in Aug.-Sept. The place is very rich in plant diversity. Pogostemon deccanensis (Jambhli manjiri) is abundant here.

Biodiversity Park, Gurheghar, Mahabaleshwar (2018-19): Gureghar is a village in Mahabaleshwar Taluka in Satara District. It belongs to Desh or Paschim Maharashtra region. It is located 46 KM towards west from District headquarters Satara. This place has a great plant diversity which include medicinal plants, orchids, lichens, fungi etc. Canscora diffusa moisture indicator, Lichens- Pollution indicator are present here.

Tamhini Ghat, Harihareswar, Diveagar and Srivardhan (2023-26): Tamhini Ghat, a well-known mega biodiversity hotspot of India. As per the Botany curriculum, students documented and photographed various plant species, including angiosperms and non-flowering plants. A sheet of 40 photographic plant species was provided to the students by the Botany faculty. While exploring the forest area, teachers use to explain the scientific names, habits, habitats, phenology, and ecological importance of different species. Students collect fungal specimens, Lichens. All participants visit Kalkai sacred grove. Teachers provide detail information about sacred groves. The sacred grove has a long and diverse history of our ancient belief in natural power and our cultural linkage with our environment. It is believed that these sacred vergin forests date back to thousands of years when human society was in a primitive state (Gadgil and Vartak 1975). The other destinations where tours were arranged include Bhimashankar, Panchgani, Purandar fort, Lohgad fort, Rajgad fort, Torna fort, Ghangad etc.

Other than the plant lists of Botanical destinations, lists of Plant diversity surveys conducted at the various villages, where NSS camps were conducted are also maintained in the department.

Table: 3 Plant diversity Survey on 16th Jan. 2023 at NSS Camp at Bhalgudi, Tal. Maval, Dist. Pune

Sr.	Botanical Name	Common name	Habit	Family
1	Achyranthes aspera L.	Aghara/ Aghada	Herb	Amaranthaceae
2	Agave angustifoliaHaw.	Ghaipat	Shrub	Agavaceae
3	Ageratum conyzoides Linn.	Osadi	Herb	Asteraceae
4	Alternanthera triendra L.	Chibukata	Herb	Amaranthaceae
5	Amaranthus cruentus L.	Rajgira	Herb	Amaranthaceae
6	Andrographis echioides (Linn.) N.	Pandhara feda	Herb	Acanthaceae
7	Argyreia nervosa (Burm. f.)Bojer.	Gavel	Climber	Convolvulacceae
8	Artemisia japonica Thunb.	Teldavana	Shrub	Asteraceae
9	Barleria cristata Prain.	Gokarn	Shrub	Acanthaceae
10	Bauhinia acuminata Linn.	Kanchan	Tree	Caesalpiniaceae
11	Bauhinia acuminata Linn.	Kanchan	Tree	Caesalpinaceae
12	Blepharis asperrimaNees.	Dikna	Herb	Acanthaceae
13	Blumea eriantha DC.	Buradi/Nimurdi	Herb	Asteraceae

14	Bombax malbaricum DC.	Kate saveri	Tree	Bombacaceae
15	Bridelia retusa (L.) A.Juss.	Asana	Tree	Euphorbiaceae
16	Calotropis procera R.Br.	Rui/Akdo/Ak	Shrub	Asclepiadaceae
17	Canscora diffusa (Vacl.) R.Br.	Kilwar	Herb	Gentianaceae
18	Carica papaya Linn.	Papai/Papaya	Herb	Caricaceae
19	Casuarina equisetifolia Linn.	Suru	Tree	Casuarinaceae
20	Celosia argentea Linn.	Kurdu	Herb	Amaranthaceae
21	Chromolaena odorata (L.) King.	Vanmuli	Herb	Asteraceae
22	Cocculus hirsutus (L.) Diels.	Vasanvel/Jaljamni	Climber	Menispermaceae
23	Colocasia esculenta (L.) Schott.	Alu	Herb	Araceae
24	Cucurbita maxima Duch. Ex. Lam.	Tambada bhopala	Climber	Cucurbitaceae
25	Cuscuta reflexa Roxb.	Amarvel	Climber	Convolvulaceae
26	Cylista scariosa Roxb.	Ranghevada	Climber	Fabaceae
27	Cyperus aristatus Rottb.	Cyperus	Herb	Cyperaceae
28	Dendrocalamus giganteus Munro.	Giant bamboo	Herb	Poaceae
29	Dioscorea bulbiferaLinn.	Karanda godri/ Gorkan	Climber	Discoreaceae
30	Eucalyptus globosus Labill.	Neelgiri	Tree	Myrtaceae
31	Ficus glomerata Roxb.	Umbar	Tree	Moraceae
32	Flacourtia indica (Burm. fil.) Merr.	Bhenkal / Tambat	Shrub	Flacourtiaceae
33	Glinus lotoides Linn.	Kotrak	Herb	Molluginaceae
34	Gymnoporia spinosa Fiori.	Yenkel	Shrub	Celastraceae
35	Heterophragma quadriloculare (Roxb.) S.	Varas	Tree	Bignoniaceae
36	Hibiscus rosa sinensis Linn.	Jaswand/Jasud	Shrub	Malvaceae
37	Ipomea parasitica L.		Climber	Convolvulaceae
38	Jatropha curcus Linn.	Chandrajyoti	Shrub	Euphorbiaceae
39	Justicia adhatoda L.	Adulsa	Shrub	Acanthaceae
40	Lagenaria siceraria (Mol.) Standl.	Dudhi Bhopala	Climber	Cucurbitaceae
41	Lantana camara Linn	Ghaneri	Shrub	Verbenaceae
42	Leucaena glauca (Linn.) Benth.	Subabul	Tree	Mimosaceae
43	Leucaena leucocephala (Lam.) de wit.	Subabul	Tree	Mimosaceae
44	Ludwigia octovalvis (Jacq.) Raven.	Panlavang	Herb	Onagraceae
45	Luffa aegyptiaca Mill.	Ghosale/Ran-dodka/Ran-turai	Climber	Cucurbitaceae
46	Moringa oleifera Lam.	Shevaga	Tree	Moringaceae
47	Moringa oleifera Lam.	Shengul/Musik	Tree	Moringaceae
48	Muntingia calabura L.	Singapore cherry	Tree	Muntingiaceae
49	Musa paradisiaca L.	Keli	Herb	Musaceae
50	Pimpinella heyneana (Wall. Ex DC.) Kurz.		Herb	Apiaceae
51	Ricinus communis Linn.	Castor/Erand	Shrub	Euphorbiaceae
52	Rorippa indica (Linn.) Hochst.	Indian field Cress	Herb	Brassicaceae
53	Spilanthes calva DC.	Akkalkara	Herb	Asteraceae

54	Syzygium cumini (Linn.) Skeels.	Jambul/Jambhal	Tree	Myrtaceae
55	Tamarindus indica Linn.	Chinch/ Amli	Tree	Caesalpiniaceae
56	Themeda triandra Forssk.	Bunden/Batani	Herb	Poaceae
57	Thespesia populnea (L.) Soland ex Corr.	Paraspimpal	Tree	Malvaceae
58	Trema orientalis (Linn.) Blume.	Gol	Tree	Ulmaceae
59	Woodfordia fruticosa (Linn.) Kurz.	Dhayti/Dhauri	Shrub	Lythraceae
60	Ziziphus mauritiana Lamk.	Ber	Tree	Rhamnaceae
61	Zizyphus rugosa Lamk.	Toran/ Churan	Climber	Rhamnaceae

Photoplate: 4. Algae Gracilaria, Padiana, Sargassum and Ulva collected on sea shore, Dist. Raigarh

Photoplate: 4. Botanical visits and Excursions,

Investigator along with Botany students

Results: Herbaria: Are repositories of preserved plants which are actually collected, dried, pressed and mounted on standard sheets along with the information of the plant specimen, arranged as per accepted system of classification and are filed, maintained and used as reference material. The preparation of herbaria is a scientific procedure. They are essential in floristic and monographic treatments. Conventional Herbarium: Preparation of herbarium is a scientific procedure.

As per SPPU syllabus, collection of plants is banned, since 2019 plants are photographed in its natural habitat considering ecological balance, e herbarium is the need of the hour.

Digital / e- herbarium: Electronic herbarium is a herbarium in a digitized form. It is a collection of digital images of plants or parts of plants. Virtual herbaria often established to expand availability of specimens to a wider public. However, the digital herbaria are not suitable for internet access because of the high resolution of scans and the resulting large file sizes (several hundred megabytes per file). Electronic herbaria are developed to increase the durability of specimens. Digital images are easily available; images of the specimens can be sent electronically. These images can be substitute for the specimens themselves, or alternatively, the researcher can use the images to preview the specimens, to decide whether it should be sent out for further study. This process cut down on the shipping expenses, and thus the wear and tear of the specimens, as well as the time associated with shipping.

V. ADVANTAGES OF DIGITAL / E-HERBARIUM

- It makes the collection available to researchers throughout the world.
- It helps the researchers to search any image of the plant on a single click.
- Digital herbarium brings together information on the diversity of all plant species and their distributions.
- It is helpful for taxonomist to identify the plants easily by comparing characters of collected plant with the image of digital herbarium.
- It helps in quick identification of plants with the help of stored images.
- It is easy to use i.e. user friendly.

- It contributes towards the preservation of the collection/specimen
- The information about new plant can be easily uploaded and it is accessible to others in very short time span.

Use of Computer in Plant Identification: In recent past, computer technology has emerged and a new efficient method of information exchange through Internet has been established. Illustrations of the plants from various parts of the world are put up at various websites hosted by different institutions.

VI. CONCLUSION

The excursions were academically enriching, scientifically informative, and culturally rewarding. Tours provided hands-on exposure to biodiversity, ecology, marine life, and conservation. The investigator has maintained conventional herbarium sheets in the departmental Herbarium section since 1994 and digital herbarium sheets since the year 2000 to till date. All the sheets are arranged in cupboards as per Bentham and Hookers Natural system of plant classification. The sheets are used for reference purpose. The sample visit reports are also maintained in the department. The longitudinal experience demonstrates that botanical excursions significantly contribute to student enrichment by integrating theoretical knowledge with practical field experience, thereby strengthening botanical education and promoting appreciation of plant biodiversity and conservation. Studies indicate that surveys, visits, field trips boost confidence of students and make them better professionals.

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