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Floroscope – A botanical collection and herbarium technique used in determining angeospermic diversity of Jambudia Vidi at Saurashtra region-Gujarat (India)

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ABSTRACT

Not until the sixteenth century did the botanists make any serious and systematic attempt to preserve, for future reference, the specimens they studied. The earliest herbarium was set up in 1545 in the University of Padua, Italy. Prior to this a few dries herbs, intended primarily for medical purposes, occasionally served as material for comparison. The usefulness of a herbarium has grown beyond it original parameters and it now serves the triple purpose of study, record and research. It is prepared and maintained with care and skill, so as to serve a long term use. A herbarium has been aptly defined as a collection of pressed, dried and preserved plant specimens, arranged according to some known system of classification. The purpose of making herbaria of Jambudia Vidi, Saurashtra region, Gujarat, (India) is manifold, such as: For comparison of description with actual specimens from the various regions; For comparison of new material; For display in the museums, both for professional and non-professional visitors; For keeping record of 'type' specimens, etc.

KEYWORDS

Floroscope;
Herbarium;
Botanical.

INTRODUCTION

Taxonomy is a word derived from two Greek words, *taxis* - meaning arrangement; as also, a division of ancient Greek army and *nomos* - meaning law. Plant taxonomy deals with those aspects of botany which are concerned with the orderly arrangement of plants, i.e. their classification, which obviously has to take into account some method and procedure, and characters or traits of the individual members.[1] Taxonomy lays emphasis on classification as an expression of comparative morphology or phylogenetic relationships. It has been therefore, defined as 'a study aiming at producing a system of classification which best reflects the totality of similarities and differences.[2] It encompasses two aims :

1 to identify all kinds of plants;
2 to arrange them into a scheme of classification that will show their true relationship.

The nomenclature of useful plants is an old and basic human urge, Local plant names are the manifestations of man's long standing association with

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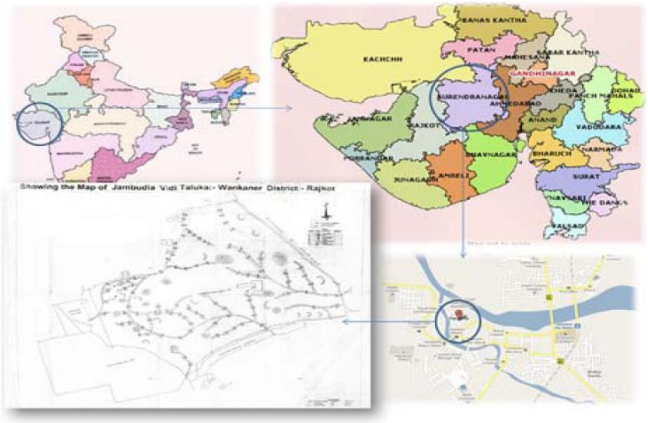
his green surroundings[3]. Names of plants or animals are of value in avoiding descriptive phrases to refer to objects and render communication easier.

Therefore, Herbarium technique is urgent and important that these must be preserved and properly documented before the information is lost forever.



LOCATION

- Physical Location Jambudia Vidi is located
- Between 22.2969° N and
- 70.7984*W Longitudes, In Wankaner Taluka of
- Rajkot district in Saurashtra peninsula.

Bio geographical location

The northern part of Rajkot district adjoining to Surendranagar district is relatively plain with undulating terrain in some of the area. Area of Wankaner Taluka is good grassland and scrub forest. North-East of Wankaner adjoining to them and Halvad is a relatively compact patch of forest in TABLE land with sparse vegetation of Acacia. In Jambudia Vidi is spread over 1952.78 Hectors. Adjoining area 700.34 hectors like Lunsar / Jivapar / Chitrakhada, Rajgadhha are seen.

METHODOLOGY

The whole operation of preparation of a herbarium can be divided, for facility of understanding, into ninee sub-heads, starting with the list of equipment.

Equipment

Collection and selection of specimens

1. Serial number tags.	8. Plant press.
2. Secateur, Clipper or tree-pruner.	9. Field note book and flora.
3. Khurpi or collecting pick.	10. Field map.
4. Knife and forceps.	11. Thread, needle and glue.
5. Pocket lens, altimeter and camera.	12. Mounting sheets.
6. Vasculum or a plastic receptacle.	13. Preservatives.
7. Dryingg papers.	14.Almirahs, shelves, building, etc..

Receptacles used in the field

Generally a metallic vasculum is used for keeping the plant specimen in the field, but in hot weather it is less useful because the vasculum becomes hot, and consequently the plants wilt and shrink. It is also less useful for collecting succulent plants and for bulky specimens. Therefore, light field press, portfolio and polythene bags are better carried along with the press. The plants are best pressed at the spot of collection as it saves them from damage and deshaping.

Field presses are either metallic (wire mesh) or wooden. The press consists of two parts. Each part is framed and webbed. Normal size of press is 45 cm × 30 cm.

A portfolio is an easier device to collect plants, which can be slung over the shoulder. It is made of two pieces of stout card - board or two boards of thin-3-ply-wood. Its dimensions are same as those of the press. It should be emptied when the total thickness of the plants and papers reaches 8-10 cm. The contents are preferably transferred to a press on reaching the camp.

The receptacle, such as a polythene bag (water proof bag) or a canvas bag can be used in preference to vasculum when the latter iss inconvenient to carry. The only drawback of this is that there is a change of plants getting crumpled. Sometimes, canisters are used to carry plants in fresh condition over short distances.

For collection of aquatic plants a piece of paper may be slid under the plant and lifted up to drain-off excess water. The plant specimen then may be kept in the press as usual, along with the paper in order to keep the specimen in natural posture.

Selection of specimen

Selection of specimen for collection is a very

important part of the whole process. Following points must be kept in mind in order to do a good job.

1. As far as possible sterile specimens i.e. specimens without flower or fruit should be avoided and, the plants should be collected with leaves, roots, flowers and fruits. The letter help in correct indentificatioon and classification of plants. Where it is not possible to collect all the parts, effort should be made to collect as much of these as possible. In the case of fuberous roots, these should be dug out and not pulled out.
2. The plant should be normal, i.e. free from disease and abnormalities and the collection should be made during day time when dew has dried from the plants.
3. In the case of unisexual flowers, both staminate and pistillate flowers should be collected. Collection of inflorescence is more advantageous.
4. In the case of grasses, roots and/or rhizomes must be collected.
5. Ripe and mature material should be preferred for collection.
6. Enough material should be collected at one time and every information about the plant and the locality should be noted down immeediately at the time and place of collection. It is better to give a serial number (with a tag) to the specimen and the same number noted in the field book with the details. Photographs of the plants and its parts will serve a useful purpose.

Method of pressing

The plant material should be so laid on the pressing paper that it covers most of it, excluding the bottom right 100 sq.cm. area for labelingg. Only one species should be placed under one drying paper unless the specimen is too small when more than one specimen may be put on one sheet, or when the specimen is too big and has to be pressed in several pieces under 2-3 sheets. Long, and herbaceous, materrial may be folded into V, N or W shapes, so as to accommodate it on one mounting sheet. The overlapping portions should be pruned out, but their attachments (petiole, pedicel, etc.), should be retained, and a few leaves should be turned upside down to facilitatge the study of both surfaces. The leaves and flowers should be pressed in open (spread out) condition. Further, the underground parts should be washed before pressing.

Drying papers should be thick, stiff and of the size of mounting paper (45 cm × 30 cm). These should be changed once a day and the moist papers should be dried in the sun or over a mild firfe. The press along with specimens may be exposed to sun but it must be protected from rain and moist air. Newspaper is a good substitute for blotting paper and may, sometimes, work better because it absorbs moisture slowly.

Some pressure is required to be put on the presses so as to prevent curling of the specimens while they are drying. But not much pressure should be applied than really needed for the purpose, especially in case of brittle specimens. As the plants lose water and shrink, the straps of presses may be tightened frequently. Sometimes the drying material is placed under suitable weights, which automatically descends down and maintains pressure as the contents shrink.

Bulky and woody specimens should be kept in a separate presses and not placed among ordinary herabaceous specimens. Similarlyy, fleshy plants must be killed while they are still fresh, either in boiling water, weak spirit or strong formain, otherwise they are likely to blacken and develop fungal growth. When parts are bulky and fleshhy, they can be split or cut longitudinally into two or more parts and kept separately. In certain cases, flowers, inflorescences, fruits, leaves, etc., have to be detached for pressing. Cotton pads may be kept between layers of bulky and sappy plants.

Small and delicate plants should be pressed separately. It has been suggested that an old noval or a periodical carried in the pocket is an ideal press for tiny plants; but their proper labeling must not be forgotten. Minute plants can also be preserved in a

95% Ethyl alcohol	50 CC.
40% Formaldehyde	10 CC.
Glacial acetic acid	55 CC.
Water	35 CC.

liquid medium with the following composition:

Drying techniques

It is very important to treat materials with care

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while drying them. Drying may be done by any of the following methods :

Drying with natural heat

1. The specimen is first kept in the field press in a dry place for 24 hrs. This period is called sweating period.
2. After sweating period, blotting paper is changed and the specimen is kept for another 24 hrs. in a dry and sunny place.
3. Again blotting (paper) material is changed the third day and while doing this the specimen should be rearranged and kept for another 2-3 days in the press. Blotting paper requires to be changed more often in rainy season and in excessively moist areas.

Drying with artificial heat

1. Prssed material is kept for sweating for 24 hrs.
2. Material is then kept in drying press and the process of drying is continued as follows:
   (i) Heated air is passed over aluminium sheets used as drying sheets or,
   (ii) Press is kept in an oven at a suitable constant temperature and a small electric fan is used to circulate air.

In the forest, lamps and stoves are used to dry the material but it is risky as the material may catch fire. Also, he artificially dried material may become brittle and may also change its colour. This method, therefore,may not be resorted to unless inevitable.

Preervation of natural colours

To maintain natural colours of the specimens and their parts, drying should be quick i.e. the drying paper should be changed very freuently, and used while still warm from sun, oven or stove. For preserving natural colour of flowers, absorbent carbon monohydroxide (COH) is soaked in formaldehyde and placed in the bottom of jar, and then the flowers are placed.

Acetatge of copper dissolved in acetic acid and diluted with water (equal volume) may be used to preserve the green colour of specimens. Leaves soaked in following solution, when dried in usual manner, retain green colour (Lawrence 1951).

Green parts preserved in the following liquid medium also retain green colour (Knudsen, 1972).

The flexibility of the plant can be retained by treating it with hot sand and paraffin wax while drying.

50% Ethyl alcohol	70 c.c.
Formaldehyde	5 c.c
Glaycerine	2.5 c.c.
Glacial acetic acid	2.5 c.c.
Cupric chloride	20 gm.
Uranium nitrite	2.5 gm.

Phenol C.P.	20 gm.
Lactic acid (Sp. Gr. 1.21)	20 gm.
Glycerine (Sp. gr. 1.25)	40 gm.
Cupric chloride	0.2 gm
Cupric acetate	0.2 gm
Distilled water	20 c.c.

Sappy specimens should be treated with certain chemicals which kill them and, therefore, cause them to give up their water more quickly. 25% spirit or boiling water may be used for this purpose. Formalin is also useful.

Mounting

The specimen should be mounted or fixed on a mounting sheet of 45 × 30 cm. (it used to be 16.5 inches × 11.5 inches, i.e. 41.25 × 28.75 cm, which is often stated as standard size) size and made of a heavy weight and of good quality paper, Sheets of hand made paper last much longer then those from machine made paper.

The specimen should be laid properly spread out on the mounting paper and glued to the sheet with the help of a good adhesive or with the carpenter's *sares* which is very good for the purpose as it is water proof. The specimens may also be stitched on the mounting sheets; this is by far the best methnod because the specimen does not loosen with the passage of time, nnor does it draw the stain of glue or paste. Adhesive tapes should not be used as they have a short glue life, as also they leave a stain on the paper.

Annotation (labeling)

A label is pasted to, or printed on, the bottom right corner of the mounting sheets. Label should be of approximately 12 cm × 8 cm. size and should incorporate following information :

A short note may accompany the specime, giving those characteristics which the dried specimen will not show, for example, colour and fragrance of flower, the hue of leaf, differences in colour,

1.	Flora of (area of region) .....
2.	Serial field number of the plant .....
3.	Genus, species and family .....
4.	Locality .....
5.	Altitude and aspect .....
6.	Habit .....
7.	Habitat .....
8.	Local name and uses .....
9.	Field notes about plant and/or locality .....
10.	Date of collection .....
11.	Name of collector .....
12.	Name of person who indentified the plant.

indumentum & venation between the upper and lower surfaces, aromatic glands, etc.

Packing and transport of specimens

Often the plant specimens collected in the field require to be sent to a herbarium, and it is then necesary to pack them in a way that they reach their destination not only safety, but also in good shape.

The specimens may be moistened with methylated spirt and treated with naphthalene power while mounting them on a sheet or placing them in an envelope before dispatch. Mounting papers are not always availble while one is working in the field. It would be enough to put the pressed and dried specimens in an improvised envelope of about 45 × 35 cm. The specimens then be provided with some kind of stiffening to prevent them from damage in transit. Card boards or stiff boards of old files may be placed on either side off teh bundle before finally wrapping them with paper for dispatch.

Poisoning

This is the process in which material is treated with certain chemicals for preservatioon purposes. This may be done either before or after mounting of dried materials.

There are certain insects like 'herbarium beetle' and 'book louse' which attack sheets and spoil the whole herbarium. This can be checked by treating herbaria with any one of the following insecticides:

Naphthalene balls are kept in almirahs as insect repellent. Use of naphthalene at frequent intervals serves the double purpose of preventing insect attack and keeping down excessive humidity in the wet climate of tropics.

Filing of specimens

It is the process of storing the herbarium sheets at a place in special wooden or steel almirahs. The herbarium sheets are kept in a file, separate for each genus, labelled and then put into almirahs. Type

1.	Mercuric chloride	:	Plants are dipped in, or brushed with, a saturated solution of $HGCl_2$ in ethyl alcohol and then dried in the usual way. Lauryl penta-chlorophenate is considered a safer substitute for mercuric chloride.
2.	Cyanide	:	Plants are dipped in a solution of sodium or potassium cyanide and then dried.
3.	DDT	:	It is sprayed on the mounted specimens.
4.	P.D.B.	:	Small cloth bags of para-dicholoro-benzene are placed in the shelves containing herbarium sheets.
5.	CS_2 or CCI_4	:	Carbon disulphide or carbon tetrachloride is kept in small petri-dishes in the shelves.

Plate 19 to 24 : Sheet preparation

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specimens are kept in a red coloured folder. Herbaria should always be kept in a dry and ventilated place and adequate care of these should be taken, as they may last many years and be used as reference for identifying plants at any time. An air-conditioned room is the best place for storing herbarium material, and a properly cared for specimen should last indefinitely.

CONCLUSION

Various characters are used not only to describe the plant specimen, but also to establish its identity, and to locate its position in the arrangement of taxa, i.e. family, genus and species. Identification is done by using checklists, herbarium sheets, monographs, taxonomic literature and flora. Result may concluded after complete field work & data collection.

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