Students' herbaria: Agents of disturbance of nature?

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Are universities teaching botany students to be careless in preparing plant collections? Herbarium making must not lose sight of the environmental ethic.

It has been noticed by several colleagues that many of the plant species collected a few decades ago are no more available at the same sites, thanks to (i) loss of habitat, or (ii) excessive removal of specimens. The latter is strongly suspected in the case of plants of interest only to botanists. As a result, progressively more students are deprived of studying specimens significant from a morphological, an evolutionary or some academic point of view. Depletion in numbers or even absence of several species, like *Nepenthes* in the Khasi hills, *Osmunda* near Mahabaleshwar lake, *Isoetes* and *Ophioglossum* from the Panchagani table-land, are examples. Non-botanists are hardly interested in them. Small-time biological-material suppliers have often done great harm to such plants, collecting them wholesale for students and biology departments of colleges.

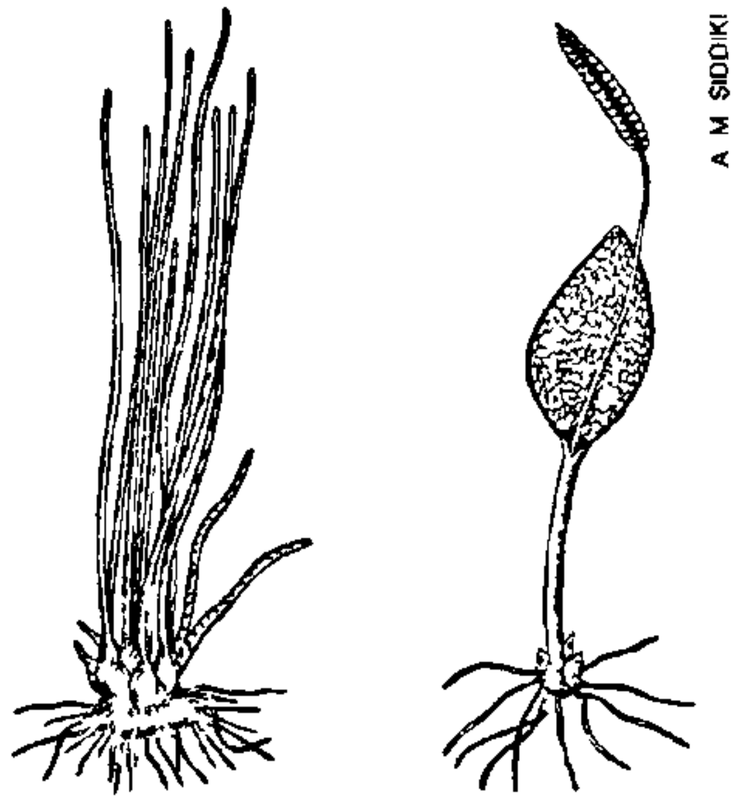
Students of botany are expected to prepare herbaria of the plants they collect from the wild for learning about nature, i.e. the habits and habitats of plants in nature. A plant collected and identified by a student, and handled several times for preservation, remains in memory without conscious effort on the part of the student, who is also expected to be able to describe the plant, in all possible details, in the field and later in the laboratory. In addition, the institution is also enriched with the plant collections of its students.

Nature of the problem

A very large number of instances of herbarium-making, however, hardly fulfil these objectives. In some instances, the objectives are achieved at a severe cost to nature. Often, the students, on excursions, are continuously on the move and have a tendency to collect specimens pointed out by the teacher by 'grab' method and pack them hurriedly. The job of description and identification of fresh specimens is rarely attempted, nor recording of the habitat done carefully. Most of these jobs are done by the teacher or a 'specialist' back in the department. The objective of training a student to learn about plants in their natural habitats becomes a casualty.

Since rare plants are supposed to enhance the value of a herbarium, students have a tendency to collect them more enthusiastically, from whatever source and by whichever means. One can imagine the plight of the keepers of botanical gardens who find that cones of *Zamia* and twigs of potted *Ginkgo* disappeared with batches of visiting students. Removal of beautiful flowering twigs of *Amhertsia nobilis* from the already depleted Jijamata Udyan (formerly Victoria Gardens), or branches of meticulously nurtured potted *Pinus*, *Cryptomeria* and *Podocarpus*, as well as ferns, from the small garden of the Institute of Science, both in Bombay, must have left the authorities in despair.

When the process of preparation of herbaria by botany students is watched carefully, it becomes evident that around 500 flowering twigs are sacrificed per student preparing for a graduate or postgraduate examination in our universities, since an average student collects one to five specimens for preparing one good herbarium sheet. In one university in western India, 400 B Sc students, each presenting 25 herbarium sheets, may cost 10,000 to 50,000 flowering twigs. Each of the six postgraduate students with plant taxonomy as elective in a university in the Deccan may be responsible for removing as many as 500 twigs, some of them of great academic interest. When one puts together the flowering-twig requirements of hundreds of graduate and postgraduate students in the 100-odd universities in the country, the figure of plants plucked every year works out to an astronomical one.



Left: *Isoetes* sp., *right*: *Ophioglossum* sp., both from Panchagani—indiscriminate collecting.

The sacrifice of plants on such a large scale is, unfortunately, going waste. Many students fail to recognize the most common trees in their own campuses, where they have spent two years. In examinations in some leading universities in the country, even specimens from their own herbaria were not identified by students. Moreover, not even 1% of the herbarium sheets of students are stored in university herbaria. The entire exercise of herbarium preparation is thus proving to be a colossal waste of educational effort and resources, especially of plants in nature.

Forest departments and botanical gardens have now banned removal of plants from areas of their jurisdiction as a desperate measure to conserve plant species. The step has inconvenienced many a genuine botanist. It is time a serious view is taken of the situation and ways are found to conserve rare and interesting plants in their natural habitats as well as in botanical gardens.

An opinion survey

In this background, a letter was addressed in April 1990 to 28 senior and

Nepenthes khasiana, the insectivorus pitcher plant, from Meghalaya.

experienced teachers of botany, all with impeccable credentials as scientists. They were requested to reflect on the following points:

(i) Is preparation of herbarium by students necessary?
(ii) If it is necessary, what should be the optimum number of sheets by each graduate and postgraduate student? And, what types of plant specimens should be collected for the purpose?
(iii) In case herbarium is not necessary, what are the options to ensure that students attained the objectives of herbarium making?

Twentyfive per cent of the teachers approached replied to the questions. The following is a summary of the replies.

(*a*) Herbarium preparation by botany students was considered by all as a 'must', since it taught the students techniques of collection, description, identification and preservation of plants. Some teachers felt that the students should be trained in even the new techniques of preservation of plant colours. One teacher did not consider the problem to be serious enough.
(*b*) Different views were expressed about the number of plants to be preserved by students. One suggested only five well-prepared sheets, while another opined that three to five herbarium sheets of each of the plant groups—algae, fungi, bryophytes, etc.—should be prepared, to ensure development of competence of preserving a variety of plants. One teacher suggested photographing rare species. Carpotheque (collection of fruits and seeds) was recommended by one. Another wished to put a stop to collection and preservation of a large number of plants, with the help of suitable guidelines from universities.
(*c*) There was unanimity about collection of 'common plants' and avoidance of 'rare' plants. One suggested plants growing in and around campuses. Another said that removal of weeds for herbarium could also lead to biological control of weeds in croplands. According to another opinion, plant collection should be done only by postgraduate students, and undergraduates should only be taught herbarium techniques. Whereas all agreed that rare and endangered species must not be removed from their habitats and students should not get special credit for their collection, one teacher recommended punitive action (like deduction of marks) for removing species marked for conservation.
(*d*) All teachers insisted on making the excursions more meaningful by increasing accent on observation and study of plants and their habitats. Some felt that going long distances for excursions was not necessary.
(*e*) Growing of plants by students was discounted as a substitute for herbarium, but some recommended it as a good additional exercise for botany students. One scientist felt that botanical gardens should be set up and maintained by botany students, while another considered the feasibility of teaching the students techniques of developing green cover on different terrains, with the aim of creating awareness of the environment in students and society.

Recommendations

Changes in the prevailing practice of preparing and submitting herbarium sheets by students for examinations are necessary. The accent should be on collecting only a limited number of specimens that are common and representative of diverse taxonomic groupings and habitats. Students may also be encouraged to learn techniques of cultivating different types of plants in different types of terrains.

To ensure judicious plant collection by students, teachers have to reorient themselves and become conversant not only with the taxonomic identity of plants but also with other information like the role of a plant species in nature and its present status of survival in the habitat.

Controlled herbarium making, aimed at protecting rare, endangered and scientifically interesting plant species from indiscriminate removal by students, may appear a small and insignificant step, but is important for inculcating the environmental ethic. Self-regulation by teachers and the student community would make embarrassing legislations unnecessary and will also lead to sustainment of a healthy nature—a much better object for learning.

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