

From the archives



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Co-operation in scientific research

One of the principal features of the recent development of higher education in India is the provision of facilities for scientific research in all the universities, and it is gratifying that the total annual output of work from their laboratories is increasing in volume and improving in quality. We have, at present, one university for every twenty millions of people and for every hundred thousand square miles. Judging merely from the geographical area of India and the density of her population, few will

maintain that our eighteen or nineteen universities are excessive. We are rather disposed to think that in South India alone there is room for at least three more universities. It has now become part of the political doctrine of enlightened Indian public opinion that a wider diffusion of higher university education is indispensable to national progress.

Some well-meaning critics still hold that these centres of research and learning are directly responsible for the growth of unemployment in the cities, and propose that the funds now granted to universities should be diverted to the more useful and urgent purpose of spreading elementary and secondary education among the people. The disparagement of higher education by these popular representatives is probably due also to a vague apprehension that the money spent on the university benefits only a few, these few do not contribute directly to the earning power of the nation and the man who pays for them receives hardly any return for his money. We are afraid that this mode of reasoning can only be considered as a sample of the logic of democratic enthusiasm.

Furthermore, there is a class of reformers of Indian universities who advocate their conversion into technological and commercial institutions where young men undergoing practical training will be put in a position to earn their living and to contribute to the material prosperity of the society to which they belong. It is true that if universities are established in manufacturing centres, their technological sides will help to foster the local industries and may even help to maintain their supremacy; but it scarcely occurs to these zealous reformers that all universities are incapable of such transformation without prejudice to their more legitimate function. If a young man is destined for an industrial or business career, it is in the workshop and the office of industrial institutions that he will learn his lessons more profitably than in the class rooms of the university. The village smithy, the local carpenter's table and the cottage handlooms provide really a more profitable training to the future rural industrialist than can be imparted in any secondary school. The fact is that all these adverse criticisms of the existing institutions are a product of an inverted snobbery.

SCIENTIFIC CORRESPONDENCE

A computer-based complementary technique for plant herbaria

Of all the biomes, the forest and wilderness are the best preserved biospheres with maximum species diversity. According to Sauer¹, biodiversity can be defined as wilderness (microbes, plants, animals) that existed before human disturbance or that would exist if left undisturbed. Forest, whether rain forest or Himalayan, dry or moist deciduous are the most rich habitats with several plant or plant-animal associations. However, management of forest then not only must be based on the inventory of biota but also their associations and interactions. The science of taxonomy provides basic information regarding identification, close relatives, classification, etc. of collected plants. However, its present

role in serving the interests of non-taxonomists in terms of information, its storage and retrieval system is under great stress. Though large amount of data have already been accumulated, the traditional methods of effective communication of information is inadequate. However, with recent developments in data storage, retrieval and even communication it is possible to obtain information at one's desk². These facts point to the urgent need for a complementary system with an easy accession.

India is one of the 12 megadiversity countries in the world. As a megadiversity country, India has a vital stake in conservation and sustainable utilization of its biodiversity resources. This is

possible based on the available information on the distribution and ongoing changes in biodiversity. This demands for countrywide, continual efforts for generating an inventory and monitoring of biodiversity³. In fact, with the alarming rate of developmental extinction, an exhaustive floristic inventory specially in the fragile ecosystems of tropics, is the most urgent need⁴. This requires a two-step effort involving (1) mapping of ecological habitats and (2) field surveys in representative localities. This extensive, regular field work or explorations under such a programme need an easy system for documentation. Such botanical surveys involve collection of plant material, detailed



GEER Foundation – Herbarium, Gandhinagar	
Genus	: Zizyphus
Species	: jujuba
Family	: Rhamnaceae
Vernacular Name	: Bor/Ber/Bordi
Locality	: Indroda Park, Gandhinagar
Population	: Dense

Figure 1. Computerized scan of phenological details compiled in one sheet. Note the adaxial and abaxial details of leaves.

taxonomical studies, preparations of herbarium for records and further studies. The correct identification and preservation of plant material with all phenological and morphological details becomes a challenging task for a taxonomist. This task is fulfilled by preparation of a herbarium. A herbarium is a collection of pressed and dried specimens mounted on thick suitable paper and arranged according to the accepted system of classification for further detailed studies⁵. Though preparation of herbarium involves standard procedure,

there are intrinsic problems associated with its preparation, storage and retrieval. To overcome such problems, we propose the following procedure to complement the herbarium.

The plant material which is being processed for herbarium can be first scanned using standard computer coupled with a scanner. An average sized plant twig on scanning takes about 2.5 Mb space in the computer. Suppose a plant specimen is collected in its vegetative and reproductive stages during sequential surveys, then one can have complete details of collected specimens (vegetative and reproductive) on one sheet. This is possible by a computer coupled scanner by overlapping the present phenological details with the records scanned earlier because of the lag in vegetative and reproductive (flowering and fruiting) period exhibited by all plant species. As for example plant species (*Zizyphus jujuba* Lamk.) of family Rhamnaceae was collected in its vegetative phase and scanned. In the next survey the same plant species was collected with its phenological events like flowering and/or fruiting. Then by overlapping the two scanned data one can generate taxonomical details covered in one sheet only (Figure 1). This complementary procedure will help in generating the virtual details for storage with the following advantages over conventional method of preservation – (1) succulents like cacti, *Euphorbia*, etc. and members of Crassulaceae pose problems in making herbarium specimens. Such material (poorly dried) is always prone to infection; (2) material being too big is difficult to accommodate on a herbarium sheet; (3) all the phenological details can be availed on one sheet; (4) proper plant identification, as both adaxial and abaxial surface get scanned (Figure 1); (5) collected data in the form of a floppy helps in

easy transportation; (6) useful in demonstration purposes in practical classes as it has all the details with natural colours; (7) no maintenance is required for herbaria; (8) easy tool with retrieval system for future reference; (9) time taken for retrieval is very less as it can be operated by the press of a finger; (10) data so compiled can be a good documentation in form of photographs which can be used straight for publication in the form of a book.

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