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Digital herbarium for the flora of Karnataka

Today more than ever, the need for study and preservation of flora has become subjects of global importance. Herbaria are important bio-resource information repositories and the plant specimens therein provide a lasting record of the flora of a location or a region. The information and knowledge available in the herbaria can be effectively used for the preservation of species and spaces (habitats). Properly sampled and preserved herbarium specimens are also valuable aids in teaching and research. Herbarium specimens are now used for studies in disciplines, which are probably never ever imagined at the time early collections were made. Importantly, they provide the archival material for comparison of species earlier and now in eco-physiological, climate and global change research. For example, herbarium specimens have been used to study changes in leaf nitrogen and stomatal density in forest trees in response to reactive nitrogen deposition and increase in global atmospheric carbon dioxide respectively. The Herbarium JCB (JCB, the international acronym) housed at the Centre for Ecological Sciences, Indian Institute of Science is the only holding in this state that has specimens collected from all over Karnataka state, correctly identified and the determinations authenticated by specialists, and with duplicates deposited with herbaria of Royal Botanic Gardens at KEW, England and the Smithsonian Institution, Washington DC, USA.

The Digital Herbarium attempted is an initiative in the emerging area of biodiversity informatics and aimed to develop a knowledge base for the plant wealth of Karnataka based on the state-wide collection available in the Herbarium JCB. The taxonomic data portrayed on each species in the database includes all information presented on the herbarium specimen label, namely, species name, author citation, sub-

species if any, variety if any, family, subfamily, collection number, locations, date of collection, habitat and the collector's name. The data further comprises 'Flora' in which the species is described. Additional information includes nomenclature update as per 'The Plant List', a detailed description, phenology, species distribution, threat status and comments on any special features of the taxon. The digitized herbarium specimens at a minimum resolution of 300 dpi and the images of live specimens provided in the database form an information synergy on the species. This initiative is first of its kind for herbaria in peninsular India. See page 1268.

Modified clays for retention and supply of water and nutrients

Clay minerals are the natural materials well known for their effect on retention and persistence of organic and inorganic compounds in soil. Clay minerals are being modified through different processes to alter their charge and surface properties tailored for specific purposes. Modified clays in general include pillared layered clays, organoclays, nanocomposite, acid and salt induced and thermally and mechanically induced modified clays. Modification of clay with polymer, particularly surface cross-linking polymer, increases the barrier property of clay composite and fertilizer treated with clay composite leads to slow release property. The surface crosslinking polymer gel which is mainly responsible for the slow release property and when it gets fixed between interlayer of expanding clay it become more stable than the other polymer. The surface-crosslinked product not only had good slow release property but also excellent soil moisture preservation capacity, which could effectively improve the utilization of fertilizer and water resources simultaneously. Clay polymer coated N-

fertilizers are found to be particularly effective in minimizing N losses and enhancing N-use efficiency in sandy soils whereas clay polymer coated P-fertilizer are effective in calcareous soil. Till date, most of the research in this direction is restricted under laboratory condition or in pot culture experiments. The research work should be directed towards preparation of suitable polymer composite for *in situ* modification of soil clays. This would facilitate development of management systems that ensures long term sustainability of soil resources. See page 1272.

Somatic embryogenesis of 'maggar' bamboo

The need for increasing bamboo plantation is very important as ever increasing demand for bamboo in the modern society has outstrips the supply, which has been steadily declining. One of the most important contributions of bamboo to the modern society is production of paper; besides it has several other well-known uses, including traditional, and provides employment opportunities. Besides its importance in the national 'economy', bamboo plantations are being considered particularly important in afforestation programmes for which production of healthy and physiologically young planting material, by establishing nurseries, is a prerequisite as the bamboo propagules are known to retain the age of the mother plant and exhibit terminal flowering. Maggar bamboo (*Dendrocalamus hamiltonii*) has tremendous scope for use in eco-friendly agro-forestry projects in the hills (up to 1800 m amsl), to bring marginal lands into use. Bag *et al.* (page 1279) describe a useful protocol for mass propagation of maggar bamboo via somatic embryogenesis using explants taken from field-grown 10- and 45-year-old elite maggar bamboo, which has an added advantage of producing a large number of plants within a short period.