Journal of the Indian Institute of Science
A Multidisciplinary Reviews Journal
ISSN: 0970-4140 Coden-JIISAD

EDITOR'S DESK

In the first issue of the *Journal* in 2015, we offer a collection of review articles on chemistry, ecology and evolution of plant volatiles edited by Professor Renee Borges, Centre for Ecological Sciences, IISc. The immobility of plants and yet their tracking of resources makes a fascinating study. The reviews appearing in this issue address some of the key factors associated with plants, such as luring vectors for pollen and dispersion of seeds by attracting fruit consumers. The ecological balance in such events has been highlighted by articles drawn from experts in the area. The editorial board expresses its gratitude to Prof. Borges for putting together an excellent collection of review articles.

In 2014, the *Journal of the Indian Institute of Science* completed 100 years of its publication. On this occasion, a special issue reflecting the history of the *Journal* will be published towards the end of January 2015. Also, a variety of topics such as earth sciences, composite materials and design have been identified for the forthcoming issues. We hope to serve the scientific community with review articles covering contemporary and path breaking areas in all branches of science.

T.N. Guru Row
Editor
ssctng@sscu.iisc.ernet.in

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GUEST EDITOR'S DESK

Plant Volatiles: Chemistry, Ecology and Evolution

A characteristic feature of plants is their immobility. While portions of the above- and below-ground parts of plants can track resources such as photosynthetically active radiation and nutrients and correspondingly grow towards photons or nitrogen, individual plants cannot move their locations. This inability to change location has resulted, for example, in plants having to resort to exchanging gametes by luring vectors for pollen, and to dispersing seeds by attracting consumers of fruit. Pollinators and seed dispersers are attracted to plants by the scents of flowers and fruit and also by their colours. Plants are also often attacked by herbivores and cannot escape from them by physical displacement. Herbivory, therefore, induces a defensive cascade of signalling events within the plant, some of which are mediated by hormones, and that also result in the emission of herbivore-induced plant volatiles (HIPVs). These HIPVs can cause defence induction in neighbouring unattacked parts of the same plant, or in neighbouring plants, and can also attract enemies of the herbivores such as parasitoid wasps or birds to the sites of the herbivory. Plant volatiles can thus be used as signals of herbivory. Plants emit volatiles not only from their leaves, but from flowers, fruits, seeds, and roots. Root volatiles emitted in response to root damage by insect larvae can elicit damage control by animals such as entomopathogenic nematodes.

Another characteristic feature of plants is autotrophy and the ability to fix carbon. Plant volatiles are built from C5 or isoprenoid building blocks that give rise to a large diversity of terpenoids, phenylpropanoids, fatty-acid derivatives and amino-acid containing volatile organic compounds. Isoprenoids have an enormous impact on atmospheric chemistry and ozone, and are implicated in many aspects of climate change. Although plants vary in their ability to produce isoprenoids, and consequently to contribute to climate change, the overall impact of volatiles produced by plants on the atmosphere is considerable.

This issue is dedicated to several aspects of plant volatiles such as isoprene emission, HIPVs, calcium signalling before HIPV emission, role of phytohormones in regulating HIPV biosynthesis, as well as the ecology and evolution of flower, fruit and seed volatiles taken together with traits such as flower and fruit colour. Reviews in this issue emphasise that plant volatiles could be subject to several selection pressures that may shape volatile production and emission. More importantly, the volatile profile of a plant ought to be seen as a trait that may correlate with other traits, and that genes controlling colour and/or odour may have pleiotropic effects on the plant phenotype. Therefore, whole plant ecology and correlated trait evolution must be considered when evaluating the significance of volatiles in any particular plant part. For example, fruit volatiles may result from correlated selection on the chemistry of leaves, and flower colour may interact with flower scent to constitute a multimodal signal to pollinators.

This is an exciting time to be working on plant volatiles since excellent volatile collection and analytical techniques are available, and the challenging questions are also being better defined. Like in an onion, only a few layers of the chemistry, ecology and evolution of plant volatiles have been peeled away; there are many more layers to be examined. We hope that this collection of reviews will help to stimulate research in this fascinating field.

Prof. Renee M. Borges
Centre for Ecological Sciences,
Indian Institute of Science,
Bangalore 560012,
India.
renee@ces.iisc.ernet.in