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Reproductive biology of vasa plant

Adhatoda vasica is an important medicinal plant and is known as vasa plant in Ayurvedic literature. Its leaves are extensively used as bronchodilator and expectorant. *Adhatoda* is a common perennial shrub that grows on waste lands in most parts of India. K. R. Shivanna (**page 408**) has investigated reproductive biology

of this important plant. The flowers remain fresh for 3–5 days to attract pollinators. The flowers are protandrous and pass through three distinct phases: male, bisexual and female. Two species of carpenter bees are the effective pollinators. They collect pollen grains when they visit flowers during male and bisexual phases and bring about pollination when they visit flowers during bisexual and female phases. As the pollinators tend to move between flowers of the same plant, there is a high level of geitonogamy (pollination from pollen of other flowers of the same plant). As the species is self-incompatible, geitonogamous pollen are ineffective in effecting fertilization. The results indicate that protandry does not prevent self-pollination but reduces interference in export and import of pollen. Although the flowers have adapted well to achieve a high level of pollination (about 95%), reproductive success in terms of fruit set is very low (only 6%) largely due to the limitation of xenogamous pollen (from other plants).

Kochi backwaters' thermohaline structure

The Kochi backwaters (situated on the southwest coast of India) provide nursery ground for a wide variety of aquatic plants, shell and fin-fishes. Its two mouths cause saline water intrusion and six rivers supply freshwater to it.

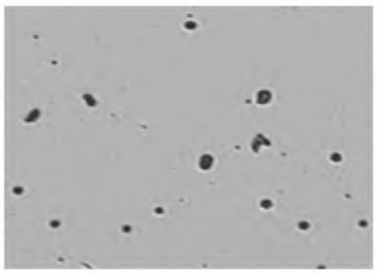
Synoptic measurements of water temperature, salinity, water level, and several surface meteorological parameters at closely spaced time-intervals during fair weather, and during/after an episodic surface meteorological event provided insight into the estuary's overall thermohaline structure and its sensitivity to tides, insolation, freshwater influx, wind and rain.

During fair weather, its horizontal temperature–salinity structure is found to be inhomogeneous, where the shallower head region is warmer and less saline than the deeper mouth region. Its diurnal thermal variations are mainly attributed to day/night heating/cooling processes, tides and winds. Its wind-cooling is delayed by more than 1.5 days, against half-a-day for the adjoining Lakshadweep island waters. Thermal variations in this estuary are influenced by factors such as solar irradiance and land/sea breeze (diurnal processes), spring-neap tidal cyclicity (fortnightly processes), shallow depth, and vegetation on the surrounding landmass. The mouth of the estuary is additionally cooled by up-welled waters from the Arabian Sea.

The estuary's response to episodic meteorological event is manifested as a sharp drop in temperature and salinity. During heavy rains, salinity at the mouth region falls considerably (~2 psu). The temperature–salinity vertical profiles at the mouth region show large stratification, with a temperature gradient of ~3.5°C and a cap of 1–4 m thick low saline waters (≤2 psu) floating on the surface. See **page 364**.

Digital holography in particle field imaging

Vijay Raj Singh *et al.* discuss (**page 391**) about the use of digital holography in particle field imaging. Digital holography (DH) is direct recording of holograms using a CCD camera and is an alternative to the use of a film or a plate. Use of fast computers in numerical reconstruction makes DH more flexible in



terms of hologram processing. The ability of numerical evaluation of both amplitude and phase information is its main advantage over other optical imaging methods. The use of in-line digital holographic microscopy has been demonstrated in particle imaging in 3D. Holograms of the particles of about 10 microns size are recorded and digitally reconstructed both in static and dynamic case. Both collimated and diverging beam in-line digital holograms are analysed. Digital focusing was done to image the particles in different planes along the depth of focus using the single hologram. Digital holographic particle imaging results are compared with conventional optical microscope imaging. A methodology for dynamic analysis of micro-particles in 3D using in-line digital holography is proposed. The dependence of depth of focus on the particle size, reconstruction distance and the NA are discussed.