dream, although data are available. In the year 2000, *Current Science*, through a special issue[2] made a strong case for public access to Indian geospatial data highlighting concerns, advantages and drawbacks. In most cases, non-accessibility to data generated through public funding, including those by national agencies was seen to be a primary weakness[7,8]. However, concrete actions are still awaited to make such data available in public domain.

To overcome this problem and foster a community-driven effort towards building a geospatial data infrastructure, an Open Access Geospatial Data Repository (OAGDR) has been developed. Accessible at http://www.ncbi.org.in/oagdr/, the need for such a repository arose from difficulties experienced while accessing such data for a web-GIS species-distribution mapping system. This experience is in tune with that of the other groups within the country. Thus, the primary objective of OAGDR is to bridge this gap and improve public domain accessibility to spatial data generated and processed by various working groups. We, therefore, appeal to those involved in generation, processing and employment of geospatial data for various analytical and modelling studies to contribute to OAGDR along with necessary metadata. Once populated, such a repository would not only improve accessibility to public domain geospatial data, but also prevent duplication of efforts. This in turn would allow the biodiversity community to spend more time on ecological modelling, leading to better management of our natural resources. Such an open access model would not only satisfy our commitment towards 'information commons'[9], but also enhance the ability of our nation to take environmentally sound informed decisions.

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VISHWAS CHAVAN*
ANIRUDDHA S. KHADKIKAR

Information Division,
National Chemical Laboratory,
Dr Homi Bhabha Road,
Pune 411 008, India
**e-mail: vs.chavan@ncl.res.in*

Need to propagate the importance of patents in India

Intellectual Property Rights has gained prominent attention during the past few years in India. The country, so far, was basically illiterate in terms of patents. Patenting activity was not given much importance till date. Then why this sudden surge in patenting activity in India during the last decade? India signed the GATT (General Agreement on Tariffs and Trade) agreement in 1994 and agreed to honour the TRIPS (Trade Related Aspects of Intellectual Property Rights) agreement, which was a part of GATT agreement, and included patents along with various other forms of intellectual property. India was given time until 31 December 2004 to honour the TRIPS agreement. Even after accession to WTO (World Trade Organization succeeded GATT later) by India, the Indian community was quite optimistic about finding some way to keep the TRIPS agreement at bay for some more time. Indian scientists never thought of patenting their research activity in any field of technology; such a community was rare, if it existed at all. The Indian scientific community was so obsessed with publishing research findings that the thought of patenting the research never occurred to the scientists. The Indian scientific community is considered highly talented and knowledgeable. Then why was it that not many Indian scientists were able to exploit their scientific prowess? Why was it that the knowledge transpired by the Indian community and traditional knowledge that has been known over centuries in India was exploited by others? The cases of turmeric, neem and basmati patenting in the United States are some examples that the world and, India in particular, have seen. Although these patents were revoked by the United States Patents and Trademarks Office, India had to spend a considerable amount of money and resources to get these patents revoked.

Another concern is the apathy of the Indian academic institutions and universities to successfully implement knowledge at the academic level[1]. Even today many institutions ignore the importance of patents and publishing is considered as one of the benchmarks to evaluate scientific prowess. Publications do help one understand the concepts of a researcher or scientist and help in the dissemination of knowledge (and technology as well). Ideas of these researchers or scientists are used (and exploited most of the time) by others working on the scientific principle/theory. And in turn, what does the researcher/scientist get? A publication to his credit! Universities in India have failed to impart knowledge of this critical aspect to the students, unlike in Western countries where universities are among leading patent applicants. These universities then license patents to the industry and garner enough royalty to pump that amount for research. Why are we, in India, lacking this kind of industry–institute liaison for betterment and exploitation of technology? CSIR (Council for Scientific and Industrial Research) has been a frontrunner in propagating the concept of 'intellectual property' and has been implementing it by having the largest patent portfolio amongst Indian organizations[2]. Though leading in patent portfolio management today, CSIR, too had a dismal performance pre-1994 in terms of protecting research findings in the form of patents. Statistics with the United States Patents

and Trademarks Office shows that from 1969 to 1994, CSIR had only 47 patents to its credit[3] (coinciding with the time India recognized only process patents and not product patents, especially in pharmaceuticals, food and agrochemicals). With CSIR rising to proactively propagate the importance of patents in India, a multi-pronged approach is required to spread knowledge about intellectual property and patents. Universities, industry and government will have to take proactive steps to take proactive steps to ensure that the nation is literate in terms of patents in the coming years.

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MANTHAN D. JANODIA[1]
J. VENKATA RAO[2]
N. UDUPA[1,*]

[1]*Department of Pharmacy Management,*
[2]*Department of Pharmaceutical Biotechnology,*
Manipal College of Pharmaceutical Sciences,
MAHE,
Manipal 576 104, India
**e-mail: n.udupa@manipal.edu*

Is *Kappaphycus alvarezii* heading towards marine bioinvasion?

Pereira and Verlecar[1] have stated that an exotic marine algal species, *Kappaphycus alvarezii*, is on the verge of becoming invasive in southern India. They have further stated that scientist-divers have reported that this alga has started spreading in the Gulf of Mannar region and may affect other marine flora. There is a fear that it may propagate through spores which could lead to a bioinvasion. Another concern, according to them, is that the seaweed absorbs high amounts of nutrients from sea water.

The Central Salt and Marine Chemicals Research Institute (CSMCRI), Bhavnagar procured a few fragments of the above alga more than a decade ago, observing all protocols of introduction and quarantine. After acclimatization and laboratory culture, the alga was introduced in the sea in confined conditions – employing a novel bag technology – initially in the Gujarat coast and later in Mandapam, Tamil Nadu[2]. Although the alga introduced by CSMCRI was of foreign origin, it was cited subsequently on the Andaman coast by Rao and Umamaheshwar Rao[3]. However, drifted *K. alvarezii* was reported from Okha coast as early as 1970 by Krishnamurthy and Joshi[4].

Mairh *et al.*[5] observed liberation of tetraspores and carpospores from the above alga, but the germlings from these spores did not survive beyond 1–4 days in the majority of cases. Tetraspores were also reported by Paula *et al.*[6], but these authors too have confirmed the mass mortality of spores in germination experiments. The above observations may help explain why no trace of the alga was found in the open waters during all the years of its cultivation in confined bags in the Mandapam area. After initiating *K. alvarezii* cultivation in unconfined conditions, i.e. in net bags and monoline, in 2000, as part of a DBT-sponsored project to make the cultivation practically viable, an EIA study was carried out by CSMCRI. No significant adverse effect on the ecosystem was observed except for depletion of nutrients in the immediate vicinity of cultivation due to its uptake by the seaweed[7]. Bioinvasion of *K. alvarezii* is evidently not a facile process since there is no reported natural stock anywhere in the world, and the alga has become available in large scale only through cultivation, in countries such as Philippines and Indonesia. According to Pereira and Verlecar although a few seaweeds have been listed as invasive, *K. alvarezii* is not one of them.

Regarding the issue of reduction in nutrient levels in sea water, the sea has a large pool of nutrients and, even though there may be temporary decline in the nutrient level as a result of cultivation, this has no adverse impact. No significant effect was found on daily growth rate of *K. alvarezii*, even though it needs nutrients from sea water to grow. Grazing of the plants by fish was a menace that had to be tackled, but this was a good indicator of the health of the water. In fact, fishing near the cultivation site is becoming a popular activity. It will be appreciated that seaweeds help oxygenate waters through photosynthesis and this could help alleviate the anoxic condition of Indian coastal waters reported recently[8].

The successful development of *K. alvarezii* cultivation technology in Indian waters, and the unprecedented interest in seaweed cultivation witnessed since transfer of the knowhow, is important for several reasons: (i) declining fish catch that has made it imperative to look for ways of supplementing incomes of the coastal population, (ii) invention of a novel technology that yields large volumes of seaweed sap rich in plant growth promoters and potash from freshly harvested alga, in addition to κ-carrageenan-containing residue[9], (iii) environmental gains through CO_2 sequestration and O_2 generation through photosynthesis, and (iv) introduction of a new sustainable cultivation that requires no arable land, no irrigation water and no fertilizer. Availability of indigenous κ-carrageenan will also open up the possibility of producing animal gelatin substitutes and biodegradable plastic, apart from its conventional uses[10]. All aspects of the work undertaken with the alga so far were debated at the symposium organized by Aquaculture Foundation of India at Mandapam[11]. It was recommended that cultivation of the alga is safe and promising. Cultivation has also been recommended by the National Academy of Agriculture[12].

As a responsible national laboratory that introduced *K. alvarezii* in India, we are duty bound to continuously monitor the environmental impact of large-scale cultivation, while taking pride in the socio-economic gains that are beginning to emerge.

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