lite-observed precursors such as land surface temperature, surface latent heat flux, cloud cover and total electron content. Scientists working with satellite remote sensing data related to earthquake applications, strongly believe that the changes observed on land, ocean, atmosphere and ionosphere are associated with the strong coupling between land–ocean–atmosphere-ionosphere. There is strong need to understand the earth processes associated with the earthquakes, that can be understood only if the earth, ocean, atmospheric and space scientists come together and give serious thought on the satellite observations that anomalous changes are observed prior to earthquakes which remote sensing scientists claim. It is hoped that the future GEOSS mission will prove an important mission in providing early warning about natural hazards in general, and in particular about an earthquake.

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Two Indian journals included in PCT Minimum List

Of the 144 journals from a meagre 13 countries, two Indian journals from CSIR, viz. *Indian Journal of Traditional Knowledge* (*IJTK*) and *Medicinal and Aromatic Plants Abstracts* (*MAPA*) find place in the Non Patent Literature (NPL) part of the PCT (Patent Cooperation Treaty) Minimum Documentation of the World Intellectual Property Organization (WIPO). Specifically, more than half (85) of these journals/periodicals are from USA alone, India with two journals shares seventh position with France and Switzerland (Table 1)[1].

Table 1. Country-wise periodicals included in PCT Minimum

Country	No. of Non-Patent Literature (NPL)
USA	85
UK	20
Germany	15
Russia	6
Japan	5
The Netherlands	3
India	2
France	2
Switzerland	2
Denmark	1
Czech Republic	1
Italy	1
Croatia	1
Total	144

This development assumes a lot of significance as India has been recognized as the major owner and contributor of traditional knowledge in the world as also in the international patent system grant of a patent for an invention is based on three criteria, viz. novelty, non-obviousness and industrial applicability. Novelty is decided by the patent examiners, based on the past patents and non-patent literature. In fact, by filing one international patent application under the PCT, and designating any or all of the PCT Contracting States (126 PCT Contracting States as on 8 May 2005), one can simultaneously seek patent protection for an invention in each of a large number of countries (India joined the PCT on 7 December 1998)[2].

1. National Institute of Science Communication and Information Resources (Council of Scientific and Industrial Research), Annual Report 2004–05, NISCAIR, New Delhi, 2005, pp. 1–2.
2. http://www.wipo.int/pct/en/ as accessed on 14 June 2005.

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Role of marine algae in organic farming

As rightly outlined by Ramesh *et al.*[1], the growing consciousness about environmental and health concerns has propelled global interest in the field of agriculture. In that article the concept of organic farming and its general characteristics have been comprehensively described. However, probable resources for organic farming have not been touched upon.

Resources for organic farming can be as varied as microorganisms, fungi, algae, animals, etc. The nutrients in organic fertilizers are less likely to be leached out and are made available to the plants by a combination of favourable conditions like warm temperature, moisture and microbial activity. With proper management, organic farming could reduce or eliminate water pollution and help conserve water and soil on the farm. Organic farmers employ natural pest controls of biological origin and plants with pesticide properties instead of chemical-based fertilizers that cause detrimental effects on plants. Organic agriculture has been witnessing a gradual growth rate in countries like Germany, USA, Japan and France.

As the efforts to unearth new sources for organic farming accelerate, one needs to evaluate the options available. Marine algae popularly known as seaweeds, have served mankind from times immemorial. Historical evidences mention its use as manure on

coastal lands of France, Ireland, Scotland and Norway. In Oriental countries seaweeds were used in fresh, dried, as well as in burnt ash form and were applied to the soil. In contemporary context, seaweed can be used in powdered, liquid, as well as fresh form. Seaweed-based fertilizer is rich in growth-enhancing factors like vitamins and plant hormones, which help in promoting growth and development of plants. Recently, seaweed has been used as a bioremediation agent in a study conducted by the University of Newcastle in Great Britain. Application of powdered seaweed on soil contaminated with the pesticide DDT reduced the toxicity of soil by 80% within six weeks[2].

However, in India, use of seaweed is restricted to commercial production of phycocolloids. The Indian Ocean, including its adjacent seas, extends over an area of about 73.44×10^6 km^2 and the potential harvest of seaweeds from the Indian Ocean is about 870 thousand tonnes (wet weight)[3]. India could draw benefits from this marine resource in various applications such as, rehabilitation of waste lands, enhancement of crop fields as well as the crops. A number of studies have already been carried out in Southern India to harness the potential of seaweeds as a natural fertilizer. Extracts from some seaweed species have shown beneficial effects on crop plants. This was reflected in the physiognomy as well as physiology of the crops. Algae are relatively high in nitrogen and potash, but low in phosphorus content. Hence, addition of phosphates could improve the fertility of this manure. The organic matter of seaweeds increases humus content of the soil, thereby ameliorating the soil texture and preservation of its moisture. A sustainable approach towards this venture is a prerequisite. An integrated organic farming system that includes solutions to pest management and land optimization, needs to be undertaken for the development of sustainable agriculture in an agronomical country like India.

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Shorea robusta – an excellent host tree for lichen growth in India

Shorea robusta or sal, is one of the most important timber-yielding plants in India, known for its heavy, hard and tough wood. It is a semi-evergreen or deciduous tree widely distributed in tropical regions of India and covers about 13.3% of the total forest area in the country. Sal occurs either gregariously or mixed with other trees in Himalayan foothills and central Indian belts (Figure 1). In the Himalayan foothill belt it extends up to the Assam valley (including Meghalaya and Tripura) in the east to foothills of north-west Bengal, Uttar Pradesh, Uttaranchal, Kangra region of Himachal Pradesh. The Gangetic plains separate the Himalayan foothill from the central Indian belt.

From the studies available on epiphytic lichens of different trees in India[1–4], the sal trees exhibit the maximum diversity of lichens represented by 64 species. The other two common associate trees of *Shorea*, *Syzygium cumini* and *Mallotus philippensis* have 45 and 9 species respectively.

The epiphytes on a particular tree (or different parts of a particular tree) are dependent on a wide range of complex interrelated factors. The topographical situation, the microclimate experienced by different parts of a tree and the nature of bark as substratum, are important factors in determining the lichen growth on a tree. The age of bark, smoothness, or roughness, fissured or ± spongy nature at base, pH, nutrient status, water-holding capacity and buffer capacity are other important bark properties affecting the lichen growth on trees.

The reason for good lichen flora of *Shorea robusta* is the variation of the tree bark at different parts of the tree. Within a single tree of *Shorea robusta*, four different niches are available for the lichens to colonize. The tree has rough, hard and furrowed bark at the base, sometimes laden with soil or dust. At trunk base, 3–6

Figure 1. Sal forest in Madya Pradesh, with luxuriant growth of lichens.