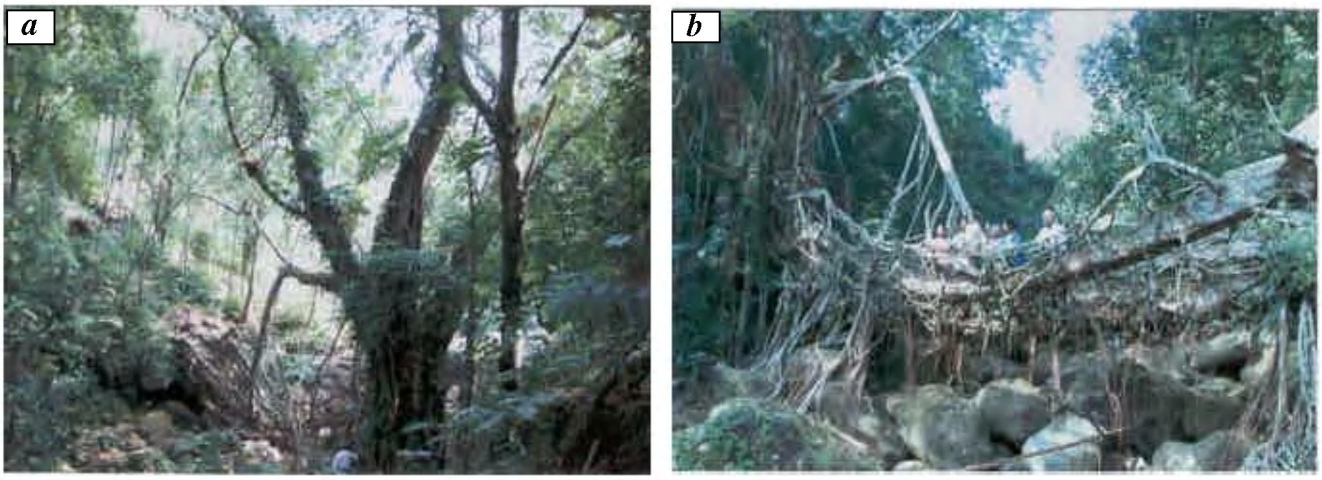

Figure 1. ***a***, *Ficus elastica* along with the 'living root bridge'; ***b***, Living root bridge.

through hollowed out betel nut (*Areca catechu*) tree trunks, which were longitudinally sliced and placed in the desired position. When the growing roots reach the other end of the river or stream as the case may be, they were allowed to penetrate the soil. These bridges usually have more than two base spans. Stones are used to fill any gaps in the base spans and over the period they get embedded in the floor of the root bridge. Some of these bridges have roots brought down from branches to join the middle of the bridge as support spans. The roots keep growing in strength and it takes 10–15 years for a bridge to be fully functional. Some of these root bridges are made by entwining the roots of two trees planted on opposite banks or in the middle of the river on huge boulders. These bridges may be 50–100 feet in length and are strong enough to carry 50 people at a time. One such bridge has two bridges stacked one above the other, like a double decker. The life span of these bridges is thought to be between 500–600 years, according to Denise P. Rayen, (www.cherrapunjee.com), who claims to have discovered and christened them as 'the living root bridges' (Figure 1 *b*). These root bridges are unique to Meghalaya and the state can be proud that their ancestors knew all about bioengineering and biotechnology and practised it much ahead of the others.

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Organic farming

This refers to the article by Ramesh *et al.*[1]. Organic farming must be looked in the light of new scientific knowledge in all interrelated disciplines and not as a traditional agricultural practice of the past.

The issues of comprehensively managing the farm and village waste and the input of deceptively simple-looking biotechnology in agro-waste management become increasingly important.

Indian farmers use nearly rupees 1.75 lac crores per year on agro inputs like seed, fertilizer, and pesticide, etc. A typical village in India with 200 ha of land needs 200 tons per year compost. This is possible through improved bio-composting processes to make it almost self sufficient – free from any external supply of chemical fertilizers, provided bio-composting can be scientifically and efficiently managed.

For both nitrogen and phosphorus-based chemical fertilizers, the situation will be critical worldwide. In fact, a phosphorus-dependent world is more vulnerable than one focused on the fuel oil availability[2]. The efficiency of both these chemical fertilizers can be substantially improved by use of microorganisms. As regards the phosphatic fertilizer, half of it is retained in the soil, and use of phosphate solubilizing microbes can increase its efficiency by 20–30%. However, these products have not reached even 2% of our farms, and a massive programme is needed to popularize them.

India produces nearly 500 million tons of agro waste per year[3]. Composition of some of these agro wastes are given in Table 1.

In addition, animal waste, waste from agro industries, human waste, etc. are all excellent resources needing appropriate technology and management for their use.

A good example[4] is enhancing the value of sugarcane industry in India, which has a huge capacity of 15 million tons of

Table 1. Composition and calorific value of some agro wastes

Agro waste	Moisture	Ash (%)	Carbon (%)	Sulphur (%)	Silica (%)	Calorific value (kcal/kg)
Pigeon pea	5	3	42	0.26	0–12	3196
Cotton straw	20	4	42	0.24	4.2	3107
Soyabean straw	15	14	39	0.27	0.76	1472
Wheat straw	9	16	44	0.21	4.27	4340
Rice husk	9	18	48	0.30	15.88	4309
Baggasse	50	15	47	0.05	0.45	2250

Table 2. Analysis of treated 'Consortia of microorganisms' compost at Bardoli Sugar Factory, Gujarat, India

Test	Untreated	Wonder Life treated
pH	8.7	6.9
Total nitrogen (%)	0.87	1.98
Total PO (%)	1.02	1.80
Potassium as K (%)	0.10	28
Sulphur as S (%)	0.26	0.68
Copper as Cu (ppm)	9.2	18.9
Zinc as Zn (ppm)	25.8	67.9
Iron as Fe (ppm)	632.8	2883.0
Manganese as Mn (ppm)	106.3	168.1
Molybdenum (ppm)	2.1	3.2
Moisture (%)	<35	45.5
Average particle size (in)	1.6–1.8	0.5–0.7
Smell	Pungent	No smell
Looks	Wheatish	Dark
Feel	Firm/rough	Loose
Microbial count	1.6×10^6	$>1.0 \times 10^9$
C : N ratio	14 : 1	28 : 1

white sugar production. Using the consortia of microorganisms to enhance the value of N, P, K and also micronutrients to increase the income of co-operatives as well as that of the farmers, is possible. This was illustrated in a typical case of a sugar factory in Bardoli district, Gujarat as detailed in Table 2. Gaushalas (cattle sheds) provide another big opportunity for value-added plant nutrient supply.

The most important consideration for organic farming will be its role in improved water use efficiency. It has been demonstrated in areas of Kutch, Gujarat[5] and Ethiopia[6] that good compost management in areas with water scarcity not only conserved moisture and increased water-use efficiency in agriculture, but also made remarkable improvement in the overall livelihood standard of local people.

These technologies are not glamorous but need intensive developmental efforts and high research priority and are extremely important for the developing world.

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Buckingham Canal saved people in Andhra Pradesh (India) from the tsunami of 26 December 2004

Information on tsunami heights relating to the mega thrust earthquake in Aceh Banda, Indonesia on 26 December 2004 has been compiled by Ramalingeswara Rao *et al.*[1] for the Indian coast. The M_w 9.3 earthquake at 6.28 h IST at the epicentre led to more than 1600 aftershocks in Sumatra and across the Andaman–Nicobar region, covering a secondary rupture 1300 km long. The maximum run-up of the tsunami was 5 m at Nagapattianam and the minimum was 2 m at Vizianagaram (Bogapuram) in the east coast of India. Buckingham Canal, about 310 km in length is situated, 1–2.5 km away all along the Bay of Bengal sea coast as shown in Figure 1 *a*. The Buckingham Canal is also known as the National Waterway number 4 (NW-4). This vital link between Kakinada, Andhra Pradesh (AP) and Chennai was built by an order of the then Governor of Madras Presidency, the Duke of Buckingham, to have a navigable waterway, for transportation of commodities such as rice, salt and firewood. The canal constructed in 1878, was named after the Duke of Buckingham and had been in operation till 1964.

The canal was dug parallel, about 1–2.5 km away from the sea coast (Bay of Bengal), to get sea water through the pre-existing creeks during high tide on full moon days, to maintain a constant water level in the canal. The width of the canal is 30 m and its depth is 10 m; its dimensions have got considerably changed in recent decades due to acquaculture debris, etc. at different locations of the canal in AP. The excess of floodwater from nearby rivers is released into the Buckingham Canal by opening the lockers (Figure 1 *b*) through the water channel on the western side of the canal near Siddavaram (Figure 2 *a*). A small segment of the canal is shown in Figure 2 *b*. Thousands of fishermen and their families are dwelling in areas between the Bucking-