Why are Indian standards not strict?

In the modern era of industrialization, due to increasing developmental activities air, water and soil are being polluted[1]. Thus it is essential to prevent/minimize the pollution load in every developmental activity. For this, various guidelines, quality standards and maximum permissible limits of pollutants have been set up in different countries. However, WHO standards are being applied in most countries of the world as they are considered as ideal. The Indian standards (BIS) or CPCB standards show relatively high deviation from the WHO standards for environmental quality. Maximum permissible limits for some water quality parameters are different than those of WHO. Limits for toxic metals (Cd, Cu, Hg, Mn, Ni, Pb, Zn) in drinking water are high in BIS or CPCB standards compared to WHO standards (Table 1). Why is there a huge difference in the acceptable limits of various standards of different countries? Heavy metals are highly toxic and cause various health problems in humans and also affect cattle and vegetation[2]. Thus, it is essential to control their migration to the unpolluted environment for the safety of human health[3] and livestock.

In India, standards of different water characteristics were set for various industries. Some industries follow these, while others ignore them. Are Indians amongst the major polluters of the world? Why are Indian water-quality standards not so strict?

Table 1. Recent standards for heavy metals (in mg/l)[4]

	Inland surface water		Drinking water				
	BIS/CPCB	WHO	BIS	CPCB	WHO (1993)	WHO (2006)	
						Normal	Health based
Cd	2.0	0.1	2.0	2.0	0.003–0.005	<1 µg/l	0.003
Cu	3.0	0.05–1.5	3.0	3.0	2.0	–	2.0
Fe	3.0	0.1–1.0	–	3.0	0.2	0.5–50	–
Mn	2.0	0.05–0.5	0.1	0.1	0.5–0.05	–	0.4
Ni	2.0	–	–	2.0	0.02	0.02	0.07
Pb	0.1	0.1	2.0	3.0	0.01	–	0.01
Zn	5.0	5.0–15.0	5.0	5.0	3.0	<20	–

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Bio-molecules as bio-fertilizers: Safe food for better health

The experiment by Haber and Busch (1907) on the conversion of atmospheric nitrogen into ammonia is a landmark in the history of agriculture. It helped to produce huge amounts of plant-based food materials. Use of fertilizer is a vital method for the production of bumper amount of plant-based foodstuff. All over the world, use of inorganic fertilizers is increasing day by day[1–3]. Application of fertilizers in India alone has increased from a mere 1.3 million tonnes (mt) at the end of the first Five-Year Plan to 12 mt at the end of the Seventh Five-Year Plan. It is estimated that in India 70 kg of nitrogen, phosphate and potassium is currently being applied per hectare of land per cropping per year which is less compared to that of other nations, e.g. 100 kg in the USA, 250 kg in Germany, 300 kg in China, 350 kg in the United Kingdom, 400 kg in Japan, 600 kg in the Netherlands and 900 kg in New Zealand and so on[4]. As crop plants are unable to use all of these materials, this accelerates underground water contamination. Soil structure and fertility are also decreasing due to heavy use of inorganic fertilizers. Therefore, several bio-fertilizers are being used now because they restore soil structure of cultivated land and solve several problems related to hazards associated with cultivation of crop plants[5]. However, hyper production of food materials is not possible using these fertilizers because these organic fertilizers work slowly even though they are eco-friendly. Vesicular arbuscular mycorrhiza is another method of restoration of soil structure and soil fertility[6,7]. Use of biomolecules as fertilizers is beneficial because of multiple reasons. Biomolecules can be used directly as fertilizers that will restore soil fertility and structure. A plant cell has mechanisms to transport its own molecules. Therefore, a cell will not face any stress conditions while importing these biomolecules[8–10]. As biomolecules are degradable, these materials will not cause any hazards that take place due to the cultivation of crop plants and use of inorganic fertilizers. Repeated cropping, lack of crop rotation, heavy use of inorganic fertilizers, etc. are the major causes of depletion of soil fertility. A liquid organic fertilizer which is made of biomolecules will produce good quality food materials. These food materials are free of heavy metal contamination which happens due to the use of compost of various kinds. Composts are mainly decomposed organic and inorganic materials where pathogenic organisms may

grow and cause dissemination of various diseases[2]. The present procedure utilizes nonpathogenic bacterial strains and ultrasonic waves. The product is mainly composed of cellular biomolecules that can be easily absorbed and transported in the plant system. A term has been coined for such a bio-product: Single Cell Fertilizer (SCF). Plants face several stress conditions during the conversion of organic or inorganic materials. A plethora of molecules have to be synthesized by a plant to take in and metabolize these materials; for example, for the fixation of atmospheric nitrogen, nitrogenase, glutamate synthetase, glutamine synthetase, etc. are needed. This is associated with growth of symbiotic nitrogen fixers and free-living nitrogen fixers. However, the fertilizer is free of toxic ingredients and therefore will produce healthy food materials. A pilot-scale experimentation showed hyper growth of crop plants. Toxic metals cause various health hazards. Embryonic differentiation is a complex molecular event which is orchestrated with a plethora of molecules, though the present knowledge on embryonic differentiation is enigmatic[11,12]. Metal toxicity in food materials is the major reason of disordering in embryonic differentiation. It causes several health hazards that can be avoided using the readymade biomolecules for the growth of crop plants. Therefore, it will open up a new emerging field of science related to the use of biomolecule as readymade organic fertilizers.

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Occurrence of exotic *Hyptis suaveolens*

Hyptis suaveolens (L.) Poit. (bushmint, pignut) of the family Lamiaceae, a soft suffrutescent herb native to tropical America, is now a pantropical weed (Figure 1). Being introduced and naturalized throughout India, it has become an obnoxious weed and potential threat to our grazing grounds. It seems to have surpassed the damage done by the other Neotropical aliens like *Lantana camara*, *Chromolaena odorata* and *Parthenium hysterophorus* in certain parts of the country, like Andhra Pradesh (AP). The phenomenon of its entry, establishment, colonization and luxuriant growth in forest openings, areas of *podu* cultivation, and pastures in wildlife sanctuaries is alarming. It forms pure dense stands over waste areas, threatening the native plant wealth (natural vegetation).

The Pakhal Wildlife Sanctuary is situated 180 km away from Hyderabad and located in Warangal district, AP. It extends over an area of 839 sq. km and lies between lat. 17°42″N and 18°10″N and long. 79°55″E and 80°10″E. The sanctuary is endowed with rich biota. It is home to the Gaur, Nilgai, Sambar and other important wild animals. *H. suaveolens* was found near habitations, roadsides, forest paths, etc. along the disturbance gradient. It is now widespread in the sanctuary, invading the core area and ascending the hills. As a result, it has often occupied the grazing grounds of wild animals and livestock. This species does not allow the native ground flora to surface by physically occupying the land and outgrowing. It is known to produce allelochemicals which inhibit seed germination of other species. Invasion by this exotic species is leading to the loss of important palatable, economic and ethnomedicinal indigenous species. Besides, it enhanced forest fire during the dry seasons. There is an immediate need to eradicate this alien weed from the environs of the Pakhal Wildlife Sanctuary to save its floristic and faunal diversity.

Figure 1. *Hyptis suaveolens*.

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