

developing and designing micro-watershed-specific schemes³. After implementation of the project, the crop production of the village increased and ultimately the livelihood of its people.

Rajendra Singh, a water conservationist also popularly known as the 'water man of India', has transformed the water-starved and dwindling water table of Alwar region in Rajasthan to one of the best surface and groundwater potential zones. The Tarun Bharat Sangh helped build 9000 johads and other water-conservation structures to collect rainwater from few high-intensity rainfall events during monsoon months, and this has brought water back to over 1000 villages and revived five rivers of the state, namely Arwari, Ruparel, Sarsa, Bhagani

and Jahajuali. Rajendra Singh's ideas, opinions and leadership with dedication are the driving force behind community-based efforts in water harvesting and water management of Alwar region. Rajendra Singh has proved that dedicated, selfless thinking and strong leadership can change the attitude of the people⁴. Once the attitude of the people changes, the movement gains momentum.

Consensus-based decision-making should be the goal of local Water Users Associations (WUA). Social audits should be in-built in the participatory groundwater management. Presently the water-use efficiency in agriculture is low which can be enhanced by the participation of stakeholders. Participatory water management can promote water conservation

and minimize the impact of climate change in rural areas.

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Food colourants and health issues: are we aware?

Colour is an imperative component of food or any edible stuff as it can enhance its appearance¹. Food colours are being used in beverages, desserts, jams, jellies, sauces, pickles, cosmetics, toothpaste, etc. In addition, medicines, including tablets, capsules and syrups are dyed with food colours. Many of the food industries and other related companies as well as restaurants have relied on colourants in order to sell their products. However, there is a question on the safety and nature of colourants which have been used for these purposes?

Numerous studies have demonstrated the dangers of artificial colourants in food, which include the possibility of onset of attention deficit disorder (ADD), inhibition of the immune system, hyperactivity and allergic reactions². In addition, the use of non-permitted colours or overindulgence of permitted colours may also cause thyroid tumours, urticaria (hives) dermatitis, asthma, nasal congestion, abdominal pain, nausea, eczema, liver and kidney damage and cancer.

In view of the above, several food colourants have been banned in developed countries due to their toxicity observations on experimental animals. According to the Centre for Science in the Public Interest (CSPI) (USA and Canada), several synthetic food colourants can cause several problems and should be prohibited from use in food. Table 1 shows

some of the widely used synthetic colourants and their toxic effects.

Food safety and quality are important parameters in supporting both national and international trade. Unlike other food additives, dyes are not permitted to be used unless it has been tested and certified that each batch meets the legal specifications. The number of synthetic colours permitted varies in each country depending upon the recommendation of the respective Food and Drug Authority Regulations. For instance, FAO/WHO Codex Alimentarius permits 14 artificial colours, European Union (EU) 15 colours, Japan 12 colours, USA 9 colours, Korea 9 colours and 8 in India.

There have been tremendous advances in promoting food safety and security in

developing nations than in developing countries. Food systems in developing countries are not always as well-organized and developed. Due to overpopulation, urbanization and lack of resources, food systems in developing countries continue to be stressed and adversely affect quality and safety. The public health sector in many developing countries is not well resourced, and has limited infrastructure that lacks the capacity to address issues associated with the safety, efficacy, labelling, and marketing control of novel food colourants. As a result, people in developing countries are exposed to a wide range of safety risks^{3,4}.

The demand and supply of street food is being appreciated in developing countries for its unique flavours and colour.

Table 1. Some of the routinely using food colourants and their effects

Synthetic food colourant	ADI* (mg/kg)	Uses in	Possible effects
Quinoline yellow	10	Sweets, pickles	Asthma, hyperactivity, rashes
Ponceau 4R	4	Biscuits, drinks	Allergy, intolerance
Allura red	7	Soft drinks	Hypersensitivity
Azorubine	4	Sweets	Allergy, hyperactivity
Tartrazine	7.5	Sweets, biscuits	Asthma, hyperactivity, rashes
Sunset yellow	2.5	Ice creams, biscuits, sweets	Gastric problem, allergy
Erythrosine	0.1	Toothpaste, cough syrup	Hyperactivity, allergy

*ADI, Acceptable daily intake.

Most of the colourants used in such food are synthetic as they are cheaper. There is, however, little or no regulation governing street food supplies. This has resulted in declining safety and quality of such food. Among the developing countries, India and Sri Lanka were the earliest to enact modern food laws. Based on the experiences of the West, a more comprehensive definition of food adulteration has been given for Prevention of Food Adulteration (PFA) Act 1955 of India. However, stringent laws and monitoring are required to avoid the risk of illness.

For instance, erythrosine is banned in the US and Europe due to the presence of high iodine content and its adverse effect. But in India erythrosine has been used for multiple purposes like colouring toothpaste, in capsules, and cough syrup and as a food colourant. Similarly, carmoisine is banned in the US, Canada, Japan, Norway and Sweden as it may cause cancer and tumours based on animal studies. However, there is no restriction to this colourant in India. There are several other colourants, which are being routinely used in our lives.

The developing countries need to frame proper legislation to cover production, sale, inspection and monitoring of food colourants. Proper labelling will

help the consumers. It should also be noted that not only should the food colour be shown as the cause of death or disease, but also any impurities that arise during its manufacture, and breakdown products that might arise during food processing operation, cooking or digestion have to be analysed. Many of the developing countries are not equipped to monitor outbreaks; however, the defect reports do not signify an absence of outbreaks.

Natural dyes are generally considered as less toxic, less polluting, less health hazardous, non-carcinogenic and environment-friendly⁵. Although natural dyes have several advantages, there are some limitations like high price, difficulty in extraction and discolouration during processing. On the other hand, artificial colours are cheaper and superior to natural dyes, specifically for tinctorial strength, hue and stability. Therefore, the use of artificial colours is more common than natural colours, although consumer awareness of health-related risks of synthetic colour additives has increased. There is no doubt that it is technologically feasible to prepare new natural colourants from locally known plants or microorganisms that have not yet been studied scientifically⁶. Technological limitations are the major bottleneck for

the commercial exploitation of the natural food colourants. The biotechnological approach could assist the large-scale production of natural colourants at reduced cost with good quality from plants, minerals, microbes and algae. Although there has been progress and advancement in legislation and formulation technology of natural food colourants in recent years, there is scope for further improvement. Above all, public awareness regarding food colourants is essential for safety issues.

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Time to take a closer look at school-level science teaching

The discussion and despair regarding the dearth of bright and hardworking students pursuing higher physics is making the rounds for quite some time. This is a national, nay, a global phenomenon. In different parts of the world, particularly in the developed countries, academicians and social leaders are addressing this problem and are trying to find solutions, taking into account the socio-economic conditions of the concerned country. But it is possibly pinching more at the grass-roots level.

In a recent write-up, Singh¹ has mentioned teaching as ‘an unattractive profession’. People talk about the non-availability of good and able students for research in physics, or for that matter in most branches of basic sciences. Quite often, a significant section of the input at the undergraduate level is not top of the

class as it used to be or as the subject demands and we need not elaborate on the much-talked about and well-known reasons behind it. This in fact has triggered a chain reaction and the initial impact is being felt possibly more at the school level, and not at the research levels. Because at the end of the day the very good among this bunch are going for research work, whereas the schools are getting the teachers mostly from the other group. Are we ready to face the fact that teachers with good conception in school physics or with good knowledge of the subject are slowly dwindling in number? Teachers who are capable of motivating at least a small section of students to pursue physics at a higher level are also found wanting.

One cannot expect a person who has hesitatingly and somewhat reluctantly

become a school science teacher to take a keen and positive attitude towards the profession immediately on his own. In fact, a good number of teachers, who as students have taken a number of shortcuts and handy methods for scoring reasonably high marks (and we know in our system this can actually be done) often lack the ability to reveal the beauty of physics (or for that matter of the other branches of basic sciences). They also lack in confidence and occasionally the ability of solving intricate problems or providing satisfactory answers to the student’s queries. In the process, they tend to downgrade themselves in the eyes of the students.

The idea of teachers’ training or refresher courses for teachers is not new. But the whole procedure has to be revamped in an altogether different way, so