In this issue

Treating fluorosis with amla

'*Fluorosis is endemic in at least 25 countries across the globe. The total number of people affected is not known, but a conservative estimate would number in the tens of millions.*' – UNICEF

THE first ever case of endemic fluorosis – witnessed in the populace of the Prakasam district of Andhra Pradesh, India – was reported in 1937. In this village, it was observed that along with skeletal and dental deformities, the afflicted also suffered from neurodegenerative disorders. Today, seventy eight years later, things have only worsened. Fluorosis has become endemic in as many as twenty states: 60 million people are at risk; 6 million people are disabled; and about 600,000 people could develop neurological disorders in the near future.

Verily, in India, fluorosis is in its most severe and widespread form, and if the disease is not reined in, it will not be long before the letters – *en* – of *endemic* are substituted by the letters *epi*. But one would be naive to jump the gun and liken fluoride to a pernicious poison that insidiously creeps through our bones with an appetite for only destruction. It is quite the contrary; consumption of fluoride has healthful positives as well.

Fluoride is naturally present in the food we eat, and is also purposefully added by municipal bodies to our drinking water because it is one of the most cost effective ways to prevent gum disease. Indeed, it is only due to the fluoridation of water that the prevalence of tooth decay amongst the population of the world has decreased by a whole 30% over the last fifty years.

The bone disease – fluorosis – occurs only when *excessive* amounts of fluoride are ingested. During the earlier stages of fluorosis, the symptoms are minor and not deleterious. But if the fluoride consumption is unchecked, there is no turning back. Teeth are compromised. Gums bleed continually. Neurons are damaged. And bone strength is significantly reduced. There is no cure, and even invasive surgeries can do little to alleviate it.

The situation, however, is not as bleak as it seems. The disease can be controlled, and even prevented by consuming certain nutrients that have been proven to be effective to curb the spread of fluorosis.

Recent studies report that one nutrient in particular is singularly effective in stemming the surge of fluorosis: Vitamin C – it tames the crippling action of fluorosis by aiding in the synthesis of an intercellular cement which bolsters bone strength. Building further on this insight, a Research Communication, **page 2094**, strives to find out whether the citrus amla – something abundantly rich in Vitamin C – could be used as a cheap remedy to ameliorate fluorosis.

In this study, subjects from Bhupnagar, a village in which fluorosis is endemic, were asked to consume amla powder twice a day for a period of nine months. During this period, urine tests, to ascertain the fluoride levels in the bodies of the test subjects, were performed once every month. The results are most promising. Not only did the consumption of amla powder lead to a significant reduction in fluoride levels, but it also alleviated several gastrointestinal problems – ulcers, constipation – the subjects were suffering from.

Does Flubendiamide kill the *innocent*?

FLUBENDIAMIDE, a broad spectrum insecticide, has become a popular pest control strategy for farmers all over the world. *And why not?* (a) Insect pests have not had time enough, because Flubendiamide is a recent invention, to evolve defences against it. (b) It kills insect pests via a novel and particularly effective mode of action: By severely crippling the pest's muscle function. And, perhaps most important, (c) it is not deleterious, at least in the short term, to human health. Considering such positives, one would be reasonable to assume that Flubendiamide is one of the more efficacious insecticides around. *Or is it?*

Killing efficiency, and toxicity to humans – alone – are not the only criteria that decide the utilitarian value of an insecticide. There is also the question of how the insecticide affects the otherwise *innocent* non-target insects – those that are not guilty of any wrongdoing. And if indeed a particular insecticide is indiscriminate and kills both pest and the innocent alike, then its utilitarian value would be undermined because its usage could seriously affect biodiversity. Therefore, considering the above, a Research Article, **page 2044**, endeavours to determine whether Flubendiamide is toxic to the innocent insects as well.

In this study, fruit fly larvae are exploited as a proxy for the innocent to ascertain Flubendiamide toxicity. Over a period of 24 hours, the larvae – their health being continually monitored – are fed food treated with different concentrations of Flubendiamide. The results, *not surprisingly*, are worrisome; Flubendiamide is after all an insecticide, an amoral poison, that is designed to serve a singular purpose: To kill.

Storing recalcitrant seeds

RECALCITRANT, meaning obstinately uncooperative, is the superlative of *stubborn*. Unruly adolescents are recalcitrant. Rebellious mobs are recalcitrant. Oxen ploughing the fields are recalcitrant. And of course, even the seeds of certain plant species are recalcitrant.

But why call seeds recalcitrant? Because unlike most other seeds that can switch their metabolism off, enter a deep slumber, and sprout even after many years of dead dormancy; recalcitrant seeds, owing to their high moisture content die within a few days after they drop to the ground. And the dead, no matter how much they are coaxed and cajoled, are the most recalcitrant, most stubborn: They simply refuse to come back to life.

But even the few odd days that the recalcitrant seeds do *live* for are not without predicaments. These seeds are particularly vulnerable to mechanical damage, metabolism induced damage, and macromolecular denaturation. Therefore, given how short their life is, and how *soft* a target they are for pestilence, pests, and environmental fluctuations, storing and conserving recalcitrant seeds *ex-situ* – in tree nurseries, and germplasm banks – is a painfully arduous task.

Several environmental factors need to be considered to ensure successful *ex-situ* recalcitrant seed storage. And the three most important factors one needs to be especially mindful of are seed moisture content; rate of seed drying; and storage temperature. A Review Article, **page 2023**, discusses the relationship between each of these three factors and the longevity of different recalcitrant seed species.

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