non-GM rice. No other subsidies were provided. Those who planted GM rice in their entire field were termed full adopters and those was who planted in part of their fields were termed as partial adopters. Between 2002 and 2003, a total of 109 adopters (full + partial) and 69 non-adopters were randomly included in the survey. These were from six of the eight sample villages, and a total of 146 households were interviewed. In total, the survey obtained data from 347 rice production plots: 123 plots with GM rice and 224 plots with non GM-rice. Regression analysis for pesticide use was carried out with GM rice varieties used, pesticide price, weather effects, year effects, producer and farm characteristics as variable parameters. The results indicate that cultivation of both GM varieties leads to a reduction in pesticide use by around 80%, which works out to 16.77 kg/ha. There is a narrower difference in terms of yield, the GM rice giving 6% higher yield than non-GM varieties. Household surveys indicated that full adopters did not report of any pesticide-related health setbacks. The partial adopters did not show any health benefits over the non-adopters.

I wonder whether we should be waiting for all the Chinese experiments to prove the benefits and safety of GM rice for pest resistance. We do have indigenous *Bt* genes. Despite all the efforts to stall, *Bt* cotton is in the field. Why is ICAR not taking the lead? It can form a consortium enabling public–private partnerships to help scientists in India take their products to the field for evaluation and commercialization. How long should we be bogged down by the same and tiring repetitive arguments on environment and individual safety? Procrastination can only lead to illicit GM rice getting into the field, just as it happened in the case of cotton. Who knows, China may be working on GM indica variety for export purposes! If *Bt* gene itself is taking so much time to reach the field, I do not know how long it will take to exploit genes that have a bearing on improving nutrition or protecting against abiotic stresses. We owe it to the nation to usher in strategies for better farming and better health, beyond the pesticide lobby. We are at least 5 years behind China before any of our indigenous GM rice can reach the preproduction trial stage – that is, if ever these efforts are allowed to see the light of the day. We can challenge the MNCs only by aggressively encouraging indigenous R&D and commercialization.

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Kabi sacred grove of North Sikkim

Sacred groves are small patches of forests conserved through man's spiritual belief and faith. In India, 13,720 sacred groves have been enumerated from 19 states. Kerala, Maharashtra, Andhra Pradesh and Tamil Nadu have the maximum number of sacred groves[1]. They are rich in rare and endemic species of plants and represent a tradition of conservation, management and even sustainable development of natural resources[2]. In the NE regions, sacred groves are found in Assam, Meghalaya, Arunachal Pradesh, Manipur and Sikkim[3]. However, a systematic approach in the study of such sacred groves is lacking.

In Sikkim, sacred groves have been reported from all the four districts. All the sacred groves are attached to the local monasteries (Gumpas), dedicated to the deities and managed by the Gumpa authority or Lamas, or often by the village community. Out of 35 sacred groves found in Sikkim, 24 are terrestrial and 11 are aquatic sacred lakes or water bodies. The Kabi sacred grove of North Sikkim is the largest and has special historic importance. This grove is situated about 22 km north of Gangtok along the Gangtok–Chungthang BRO highway, at an elevation of 1950 m mean sea level. The grove occupies about 3 km^2 of area and is bounded by households and degraded forests.

A detailed study was conducted in the Kabi sacred grove to evaluate the floristic composition of the grove, access common threats to it and provide a strategy and action plan for conservation of the existing plant diversity of the grove. Analysis of plant diversity available within the boundary of the sacred grove revealed altogether 241 species. The species come under 183 genera and 84 families. The Pteridophytic flora comprise of 13 families, 21 genera and 30 species and the Angiospermic flora represents 70 families, 161 genera and 210 species, while gymnosperms are represented by a solitary species, *Cryptomeria japonica* (L.f.) D. Don. There are 44 species of trees, 26 species of shrubs, 91 species of herbs, 21 species of climbers, 13 species of grasses and 16 species of epiphytes. Analysis of the floristic composition of biodiversity of the sacred grove revealed that there are eight sacred plants, 11 plants or plant products that were edible, eight plants used as firewood, 16 types of plants having timber value, and 41 medicinal plants.

The present status of the grove is of concern, as it is gradually declining under constant anthropogenic pressure. Spiritual sentiments of the people are attached with the erected stones (stones of brotherhood)[3], but not with the plant diversity of the area. This exposes the biodiversity for exploitation. People's rural appraisal (PRA) study revealed that different non-timber forest produces (NTFPs) are being collected often by the local people. Due to the fast-changing society framework and mindset of the younger generation, the spiritual concept behind the grove has been diluted. Moreover, activities inside the grove are restricted to some auspicious occasions once or twice a year; otherwise it remains nothing more than a neglected forest patch. The PRA study inferred that about 20% of the area was encroached for cultivation during 1970–90 and about 10% of the forest cover degraded due to clearing of large fallen trees for house construction as well as for fuel. Recently, construction of concrete footpath and a shrine further exposed the grove for degradation.

It is clear that this sacred grove cannot be preserved based only on spiritual belief. There is an urgent need to implement rural participatory management practices by the state government, with the help of the existing village community and forest committees. The area adjacent to the grove may be developed as supply reserve forest, which can supply the biomass need of the people. In turn, it would also reduce anthropogenic pressure on the sacred grove. A small task force constituted by taking help from the local community, may be entrusted with the responsibility for development, organizing rituals and controlling entry into the forest. The degraded areas and gullies of the grove should be immediately restored or regenerated with native plant species instead of planting exotic species. Steps must be taken to increase awareness among the nearby village communities regarding the importance of conservation of sacred groves. Presently, there is no legislation regarding conservation of sacred groves in Sikkim. Thus a sacred grove conservation programme may be initiated, taking local administrative bodies, NGOs, etc. into confidence.

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Transforming ‘traditional anecdotes’ to ‘evidence-based medicine’ and its relation to diabetes

The article by Tiwari[1] is a timely compilation which may open up new vistas in realizing the therapeutic potential of Ayurveda in the treatment of diabetes and other chronic diseases. Diabetes mellitus is considered as a metabolic, inflammatory and vascular disease, whose pathogenesis originates from multiple cellular alterations and gene–environment interactions. It is interesting to note that Ayurveda recognizes Vata–Vriddhi (oxidative stress) as the cause of majority of diseases. Extensive research directed to better understanding of the pathogenesis of diabetes now points out that oxidative stress could be the common denominator linking various molecular disorders of diabetes[2]. The theoretical importance of oxidative stress in diabetes is highlighted by its potential double impact on metabolic dysfunction on the one hand, and the vascular system on the other. Thus, pancreatic β-cells producing insulin as well as its target adipose or muscle cells can be negatively affected, as can blood elements and various cell types in the large and small blood vessels implicated in diabetic complications. The importance of oxidative stress is also supported by various recent findings in which most of the existing classes of anti-diabetic and anti-hypertensive agents produce beneficial effects partly by correcting oxidation-related modifications.

By nature, plants make more antioxidants to protect themselves from ultraviolet light from the sun and environmental stress. Therefore, there is also logic in that medicinal plants have strong Vata-Nasak (antioxidant) properties that should be exploited by research to treat multifactorial diseases like diabetes. The fact that a number of tissues are susceptible to oxidative stress in diabetes, the most susceptible being the pancreatic β-cells, suggests that intervention against oxidative stress could be a powerful therapeutic approach in both prevention and treatment of diabetes and other chronic diseases. The idea that medicinal plants with antioxidant properties may also prevent the disease is conceivable, because many of the oxidative reactions and abnormalities can already be evidenced in prediabetic states, long before diabetes is detected.

Recent molecular investigations all over the world highlight the power of herbs. These investigations also create much hope in transforming ‘traditional anecdotes’ to ‘evidence-based medicine’. For example, curcumin, the product of turmeric has been extensively studied recently[3], and is shown to exhibit intracellular molecular actions which modulate specific cell-surface receptors, nuclear receptors, ion channels, transporters, etc. These mechanistic studies position curcumin to become a new ‘lead’ or ‘chemical entity’ in prevention and treatment of certain cancers, Alzheimer’s, Parkinson’s, diabetes, atherosclerosis, cystic fibrosis and many other chronic diseases. While the popular prescription drug ‘aricept’ has been shown to offer no real benefit to Alzheimer’s patients, a recent study[4] found that turmeric holds the potential to fight against Alzheimer’s disease. In this study, turmeric not only inhibited accumulation of beta amyloid, a protein in the brains of Alzheimer’s patients, but also broke up the existing plaques.

There has not been a serious institutional effort to test ayurvedic treatment leads in early human trials. Large pharmaceutical companies have little commercial or professional incentive to test low-cost, non-proprietary treatments. However, a paradigm shift in this direction is underway in India through the diabetes herbal project of CSIR, under the New Millennium Indian Technology Leadership Initiative, whose results are expected to move herbal medicine into the mainstream.

The transformation of digitalis from a folk medicine, foxglove to a modern drug, digoxin, illustrates principles of modern pharmacology that allow development of safe and effective drugs from nature. In her book *Regulating Bioprospecting*, Gehl Sampath has recently voiced her concern that ‘developing nations are not mining their green gold’. There is no doubt that India’s biodiversity offers greatest bioprospecting opportunity, but we have to address the important issues of standardization, effectiveness and safety with regard to traditional medicine. In treating diseases like diabetes, we need to have collaborations between conventional and traditional care providers to improve results and help reform the health sector in developing nations.

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