that in India the poor are always poor, and the rich are always rich. By popularization of genomic programmes, a new form of genetic discrimination will emerge.

Social discrimination based on genomic data may create repercussions across the globe as well as racial prejudices. James D. Watson, the co-discoverer of the DNA structure raised a storm recently, when a British newspaper quoted him as saying that black people are not as intelligent as the white people, based on genomic data. Unfortunately, when his genomic analysis was done, Watson was found to have 16 times the number of genes considered to be of African origin than the average white European does. Is it necessary to make scientific studies in this manner?

Today, in India, sex determination of a foetus is a serious offence. What is the legal implication if a parent decides to abort a foetus as it may develop certain diseases by the age of 20 years, as predicted by the genomic data of parents?

Of course, the genomic data could be utilized for developing drugs based on the response in ethnic communities, e.g. the heart disease drug, BiDil, is marketed exclusively to African-Americans, who seem genetically predisposed to respond to it. But the unnecessary mileage given in the media may land the whole programme in a wrong place. With the growth in genomics, a new kind of warfare, i.e. the genomic warfare has begun. The astrological horoscope prevalent in countries like India has intensified sufferings of women. The personalized genome programme also shares a similar concern of severe intensity. It seems that the proponents of eugenics may regain their power and ultimately destroy mankind.

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Pest management for cotton ecosystems or ecosystem management for cotton protection?

Cotton, as a commercial crop has gone through subsistence, ecological, exploitation, crisis and disaster phases of pest management, with insecticides on focus at the later three stages. Restructuring of pest-management strategies during the last few decades under the banner of Integrated Pest Management (IPM) or Insecticide Resistance Management (IRM) continued to give considerable and selective preference respectively, to the insecticides. Such an approach could only achieve the short-term benefits of reducing the pesticide usage and improving the profit accrued by the farmers. Currently, the transgenic cotton hybrids with myriad genes, singly or in combination, have added preventive power against bollworms, and their cultivation in terms of area coverage has shown a steep upward trend since the commercialization of the technology. Given the rate of adoption of biotech cotton, not only has there been change in the cotton cultivation profile in the country, but also in the associated science of entomology, due to the changing pest scenario. While there is decline in the pest status of bollworms, the sap feeders, viz. jassids, aphids, mirids and mealy bugs are emerging to attain the pest status. We present here a critical appraisal of the cotton pest management thus far, and the urgent need for the paradigm shift in research to a higher system level.

Skewed insecticide use against the regular and emerging sucking pests of cotton is already establishing the momentum for an ‘insecticide treadmill’, with the ensuing ecological perturbation of *Bt*-ecosystems. Such a situation is arising on account of mis-match and misuse of cotton production inputs and knowledge. Pest management for the cotton ecosystems is leading to the practice of curative measures against a single, key or potential insect pest on a temporal basis during the season, with the expectation of only short-term benefits not accounting for sustainability. Although management tools such as bioagents, botanicals and behaviour-modifiers, which are promoted as alternatives to insecticides for pest management in cotton ecosystems, have provided positive benefits, their function and effectiveness need further improvement in terms of stability, mass production, storage, quality control and cost reduction. Exploitation of native natural enemies and practice of some of the cultural operations as pest-management tools have not been aggressive so as to harness their efficacies. Overall, the efficacy of the management measures against the target insect pest(s) alone is the major criterion for recommendation, and the effects of other system components, if considered, are only to a limited scale. It is not rational that the hitherto higher insecticide use against bollworms can be substituted by fewer sprays against sucking pests. On the pattern of insecticide use, it is the case of synthetic systemic toxicants replacing the group of contact poisons, and the former has more potential to bring about counter moves by the system variables, directly and indirectly over the latter. Thus we have shifted the burden only between the shoulders, and the imbalance is always the reminder. The present scenario of the changing ecosystem components and the greater change of the socio-economic milieu warrant an appraisal, and improvement of managing cotton pests from a total system’s perspective.

A paradigm for ecosystem management for crop protection is needed, with due consideration to the innate components of the ecosystems empowering maintenance of good health of the crop. Understanding the exact reasons in the context of overall crop management, behind the emergence of pest problems alone complements a robust pest-management strategy. The significant reduction of insecticides on cotton experienced through implementation of IPM/IRM, and adoption of *Bt*-cotton has added strength to manage the system. Presently, there has been re-establishing population of beneficial arthropods in cotton ecosystems across regions. With cotton crop as an interactive component of the farming system, its salient capability of responding to herbivore damage and moisture stress through compensation and source–sink adaptation respectively, is a boon for higher output without any attendant remedial measures. With so many positive feedbacks of the system components, reexamination and reorientation of strategies for the ecosystem are the priorities in case of cotton farming. Ecosystem management incorporating off-cum-growing season habitat management through synchronization of soil, water, nutrient-oriented production practices, at farm and community levels, to enhance and fortify an unconditional balance among system variables, would result in sustainable qualities of a total system. The simple cultural practices under the growers' control, viz. timely crop termination resulting in closed seasons, compulsory crop rotations, sustenance of soil health through organic manure, proper field sanitation, adoption of cropping systems inclusive of crops with barrier, trap, indicator and refuge functions, careful selection of quality seeds of robust genotypes and timely (early) sowing form the foundation for management of the ecosystem. The approach of alternative and artificial system management using synthetic products should come in handy only to avoid the risk of greater financial loss at times of outbreak. The applied components of pest management on the crop using botanical, biological, behavioural or insecticidal methods should be based on the status of crop growth and development, that reflects the combined effects of innate and managed edaphic, micro and macroclimatic growing conditions, as against the pest numbers and damage levels as action thresholds. Such an approach not only accounts for the genetic response of the cultivar against insect pests, but also for the subtle role played by the native natural enemies in turn maximizing the built-in pest reduction features of an ecosystem.

The pursuit for ecosystem management through understanding of the dynamic variables of crops, pests, natural enemies, inputs, costs, returns and quality, with optimization approach through an interactive information system, would lead to powerful and long-term solutions for the ever-changing pest problems. Research programmes networked across crops and farms of a geographical region with multi-tasking objectives utilizing specialists and generalists of multi-disciplines would lay a strong foundation for problem-solving. The stability of ecosystems depends on sustained efforts to find ways to modulate the system parameters to remain at equilibrium most of the time. When growth and development of cotton genotypes are the inclusive manifestations of edaphic, environmental (biotic and abiotic) and management factors, is it not appropriate to address the pest problems through plant health-based ecosystem management measures of production and protection? Management of sucking pests and bollworms based on crop symptoms and fruit retention levels respectively, is required for precision in cotton protection apart from the approach of integrated farming systems of cotton production incorporating decision-support systems.

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An environment friendly cheap method to reduce coastal malaria in India

Malaria is one of the serious scourges inflicted upon humanity. It causes human mortality and morbidity along with great financial loss. Every year about 300 million people are estimated to be affected and a further 2400 million (about 40%) of the world's population threatened by the disease[1]. Malaria is endemic in India and active transmission has been reported from many areas. Bulk of the cases is found in the flood plains of northern India and coastal plains of the east and west coasts. The epidemiological situation in India in 2005 is as follows[2]: Population in malaria affected areas, 1044.7 million; number of reported deaths due to malaria, 963 persons; number of reported malaria cases, 1,817,093; *Plasmodium falciparum* percentage, 44.3 and established malaria vectors, *Anopheles dirus*, *An. minimus*, *An. philippinensis*, *An. culicifacies*, *An. stephensi* and *An. annularis*.

Bacillus thuringiensis is a Gram-positive, rod-shaped, spore-forming bacterium with mosquitocidal properties[3]. *B. thuringiensis* belongs to the *Bacillus cereus* complex that also includes *B. cereus*, *B. anthracis* and *B. mycoides*. In 1975–76, a WHO-sponsored project in Israel examined mosquitoes for the presence of pathogens as part of the development of biocontrol strategy against malaria vectors. During this survey, a new *B. thuringiensis* strain was discovered with high toxicity to mosquito larvae[4]. It was later characterized and designated[5] as *B. t.* var. *israelensis*, serotype H14. The rapid development of *B.t.i.* products for mosquito control resulted from the reported toxicity of synthetic insecticides in human and non-target organisms and development of resistance due to over exploitation. It has been noticed that when conditions for bacterial growth are not optimal, like many other bacteria, *B.t.i.* also forms spores. *B.t.i.* H-14 serotype dormant stage products contain spores and parasporal crystals. The parasporal crystal contains four major proteins – Cyt 1A (27.3 kDa), Cry 4A (128 kDa), Cry 4B (134 kDa) and Cry 11A (72 kDa) – in three different inclusion types assembled into a spherical parasporal body held together by a lamellar envelope[6]. Among these proteins, Cry 4 protein toxin is Dipteran-specific. All proteins are toxic to mosquitoes; however there appears to be a synergistic interaction between the Cyt1Aa and the Cry4 and Cry11 proteins, resulting in high toxicity to mosquito larvae.

Researchers in Peru have discovered a low-cost, eco-friendly weapon in the fight against malaria. Palmira Ventosilla (The Instituto de Medicina Tropical 'Alexander Von Humboldt', Lima) has developed a method for biological control of mosquitoes. In Peru, during the field evaluation of dormant spore forming *B.t.i.* H-14 serotype strain against mosquito larvae, *B.t.i.* were grown within fresh coconuts. At first fresh coconuts were taken and a cotton swab doused with *B.t.i.* dropped