

crops⁴. The area adopted by elephants has rich vegetation, including bamboo shoots, which are their favourite food. Failing to understand the root of the problem, the Government of Andhra Pradesh launched 'Operation Gajendra' to return the elephants to their original habitat, with the help of trained experts. In this operation, three out of 11 elephants died during their forcible return to the Lakhari Valley Wildlife Sanctuary.

At present, six elephants are found settling down near Veeraghattam forests, which has rich vegetation, including bamboo. This area extends over 15 km², with open mixed deciduous forest. Sal (*Shorea robusta*) is the main component of the forest with some rare flora like *Cycas* and ferns, besides wild animals like panther, sloth bear, sambar, cheetal and pal civet. The Orissa-Andhra Pradesh border should be recognized as an elephant corridor and the area must be declared as an elephant habitat zone. The recent incident might have occurred due to various kinds of man-made disturbances to the elephant habitat in Orissa.

The Orissa State Energy Department is considering a proposal to erect transmission towers and laying power lines inside the sanctuary, which would not only result in deforestation of the area but also pose serious threat to the wildlife habitat⁵. The main causes of migration of pachyderms from Orissa to Andhra may be loss of their habitat, conversion of forests to other uses, increasing anthropogenic pressure on habitat, increasing elephant population and their search for food. Mining, followed by deforestation and poaching, have emerged as important factors for rapid loss of their habitat and corridor path. Efforts to save the Asian elephant now need a massive thrust. There is need to develop scientific and planned management for conservation of elephant habitats and their viable populations in India. Therefore, the present habitat of elephants spanning Veeraghattam and Seethampet mandals of Srikakulam District and Jiyamma Valasa mandal of Vizianagaram District, should be declared as a Wildlife Sanctuary or an Elephant Reserve to provide them better protection.

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Personalized genome game – A new social discrimination in the offing

The genomic race has been eulogized as the new saviour of human kind. Personalized genome sequencing is going to be a routine procedure. Like today's clinical laboratories, sequencing laboratories will be prominent throughout the world in the near future. Human beings have the basic instinct to know how their future will be. The genomic race paves the way to a new genetic horoscope that can predict the diseases a person would get in his/her lifetime, how one will look like phenotypically or how intelligent one's children would be. New genetic tests will soon be available to offer people answers to these questions and more, assessing their risk for a range of conditions based on a sample of saliva or blood. A physician can prescribe medicines based on the genetic make-up of individuals. The future physician may not use a stethoscope or sphygmomanometer, leave alone recording the pulse rate manually. Is it a reality or an utopian idea?

According to the current trend, personalized genomic sequencing is going to

be a reality. Many companies like deCODE Genetics, Navigenics, 23andMe, Myriad Genetics Inc., Knome, etc. are already in the race. Many of these companies offer personalized genome services. 23andMe claims that it can even find out one's ancestor. Celebrities like James Watson and Craig Venter have already sequenced their genomes, sponsored by the companies. Recently, Dan Stoicescu of Switzerland had sequenced his genome from Knome paying US \$35,000. So the list is growing day by day. The day is not far in the future when we can get the same service in major cities of India. We have to be cautious before accepting this technological fancy.

It is true that genomic data can indicate predisposition to certain diseases, but it does not mean that the person will surely be inflicted with the disease. The mental trauma one has to carry with the feeling that at about the age of 50, he/she will get cancer or Alzheimer's disease is immense. More than the promises it puts forth, the personalized genome pro-

gramme will create chaos in the society. One of the major concerns is that results might encourage people to seek unnecessary and expensive follow-up tests to look for problems that are not there, or there may be a feeling of despair that one cannot do anything about his/her genetic fate.

Confidentiality of the data is also a major problem. Today our insurance companies do not confirm persons having certain diseases in the preview of health insurance. Soon, insurance companies may make it mandatory for all clients to submit their genomic data. Again the day is not far when our brides and grooms will reject proposals solely based on genomic data. What will be the social implication of such a problem? In India, generally people note the family history of the bride and groom. The other parameters include education, health status, economic background and social status. On close scrutiny, one can see that we are re-creating a eugenic culture knowingly or unknowingly. This is the reason

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