Potentials ...

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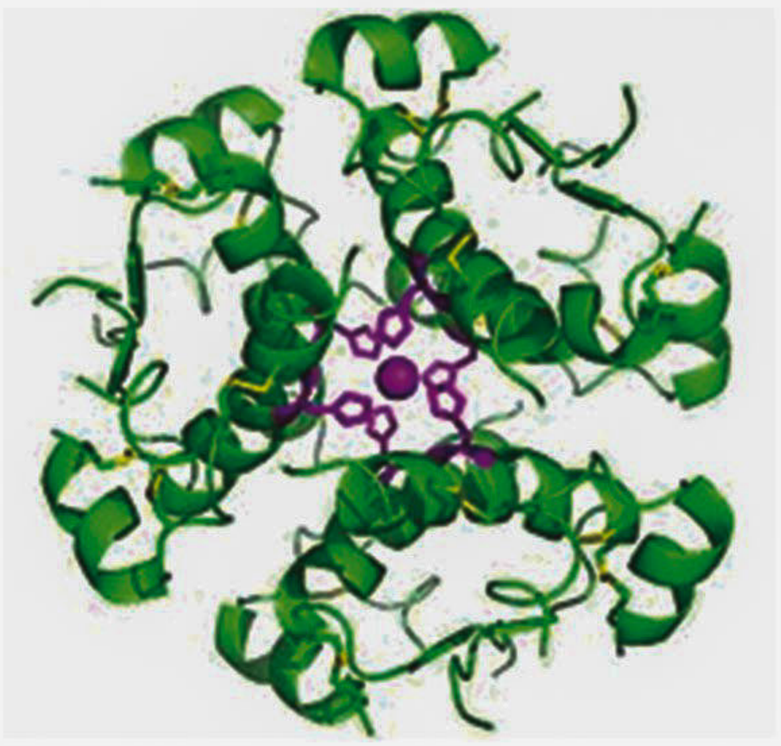
The future potential of plant biotechnology includes working on genetic modification of herbal plants by modern technology to develop effective drugs, beautyceuticals and neutraceuticals, development of rapid diagnostic tools and development of post-harvest technology to minimise the loss of agricultural produce and to produce stress tolerant crop varieties.

Biotechnology in health care and diagnostic services has been started and is rising day by day. There are several organisations such as International Centre for Diarrhoeal Disease Research 'Bangladesh (ICDDR,B), Bangladesh Institute of Research in Diabetic, Endocrine and Metabolic disorders (BIRDEM), and Institute of Public Health (IPH), Institute of Epidemiology, Disease Control and Research (IEDCR) are prominent among others. These organisations are providing molecular diagnostics such as PCR, microsatellite marker based diagnosis of tuberculosis, diarrhoea, cholera and hepatitis viruses etc. Development of Shigella vaccine is being carried out at ICDDR,B. BIRDEM is providing molecular diagnostic services like PCR of infectious diseases (tuberculosis, viral hepatitis, HIV etc.), karyotyping etc. Recently, some private company has also been started to provide molecular diagnostic services. The IPH is engaged in the production of vaccines and anti-sera. Intensive effort of scientists of IPH has made small pox eradication program successful by producing sufficient quantity of highly potent small pox vaccines. Since 1992, the IPH has also been engaged in the production of high quality tetanus vaccines. Incepta, a leading pharmaceutical company in the country has signed an agreement with International Center for Genetic Engineering and Biotechnology (ICGEB), New Delhi Unit, for commercially manufacturing hepatitis B vaccine. The establishment of National Forensic DNA Profiling Laboratory at the Dhaka Medical College Hospital (DMCH) made it possible the forensic tests of international standard in Bangladesh since 2005 with the technique termed DNA fingerprinting to perform paternity tests, criminal dispute in cases of rape and murder etc.

Animal biotechnology encompasses a broad range of techniques for the genetic improvement of animal species, animal vaccines and development of rapid test kits to diagnose the disease of livestock, poultry and companion animals. National Institute of Biotechnology (NIB), Bangladesh Livestock Research Institute (BLRI) and Bangladesh Agricultural University (BAU), Chittagong Veterinary and Animal Sciences University (CVASU), etc. are working to adopt modern biotechnological tools to develop livestock and poultry. Techniques of traditional biotechnology like artificial insemination and selective breeding are being practiced extensively in the country. In vitro fertilisation and embryo transfer have been carried out successfully in the laboratories and in field trial, and are being used in some selective areas. A number of vaccines have been developed against cattle, poultry and goat, e.g. Goat Plague (PPR), goat pox at BLRI. Vaccines against anthrax, Foot and Mouth Disease (FMD), fowl cholera, Salmonella, Newcastle disease, etc. are producing by Department of Livestock Services (DLS) under the Ministry of Fisheries and Livestock (MoFL). Besides, work is going on the development of multivalent FMD vaccine at BLRI. Since 2007, poultry industries of the country are facing avian influenza epizootics; National Reference Laboratory for Avian Influenza at BLRI has been engaged to detect avian influenza virus subtype and molecular characterisation of the pathogen. Research on DNA fingerprinting and microsatellite genotyping methods for parentage verification and molecular characterisation of indigenous goat, sheep, cattle and buffaloes are being varied out at NIB, BAU and BLRI. Karyotyping and blood protein polymorphism of goat, sheep, cattle and buffalo are also under research in BLRI and BAU.



Computer-generated image of insulin hexamers PHOTO: COURTESY

Bangladesh Fisheries Research Institute (BFRI) conducts some basic Biotechnological research on seed production of endangered fish species through in vitro fertilisation, production of carps, catfishes and genetically improved farmed tilapia (GIFT) through selective breeding, production of monosex tilapia, development of hydrid variety of magur and punti, and freshwater pearl production. Besides, the faculty of science of the University of Dhaka and faculty of fisheries of the Bangladesh Agricultural University (BAU), Mymensingh, develops the techniques for characterisation of different commercially important fish species including Hilsa through RAPD, mt DNA and RFLP techniques. No transgenic strain of fish has been produced in the country yet.

In the field of industrial biotechnology, Bangladesh is yet to make real breakthroughs. Modern biotechnological programmes involving gene transfer technology have yet to be started in real earnest. However, the results are quite encouraging and a good number of projects are in advanced stage, which can be taken up for commercialisation. Mass scale production of spirulina, biofertiliser, bakers yeast, citric acid has been reached at the commercial stage. A few distilleries in the country are already utilising >50,000 MT of molasses for the production of ethyl alcohol. Research is also going on enzymes, single cell protein, etc. A five year (2011-2015) action plan on Industrial Biotechnology has been drafted in the light of National Biotechnology Policy, 2012. A significant achievement has been made in the field of 'Biogas' production from animal excreta (cow dung) and agricultural residues. The Institute of Fuel Research and Development (IFRD) have been working since long in this field. As a result of research findings and its subsequent development in collaboration with Department of Energy (DOE) at present more than 20,000 biogas plants have been installed in rural areas. An extended programme to set up about 100,000 biogas plants throughout the country has also been taken up by the government, which is now under implementation. Institute of Fuel Research and Development (IFRD), BCSIR has installed more than 25,000 domestic biogas plants across the country under three projects. As on 31 December 2012, a total of around 65,317 biogas plants have already been installed in Bangladesh. Last year, three new bacterial species (Rhizobium bangladeshense, Rhizobium binae, Rhizobium lentis) were discovered at the Bangladesh Institute of Nuclear Agriculture (BINA), which create nodule in the lentil crops and increases productivity of it.

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