UNIT-I

SEMESTER-V

SKILL BASED ELECTIVE COURSE

SBEC-III RECOMBINANT DNA TECHNOLOGY

HISTORY & ACHIVEMENTS OF RDNA:-

Recombinant DNA Technology:

Recombinant DNA Technology is defined by the Encyclopedia Britannica as" the joining together of DNA molecules from different organisms and inserting it into a host organism to produce New genetic combanations that are of value to Science, medicine, agriculture and industry.

Recombinant DNA Technology - Steps Applications and limitations:

Isolation of Genetic Material.

Restriction Enzyme Digestion.

Amplification using PCR.

Ligation of DNA molecules.

Insertion of Recombinant DNA into Host.

Isolation of Recombinant cells.

Application of Recombinant DNA technology.

Limitations of Recombinant DNA technology.

3 uses of Recombinant DNA:

Recombinant DNA technology has also proven important to the production of vaccines and protein therapies such as human insulin, interferon and human growth harmone. It is also used to produce clotting factors for treating haemophilia and in the development of gene therapy.

Some Examples of Recombinant DNA Technology:

Pharmaceutical products.

Vaccines Represent Another application of Recombinant DNA technology.

Diagnostic testing.

Gene therapy.

DNA fingerprinting.

DNA and Agriculture.

Discovered r.DNA Technology in,

Herbert Boyer.

Stanley Norman Cohen.

Recombinant DNA / Inventors.

HISTORY OF rDNA TECHNOLOGY:

In, 1972 David Jackson, Robert Symons and Paul Berg Successfully generated rDNA Molecules. they allowed the Sticky ends of complementary DNA by using an enzyme DNA ligase... Boyer developed a Recombinant plasmid (pSC101) Which after using as vector replicated Well within a bacterial host.

Recombinant DNA technology Invented:
1970s,

The first production of recombinant DNA Molecules, using Restriction enzymes, occured in the early 1970s. Recombinant DNA technology involves the joining of DNA from different Species and Subsequently Inserting the hybrid DNA into a host cell, often a Bacterium.

Discovered r-DNA technology:

Herbert Boyer

Stanley Norman cohen.

Recombinant DNA /inventors.

The first licensed drug generated using recombinant DNA technology was human insulin. developed by Genetech and licensed by Eli Lilly and company.

Principles behind rDNA technology:

Recombinant DNA technology is the joining together of DNA molecules from two different species. the recombined DNA molecules is inserted into a host organism to produce a new genetic combinations that are of value to Science, Medicine, agriculture, and industry. Recombinant DNA technology since the focus of all genetics is the gene, the fundamental goal of laboratory geneticists is to isolate, characterize, and manipulate genes. Recombinant DNA technology is Based primary on two other technologies.

Cloning and DNA Sequencing. cloning is undertaken in order to obtain the clone of one particular gene or DNA Sequence of interest the next step after cloning is to find and isolate that clone among other members of the library (a large collection of clones.) once a segment of DNA has been cloned, its Nucleotide Sequence can be determined. Knowledge of the Sequence of a DNA Segment Has many uses.

The possibility for recombinant DNA technology Emerged With discovery of restriction enzyme in 1968 by Swiss

Microbiologist Warner Arber. the following year American Microbio-logist Hamilton O. Smith purified so-called type II restriction enzymes, which were found to be essential to genetic engineering for their ability to cleave at a specific site within the DNA (as opposed to type) I restriction enzymes, which cleave DNA at random sites.)

Drawing on Smith's work American molecular biologist Daniel Nathans. helped advance the technique of DNA recombination in 1970-71 and demonstrated that type II enzymes could be useful in genetic studies. About the same time, American biochemist Paul Berg developed methods for splitting DNA Molecules at selected sites and attaching segments of the molecule to the DNA of a virus or plasmid, which could then enter bacterial or Animal cells.

In 1973 American Biochemists Stanely N. cohen and Herbert W. Boyer become the first to insert recombined DNA, Molecules of DNA from two different species that are inserted into a host organism to produce New genetic combinations that are of value to science, medicine, agriculture and industry. Since the focus of all genetics is the gene, the fundamental goal of laboratory geneticists is to isolate, characterize, and manipulate genes.

Although it is relatively Easy to isolate a sample of DNA from a collection of cells, finding a specific gene within this DNA sample can be compared to finding a needle in a haystack consider the fact that each human cell contains approximately 2 meters (6 feet) of DNA. therefore, a small tissue sample will contain many kilometers of DNA, enabling researches to determine its Nucleotide sequence, study its transcripts, mutate it in highly specific ways, and reinsert the modified sequence into a living organism.

ACHIVEMENTS OF rDNA

Recombinant DNA Technology:

Recombinant DNA Technology has also proven important to the production of vaccines and protein therapies such as human insulin, interferon and human growth hormone. It is also used to produce clotting factors for treating haemophilia and in the development of gene therapy.

A review : Achievements in application of Recombinant DNA technology for creation of Industrial Microorganisms.

* Research:

The first-ever insect vaccine helps bees stay healthy. The easily administered oral vaccine could keep pollinators safe from Bacterial disease and give invaluable support for food production worldwide.

Food and pollination services are important for everyone. Humans, production Animals and Wildlife alike. Inventing Something that Guards against pollinator losses will have a tremendous impact.

the Dalan AH oral vaccine, previously, called prime BEE is the first ever vaccine for Honey bees and other pollinators. It fights Serve Microbial disease that can be detrimental to pollinator communities. the invention is the fruit of research carried out by two former Scientists in the University of Helsinki, Dalial Feritat and Heli Salmela.

* Future plans: Vaccinating commercially used pollinators against any Microbe:

Dalial Feritak and Dalan Animal Health are the pioneers in a totally New animal health Sector.

"I Sincerely belive it is about time we start caring about our Six-legged companions, whose work and contributions to our Wellbeing have been neglected Way too long. We take our bees for granted but this Industry is a breaking point and it is high time that we find Solutions to help to protect them. Vaccines has proven to be the most effective Way to prevent And contain disease and most importantly, our approach is organic Without the use of Harsh chemicals." Dalial Feitak Says.

Dalan AH aims to develop a vaccine against American foulbrood, a bacterial disease caused by the Spore-forming Paenibacillus larvae Ssp. larvae American foulbrood is the most widespread and destructive of the bee brood disease. "We hope that we can also develop a vaccination against other Infections. Such as European foulbrood and fungal disease. the plan is to be able to vaccinate against any Microbe."

Being a pioneer is Inspiring:-

The journey towards the vaccine has so far been Immensely Inspiring.

"Writing the roadmap for Insect vaccination and filling the clinical protocol With the Regulator was Super exciting. the other Inspiring moment was Seeing My Idea come to life and and Seeing a prototype vaccine formulation in a bottle had been a dream come true. Now we have to get it approved and onto the Market So others got to participate in changing the Way we care for our Insects.