Genetic Engineering -Tool for Mankind

Shashwat Mandal, and Christian Bach

***Abstract*—This study was conveyed to send a driven research of Genetic Engineering its Tools, Applications, as well as Ethics which are some of the areas of Genetic Engineering which has impact on human life. Some people think Genetic Engineering as a boon where as some people think genetic engineering are way to interrupt the natural process. The motivation behind this paper is to show a review to discuss some of factors in Genetic Engineering that makes Genetic Engineering a need for mankind. The main goal of the study was to inspect various Tools, Application along with Ethics in Genetic Engineering as a tool for mankind**

***Index Terms*—Genetic Engineering; Tools; Recombination; Risks; Application.**

I. Introduction

There is numerous of literature on Genetic Engineering [1]-[9]. Genetic Engineering has been around for a period which has now been an important part of Human life as it has enhanced the living standard with regards to health care, food, medicine as well the environment. According to [10], Genetic engineering is an alternation or change in natural process where genetic potential is acknowledged and changed into facts. According to [11] Genetic engineering, involves the group of techniques that is used to slice and rejoin the DNA, especially DNA from different biological species, and subject the resulting hybrid DNA to form new combinations of heritable genetic material [11]. Genetic Engineering has advantages as well as disadvantages but how mankind uses it is in their own hand. So, taking the benefits of Genetic Engineering for development of different sectors should be considered with all the perspective of everyone so there is less controversy about the Genetic Engineering.

The point of the paper is to give a calculated hypothetical system which are based on the articles and journals in Genetic Engineering. For scientific purpose, Genetic Engineering has been taken as a central part of the study and divided into three parts which are Tools of Genetic Engineering, Application of Genetic Engineering and its Risk [12]-[40]. The article covers three main areas of Genetic Engineering which should be looked upon with great interest so that we can get more knowledge about Genetic Engineering and how to use for betterment of mankind.

This study focuses to contribute the areas where Genetic Engineering is proven to be a boon for mankind and there is lot of possibilities for the application of Genetic Engineering to enhance the areas that is still not developed from which mankind can take maximum benefits. The application of Genetic Engineering will help mankind to solve various problems related to food, health, medicines as well as the environment. Thus, the study offers some important perception for giving out a framework model which highlights the importance of Genetic Engineering along with the tools, its application and the risk associated with it.

This report has been composed in following way, the undertaking research technique and after that the reliant variable which is trailed by the three factors alongside the connection between them as far as survey driven research strategy utilizing the examination [41]. Finally, it will display the commitment to the examination and decision gives a rundown and evaluate of the discoveries which will help to identify areas for further research.

II. Research Methods

A comprehensive literature review on Genetic Engineering created a theoretical foundation of the paper. Using the grounded theory, a model was developed. This is a timely topic as the new shape of recent environmental regulation appears to be strict. A new model is presented to encapsulate highly dynamic interaction of Genetic engineering and Application, Tools of Genetic Engineering, and Risk that reflect what is the benefits of Genetic Engineering, what are its tools, as well as risk associated with it.

The exploration techniques utilized as a part of this examination takes after the standards illustrated by [41]. It is an extensive writing audit on Genetic Engineering-an apparatus for humanity. More than sixty articles have been inspected in pertinent diaries such us JSTOR, Science Direct, and others which made a hypothetical establishment of the paper. Three techniques are for Genetic Engineering that have been recognized as fundamental instruments.

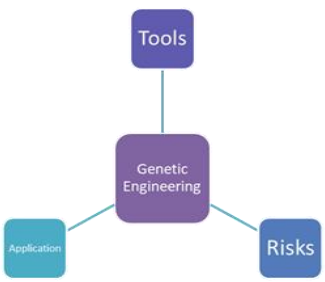

Fig. 1. Factor associated with Genetic Engineering

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III. Discussion

Genetic engineering is about intervention in natural process in which the hidden potentialities are realized [10]. The genetic engineering can be used for healing purposes in different situations [38]. Genetic engineering is used to excise the genetic material from one organism and transfer into the other one with new genetic material [42]. The genetic engineering is also known as Recombinant technology that is used to cut and join genetic material, mainly DNA and introduce it into another organism creating hybrid DNA [11]. There is a huge difference in field such as medicines agricultures [2]. Genetic engineering is used to cut move and transfer DNA from one organism to another [6].

A. Tools of Genetic Engineering

The author mentions that genetic engineering is about intervention in natural process in which the hidden potentialities are realized [10]. The genetic engineering can be used for healing purposes in different situations [38]. Genetic engineering is used to excise the genetic material from one organism and transfer into the other one with new genetic material [42]. The genetic engineering is also known as Recombinant technology that is used to cut and join genetic material, mainly DNA and introduce it into another organism creating hybrid DNA [11]. There is a huge difference in field such as medicines agricultures [2]. Genetic engineering is used to cut move and transfer DNA from one organism to another [6].

Due to advances in the genetic tools the future of genetic engineering is very bright, and much more can be done in this field [3]. The genetic tools can help to solve the problems concerned with interpreting the genetic evidence and importance of interdisciplinary efforts [35]. By using the genetic tools in proper way, it can be proving to be beneficial and surprising in many situations [16]. Medical urgent conditions such as immunodeficiency can be diagnosed and treated using genetic tools such as Gene therapy [24]. With the development in high resolutions molecular genetic tools have given attention to process that contributes to decline of plant and animals' populations [43]. Somatic hybridization is one of the easiest and efficient methods for genetic characterization [44].

The knowledge that behind the Recombinant DNA Technology is to cut plasmid DNA into fragments, recombined the fragments with DNA ligase enzymes and transformed bacteria with the recombinants is what the recombinant technology is all about [45]. The utilization of Recombinant DNA Technology is for separation and replication of a one organism and addition of it into another species After then the host cell is having new characteristics to secrete protein for which the gene was inserted. [27]. The Recombinant DNA particles is an innovation that is utilized to exchange outside gens and duplicate them at sub-atomic level profoundly changed the possibility of recombinant DNA research and innovation which has turned out to be a standout amongst the most intense instruments for sub-atomic science and a promising device for Genetic Engineering which could fabricate valuable quality items on of it into another species which is a host cells [46]. Genetic engineering or Recombinant DNA technology used for alteration of the DNA of a cell so that it produces a protein which naturally occurs in another organism [12]. Recombinant DNA Technology is the process of constructing a DNA molecule which usually involves the combination of a specific DNA of interest for one species, the donor, with that of an appropriate vector which may be plasmid, bacteriophage or virus [8].

The biolistic process is used for the transformation of foreign material from diverse organisms including the animal cells and tissues to another organism [47]. Biolistic is the immediate and reproducible innovation which offers an option for DNA free genome altering advances in which qualities can be fitted to suit the coveted catalyst which should achieve the coveted tissue which in a host cells [48]. The Biolistic process also known as microprojectile bombardment that which is a certified method for DNA delivery into the various species [49]. Biolistic has been successfully used to insert the nucleic acid into different organisms which are not amenable tore traditional methods of transfection [13].

Electroporation is a simple technique that is used of altering the genetic makeup of the organism which induces genetic material in the membrane using high voltage electrical fields for short time. This type of phenomenon avoids disadvantages of substance, mechanical, and viral-actuated combination methodology, for example, cell lethality, have go confinement, or in the constraint on the quantity of cells that can be intertwined [50]. Apart from Biolistic and Agrobacterium-mediated transformations, electroporation is other technique which is used insertion of DNA to generate new types of organism [51]. Electroporation is done by short application of high-intensity electric fields of permeable bio membranes which is commonly used to transfer genetic membrane into plant protoplast along with mammalian cells [52]. The use of an extreme electric field crosswise over cell films adjusts the electric potential contrast over the layer which brings about the pore development, that permits the presentation of exogenous material into the phone, this procedure is known as electroporation [18]

B. Application of Genetic Engineering

In 1960s an experiment on dwarf wheat and rice was one of the most significant modification in plants [26]. The genetic tools are used to identify the genetic structure and population of big horn sheep [19]. Population n or landscape-scale Eco toxicological has lag far behind despite the advances in genetic engineering [29]. The molecular genetics is used for bear research its conservation and management [53]. Foreign and viral protein via negative strands can have biotechnological applications [54]. Logic regression is technique that is used to build Boolean rules which is used to get more accurate data for genetic engineering. PRIM stands for Patient rule induction method which is used to find sub regions in the input space with low values for target value and extreme regression is used [40].

On the planet just about 90% of the human nourishment supply is just given by 15 crops species which is modest number out of 10-30 million species which is habiting in our biosphere, presenting qualities shape different creature and live stock has been viewed as a promising approach to

upgrade the efficiency [55]. Gene manipulation n the agriculture goes very far ahead because novel plant species are bread that can never evolve in the biosphere, molecular biologist are looking for the perfect genetic combinations that can help to breed plants with increment in disease resistance, tolerance to stress, content of protein as well as self-fertilization [4]. A couple of years back the specialists found that Agrobacterium tumefaciens because crown irritate tumors in plant by exchanging a bit of DNA from a bacterial plasmid into plant cells which led to conclusion that plasmid can be utilized to convey valuable qualities into plant for its profitability [56]. Food shortages exist on the planet as the human population is expanding quicker than the sustenance generation capacity of the agricultural products, introduction of the Genetic engineering can help to reduce this problem to certain extent [57].

The genetic engineering could be used to manufacture the various animal proteins of commercial value as it involves introducing genes into natural DNA sequences to force cells to make protein that would not ordinarily be made such as manufacturing of Rennin, ab endangered protein used in cheese making [58]. In the animal breeding there are and now techniques for achieving the result like producing a grazing animal suitable for Central Africa as well as other regions [10]. Genetic engineering can be used to isolate a gene from a different source and transferred into a chromosome of a living cell so that the gene can directly synthesize a specific protein [5]. The involvement of Genetic Engineering has enhanced dairy cows that produce more milks, horses that are large larger and stronger, hundreds of dogs of different shapes and sizes which are able to hunt or fight, sheep dogs to protect the herd [7]. The new range of technology is very huge, the cloning, developing life exchange, sex determination by using Genetic Engineering for animal product efficiency, improving quality of food that we consume, for production of pharmaceutical medicine as well as organ transplantation in human patients [59].

With the introduction of genetic Engineering into the health sector human insulin, development hormone as well as interferon are manufactured by the bacteria cells and gained insights into principals of cell functions, the underlying characteristics of tumor virus along with genetic disease [60] The public will be at the greatest benefits of as the fear of the genetic engineering will be replaced with a welcoming of blessings which come from genomic research which will lead to exciting new ear in medicine impacting the health of humankind [39]. The genetic technology is so precise that it will allow us to design children by elimination of genetic disease and enhance individual life [20]. The new genetic technologies are applied medicines which happens with regards to public interest with possibility of more compelling treatment of human ailment [61]. Since the finish of the Human Genome Project, doctor and researchers have found better treatment of patients, for example, now researcher can relate an illness with a genetic expression [62].

C. Risks

The fundamental issue is that advances in learning don't consequently characterize the criteria for their utilization. Accordingly, we find that about the greater part of our logical information has the capability of being "great" or "terrible," contingent on man's use of it [63]. In the debates about our utilization of hereditary science, the most clear and persuasive good dream has emerged in the positions of those contradicted to human hereditary designing in any form, for whatever reason and risk associated with it [64].

The questions that brings ecologists to center stage in the debate is simple: how organisms will be carrying altered or new genes relate to the evolution and ecological interrelationships of indigenous organisms when introduced to natural environments [65]. The Biotechnology is going to confront major obstacles in near future, easing the perils of abiotic stretch which are salinity, dry season and temperatures, involving bug control, upkeep and improvement of nature, quality of foods as well as release of genetic material into the environment [1]. This exploration administering, the direction and observing of hereditarily designed microorganism and infections discharged into the earth, the perils related with discharging GEMs into nature are the creation and advancement of new technology which harms the environment and non-target species [25]. The widespread planting of the genetically modified crops has yet to be sanctioned, the prospect that highlights the public worries to both the environmental and health issue, implications of genetically modified organism, the application of genetic engineering in the production of novel agricultural products raises significant concern for protection of the environment [9].

Recent research was carried to understand public attitudes towards biotechnology and more specifically, genetic engineering which has focused on attitudes towards the use of the technology rather than its specific application concerning about the ethical issues [23]. Human enhancement has recently become controversial topic in bioethics, question about human enhancement has been a major concern in many peoples [15]. Many projects in other areas like agricultural, medical and engineering ethics; recombinant DNA research and energy related projects, are also concerned with social impact where ethics comes into major play [33]. At first, the Human Genome Project seems to be ungoverned by any explicit ethical or legal norms, however from its beginning the HGP has spawned a myriad of international, regional and national reports and guidelines and more legislation [36]. An important part of the discussion is consideration of the ethical issues, so far, the debate on the ethics of genetic engineering has been vigorous and reasonably well informed, in many ethical issues raised by genetic engineering they were only able to list many possible kinds of consequences [66].

IV. RESULTS

The conformation from this study leads to fact that Genetic Engineering is growing a great significance in development of human life along with animal and plants. Application of genetic Engineering can be used in various areas and new technology can also be developed that will enhance the quality of life. For several years such as Recombinant Technology, Biolistic and Electroporation is used to transfer genetic material into other organism to get a

desired gene product. There is also risk, and benefits concerned with genetic engineering. The result of the study is shown in Fig.2. where the structure created is introduced including every one of the factors examined in this research

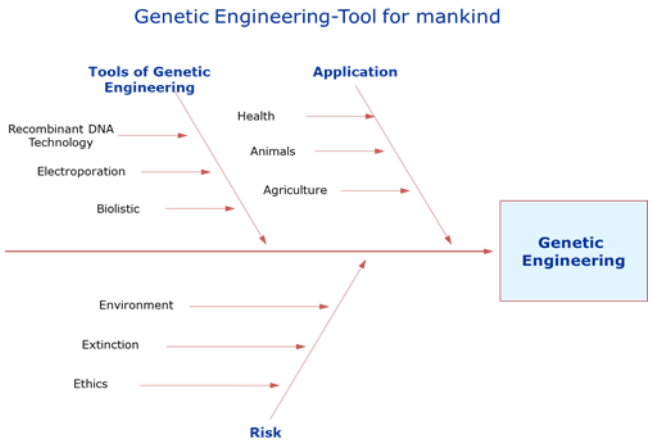

Fig. 2. Proposed framework model of relationship between key factors to determine Genetic Engineering

V. Contribution and New Insight

With reviewing the literature, we can agree that the Genetic Engineering is a technology that can make our life easier by enhancing the quality of food that we consume, the medicine we intake, the animal products that we eat, the agricultural products that we use in daily life. Genetic engineering uses technology such as Recombinant DNA Technology, Biolistic method and Electroporation. This literature also covers the risk associated with Genetic Engineering. The ethical as well as the environmental risk associated with Genetic Engineering is discussed in the literature. While modifying any genes of an organisms, the effect on the environment as well as the ethical concern should be kept in mind. The use of Genetic Engineering should be done carefully as it affects the environment and has many ethical issues. There is some limitation to this literature as only some of the factors are considered here and many more are not discussed. Therefore, there needs to be more research on this topic and the topic should be analyzed in more detail to get good information about the different factors of Genetic Engineering.

VI. Conclusion

This study is a good topic because the researcher can build up a superior comprehension of Genetic Engineering as it can be used for betterment of human life with the advancement in new technology related to Genetic Engineering. The applications of the Genetic Engineering as well as its different tools along with different tools should be considered for betterment of mankind.

This model is based on different articles which is about the different factors of Genetic Engineering such as tools of Genetic Engineering, application of Genetic Engineering as well as the risk associated to Genetic Engineering.

Since the research has accomplished its objectives, there are few unavoidable limitations. These data are related to just sixty articles as well as the researches. The result of the research provides us with ways to utilize the Genetic Engineering for betterment of mankind and to understand risk associated with it.

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