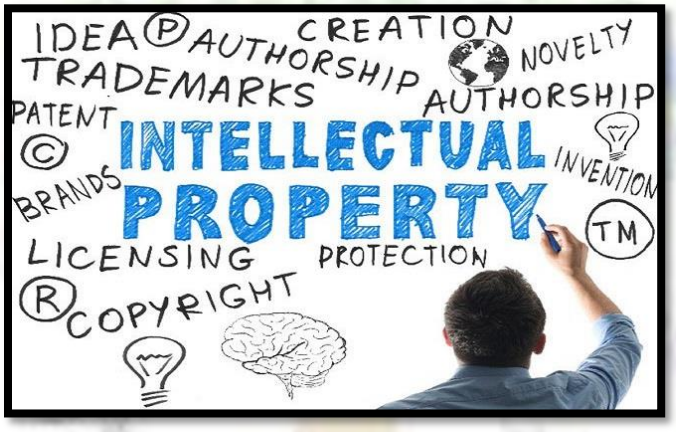
# e-NEWS LETTER

Volume VI, Issue II, May 2019

## Gujarat University Botanical Society (GUBS)

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**Gujarat, India.**

# ANKUR

## VOLUME VI ISSUE II May 2019

## INSIDE THIS ISSUE….

**Vol. VI, Issue II, May 2019**

# *ANKUR*

***……Sprouting of thoughts***

***Ankur is symbol of new beginning towards growth. And Ankur is here to introduce budding writers. It would represent interesting articles in Botany, Bioinformatics and Climate Change Impacts Management. Each seed has the innate potential to grow - blossom, and display its magnificence after its dormancy has been broken. Same way this newsletter would provide a platform to young researchers to share news and views, promote awareness about the subjects and generate interest in related issues. Ankur would be taken care of by a team of dedicated Student Editors who would select and edit articles for online publication.***

***We wish Team Ankur all the best for this endeavor.***

## *FROM EDITOR'S DESK….*

**Ankur is now six years old. This newsletter is intended to be published twice in a year. The growth and development of Ankur reflects the growth and progress of the students of the department. This newsletter will serve to reinforce and allow increased awareness, improved interaction and integration among all of us.** ***The journey began five years ago and now Ankur has blossomed and is spreading the fragrance to everyone around with the message that plants are significant and valuable. In this issue, we focus on Bioethics and Biosafety.***

**Editorial Team**

**Dr. Archana Mankad**

**Dr. Hitesh Solanki**

**Dr. Himanshu Pandya**

**Dr. Bharat Maitreya**

**Dr. Nainesh Modi**

**Dr. Saumya Patel**

**Ms. Jahnavi Pandya**

# PATRON'S MESSAGE

Domestication of plants resulted in their utilization and realization of their immense potential. Today the pace of development has taken a massive leap with the advent of newer technologies. This has led to issues of Intellectual Property rights all over the world. With research and innovations taking a giant leap, issues emerging out of maintaining secrecy not only for economic benefits, were centerstage in trade. Laws and enforcement are the only way that can provide solutions to this global issue.

This issue of Ankur focusses on **Challenges of IPR and Bioethics in Plant Science** and shares the anguish of all of us while showing us what is done and what remains to be done.

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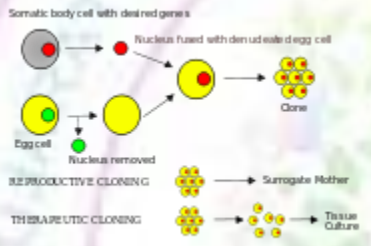
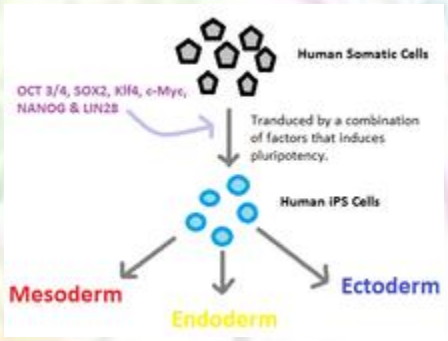
# BIOETHICS

**Dr. Archana Mankad**

Bioethics is the study of the ethical issues emerging from advances in biology and medicine. It is also moral discernment as it relates to medical policy and practice. Questions like relationships among disciplines of biology like life sciences, biotechnology, medicine, politics, law and philosophy are addressed. The possibilities of experiments like human cloning has raised controversies and prompted several nations to pass laws regarding human cloning and its legality. Two commonly discussed types of theoretical human cloning are therapeutic cloning and reproductive cloning. Therapeutic cloning, the area of active research involves cloning human cells for use in medicine and transplants. It can be done through somatic cell nuclear transfer and pluripotent stem cell induction. Reproductive cloning refers to making of an entire human instead of just specific cells or tissues.




*Somatic Cell Nuclear Transfer*




*Induced Pluripotent Stem cells*

Cloning can help in understanding development biology while studies in signal transduction along with genetic manipulation within an early human embryo can provide answers to many developmental diseases and defects. Cells created by Induced Pluripotent Stem Cells(iPSC) and Somatic Cell Nuclear Transfer (SCNT) can be used as model systems in drug discovery and can be used in stem cell therapy for bone marrow transplantation or to create organs in regenerative medicine.

Most countries around the globe have banned human cloning. In India, there is no law for cloning, but guidelines prohibit whole human cloning (Reproductive cloning). India allows therapeutic cloning and use of embryonic stem cells for research purposes.

References:

https://en.wikipedia.org/wiki/Human_cloning#cite_ref-60

*Bagla, Pallava (Jun 24, 2009). "Should India ban human cloning?". New Delhi: NDTV. Retrieved Apr 18, 2014.*

*"Cloning Ethical Policies on the Human Genome, Genetic Research and Services [India]". Genetics & Public Policy Center. Archived from the original on 2014-04-20.*

Image courtesy: https://en.wikipedia.org/wiki/Human_cloning#cite_ref-60

# BIOSAFETY

**Prof. Dr. Himanshu Pandya**

Biosafety refers to the prevention of largescale loss of biological integrity, focusing both on ecology and human health. It is also related to alien viral or transgenic genes like MadCOW; Genetic therapy products in medicine; PCB levels affecting fertility in chemistry; interplanetary contamination in exobiology and risks associated with synthetic biology.

Biosafety is extremely pertinent and requires multilevel monitoring to prevent Bioterrorism. Genetic manipulation is not new. While traditional fermentation techniques have contributed enormously to human wellbeing, the ability of modern biotechnology to alter life forms is both exciting and alarming. Such Living Modified Organisms (LMOs) or Genetically Modified Organisms (GMOs) have already entered our ecosystem raising an urgent need to regulate and manage safety of all other organisms. Biotechnology is a global industry and can be monitored and regulated only by International rules. In 1995, the Parties to the Convention on Biological Diversity responded to this challenge and after due diligence the Conference of Parties adopted **The Cartagena Protocol on Biosafety** in 2000. The protocol ensures safe transfer, handling and use of GMOs subject to transboundary movement.

There are a few separate International Instruments and standard setting processes that address various aspects of Biosafety. These include:

1.The International Plant Protection Convention (IPCC) for protection of plant health

2.The Codex Alimentarius Commission for food safety and consumer health

3.The World Health Organization for Animal health (OIE) for safety of animal products

4.World Trade Organization (WTO) for monitoring trade relevant to biosafety

The Cartagena Protocol can only ensure that the global use of biotechnology is safe if each and every country actively promotes biosafety at national level. Governments cannot achieve biosafety on their own. They need the active involvement and cooperation of other stakeholders. The science of biotechnology is advancing rapidly and so the Protocol will have to be periodically reviewed for its effectiveness. Biosafety will remain a top priority international environmental agenda for years to come.

References:

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https://www.cbd.int/doc/press/presskits/bs/cpbs-unep-cbd-en.pdf

https://bch.cbd.int/protocol/background/

Image Courtesy: https://www.tp.edu.sg/courses/part-time-courses/micro-learning-courses/catalogue-of-courses/biosafety-n-biosecurity-essentials

# PLANT PATENTS

Dr. Hitesh A. Solanki


A plant patent is granted by the United States government to an inventor (or the inventor's heirs or assigns) who has invented or discovered and asexually reproduced a distinct and new variety of plant, other than a tuber propagated plant or plant found in an uncultivated state.

The grant, which lasts for 20 years from the date of filing the application, protects the patent owner's right to exclude others from asexually reproducing the plant, and from using, offering for sale, or selling the plant so reproduced, or any of its parts throughout the United States, or from importing the plant so reproduced or any part thereof, into the United States. This protection is limited to a plant in its ordinary meaning: A living plant organism which expresses a set of characteristics determined by its single, genetic makeup or genotype, which can be duplicated through asexual reproduction, but cannot be "made" or "manufactured". Cultivated sports, mutants, hybrids or transformed plants, where sports or mutants may be spontaneous or induced and hybrids maybe natural, from a planned breeding program or somatic in source. While natural plant mutants might have naturally occurred, they must have been discovered in a cultivated area. Algae and macro-fungi are regarded as plants, but bacteria are not.

**Rights conveyed by a Plant Patent**

Grant of a plant patent precludes others from asexually reproducing, selling, offering for sale, or using the patented plant or any of its parts in the United States or importing them into the United States. A plant patent is regarded as limited to one plant, or genome. A plant derived from a sport or a mutant is unlikely of the same genotype as the original plant, and thus would not be covered by the plant patent to the original plant. Such plant derived from a sport or such mutant may itself be protected under a separate plant patent, subject to meeting the requirements of patentability. A plant patent expires 20 years from the filing date of the patent application. As with utility patents, when the plant expires, the subject matter of the patent is in the public domain.

References:

https://www.uspto.gov/patents-getting-started/patent-basics/types-patent-applications/general-information-about-35-usc-161

# IPR IN PLANT BREEDING

**Dr. Saumya Patel**

Plant breeding has conventionally offered challenges for patent safety due to several technical and legal factors that include complications in defining, as well as verifying, whether the breeding of a new plant variety constitutes an innovation, as well as the fact that plants can self-reproduce.

As per the Indian laws for protection the living entities of natural origin such as plants, animals, in whole or any part thereof, plant varieties, species, seeds, genes and microorganisms are not patentable.

Also any process of manufacture or production relating to such living entities is also not patentable With the advent of the Plant Variety Protection (PVP)Act, formerly as Indian Plant Variety Protection Bill,2001, makes it possible to register the extant as well as newly developed plant varieties and prevent the unauthorized use of registered plant varieties. Prior to this Act, India had only a Patent Act of 1970, which did not permit the patenting of methods of agriculture and horticulture (Chandrashekara and Vasudeva,2002). To qualify for protection under Plant Variety protection, a variety should be "new" (in the market) and must also be shown to be distinct, uniform, and stable (the DUS criteria). The right holder then has all rights to commercialize the variety, but there are two imperative differences from patent protection. The "farmers' privilege" (which is distinct from "farmers 'rights") allows farmers to save, reuse, and possibly exchange or sell their own harvested seed. The "breeder's exemption" means that other breeding companies and organizations are usually free to use a protected variety for additional breeding efforts.

References:


- Chandrashekaran S and Vasudev S ,2002 Journal of Intellectual Property Rights 7 506-515

- Shabir H. Wani, Renuka Devi, N. B. Singh, A. Haribhushan, Diana S and Hanif Khan, 2013 Intellectual Property Rights System in Plant Breeding, Jour Pl Sci Res, 29 (1) 112-122

# GUIDELINES FOR PROCESSING OF PATENT APPLICATIONS RELATING TO TRADITIONAL KNOWLEDGE AND BIOLOGICAL MATERIAL

**Jahnavi Pandya**

The Government of India has taken pro-active policy steps in encouraging Indian industry to focus on IP led R&D. The new Intellectual Property Rights policy has more clarity and uniformity about issues regarding Intellectual Property Right protection and technology transfer.

It has been reported that the Indian Patent Office is granting patents on the use of traditional knowledge (TK) of India, particularly relating to the Ayurveda, Unani and Siddha systems of medicine etc and patents have been granted on inventions related to biological resources obtained from India without taking adequate care to observe the mandate of law. This is inspite of the fact that other international patent offices are denying/objecting to the grant of such patents on the basis of prior art evidence retrieved from the Traditional Knowledge Digital Library (TKDL).

Indian law has adequate provisions for the protection of TK and Biological Resources. Traditional knowledge, by its very definition, is in the public domain and hence, any application for patent relating to TK does not qualify as an invention under section 2 (1) (j) of the Patents Act, 1970, which defines that "invention means a new product or process involving an inventive step and capable of industrial application". Further, under section 3(e) of the Patents Act "a substance obtained by a mere admixture resulting only in the aggregation of the properties of the components thereof or process for producing such substances" is not an invention and hence, not patentable. The Indian Patents Act also has a unique provision under Section 3 (p), wherein "an invention which, in effect, is traditional knowledge or which is an aggregation or duplication of known properties of traditionally known component or components" is not an invention and hence, not patentable, within the meaning of the Patents Act. Additionally, sections 3 (b), (c), (d), (f), (h), (i) and (j) are of relevance with respect to the patent applications related to TK and/or biological material.

On the issue of Biological resources, section 6 (1) of the Biological Diversity Act, 2002 provides very clearly that "no person shall apply for any intellectual property right, by whatever name called, in or outside India for any invention based on any research or information on a biological resource obtained from India without obtaining the previous approval of National Biodiversity Authority before making such application; provided that, if a person applies for a patent, permission of the National Biodiversity Authority may be obtained after the acceptance of the patent but before the sealing of the patent1 by the patent authority concerned; provided further that the National Biodiversity Authority shall dispose of the application for permission made to it within a period of ninety days from the date of receipt thereof. The Indian Patent Law complements this provision of the Biological Diversity Act, 2002 by making it mandatory for the applicant

of a patent to submit a declaration under Form-1 (Application for Grant of Patent) of the Patent Rules 2003 to the effect that "the invention as disclosed in the specification uses the biological material from India and the necessary permission from the Competent Authority shall be submitted by me/us before the grant of patent to me/us." The Biological Diversity Act, 2002 has a penal provision in this regard under section 55 (1) which provides that "whoever contravenes or attempts to contravene or abets the contravention of the provisions of the section 3 or section 4 or section 6 shall be punishable with imprisonment for a term which may extend to five years, or with fine which may extend to ten lakh rupees and where the damage caused exceeds ten lakh rupees such fine may commensurate with the damage caused, or with both."

It should be ensured that all patent applications relating to Traditional Knowledge (TK) are correctly identified, screened and classified as "Traditional Knowledge" by RECS Section. The RECS in-charge should take due care that no case relating to TK is wrongly screened and classified. Additionally, the person in-charge of screening should accord appropriate IPC classification for such TK applications so that these applications can be properly routed for examination to the respective groups such as Chemistry, Pharmaceuticals, Agrochemicals, Biotechnology, Microbiology, Biochemistry, Food, Mechanical, etc. e.g., C07D, C07G5/00 (for Chemical), A61K, A61L (for Pharmaceuticals), A01N (for Agrochemcials), C12S, C12N, C07K4/00; 14/00 (for Biotechnology), C12N, C12P, C12Q (for Microbiology), C12F, C12G (for Biochemistry), A23C, A23L (for Food), B25F (for Mechanical), etc. The screening of an application as “Traditional Knowledge” is an administrative process for facilitating the examination and to indicate that the subject-matter of the application is important and has relevance in the context of traditionally known substances, articles or processes for preparing them or their use.

In the rare situation that the screening and/or classification by the RECS Section is not found to be appropriate in respect of applications relating to TK during allotment/examination, it should be immediately brought to the notice of the Group Leader by the concerned Examiner/Controller and re-screening and/or re-classification should be done by the Group Leader (GL) forthwith.

If an application is wrongly screened and classified as "Traditional Knowledge", only the Technical Head shall be competent for re-screening and/or re-classification of the same to any other screening field on the recommendation of the concerned Group Leader.

System Administrator should create separate screening fields in the Module namely, TK-Chemical, TK-Biotechnology and TK-Mechanical.

# ETHICAL CONERNS OF TRANSGENIC CROPS

**Ancy J. Fernandes**

Transgenesis is a way of improving and combing the agricultural knowledge with the biotechnology for the progressive thought leading to upliftment of agro based industries consecutively causing social and economical changes in the society. Transgenic refers to the insertion or movement of the gene into an organism naturally or by inducing them artificially. Transgenic organisms are the outcome of mutations caused naturally and by induction. The genetically modified organisms (GMO's) are transgenetically formed by in vitro experimentation for developing new crop's species, hereafter it could be said that the GM crops are the" unnatural" transgenic organisms. As every coin has two sides, so do the GMO's have, i.e. there could be an affirmative or pessimistic outcome of growing them in the field conditions as well as for the individuals who consume them. The frequency of producing a transgenic plant is faster as compared to all the other living organism is due the efficiency easiness of handling them in laboratory conditions.

Ethical queries related to biotechnological incorporation is a matter of debate wherein, both consent ethics as well as virtue ethics emerge. The Nuffield Council on Bioethics (NCOB) on the social and ethical issues towards the use of genetically modified crops has published reports in 1999 and 2004. Reports emphasized on 5 major concerns about the GM crops which are: Potentiality to harm human health, Environmental damage, Negating impact on traditional farming techniques, Dominance of corporate groups, Technological use to produce unnatural products. The ethical problems in relation to principle of human welfare, human rights maintenance and justice, apprehensions concluded that genetical modifications were almost similar to the conventional breeding practices. For the developing countries an assessment of the costs, benefits and risks were to be analyzed responsibly with a thought that it would reduce poverty, improve food security and profit levels rise. New products being introduced were expected to have improved nutritional benefits, high level of pest resistance and higher yields for uplifting various sectors in the developing countries. Commercialization of GMO's is currently at a juvenile phase speculations of both positive and negative responses would be obtained in the coming future. The present market shows an increasing demand for these deviant transgenic crops we all need to wait for the real picture to be revealed from the side of the punter, days ahead of the GMO's production and the acceptance.

References:

1. https://www.macalester.edu/~montgomery/GMOs2.htm
2. Agnes E. Ricroch, Michele Guillaume-Hofnung and Marcei Kuntz (2018), The ethical concern about transgenic crops, *Biochemical Journal*, 475 (4): 803-811.
3. Weale A (2010), Ethical arguments relevant to the use of GM crops, *New Biotechnology*, 27(5): 582-587.

# ROLE OF IPR IN HORTICULTURE

**Dhruv Pandya**

IP protection in horticulture can take the form of patents, trademarks, geographical indications, copyrights, plant variety protection and trade secrets. Each of these different types of statutory IP protection protects a different type of intellectual property and grants different rights to the owner. Geographical indication is also giving a new dimension by providing incentive on international level. Darjeeling tea, Assam tea, Nilgiris tea, Dasheri and Alphonso mangoes, Coorg coffee, Basmati rice, Bengal cotton, Kerala bananas, Cardamom from Kerala etc. are some of the examples which bring laurels to the country on one hand and uplifting the livelihood of the native of that area. Development of a new plant cultivar or variety, either by traditional breeding methods or by modern molecular modification, requires a lot of time and effort.to recover the costs of this research and development, the breeder may seek to obtain exclusive marketing rights for the new variety. Keeping it a trade secret is one way to do this, as well as obtaining a plant patent, utility patent or plant variety protection. PVP (Plant Variety Patent) is a good choice for many breeders. Indian horticulture is a globally more competitive and more progressive by using knowledge as a strategic source so that horticulture sustains livelihoods of millions of households dependent upon it in an environmentally sustainable manner. The major contention is that India should not view the challenges posed by WTO as if it will remain always an importing country and that it has no substantive intellectual property to offer to world market. The provision of TRIPS need to be strengthened to include microorganisms but exclude live forms, registration system of grassroots innovations, widespread patent search facility for education and entrepreneurial networks and center so that quality of research and education can be competitive, Fruits and vegetable products with improved health benefits, antioxidants and nutritional quality and the technologies to extend the shelf-life of fruits and vegetables all come under IP issues and a number of patents have been obtained throughout the world. Much progress has been made for advancement of horticulture sector. There is a need to aware researchers and associates regarding influence of the IPR.




Reference links:

https://www.researchgate.net/publication/293569536_Current_status_of_IPR_issues_in_Horticulture

http://planningcommission.nic.in/aboutus/committee/wrkgrp/horticulture.pdf

# IMPORTANCE OF INTELLECTUAL PROPERTY RIGHTS

**Milan Vala**

- Intellectual Property rights (IPR) are the exclusive rights given to the creators for their new creation. Intellectual property is intangible.
- There are various types of IPR including patents, copyrights, trademarks, industrial designs, geographical indications, trade secrete etc.
- IPR is very important for the development of society because of some valuable reasons:
    - IPR provide incentive to the creators for new creation.
    - IPR also create the competition among individuals. Thus it's a one kind of progress of the society.
    - IPR ensure the availability of genuine and original products.
    - IPR ensuring material reward for intellectual property.
    - IPR may also useful and important for the solution of some global challenges such as in the field of alternate sources of energy, new products to the farmers and also for the low cost drugs development for the poor people.
- Some objectives which are useful for the development like stimulating economic growth, improve the health status, enhancing access to education as well as overall sustainable development.
- For the development of any society it's directly depend on IPR and also its policy frame work.
- Some death of inventions, economic loss, decline of an intellectual era in the country because of lack of IPR awareness.
- For create something new needs manpower, energy, skill, money etc. IPR in basic education system and promote IPR registration by encouraging the innovators and creators. It's a very essential for policy makers.

References:

Jajpura, L., Singh, B., & Nayak, R. (2017). An Introduction to Intellectual Property Rights and their Importance in Indian Context, Vol. 22, 32-41.

Sharma, D. K. (2014). Intellectual Property and the Need to Protect it. *Indian J. Sci. Res*, *9*(1), 084-087.

# DEBUNKING THE MYTHS OF CANOLA

**Nikita P. Sapra**

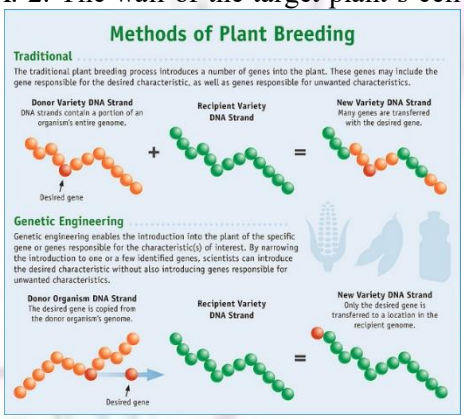
One type of technology, however, has given rise to a host of concerns and questions, namely Genetically Modified Organisms (GMOs). GMOs are those organisms that have been modified by the application of recombinant DNA technology or genetic engineering, a technique used for altering a living organism's genetic material. These include, inter alia, pest resistant cotton, maize, canola (mainly Bt or *Bacillus thuringiensis*), herbicide glyphosate resistant soybean, cotton and viral disease resistant potatoes, papaya and squash. In addition, various transgenic crops are under development and not yet commercially released with traits for biofortification, phytoremediation and production of pharmaceuticals, such as rice with high level of carotenoid for production of Vitamin A (e.g. golden rice) and bananas with vaccines

**Economic significance**

There is significant demand for Australian canola oil, meal, and other valued-added products in both domestic and international markets. This demand is driven by greater nutritional awareness by consumers and their desire to replace unhealthy oils (Australian Oilseeds Federation 2008). Consequently, canola oil is becoming less substitutable. The end uses of canola can be broadly classified into four groups including human, animal, industrial and export consumption. Domestic crush demand represents approximately 30 per cent of canola production and in excess 70 per cent is exported. Roughly 90 per cent of this processed oil is for human consumption and the remaining 10 per cent for industrial consumption

**How are transgenic plants made**

Once a specific gene has been identified, isolated and manipulated it must be reintroduced to the target organism. This is not a simple process. There are three techniques currently being employed for the transfer of a gene into the target crop: 1. The DNA encoding the desired gene is inserted into a bacterium that has the ability to infect the target plant and transfer a piece of DNA. 2. The wall of the target plant's cell is physically removed, and the stripped cell is jolted with electricity to disrupt the cell membrane and allow the new DNA to pass into the cell. 3. The new DNA is coated onto tiny gold pellets and a gene gun is used to "shoot" the gene into the target crop cells. For cells that successfully receive the new gene, standard tissue culture techniques are applied to induce the cells to grow into adult plants (Voiland and McCandless, 1999).




**Pros and Cons**

The problems caused by GM canola have been due to perception rather than reality. Europe has blocked Canadian canola because of GM traits, and they've fretted over Canadian mustard containing trace amounts of canola. Organic producers in Canada have claimed losses due to contamination. These are all issues of perception – that somehow GM canola is something to be feared. Some liken GM canola to a weed and it's certainly true that you have to keep herbicide resistance traits in mind to achieve control of volunteer canola plants. However, it wouldn't have been any different had the resistance been achieved through regular plant breeding rather than transgenic manipulation. It's the end result that matters, not how you get there.

References:

1. Green, A., & Salisbury, P. (1998). Genetically Modified Oilseeds. The Impact of Gene Technology on the Australian Oilseeds Industry.
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# GENETICALLY MODIFIED BT COTTON: A BOON FOR FARMERS

**Pujan N. Pandya**

Bt cotton, was first introduced in 1996 commercially as the insect resistant protein which produced a insecticidal protein from Bacillus thuringiensis (Bt), a soil bacterium. Many farmers across the globe have vastly benefited from this technological uplift giving then increased crop productivity, convenience and savings in terms of time. There are various economical, social and environmental benefits to the farmers from cultivation of Bt cotton. Globally, there is a rise in farmers growing bt cotton since 1996. Bt cotton improved the crop yield in terms that it reduced the spraying of pesticides on the crop which lead to reduced exposure of workers and environment to the chemicals (Weblink-1).

Bt cotton, resistant to the cotton bollworm complex is a plant variety which contains the genes from Bacillus thuringiensis. The family of proteins, Bt originates from the strains of the bacteria, Bacillus thuringiensis. More than 200 different types of Bt toxins which affects different types of insects. Bt cotton plants are basically genetically modified plants by the addition of genes which encodes the toxin crystals in the cry group of endotoxin which leads to the death of the insect after ingestion of the Bt crop (Purcell JP. & Perlak FJ., 2004 and Kathage, J., & Qaim, M., 2012).

Technological advancements which resulted in the production of Bt cotton variety positively influenced the farmers in terms of three channels which are the total cotton yield, changes in the cost of insecticides and pesticides and changes in the cost of seeds. Increased income and increased quality of life of the farmers are the two main advantages of the Bt cotton. Large and sustainable benefits of Bt cotton have contributed tremendously to the social and economic development in India. (Purcell JP. & Perlak FJ., 2004)

Although Adoption of Bt cotton variety is widely accepted by the mass heated controversies regarding their advantages and disadvantages do occur due to the uncertainty about its long term effect. A study by Kathage J. & Qain M., in 2012 based on the collected panel data between 2002 and 2008, they showed that there had been a 24% increase in the yield of cotton per acre in the farms through reduction in pest damage. A 50% of total gain generated in cotton farming had also been observed amongst the smallholders. The benefits of Bt cotton had been found to be stable throughout with indications that there might be sustainable increased benefits (Kathage, J., & Qaim, M., 2012)With the huge benefits of Bt cotton and its positive impacts on socio-economic developments in India, a new thrust for the emerging technologies that would further have positive effects on the growth statistics for Indian farmers needs to be further researched and adopted for India's shining future.

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- Purcell, John P., and Frederick J. Perlak. "Global impact of insect-resistant (Bt) cotton." (2004).
- Kathage, J., & Qaim, M. (2012). Economic impacts and impact dynamics of Bt (Bacillus thuringiensis) cotton in India. Proceedings of the National Academy of Sciences of the United States of America, 109(29), 11652–11656. doi:10.1073/pnas.1203647109

# GOLDEN RICE: FIGHT AGAINST VITAMIN A DEFICIENCY

**Sanjukta Rajhans**

## Introduction

The first-generation transgenic crops targeted more towards the attempts in reducing the input costs. However, second generation transgenic crops represent "value added innovations". Golden Rice is a second generation transgenic and is considered as a ground-breaking step for producing a significant impact at the consumer level. The rice contains provitamin A, which the body converts into Vitamin A. This GM crop has been considered as a beneficial solution for vitamin A deficiency (VAD). [3]

## Economic Importance

The challenges such as poverty, poor infrastructure, lack of awareness and technology has made this rice variety a little costly in the developing countries in comparison to the developed countries. In combination with efficient approaches Golden Rice could lead to a highly effective, cheap and modest contribution for the relief of a major health problem. [4]

## Manufacturing of the crop

Golden Rice was engineered from normal rice by Ingo Potrykus and Peter Beyer in the 1990s. It has been named for its golden colour which is caused by Beta-Carotene. There are 3 main steps for the production of this rice. They are as follows-

Step1- Transfer of specific genes into the plant embryos.

Step2- The embryos incorporate the new genes into their DNA and produce desired constituents. They further grow and produce seeds.

Step 3- The efficacious heritability of the new genes confirms that the modified plants have passed on their inherited genes to their offsprings. [1]

Advantages and Disadvantages-

- Golden rice produces beta- carotene which is converted by the body to vitamin A. this rice has the potential to be a valuable asset against global vitamin A deficiency.
- It can help in preventing blindness.
- The rice is costly and cannot be afforded easily by the people living in the developing countries.
- To some extent it can be allergenic. [2]

References:

1. (https://embryo.asu.edu/pages/golden-rice).
2. (https://escholarship.org/uc/item/2h01f05c).
3. (https://www.downearth.org.in/news/agriculture/commercialisation-of-gm-rice-turns-out-to-be-a-dud-report-62218).
4. (www.goldenrice.org/Content3-Why/why3_FAQ.php).

# Environmental Benefits of Genetically Modified Crops

**Shirin Qureshi**

By year 2050, there will be 9.5 billion people living on this planet. So, the world population is expected to increase by 3 billion. Feeding these people will mean massive changes in the production, distribution and stability of food products. Increasing fluctuations in weather conditions and climate change can radically alter the rainfall patterns and therefore, migration of people and shifts in agricultural practices would be observed. (1) All these major concerns can be solved, by genetically modified crops. Following are the environmental benefits observed:

1) Genetically modified crops decrease dangerous pesticide usage

Genetically modified crops are insect-resistant. Hence, produce their own highly specific pesticide called Bt proteins against the specific group of pests. This results in no usage of insecticides or pesticides over the crops. Bt proteins are safer than the pesticides and herbicides used in conventional farming. (3)

2) GMO's increases yield and decreases land use.

GMOs increases yield whereas organic farming decreases yield by 34%. Also, GMOs require less land compared to the organic farm to grow the same amount of food. (2)

3) GMO's boost non-tilling farming

Tilling is used as a weed-management method, but it also removes nutrients from the soil, causing more erosion and runoff and harms earthworms, ants and other organisms. For herbicide resistant crops, no mechanical weed removal is required. GM farmers do not need to till their soil as much and some farms that grow GMOs do not engage in any tilling at all. (2)

4) GMO's save beneficial insects

Because insect-resistant GMOs that use the Bt proteins only affect a specific group of insect pests, it has little to no effect on any other insects. This can result in the survival of insects which used to die due to the spraying of insecticides. (3)

5) GMO's reduce carbon dioxide emissions

Farms that grow GMOs require less diesel to power their tractors because of no pesticide usage and tilling and thus, less carbon dioxide is produced. This would lead to lower carbon footprint.

## References:

(1) https://isaaa.org/resources/publications/pocketk/4/default.asp
(2) https://blogs.umass.edu/natsci397a-eross/environmental-benefits-of-genetically-modified-crops/
(3) https://medium.com/@debunkingdenialism/five-ways-gmos-benefit-the-environment-c48eee7e2765

# MICROBIOLOGICAL ETHICAL ISSUES

**Suhani Parekh**

Bioethics has emerged as a new discipline over the past few decades and is continuing to become a multidisciplinary subject. In microbial research, certain bioethical issues related to human experiments need to be focused. Issues of potential harm, informing the individual in clinical trials, right of pregnant women, consent in mandatory screening tests etc. are some of important ones. Laboratory services are inseparable part of research and with the advance in laboratory technologies; new and complex ethical issues are taking place. So personnel working in laboratory should be aware of their ethical duties. There are some guideline for ethics in India and around the world some of which are as follows: 1) Code of ethics-The American society of microbiology(ASM) has defined code of ethics which includes detailed standards for ethics, rules, and conduct in research. This code emphasizes promotion of human welfare, accumulation of knowledge, honesty, truthfulness in research. 2)Indian council of medical research(ICMR) have guidelines for medical research on human participants in India. It includes prior consent to the participants that they are a part of clinical trials, no forceful attempt or purchase of humans for clinical trials etc. ICMR has also issued guidelines on laboratory practices. It mentions that a procedure has to be followed in medical research so as to provide quality data that can be useful in patient's treatment. A list of principles has been given in these guidelines by ICMR. 3) World Health Organization (WHO) has a handbook for good laboratory practice which covers every aspect of laboratory work. Although it doesnot mention ethical issues, but laboratory practices included in it automatically points towards sound ethics. 4) Ethical issues in following scientific procedures mentions that there should be a set of standard procedures, and any deviation from it, or finding a cheaper and easier method would require scientific consent. The main motive is that profit should not be the main motivating factor in choice of tests. 5) Ethical issues in documentation of test and environmental variable include- what test is carried out, when, how and by whom. For e.g. it is ethically wrong to allow unqualified personnel to carry out tests without supervision. 6) Ethical issues with quality assurance and with evaluation and reporting of results are also there. For e.g. manipulation with other's result is a wrong attempt. 7) Some Ethical issues are with usage of stored biological material like serum, cell biomass which are often used in experiments. The use of these materials involves proper check on the quality of stored material and prior consent from the patient involved. 8) Ethical issues with the use of microorganisms states that since most microbiological research uses microorganisms, information about the use of MO, proper method to discard them, safety measures, toxicity should be known. The use of genetically modified organisms (GMO) should be done carefully to other organisms like plants or animals. Any harm to any individual organism can lead to complex issues. 9) Lastly research ethics in important in microbiology which involve ethical review of protocols, documentation, informed consent from individuals, reporting of adverse events and any deviation from protocols. Regular reviews and ethics in publication have to be followed. Microbiologists need to be aware of these guidelines and code of ethics for research and a good standard ethics will lead to a positive public perception and quality research in the society.

References:

1) P desikan *et a*l.,2011. Ethical issues in microbiology, *Indian journal of Medical microbiology*,29(4), 327-330 .

# IPRs RELEVANT TO AGRICULTURE

**Swati Jayswal**


There are so many IPRs used in the daily routine. But in the agriculture sector few are used among them. The IPRs used in the agriculture field are patents, plant breeders' rights, trademarks, geographical indications and trade secrets.

They are used to protect goods or services produces in the agricultural sector.

Patents:-Patents provide the strongest protection for the production of any patentable plants, animals and biotechnological activities. Now-a-days patents work as the most important IPR in the field of agricultural goods and services. With the help of patents, the patentee is benefited having a right to prevent another from using, making or selling the patentable product or process. The patented work or process should be novel, not known to prior, useful and industrially applicable.

Plant breeders' rights:-There are so many countries in the world, which provide plant breeders' rights to promote conventional methods of plant breeding. The criteria for granting this is lower compared to patents. This includes distinctness, uniformity and display of the similar required characters on reproduction. This type of rights promotes breeding activities in the private sector.

Trademark:-A Trademark is an IPR used in both the agricultural and industrial sector. The main objective of a trademark is to distinct enterprises from one another. It is for limited time and a person should renew it after particular time duration.

Geographical indications:-Geographical indication is a commercial mark used more in agriculture compared to industry. This is used with a country originated products, the region or the locality where the products' characteristics attributed. This prevents third parties from passing off their products as those originating in the given region. There are so many examples like 'Champagne', 'Roquefort' and 'Darjeeling'. The main advantage of this is there is no time limit for it.

Trade secrets:-It is used in the agricultural sector to protect hybrid plant varieties. Trade secrets are used to protect third party misappropriation through legislation from unfair competition or to control trade practices or to contract law. This is also not time limited.

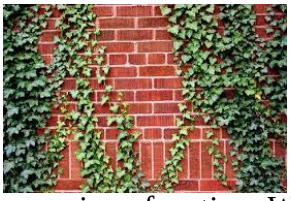
Reference:

Watal, J. (1998). *Intellectual Property Rights in Indian Agriculture* (No. 44). Working Paper.

Image source: http://www.livelaw.in/cms/wp-content/uploads/2014/11/IPR-Lobbying1.jpg

# LESSONS FROM NATURE

**Dr. Archana Mankad**



Plants have stem, root and leaves, each part designed to perform its own unique function. While the stem shoulders the responsibility to take the plant to great heights, it also stands firm and supports the branches in most plants. Hence, stems are normally equipped with firm tissues that provide mechanical support and strength. But some plants lack mechanical support and so have weak stems. These plants end up being categorised as climbers, creepers, twiners etc. They never hesitate in taking help from anything that can provide the much-needed support. Some do it by putting their best efforts in making modified structures like spines, tendrils or the like. Many others simply cling to the support and grow. Infact, they produce amazing flowers and provide flexibility of forms to a landscape designer.

Not all of us are equipped with all that is needed to excel in life. What is important is to be aware of it and work to fill the gap. There are ample opportunities around us that can support us and can help us overcome our shortcomings. An honest realisation and an earnest effort along with a humble outlook paves the way to success. A positive outlook, a desire to put in all possible efforts, taking all possible help and an inherent capability to bloom would be like the icing on the cake.

## GLIMPSES OF ACTIVITIES OF GUJARAT UNIVERSITY BOTANICAL SOCIETY

The much awaited **FUN FIESTA** welcoming the year 2019 witnessed enthusiastic and creative participation by the members of GUBS. Each day had a different theme and a new challenge. The much awaited FOOD FESTIVAL was a big attraction and attracted many foodies. The students showcased their culinary skills and tried their hand on marketing their delicacies. The judges were happy to taste and decide who deserved to win the prizes.







The staff and students of the Department participated in the **Paryavaran Kumbh** at Varanasi. Prof. Bharat Maitreya led the group including students, Mr. Pathik Bhatt, Mr. Dhruv Pandya, Jaivin patel and Mr. Sanjay. They actively participated in the event and made their mark as participants from Gujarat University. They received certificates and mementoes from the organizers

The students of Bioinformatics participated in a **workshop at IISER**, Pune and presented posters. The students of Botany and Bioinformatics participated in the **International conference at L. M. College of Pharmacy**, Ahmedabad.

The students of Botany participated in the **workshop on Foldscope** at Sadra. Ms. Swati Jaiswal, Kalpa Oza, Ronak Charan, Madhavi Singh actively participated in the workshop and benefitted by learning the making of a Foldscope. The students also were sensitized towards humble and simple living at the campus in sadra.

The staff and research scholars took up the responsibility of career counselling also referred to as the **OUTREACH ACTIVITY** for the TY B Sc students in different Science colleges of Ahmedabad and Gandhinagar. There were presentations and/or orientation for Bioinformatics, Climate Change Impacts Management & Horticultural Science and Garden Management. The UG students were also informed about the PG diploma courses and the advantages of being part of GUBS. Prof. Archana Mankad, Prof Bharat Maitreya, Dr. Saumya Patel took the lead and were accompanied by Mr. Nirmal Desai, Mr. Dhruv Pandya, Ms. Harshida Gadhavi, Mr. Naman Mangukia, Ms.Swati Jaiswal, Ms. Neha Jha, Mr. Pathik Bhatt, Ms. Pujan Pandya and Ms. Sanjukta Rajhans.

The annual function of GUBS was organized and was a fun filled event. The participants and winners of different activities received prizes and certificates. It also involved the announcement of GUBS awards.

**GUBS AWARDS** called as **GOLDEN PETAL AWARDS,** is our novel endeavor to acknowledge, appreciate and bring to limelight the best among the students of the department during the academic year. It is an initiative to generate interest and highlight the significance of wholehearted participation and commitment towards both curricular and co-curricular activities. A very creative memento and a very impressive certificate was specially designed by the creative team of the department. The different categories of GOLDEN PETAL AWARDS are GOLDEN PETAL AWARD FOR ACADEMIC ACHIEVEMENT- for the toppers in internal exams and all those who were awarded fellowships by UGC/DST and all those who win prizes in seminars / conferences at GUJARAT UNIVERSITY, GOLDEN PETAL AWARD FOR EXCELLENCE- for the students who proactively and wholeheartedly displayed excellence during various events of the department, GOLDEN PETAL AWARD FOR THE RESEARCHER OF THE YEAR-for the excellent publications, and GOLDEN PETAL AWARD FOR OUTSTANDING ACHIEVEMENT-for all those who have won prizes during oral/poster presentations at seminars/

conferences outside Gujarat University and won prizes in state level competitions organized by other scientific organizations like Science Academy and made us proud as well as all those who have been conferred special appointments / fellowships or passed prestigious examinations. In addition to this we have GOLDEN PETAL AWARD FOR THE PRIDE OF THE DEPARTMENT for those who have MADE US PROUD BY THEIR ACHIEVEMENTS.GOLDEN PETAL AWARD FOR ACADEMIC for Prize in SCIXL to CHIRAG PATEL ,Prize in SCIXL to RASHMI YADAV, Prize in SCIXL to PUJAN PANDYA, Prize in SCIXL to NIRMAL DESAI, Prize in SCIXL to PATHIK BHATT, Prize in SCIXL to ALAY MEHTA, Prize in SCIXL to BHANU SOLANKI, Prize in SCIXL to RONAK GADHAVI, Prize in SCIXL to LOVELY JAIN, Prize in SCIXL to RIMA ZINZUWADIA , Prize in SCIXL to ARPITA RANA, Prize in SCIXL & TOPPER INTERNAL EXAM BIOINFORMATICS SEM I to YASHRAJ SINH JADEJA, Prize in SCIXL to KHUSHBU RAJPUT, Prize in SCIXL& TOPPER INTERNAL EXAM CCIM SEM III to KASHYAP PATEL, Prize in SCIXL & TOPPER INTERNAL EXAM BOTANY SEM I to PARTH DESAI, Prize in SCIXL & TOPPER INTERNAL EXAM CLIMATE CHANGE SEM I to MIHIR PRAJAPATI, Two students in BOT sem III had same marks in internal exam so..we have two toppers..TOPPER INTERNAL EXAM BOTANY SEM III to KRISHNA DESAI,TOPPER INTERNAL EXAM BOTANY SEM III to POOJA SHARMA,TOPPER INTERNAL EXAM BIOINFORMATICS SEM III to HARSHA MOTWANI,TOPPER INTERNAL EXAM CLIMATE CHANGE SEM I to DOLIKA PATEL,TOPPER INTERNAL EXAM HORTICULTURAL SCIENCE AND GARDEN MANAGEMENT SEM III to SNIGDHA DIXIT, TOPPER INTERNAL EXAM HORTICULTURAL SCIENCE AND GARDEN MANAGEMENT SEM I to AARKI THAKOR, GOLDEN PETAL AWARD FOR EXCELLENCE IN MANAGEMENT to NIRMAL DESAI and JAHNAVI PANDYA, GOLDEN PETAL AWARD FOR EXCELLENCE IN MENTORING to DHRUV PANDYA, GOLDEN PETAL AWARD FOR HAPPY TO HELP to SANJUKTA RAJHANS, GOLDEN PETAL AWARD FOR RESEARCHER OF THE YEAR to SWETA TRIPATHI and PUJAN PANDYA, GOLDEN PETAL AWARD FOR EXCELLENCE IN RESEARCH to DR. MAULIK PATEL and CHIRAG PATEL, GOLDEN PETAL AWARD FOR OUTSTANDING ACHIEVEMENT for PRIZE IN MINAXI LALIT SCIENCE EXAM BY GSA to PARTH DESAI, for PRIZE IN MINAXI LALIT SCIENCE EXAM BY GSA to HARSHA MOTWANI, for PRIZE IN MINAXI LALIT SCIENCE EXAM BY GSA to SIMRAN KABANI, for CLEARING GSET

TO KRISHNA DESAI, for CLEARING JOINT CSIR- UGC JRF AND LECTURESHIP (NET) EXAM TO SWETA PATEL , for Second prize in entrepreneurship conclave and Incubated at GUSEC to BINDI PATEL, for Second prize in entrepreneurship conclave and Incubated at GUSEC to RAHUL KATARA, for Prize in conference by GCRI to SWETA TRIPATHI, for National award for Shooting to HARMIT PATEL. GOLDEN PETAL AWARD FOR PRIDE OF THE DEPARTMENT for receiving Prime Minister's Fellowship Scheme for Doctoral Research to **NAMAN MANGUKIA**, GOLDEN PETAL AWARD FOR PRIDE OF THE DEPARTMENT for receiving AACR Global Scholar-in-Training Award to **DR. SAUMYA PATEL**. GOLDEN PETAL AWARD FOR FACULTY OF THE YEAR to **PROF. HITESH SOLANKI**. GOLDEN PETAL AWARD FOR ENTERPRISING LEADER OF THE YEAR TO **PROF. HIMANSHU PANDYA.**