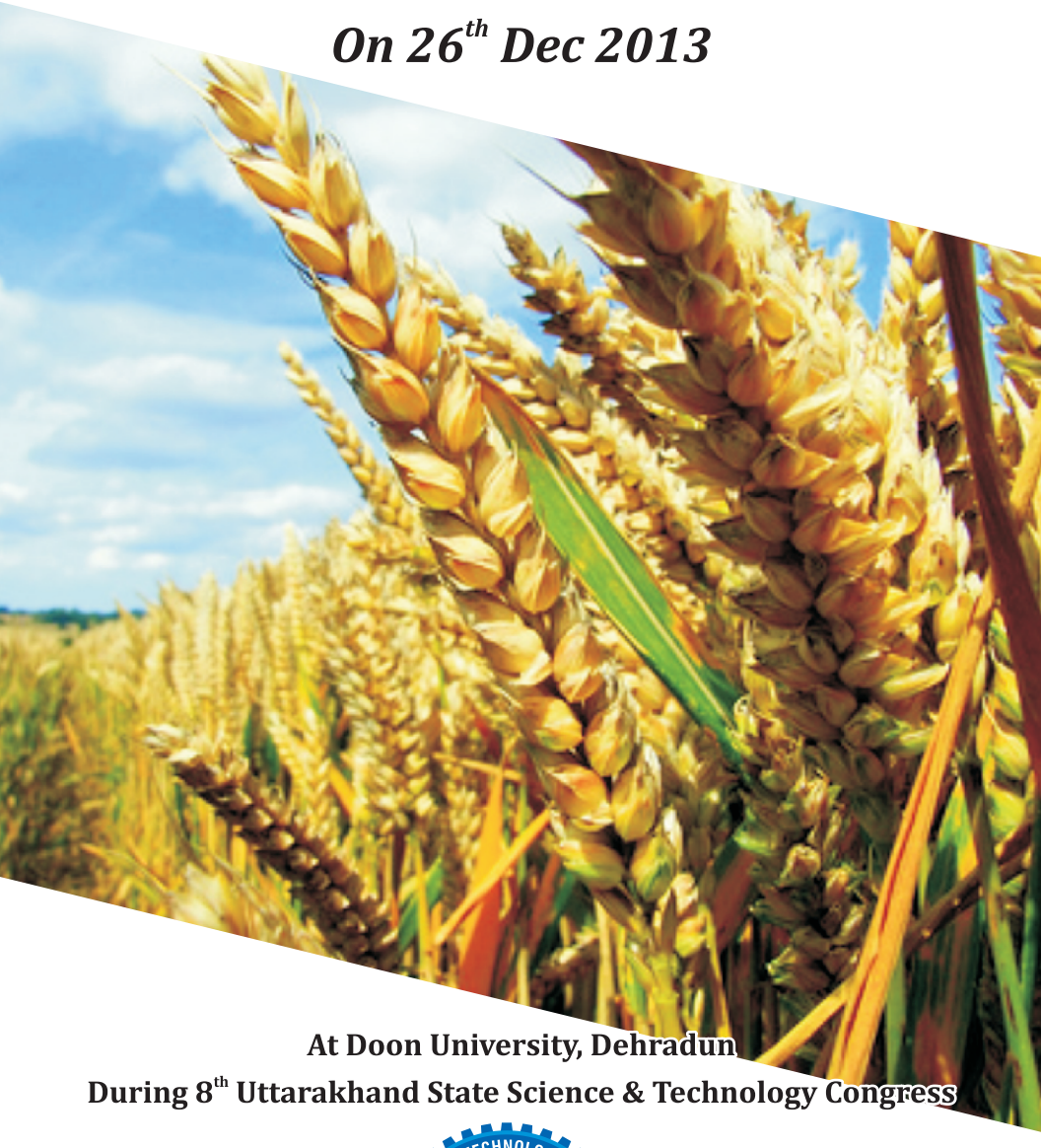
# BRAINSTORMING SESSION

## GM Crops

## Potential for Mountains

***On 26th Dec 2013***



**At Doon University, Dehradun**

**During 8th Uttarakhand State Science & Technology Congress**


**Uttarakhand State Council for Science & Technology**

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# Rationale

With increase in population and concern about the quality of food, the agriculture biotechnology has gained focus in the recent past in India. Sustained growth in agricultural productivity will depend upon continuous improvements in germplasm (plants, animals including fish and microbes) and improved nutritional value of staple foods, besides crop and livestock disease and pest control. Biotechnology plays an important role in enhancing agricultural productivity.GM crops/seeds, biofertilizers, biopesticides, biofuels etc are new generation requirement. Genetically modified or "GM" crops are being considered as having the potential to bring about the second green revolution. Their use in crop improvement, inculcating pest resistance, drought/salinity tolerant or crop biofortification has been the underlying phenomenon in articulating such thoughts/vision.

Factually speaking, academicians are spearheading the research & development in GM Crops. However how enabling the environment is and how the masses are responding is a matter of concern. It has also to be noted that GM crops does not only mean Bt crops, it also represents crop enhancement by incorporating tolerance, increasing nutritive values and pest resistance too. So are we adopting a proactive role in marketing these concepts? There is a need to address such issues and deliberate on the significance of GM crops in days to come; the outcome of this session hopefully Therefore will try to bridge some of the gaps in nurturing an informed society towards GM crops.

# Conceptual Outline

India is currently working on 111 transgenic crop varieties of various vegetables, fruits, spices, cereals, bamboo etc. Transgenic crops brinjal, cabbage, castor, cauliflower, corn, groundnut, okra, potato, rice and tomato are under field trials stage. But it is cotton which was the first GM crop to be extensively worked upon & commercially released in India; the reason being that India has the largest area under cotton cultivation in the world.

Both public and private sector are actively involved in R&D of GM crops. A working paper on agricultural biotechnology by Indira *et al.* (2005) tells about the major players in public and private R&D of GM crops in 2004. The public organizations are basically doing primary research, while the research conducted so far by private sector in India involves backcrossing the genetically engineered traits from the imported GM crops/ seeds into selected local varieties of the crop through standard breeding techniques. For instance India cultivates 4 species of Gossypium (cotton) consisting of 30 varieties and 20 hybrids. The Bt cotton commercialized thus is principally a backcross with these local/hybrid varieties. In recent times, area under genetically modified crops has increased substantially resulting in a surge in productivity. There is also an established regulatory mechanism regarding GM crops. Similarly with the approval of Bt gene being spliced in cotton seeds, genetically modified crops are on the verge of being marketed. This has resulted in eruption of numerous seed firms and tissue culture laboratories. But with all the systems in place still there are apprehensions about it in the public.

Another important dimension of GM crops is that they come under Intellectual Property Rights regime in India. The prevailing model for GM crop innovation is that multinational companies either commercialize their products in joint venture with local seed companies or license out to smaller local companies. This necessitates paying of license fees as well as paying of increased cost of GM seeds by local farmers who are willing to take up GM crop farming.

Though a highly specialized and laboratory intensive field, however its wider applications have made us contemplate on its usage and it's utility in times to come. Therefore to deliberate on such issues, this brainstorming session was organized.

# Objectives

1) Technology exists and is continuously being developed. Should we or should we not adopt them? -Assessing the risks and benefits of the GM crops
2) Work being undertaken by the Uttarakhand state universities on areas other than Bt based genetic engineering products (crops, plants, seeds etc., salt and drought resistant crops, Better self-life; enhanced food values, RNAi based technology, anti viral strategies etc.
3) IPR issues related to GM crops
4) Identifying genetic attributes suitable for local needs & their incorporation in local host species for solving regional problems like malnutrition, pest resistance & drought resistant species for rainfed areas.
5) Prioritizing the areas of intervention for state specific needs.

# Outcome

The session consisted pf a mix of eminent personalities from the field of academics, policy makers, government departments and private companies. The deliberations put forth that the technique of genetic engineering/modification in crops can be a critical driver not only for increasing productivity and tolerance in the edible plants, but for eradicating malnutrition through collaborative approaches and a scientific mindset. To help in creating a broader foundation towards GM crops for the state, the general masses should be made aware of it. The discussants recommended developing a systemic approach towards attaining the target of prioritizing the species which need genetic modifications or species having special genetic traits.

The discussion revolved around the topic whether adoption of GM technology is suitable for a state like Uttarakhand. The state which is known for its holiness, its untouched green beauty, as a biodiversity reserve is primarily by default an organic state. This milieu of factors made the discussants ponder whether the state should go for field trials of GM Crops or not.

# Recommendations

To help implement the national strategy & prepare a roadmap for the decade for the state, some of the recommendations put forth by the panel of experts are:

- Need based adoption of the transgenic technology for the crop improvement in the hilly area and terai regions of Uttarakhand
- As per the National mandate for crops (2010) especially on millets, the work can be initiated on the millets which suit the hilly soils and can grow in stressed conditions. We can go for specific state level crop requirement.
- A group can be formed of lead labs, IPR experts, industry and policy makers to identify specific need based target like biofortification, aromatic plants, herbal plants, to increase their active constituents.
- Development of the system to look into the risk assessment of the transgenic crops which may lead to gene pollution/erosion, biodiversity loss etc. (though lot of trials have been undertaken for the risk assessment so far no negative aspects have been reported).
- GMO releasing policy has to be simple
- Strong advocacy for promoting GM crops at Govt. level to convince the politicians
- More emphasis needs to be given to develop the varieties which can withstand abiotic and biotic stresses or could survive and grow well under changing climate scenario.
- GM technology should continuously be developed in the state to be competitive in India and the world.
- IPR awareness and filing of IPs should be encouraged
- In situ biodiversity conservation may be encouraged with plant biodiversity register
- Encouragement of protection/ registration of traditional farmers varieties may be encouraged.
- The recommendations may kindly be submitted to State Biotech Board
- R&D activities for identification of potential genes from our plants treasure trove of diversity should be encouraged through intervention of Hi-through put genomics tools.
- Right now focus of Uttarakhand's public & private institutions should be development of GM crops rather than adoption due to organic

farming, small land holdings and in the context of issues of biodiversity.

- There are instensive efforts at the government level to create a network of biosafety in the state by creation of biosafety committee at district and state level under International Cartagena protocol of Biosafety.
- There is a need of establishing a accredited GM testing laboratory with in the state.
- Refinement of technology should be promoted for overcoming the apprehensions of the public, media, NGO and other stakeholders.

- Major genetic attributes to be focused upon should be-
  - Insect and pest resistance in vegetable & fruits
  - Delayed ripening of fruits
  - Enhanced alkaloid production in maps
  - Nutrient and water use efficiency in cereals

Since Uttarakhand has adopted organic cultivation, GM seeds can not be allowed in organic cultivation. Secondly, biodiversity of Uttarakhand should also be given importance before working on GM technologies. But we can keep the technology ready for future by working on the trails mentioned above. For that we can go far development of GM crops rather than its adoption.

# ECOSYSTEM SERVICES AND GROSS ENVIRONMENTAL PRODUCT (GEP)

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