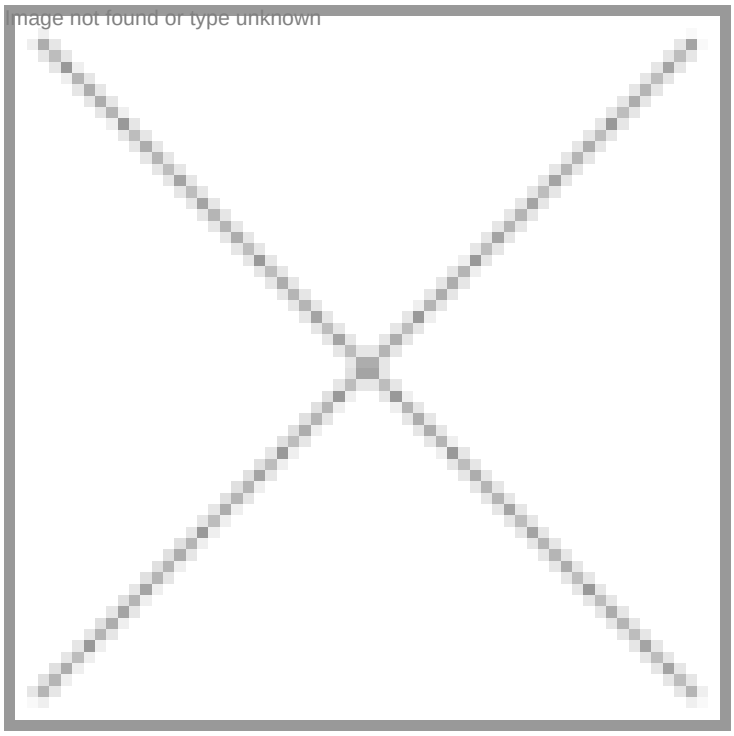
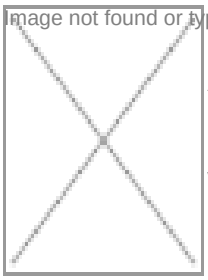
BioSpectrum the business of Bio & Health Sciences

"Spurious" Science Dominates Anti-GM Debate!

04 November 2004 | News





As the international year of rice draws to a close, China as usual is getting ready to introduce GM rice commercially, whereas there is a beginning of a movement to not only ban its introduction to other parts of Asia, but also a call for a moratorium on commercialization of GM crops for a variety of reasons. At the same time, one cannot but help notice how far the polarized GM debate has traversed since it all began more than a decade and a half ago. Even though commercialization of GM crops is in full swing around the world without a single instance of anything having gone wrong, the anachronistic pitch continues to queer new heights. If it is not social impact, it is imaginary ethical impact and if it is not economic impact, it is about democratization of biotechnology, if not, it is about socializing biotechnology, or else it is the "ephemeral" public participation in the decision making process. What has happened in all of this is that GM crops have been "criminalized" without any scientific basis.

There is no question that in this day and age, all human endeavors must be scrutinized and they all must jump through the hoops to pass muster called "public opinion". But, they must be done by knowledgeable people who have expertise and broad perspective of the role technology in development. But, when it comes to the question of assessing modern biotechnology, the knowledge and expertise of some of the stakeholders leaves much to be desired. Not withstanding the safe use of GM crops for almost a decade wherever they have been commercialized, there is a pervasive attempt to hoist false scientific charges against GM crops that are wantonly mischievous. GM crops have been tagged with a "guilty" label based on a faulty science, and now it seems that they have to be proven innocent by the scientists. That is to say prove that they are not dangerous! How does one design an experiment to prove that GM crops are not dangerous? When and who decides enough safety tests have been done. Scientists have done as much as their knowledge base permits to prove that

GM crops are as safe as any other food available in the market place and the efforts will continue in keeping with the pace of technology development, but that does not seem to satisfy the critics. There is a plethora of scientific literature available and a bi-annual scientific biosafety meeting discusses some of the best research on the safety of GMOs. They keep assuring that GM crops are safe to the environment and to human and animal health, but the critics don't buy them. Instead offer their own spurious scientific evidences and flawed scientific arguments to prove that GM crops are unsafe.

If one takes a serious look at the some of the criticisms of GM crops regarding their safety almost all their arguments are flawed in science, and it is hard to fathom why these critics continue to purvey such scientifically flawed or misguided arguments and to what end? There is a sort of "revisionist science" in the making just to jettison GM crops technology around the world. The worldwide web is full of them if one cares to read them. Most of the public have better things to do than to keep reading everything on the web these days, but some us who have innate interest in the subject keep track of them. By reading some of "their" literature and arguments, it becomes obvious that they have a modicum of scientific training and make believe that they know what they are talking about. They use many of the scientific jargons used by the scientists and have created some of their own to mislead the public. But, a closer scrutiny of what they are saying, it becomes clear that they turn and twist scientific facts, and grossly misinterpret them to scare the public. If one is honestly ignorant, or innocent, it should be possible to deal with them much more directly and inform them. But, how do you deal with people who are hell bent on misinterpreting scientific facts and mislead the public just to keep their activism alive? What gives them legitimacy is that the establishments in Europe and North America and now in Asia and Africa give them credence by acquiescing to their demands by instituting multi-million dollar programs to research safety questions related to GMOs and try to prove the negative, an impossible task indeed. Both North America and the European Union have spent literally hundreds of millions of dollars on biotech risk assessment research to prove the safety of GMOs, but to no avail. Now they say, you should repeat such kind of researches in Asia and Africa for decades to prove it to them that they may be safe. Clearly no amount of money spent on such red-herring research can all go a waste. Very many fundamental questions about safety, gene flow, out-crossing, and genetic stability and food and feed safety have been answered that hitherto had not been addressed. Also, many long-standing ecological questions have also been addressed as well. In sum, something good has come out of it. But, if you apply the cost-benefit analysis to that exercise, then it will come a cropper as precious dollars that should have been spent on much needed technology development and research capacity building around the world to tackle real problems have been squandered. But, be that as it may. I think risk assessment research must continue, but the critics must read the results of those projects and stop misleading the public about the GMO safety based on the high quality science used in them.

Malapropisms

What are the most common scientific malapropisms flaunted in the media and the public? It is commonly alleged that the introduced genes are leaky and therefore unstable alluding that genes will leak out of the GM plants and wreak untold havoc. The jargon "leaky" is used in a totally different context by molecular biologists to characterize the nature of gene expression. Second, they say introduced genes cause pleiotropic effects and scientists don't know what the hell is going to happen to the GM crops but conveniently ignore that it was the scientists who discovered pleiotropic effects of genes long ago, and know how to ensure that it does not affect the phenotypic expression of a selected trait by ensuring stable inheritance. There is something known as signal to noise ratio through which scientist screen and select the stably expressing lines. They seem to conveniently not mention that all the introduced varieties of crop plants have been rigorously tested by selection for stable inheritance of desired traits to bring it to the market place. Otherwise, can one imagine modern day seed companies selling seeds that do not perform what they are intended to be? Third, they say antibiotic marker genes render antibiotic chemotherapy useless by spreading into human and animal gut and other microorganisms. But, they will never tell the gullible public that if there is no selection pressure neither will there be a gene transfer nor do they express and that antibiotic resistance genes are already widespread in the environment. They will also not tell you that the same organisms that produce antibiotics also have developed resistance genes to protect themselves. What is important in gene transfer experiments in the gut is the frequency with which gene transfer occurs under what kind of selection pressure? They will never put this issue of antibiotic resistance marker genes in the overall context of a century old phenomenon called "antibiosis" that has been studied to death. But, they also do not distinguish between antibiotic producing genes and antibiotic resistance genes. Fourthly, there is this scientifically bogus phenomenon known as "genetic pollution" or "genetic contamination", a pure concoction of the GM opponents as if the genes are getting transferred for the first time now that GM crops are here. Using the words "pollution" and "contamination", you can scare away any innocent and ignorant public and rally support for their cause. They will never say the gene flow is an ancient trait of all living organisms throughout evolution and is the basis of speciation and biological diversity in the world. Fifth scientific malapropism that is flaunted is that modification of oil profiles in GM plants like canola will change the lipid profiles of cells (lipids, fats, and oils are one the same to them) and lipids are an important component of cell membranes. If you change the lipid profiles of cell membranes, they will develop big holes and drain out cell contents and the whole plant will be destroyed. On the face of it, it all looks plausible, but does it make any scientific sense that a modern day biotech seed company will try to market GM seeds that die off and can you imagine how one would bring such products to the market place? How can one sell such a seed whose progeny would have its entire cell contents drained out? It will be like visiting a boneless chicken ranch. The sixth malapropism is that "gene silencing" will

somehow silence some important gene and cause untold effect in GM plants. The fact that "gene silencing" is one of the finely tuned gene regulation processes known so well in prokaryotes and has been discovered in tissue culture derived plants in the past 30 years. By discerning the basic mechanisms of gene silencing a brand new biotech industry is coming to the fore by using this powerful tool to tackle ever so many problems in biology. Practicing scientists know very well that the basic minimum requirement for gene silencing is sequence homology and whatever gene silencing that may occur happens only with the introduced gene only in a specific plant and it does not affect the entire field of GM crops, if at all. Gene silencing has never been recorded from a field of GM crops so far. But, who cares about the truth? The emphasis here is on the word "silencing" conjuring up an image killing a plant. Once again, when a stably inherited GMO is selected all these matters are taken care of. But, the critics would never want to study these things properly and convey proper information to the public as it odes not serve their purpose. For as long as golden rice has been in the news, anti-GM critics have been telling the world that people will have to eat 8 kilo grams of rice a day to get all the required daily doze of Vitamin A based on the miniscule quantity of Vitamin A produced from the very early construct of golden rice. When golden rice was first unveiled to the world, it was to provide a proof of concept that such complex metabolic genes can be successfully transferred to food crops, and such a technology can be exploited for the biofortification of staple food crops that do not provide adequate nutrition now. Is it really possible that scientists are so stupid to market a rice variety which people will have to eat in kilogram quantities daily to benefit from it? Is it not really absurd? Scientists deserve better credit than that. The fact of the matter is that there has been a fantabulous progress in the making of golden rice and iron rich rice that are now undergoing field tests, and soon very many other needed tests will be carried out before commercialization. This marvelous technological approach is now used in an international multi-million dollar biofortification research program funded by the Gates Foundation. The other scientific falsehood that is constantly propped up is that Bt Cry9c gene produces an allergenic toxin when in fact it has been investigated most thoroughly and found not to be so. But, they don't relent because if they accept scientific facts, they will have one less weapon in their armor to fight against GM crops. There is still a belief perpetrated by the anti-GM lobby that terminator genes will escape into the wild and sterilize biodiversity, a blasphemy to say the least.

Recently, there has been a new allegation that hybrid crops of the green revolution are responsible for the development of super viruses that have now metamorphosed into SARS, HIV and mad cow disease. The fact that that line has been espoused by Nobel Laureate Maathai, it gives lots of credence to anti-GM lobby to use such scientific misinformation to their own end. There is also a sentiment against applying GM technology to medicinal plants and commercializing pharmaceutical transgenic plants not realizing that none of these plants are so sacrosanct that they cannot be researched upon using modern scientific approaches. It is already happening, and in fact, it makes eminent sense to understand the mechanisms of medicinal plants better so that we can manipulate them to produce their principal ingredients at will and don't have to destroy them for good in the nature. Imagine, taxol can now be synthesized, and one need not harvest the barks of the precious yew trees in the Himalayas. This is biodiversity conservation using modern biotech for you. Examples galore from chemical micro-array technology and metabolomics to get at ever so many naturally occurring medicines from plants, animals and microbes that can be synthesized either biologically or chemically and make them available at affordable costs to large populations. This is a constant quest of the scientists, and hat should continue. History of modern medicine is replete with so many examples of exploiting modern science to deliver health care.

You will never see these anti-GM scientists present a paper of their "scientific" concern at a proper scientific forum where knowledgeable scientists can address them. Because, they know that their scientific malapropisms will not stand scrutiny. Instead, they hoist them on the gullible media who promptly purvey them without verification, as it sounds scientifically credible because they use some scientific jargons. There is no rhyme or reason to oppose GM crops based on good science. Underneath many of these specious arguments is deep-rooted ideological and political opposition to the modern biotechnology. But, the good news is that GM crops technology is taking root all over the world on its own merit. The opponents' last hope was Brazilian President Lula who they thought will stop GM crops technology. Instead, he just approved GM soybeans much against a world-wide campaign to stop him. Lula approved GM crops because he was convinced of the benefits of GM soybean based on facts and evidence and not rhetoric. We all have to keep repeating scientific facts, as we know as many times as the opponents of GM crops keep repeating their scientific lies. Otherwise, there is a real danger of this beneficial technology either delayed or not reaching those who need it the most in the developing world. The scientific community in the developing world must wake up to counter this non-scientific propaganda against biotechnology and directly communicate with the public and the media to present scientific facts to promote safe and effective deployment of biotechnology.

Dr. Shanthu Shantharam is the President of a biotechnology affairs consulting firm, Biologistics International in Maryland, USA.