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“Life-saving technologies are blocked from reaching the farmers”

—Prof. Marc Van Montagu, founder, Institute of Plant Biotechnology for Developing Countries (IPBO) and president, European Federation of Biotechnology (EFB)

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The Belgian molecular biologist Prof. Marc Van Montagu is the founder of the Institute of Plant Biotechnology for Developing Countries (IPBO). Along with his colleague Prof. Jeff Schell, Prof. Marc Van Montagu discovered the gene transfer mechanism between agrobacterium and plants, which resulted in the development of methods to alter agrobacterium into an efficient delivery system for gene engineering in plants. He developed plant molecular genetics that includes molecular mechanisms for cell proliferation, differentiation and response to abiotic stresses (high light, ozone, cold, salt and drought) to develop transgenic crops resistant to insect, pest, and tolerant to novel herbicides. Prof. Montagu is also the founder of two successful biotech companies—Plant Genetic Systems Inc. and CropDesign. He is the president of the European Federation of Biotechnology (EFB) and a board member of the Indian biotech company Avesthagen.
Here are the excerpts from the exclusive interview with the Father of Genetic Modification of Crops, Prof. Marc VanMontagu:

Genetically modified organisms (GMOs) are readily accepted in drugs and medicines. But why is there so much of opposition when it comes to GM food crops?
Biotechnology is used in almost every product that improves our daily lives, which includes discovery, design and production of life saving drugs and detergents we use in our washing machines; GMOs are one such biotechnologies that are used in the manufacture of these products. Over the last 12 years, genetically modified maize, soybean, cotton and canola are readily accepted by farmers worldwide. The increased productivity of these GM crops has allowed the prices of the commodities to remain within reasonable limits, to the benefit of consumers. Farmers have understood the benefits of genetically engineered crops. The resistance of GM crops to insect pests or its tolerance to environmentally safe herbicides is

giving direct benefits to the farmers in terms of higher yields or reduced application of pesticides.
Scientific evidence from the farming communities in China and South Africa, who have adopted insect resistant cotton, has shown that there are direct health benefits linked with lower exposure to pesticides. At the same time, these small farm holders have had more time to spend in off-farm activities, and so the benefits are multiple. A significant benefit to the environment through lower use of pesticides and herbicides has also been demonstrated. For example, the adoption of herbicide tolerant soybean varieties has allowed farmers in the USA and Argentina to follow the practice of no-till agriculture that reduces the amount of carbon released to the environment and helps sustain soil integrity, which is vital for the future of food security. We continue to see evidence of further benefits to farmers, food security and the environment, as each year passes many acreages of land are used for genetically modified crops.
Another reason why society has been more cautious in accepting GM crops is that there is opposition to the so called'control of the food chain by multinationals'. This is a flawed perception since it is not the seed producers who control the food chain, it is the food and drink retailers who reap the major profits in this sector —and it is these same food and drink companies who own the major organic brands in the US. So there is little basis for this argument. To a larger extent, it is the global seed companies who hold the bulk of the GM technologies in the market today. This is because of the fact that the regulations and the costs of bringing a GM crop to the market can only be met by the multinationals. This is arising from the continued opposition to the introduction of GM crops, and means that no public sector organization, third world country or SME can afford to develop this technology beyond the stage of confined biosafety and performance trials. As a result of this confusion, we are seeing brain drain in Europe, stalling of promising new crop varieties (such as drought and pest resistant crops or bio-fortified staple crops that are of relevance to the developing world), and a reluctance among investors to promote an SME culture, which are all vital components of the global knowledge-based economy.

It is assumed that genetic engineering in food crops will revolutionize agriculture and eradicate malnutrition and hunger. How can plant biotechnology help the developing countries?
There have been many endorsements of GM crop technology – as a vital instrument for meeting food security, developmental and environmental objectives over the years by authorities at the highest level, including the UN FAO, WHO, OECD, World Bank, and from over 25 Nobel Laureates. There is therefore a very strong support, drawn from a very diverse spectrum of opinion makers committed to finding sustainable solutions through innovation of agriculture for the very complex challenges facing society and the environment on which we depend. Environmentalists on the other hand express concerns over the sustainability of world agriculture and food security in the next 50 years if we are to continue with a 'business as usual' approach. Investments in science and technology for agriculture have repeatedly brought immense returns in crop productivity and are widely recognized as a vital instrument for the development, particularly for the rural poor, who represent 75 percent of the world population. In the 1980s, Overseas Development Aid (ODA) for agriculture stood at 16 percent, when the successes of the green revolution were still fresh in the minds of investors. Today, ODA for Agriculture stands at only 3.8 percent, and this will not change unless agriculture is brought rapidly back on to the world political agenda. It is to be hoped that the food crisis of 2008 should serve as a wake-up call for policy makers to re-evaluate the potential that lies in present crop improvement pipelines, and to find measures that fast-track the approval of technologies that have the potential to invigorate agriculture for development. Biotechnologies, including GM crops coupled with modern breeding techniques and improved rural infrastructure are a coherent answer to many of the challenges we face for the sustainable production of food, feed, fuels and fiber. It is absolutely essential that all of the major scientific breakthroughs we are seeing today in terms of improving yield, improving the nutritional content of staple crops and drought tolerance are made available to the people who need them the most. Scientists have a responsibility here, better international R&D networks need to be established to support the scientists in developing countries who understand the local problems, but who lack access to the knowledge and technologies that the technology proficient countries possess. Existing models of technology transfer are clearly failing, and new vision for global interaction is urgently needed.

GM Crops still face a lot of resistance from public, politicians and more specifically many groups of activists. What would you tell those people who say GM Crops shouldn't be allowed?
There are absolutely no scientific grounds for the position that the activists have taken. They present alarmist arguments like there are health risks, damage to the environment and loss of biodiversity. The truth is however, more reassuring. Firstly, the regulatory authorities, who oversee the research, testing and development of these GM plants, backed by national and international legislations, have very stringent guidelines regarding biosafety. Prior to the commercial release of a new variety, several biosafety criteria have to be satisfied to get the authorization. These regulations are important for ensuring that there are no risks to the environment or human health. The activities of the national regulatory authorities such as the USDA-APHIS or the European EFSA are highly transparent, and are readily available to the public for consultation through their databases published on the web. As an example, there are repeated calls for moratoria on the release, including field testing of GM trees, based on the assumption that we know too little about the environmental impact of this technology. In response to this assertion, and to provide a scientific basis for discussions relating to the biosafety of GM trees under the Convention on Biological Diversity negotiations we carried out a study of what is known on this subject. We found that over 700 trials have been conducted worldwide since 1988 in over 35 species of tree, largely by public sector scientists, and often with environmental or societal rather than commercial objectives. It is important that these facts are put in the hands of the policy

makers so that any debate is properly informed and that the relevant scientific facts are first and foremost on the agenda. This is essential, since the demand for trees and forest products will continue to rise, and modern plantation forestry, including GM trees will be needed to meet this demand and alleviate pressure on the remnants of natural forests that are so vital for the environment and biodiversity.

Therefore, rather than stall the testing of new varieties, we urgently need to see more testing, and that information regarding the biosafety, environmental benefits and performance of these plants should reach policy makers and society. Indeed, the only way in which the biosafety and performance of GM plants can be assessed is through controlled field trials—the same way as experimental new drugs are tested in clinical studies. We can no longer afford to stall progress given the magnitude of the challenges facing agriculture and food security. If the technologies presently under evaluation are stalled, we have to question what will happen to technologies such as drought resistance that must be brought to the farmers who will bear the brunt of climate change. It is reassuring to see the impressive performance of GM drought tolerant wheat currently under evaluation in Australia. Scientists are seeing a 20 percent yield increase compared to the best performing varieties over two seasons now. This is exactly the sort of technology that has been so diligently developed and that could help stabilize grain prices and provide food security in the future. It should be remembered that the recurrent drought in Australia and its impact on grain production has not only removed a staggering one percent from Australian GDP, it is one of the prominent causes of last years food price crisis.

Finally, the activists should really take a hard look at the ethics and morality of their untenable position. Potentially life-saving technologies such as bio-fortified staple crops are blocked from reaching the farmers as a result of 'biosafety concerns' broadcast by a variety of organizations. When one considers that malnutrition, rather than disease, is the single most important cause of disability and premature death, there should be no grounds for blocking technologies that have proven biosafety track records. One can see parallels in the field of medicine where new drugs for 'orphan diseases' are fast-tracked by the regulatory authorities to ensure they reach those who need them the most.

What is your opinion about the debate on the safety of genetically modified foods in India and other countries?

Firstly, there is an established track record of risk assessment and supporting documentation established by the regulatory authorities in which GM crops are tested and commercialised. The goal is to ensure that countries use common methods to collect consistent information for risk/safety assessments in their development of biotechnology regulations and guidance and that any information relating to the biology of an organism would be the same regardless of what the country's regulatory system was involved.

Secondly, there is a history of safe use of transgenic plants in thousands of trials and commercial planting around the world.

Thirdly, there is an established dialogue on appropriate data and safeguards for GM plants among different countries; organizations involved in their testing, and organisations such as the UN FAO are responsible for evaluating the relevance of new technologies for world agriculture.

The overwhelming conclusion from these different sources is that a case-by-case approach to GM crop regulation would be the sensible way to proceed, and this basic approach is officially recognized in the Cartagena Protocol for Biosafety.

The consensus opinion is that the general methodology for science-based risk assessment set forth in the protocol is adequate and any debate on the issue of biosafety should be fact and science based.

I would, however, like to take this opportunity to voice my concern over the present situation in India concerning the commercialization of GM (insect resistant) brinjal. It is clear that there is no debate on the real issues being of developing this variety. It would appear that a well organized and well financed campaign of mis-information has been mounted to scare the public over 'health risks' associated with the consumption of this brinjal. A number of points need to be made—the variety has been produced to provide resistance to an insect pest that ravages the 500,000 hectares of brinjal cultivated in India – using technology that has passed rigorous biosafety testing not only by the Indian GEAC, but also elsewhere around the world. It is ironic that questions regarding the safety of the technology (the Bt gene) are raised when the Bt protein (the same technology) is the most commonly used agent for insect control in organic agriculture for many years (90% of world organic insecticide used).

At present, the only form of control of this insect pest is through the application of insecticides. Insecticide spray is not an effective control, and for those farmers have to spray pesticide almost daily. The most commonly used insecticide is endosulphan, a neurotoxin that is banned in most countries around the world because of the proven health risk to farmers and consumers.

We have calculated that if the entire area of cultivation were sprayed at the present dosages, then the total annual cost to farmers would be in the region of $600 million per annum. If these farmers were to adopt the GM brinjal, they would firstly benefit financially since they would have to spend less on insecticide, but also they (and the consumers who buy their produce) would benefit through less exposure to dangerous chemicals.

Numerous studies have been carried out by medical organizations in India and published in the international peer-reviewed press on the toxicity of endosulphan in rural communities. I therefore find it utterly perplexing why we should read in the press that Indian doctors have made declarations on the health risk of the GM brinjal.

We must really ask the question of who would stand to lose if GM brinjal reached the market in India, and maybe in our search for the answer to this question, we may understand better the motivation behind the campaign to ban GM brinjal. I think it is important that the relevant ministers for health, agriculture, finance, and the environment should consult more to

develop a multi stakeholder plan for the role of GM technology in the future of Indian agriculture.

Is the public concern about GMOs higher in Europe than in India?

I would not say that concern is higher in Europe than in India. It is important to understand that agriculture has a verydifferent relevance for Europe and India. In Europe, only two percent of the workforce is involved in agriculture, whereas in India around 60 percent—the majority of the country's poor are involved in agriculture, and many of the farmers cannot afford the inputs required for the high productivity practices we see in

Europe. It is in this context that we should view this point. European farmers and consumers have the luxury of choosing to produce or consume organic, conventional or GM produce. Providing enough food, or incomes for the rural poor through more productive varieties or the sale of cash crops such as cotton is essential for India. India should be able to make its own decisions about what the most appropriate technologies are needed to meet these goals. We have already seen the rapid adoption of GM cotton in locally bred varieties adapted to the growing conditions in the different parts of the country. It is important that India can make similar decisions for the release of insect (Bt) resistant brinjal and other crops. In the future, it is widely acknowledged that India will see dramatic reductions in yield as a result of climate change. It is therefore essential that scientists and seed companies – with the correct policy frameworks and investment infrastructure can develop new varieties that are designed to meet this challenge under appropriate biosafety regimes.

At the same time, the purchasing power of an increasingly urban population in India hints at a shift in diet habits. The production of sufficient feed for livestock is an important priority for future scientific and policy objectives, and Indian scientists can and must play an active role in tackling for this challenge.

What is needed to reduce the public concern about GMOs in the developed and developing countries?

Science-based, balanced and objective debate, at the highest level, followed by unambiguous dissemination of the real risks and benefits to all stakeholders. In the future we will need to double food production to feed nine billion people. With less available arable land, fewer chemical inputs, less water, and fewer people involved in primary agriculture, we need to look at all options including GM crops to meet this deep rooted and complex challenge. The public need to be engaged in this debate, so that they can understand the complexity of the challenge facing society and the environment, the urgency of the need to find solutions, and the pivotal role innovation in agriculture will bring to implementing change.

Can you tell us more about your organization IPBO and its activities?

We founded the Institute of Plant Biotechnology for Developing Countries (IPBO) in 2000. It is an initiative supported by the Flemish government and the Suri Sehgal Foundation, (an organisation committed to rural development programs in India). We exist to strengthen training of plant biotechnologists and plant breeders in developing countries; enable the implementation of science-based biosafety policies in developing countries and act as a focal point and internode to promote and leverage outreach for the biotechnology platform of Europe to developing countries.

IPBO today is an internationally recognized center for training on plant biotechnology, biosafety and international regulations that govern the cultivation of genetically modified plants. It represents a powerful forum to both leverage the opportunities plant biotechnology presents for sustainable rural development, and challenge the obstacles facing its deployment. IPBO advocates support for global R&D networks in plant biotechnology to construct local scientific capacity building of relevance to local bottlenecks and challenges. IPBO is lobbying for the harmonization of regulatory norms, political consistency and public awareness of plant biotechnology for development, and its in close interaction with the leading international organisations involved in the deployment of plant biotechnology and GM legislation.

Narayanan Suresh with Jahanara Parveen