

'Market is the place to decide Terminator's usefulness'

WORLD AGRICULTURE is in the throes of a technological revolution, in a manner as has been never seen before. This revolution of biotechnology sweeping the western world purports to help humankind in the quest for a sustainable co-existence with the elements in a rapidly depleting world order. Its detractors are constantly raising the bogey of this human intervention playing God and leaving behind a trail of devastation on the very basis of our sustenance, the ecosystem.

The latest round of passionate debate in the international arena has been sparked off by the grant of a patent by the US Patents Office, jointly to the US Department of Agriculture and Delta & Pineland Co, for a genetic engineering technology that can render seeds sterile and therefore unusable for raising a new crop.

This patented technology, dubbed as the 'Terminator' technology, has seen much debate in the Indian context. Some of its critics have gone so far as to uproot and burn test plants of another kind of genetically modified cotton that was in no way related to this putatively dreadful technology!

Dr Sivramiah Shantharam, a senior Operations Manager with the US Department of Agriculture in the Animals and Plant Health

Inspection Services (APHIS), prepares environmental risk assessment and biosafety review of applications for field testing and commercialisation of genetically engineered crop plants and micro-organisms. He is in the know of this 'Terminator' technology and had earlier offered his considered opinion on it. On a recent visit to Chennai, he spoke to Dr Gurumurti Natarajan on some of the vexing issues relating to the technology.

What is the mechanism of this Terminator technology?

The Terminator is an unfortunate choice of expression given to an ingenious and clever application of findings from basic research efforts aimed at understanding fundamental mechanisms of plant gene structure, function and expression. This technology, coined as "Control of Plant Gene Expression" by its originators, comprises a set of five genes that are expressed in a controlled and co-ordinated fashion to deliver a toxin to the embryo of seeds that carry them.

The toxin prevents the germination of the seed in the following, F1, generation. These genes give expression to the final product only in the presence of an external inducer, in this case the antibiotic kanamycin. This technology, however, is in the developmental stage and needs some more work before it can be applied to any

plant species, cultivated or otherwise. These genes in or by themselves have no agronomic value but can be used in combination with other value-added, gene-coded traits to serve as a deterrent to poachers and others who misappropriate the seeds of such improved varieties. It also provides for a wonderful built-in biosafety mechanism to prevent gene escape from transgenic plants to non-target organisms. It is a system that helps the developers of transgenic varieties to protect their invention and intellectual property.

Commodity Chat WITH SIVRAMIAH SHANTHARAM

Who would be the major beneficiaries of this technology?

The major beneficiaries would be farmers around the world who can now look forward to a new thrust in development and creation of value-added cultivars of crops such as rice, soya, wheat, groundnut and so on that have so far not received the kind of research attention that some other crops such as maize, sunflower, and tomato have received. This is largely because of the immense potential to add certain desirable traits (like increasing the yield). The application of such technologies of genetic engineering gives the assurance that the investment

in these technologies will be suitably rewarded through profits in commercialisation.

What are the benefits that it would confer to the originators of this technology?

The originators will be able to secure the protection of the new transgenic variety that they have produced and thus protect their intellectual property. Someone in the business of commercialising this technology could stand to gain from the sale of seeds of such varieties, the extent of which would be governed by market forces.

What can be the negative fallout to the farmers who use seeds bearing this technology?

The farmers who choose to use seeds generated from the application of this technology will not be able to save seeds for planting the next crop.

However, if the farmers find these varieties economically beneficial, I do not see why they will hesitate to adopt them and ask for similar seeds in the future also. I would like such an opportunity to be presented to the Indian farmers, as indeed everywhere, so that they can decide what is good for them.

The market place will be the

surest way of deciding the usefulness of these varieties, as indeed of any new product.

What is the justification to the perceived threats of unsolicited contamination of neighbouring plants or, worse, even the wild relatives of cultivated crops?

As I said earlier, an application of these so-called Terminator genes has not seen the light of the day. The trait governed by the application of this technology has not been field-tested and has not undergone any regulatory review in the US as of now.

So, much of what is heard and read about this technology can at best be described as hearsay or conjectural. But my understanding is that the 'Terminator' genes can perhaps be the best form of an in-built insurance against the risk of gene escape into the wild or weedy relatives of the cultivated species as the F1 seeds will not germinate! There is thus no justification for such a biosafety fear or concern.

How can this technology provide a filip to the creation of better-yielding varieties of self-pollinated crops such as rice, wheat, groundnut, soya and so on that have traditionally not received much private-funded research? This technology is also being touted as a "technology protection system" by its developers. In countries of the world that have no legal protection for new varieties and products of biotechnol-

ogy which require an enormous investment, such a "technology protection system" can provide a great incentive to both public and privately-funded research in science and technology. Biotechnology can offer some of the best opportunities and solutions to solve some of the most recalcitrant problems faced both in the developing and developed economies.

What are the known risks from consuming products mediated by genetically modified organisms (GMOs)? GMOs are intrinsically the same as non-GMOs. Biotechnology is only a set of techniques that can aid the development of living organisms as desired by man. The risks of GMOs are no different from that of any other new variety released through classical plant-breeding techniques. I stress that there is a perceived threat or risk in different parts of the world regarding GMOs.

It is important that everyone involved in the business of delivering safe products of technology address these concerns in an assuring manner so that the consumers can see and experience the benefits of this technology and satisfy themselves that it is safe. It takes a great deal of open, transparent and honest communication and evaluation to create awareness and acceptance of any new technology or product thereof.