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Faith in chloroplast transformation

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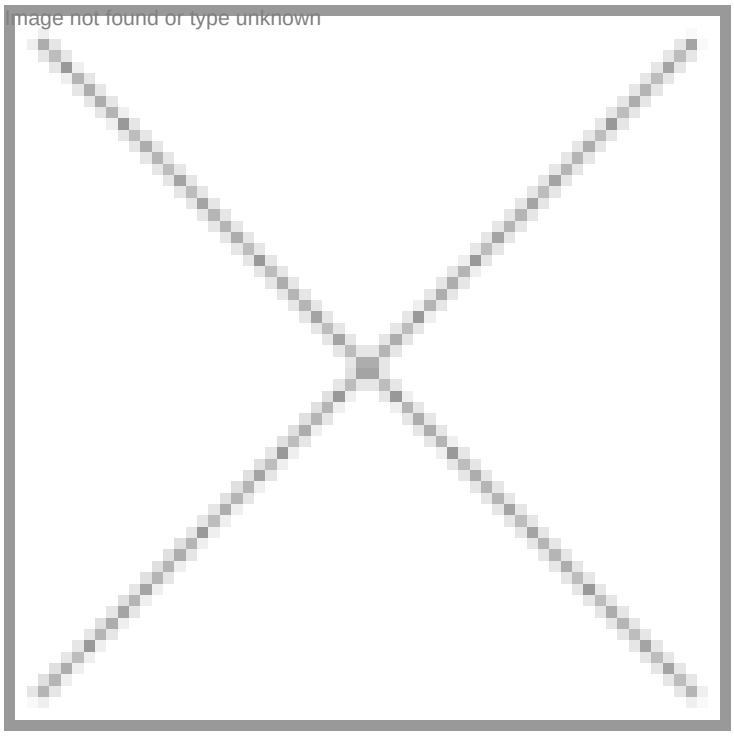

Researchers at IARI back chloroplast transformation techniques.

A defender of transgenic technology stated aggressively from a conference table: "There is no hue and cry about this technology (chloroplast transformation techniques) amongst the industry. Unaware people might be crying because they are not aware with the techniques involved in this technology." Why is his faith on this technology so strong? The cutting edge research work that is in progress at IARI's National Research Centre on Plant Biotechnology demonstrates a point or two.

"So far we have used nuclear transgenic technology. But time has come to look beyond the traditional ways and enhance the outcome by making more changes to the prevalent technology. Chloroplast transformation is one of them. This innovative technology can be termed as an improved version of nuclear transgenic technology," informed Dr Kailash C Bansal, satisfied with results he got during the research work. Dr Bansal is principal scientist at National Research Centre on Plant Biotechnology, IARI, New Delhi and also heading the Plant Tissue Culture Lab there.

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Dr Kailash C Bansal

Elaborating the advantages of this technology, he said, "There are several advantages like better environmental biosafety and better insect resistance." It was in 1992, when Dr Bansal came to know about this cutting edge research work at Rutgers University, USA under the leadership of Prof. Pal Maliga. Later on in 1996, he got the opportunity to work with Dr Maliga, for the same project. Dr Bansal brought this research work to IARI a few years back. "At this center, we are focusing on developing potato, tomato and mustard varieties. We have started research on maize too. Besides, we are also working on a few other horticulture crop varieties," informed Dr Bansal. It is not that this technology has not been tried out. "It is already perfected in tobacco and has been successfully marketed in the US," Dr Bansal added.

Why are Dr Bansal and his team so excited? Through this technology, transgenic plant varieties can be developed without any antibiotic selection marker. Apart from this, by adopting this technique, spreading of transgenic gene to other neighboring crops can also be prevented. According to Dr Bansal there are reports that confirm development of resistance to herbicides by weeds or to Bt toxin by insects pests in case of Bt transgenic crops. In such a scenario, it becomes more challenging to tackle the problem of gene outflow to the weedy or wild relatives of cultivated crops of agricultural importance.

"Based on the occurrence of agricultural crops and their related wild or weedy species in the same geographical regions, it is suggested that chloroplast transformation should be a method of choice for generating improved transgenics in crops such as rice, sorghum, cucurbits, vigna species, Cajanus species, solanaceous crops, and Brassica species. In addition, maize, wheat and cotton should also be included in the above list." His defense was that this technology is safe for environmental biosafety. "By safeguarding the neighboring crop, we do not have any danger of environmental biosafety. Actually, in this technique, the transgene remains locked up in chloroplast. There is no pollen in chloroplast. And there is no question of spreading the transgene through pollen. Hence there is no threat from pollen to spread the gene to neighboring crops."

He cited some more advantages. "This technique is also helpful in producing protein rich variety at a unprecedented high level. Soluble protein ranging from 4 to 40 percent is found in the produce of results of this research."

So from farmers to direct consumers, biotech to pharma industries all can avail the fruits of this technique. "For instance, if we use plants as bioreactors for pharmaceutical application, then this technique would be very useful as it has the ability to produce protein rich plant variety. But it would take another few years to make this technology ready for the industry," Dr Bansal said. He reminded, "It might take more than a year to actually come into the market, but spreading correct message about this is vital for the success and future of this technology."

Faiz Askari