

# Molecular Farming : Human Vaccine in Tomato Sauce?

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Molecular farming is a novel technology that employs plants, viz. tobacco, potato, maize or carrot, to produce large quantities of pharmaceutical substances such as vaccines and antibodies. As often as not, animal or microbial cell cultures have been used to create vaccines but owing to overriding expenses on maintenance, safety, storage and transport, the technique turns out to be 1.5-2 times costlier than the one employed for plant derived vaccines.

In molecular farming, the plant acts somewhat like a bioreactor, churning out colossal amount of pharmaceutically active substances. The genetic information required to synthesize the therapeutic substance is carried on a DNA fragment by the process of transformation. This DNA molecule is introduced into the plant where it works as a part of the plant genome. The genetic information so incorporated into the plant genome is read by the mRNA to produce the pharmaceutical compound along with typical plant proteins.

Recently, researchers from the Universidad Catolica in Santiago, Chile have taken genetic sequences of cholera & hepatitis virus and put together into tomato plants. The host plant then produced key proteins of both the pathogens,

in the same way, as they do in conventionally created vaccines using cell cultures from animals or microbes. The tomato derived vaccine, so obtained, could easily be stored in the seeds of tomatoes themselves.

As with any new technique, molecular farming has its teething problems. The threats of cross-pollination and food crop contamination cannot be overlooked. There may well be a possibility that the pharma-plant, containing vaccine, is fortuitously consumed by an animal, which may cause desensitization inside its gastro-enteric tract. Or the active substance could enter the groundwater and lead to harmful effects. One such public incident has been observed in 2002 in the United States, when a soya field was found contaminated with maize (producing a pharmaceutically active compound - trypsin). Eventually, the entire harvest of 13,500 tons of soybeans had to be destroyed then and there. The author recommends that such risks must be addressed, without more ado, by using non-food plants like moss, tobacco etc. or by growing plant cell-cultures in a contained environment.

Key words : Genetically Engineered Crops, Molecular Farming, Plant derived Antibodies & Vaccines.