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Research Paper

Pharmaceuticals and Vaccines From Transgenic Plants

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Vaccines are available for many of the diseases that cause widespread death or human discomfort in developing countries,but they are often expensive both to produce and use. The majority must be stored under conditions of refrigeration and administered by trained specialists,all of which adds to the expense. Even the cost of needles to administer vaccines is prohibitive in some countries. As a result the vaccines do not reach those in most need. Researchers are currently investigating the potential for GM technology to produce vaccines and pharmaceuticals in plants. This could allow easier access, cheaper production and an alternative way to generate income. Vaccines against infectious diseases of the gastro -intestinal tract have been produced in plants such as potato and bananas (Thanavala et al.1995). Another appropriate target would be cereal grains. An anti - cancer antibody has recently been expressed in rice and wheat seeds that recognizes cells of lung,breast and colon cancer and hence could be useful in both diagnosis and therapy in the future (Stoger et al. 2000). Such technologies are at a very early stage in development and obvious concerns about human health and environmental safety during production must be investigated before such plants can be approved as specialty crops. Nevertheless, the development of transgenic plants to produce therapeutic agents has immense potential to help in solving problems of disease in developing countries.

About one - third of medicines used today are derived from plants, one of the famous examples being aspirin (the acetylated form of a natural plant product, salicylic acid). It is believed that less than 10% of medicinal plants have been identified and characterized and the potential exists to use GM technology in a way that increases yields of these medicinal substances once identified. For example, the valuable anti-cancer agents vinblastine and vincristine are the only approved drugs for treatment of Hodgkin's lymphoma. Both products are derived from the Madagascar periwinkle, which produces them in minute concentrations along with 80-100 very similar chemicals. The therapeutic compounds are therefore extremely expensive to produce. Currently , there is intensive research in progress to investigate the potential of GM technology to increase the yields of active compounds,or to allow their production in other plants that are easier to manage than the periwinkle (Leech et al.1998)

Thus it is recommend that transgenic crop research and development should focus on plants that will (i) improve production stability ; (ii) give nutritional benefits to the consumer; (iii) reduce the environmental impacts of intensive and extensive agriculture and (iv) increase the availability of pharmaceuticals and vaccines;

while (v) developing protocols and regulations that ensure that transgenic crops designed for purposes other than food, pharmaceuticals, industrial chemicals, etc. do not spread or mix with either transgenic or non transgenic food crops (vi) to develop viral, bacteria, fungal and insect resistant crops.