

## Royalty-free licenses for genetically modified rice made available to developing countries

Hopes that a new, life-saving, genetically modified rice will be grown in developing countries have been boosted with a decision that gives developing countries royalty-free licenses for technologies used to produce so-called golden rice. Rice enhanced with betacarotene, which is converted by the body into vitamin A, could help millions of people suffering with diseases caused by vitamin A deficiency.

The grain known as golden rice was developed with the support of the Rockefeller Foundation and others over several years by Dr Peter Beyer of the University of Freiburg in Germany and Professor Ingo Potrykus of the Swiss Federal Institute of Technology, Zurich. The technology involves modifying the DNA of the commonest rice plant, *Oryza sativa*, by adding bacterial and daffodil genes to produce rice cells capable of making betacarotene using certain methods patented by the life sciences company Monsanto. Monsanto have now agreed to provide royalty-free licenses for its technologies to help fast-track the further development and distribution of the rice.

"I now very much hope that others having intellectual property rights used in the development of golden rice will follow the generous example of Monsanto and also provide a royalty-free license for the humanitarian use of the technology and its transfer to developing countries," said Professor Potrykus, codeveloper of golden rice. Some 32 companies and institutions hold 70 patents for various technologies used to create the enriched rice.

It is estimated that 100 to 250 million children in the developing world do not get enough vitamin A. Vitamin A deficiency significantly increases the risk of severe illness and death as well as being the leading cause of blindness in developing countries. About 200 000 to 500 000 children become blind every year and half of them die within a year of becoming blind. An adequate intake of vitamin A could also reduce the mortality associated with infectious diseases like diarrhoea and childhood measles by boosting the activity of the immune system impaired by the lack of vitamin A.

Explaining the decision to make the golden rice licenses freely available, Hendrik Verfaillie, Chief Executive Officer of Monsanto, said: "We wanted to minimize the time

and expenditure that might be associated with obtaining licenses needed to bring golden rice to farmers and the people in dire need of those vitamins in developing countries." Some, however, have labelled the exercise a public relations exercise designed to reduce public concerns over the use of genetically modified foods. It is clear that much work remains to be done and it may take some years before countries can realise the potential benefits of these developments.

Dr Jorgen Schlundt, Coordinator for the Food Safety Programme at the World Health Organization, commented: "Before genetically modified rice can be widely introduced, scientific evidence will need to be provided to assure that the rice is safe and nutritionally adequate, does not pose unacceptable risks to the environment, and will provide the human health benefits suggested." He added: "WHO, along with the Food and Agriculture Organization of the United Nations (FAO), and the jointly sponsored FAO/WHO Codex Alimentarius Commission are developing the methods and criteria to be used for the international assessment and management of genetically modified foods, including requirements for the labelling of such foods and their products. WHO is studying possible human health hazards from the release of genetically modified organisms into the environment and, as a first step, the WHO Regional Office for Europe has organized a seminar on this topic for September 2000."

The report of the June 2000 consultation on genetically modified food held at WHO Headquarters in Geneva, as well as other related information, is available on the web at <http://www.who.int/fsf/GMfood/index.htm>. ■

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## Study in India confirms increase in drug-resistant cholera

Researchers in India have isolated strains of the bacteria that cause cholera which are resistant to some commonly used antibiotics, according to a new study published recently in the *Journal of the Indian Medical Association*. The researchers said that overuse of certain antibiotics may have contributed to development of the resistant strains and suggest that the use of certain key drugs be reduced to avoid progression and propagation of the resistant strains.

A recent outbreak of severe diarrhoea in West Bengal was already linked with the emergence of strains resistant to furazolidone, an antibiotic commonly used to treat cholera in children. In the latest study, a team from the National Institute of Cholera and Enteric Diseases in Calcutta analysed samples taken from 23 adults stricken with cholera during an outbreak in West Bengal in 1997. Bacteria isolated from the samples were all resistant to five commonly used antibiotics.

Resistance to one of the antibiotics, furazolidone, is particularly worrying, the researchers said. The antibiotic is the first choice drug for children who typically cannot tolerate more powerful antibiotics, such as tetracycline, because of side effects.

Diarrhoea due to cholera infection comes on suddenly but can take as long as five days to develop. Victims suffer from abdominal cramps, nausea, vomiting, dehydration, and, in severe cases, shock. The bacteria thrive in estuaries, lakes, rivers and coastal areas and are associated with blooms of zooplankton, especially copepods, which resemble tiny shrimp. The disease has been a particular concern for health authorities in India following recent widespread flooding in some districts.

Doctors have been warning for years that bacteria are becoming resistant to even the most potent antibiotics. Bacteria become resistant when microbes with a slight tendency to resist an antibiotic survive and pass on their genes; fully resistant bacteria eventually evolve. If a patient fails to take a full course of drugs to eliminate a particular infectious agent, resistance develops even more quickly.

Earlier this year, a team of scientists announced that they had sequenced the entire genome of *Vibrio cholerae*. In the long term, scientists hope to use the sequence information to identify and remove genes associated with the disease which should facilitate the development of a safe and effective vaccine. ■

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## Use of the Internet as a public health intervention tool for an outbreak of syphilis

A recent study of a syphilis outbreak amongst homosexual men in San Francisco showed a significant association between the use