Vaccine refrigeration soon superfluous?

Scientists at Oxford University and Nova Bio-Pharma Technologies have developed a simple and cheap way of making vaccines stable – even at tropical temperatures – reported Oxford University in February 2010. The technology has the potential to revolutionise vaccination efforts, particularly in the developing world where infectious diseases kill millions of people every year, by removing the need for fridges, freezers and associated health infrastructure. The work, funded by the Grand Challenges in Global Health partnership with other funds from the Wellcome Trust, is published in the journal *Science Translational Medicine*.

Oxford University carried out the proof-of-concept study, showing that vaccines they are developing could be stabilised for months using Nova's patented technology – the Hypodermic Rehydration Injection System (HydRIS). The team demonstrated it was possible to store two different virus-based vaccines on sugar-stabilised membranes for 4–6 months at 45 °C without any degradation. The vaccines could be kept for a year and more at 37 °C with only tiny losses in the amount of viral vaccine re-obtained from the membrane.

The method involves mixing the vaccine with the sugars trehalose and sucrose. The mixture is then left to slowly dry out on a simple filter or membrane. As it dries and the water evaporates the vaccine mixture turns into a syrup and then fully solidifies on the membrane. The thin sugary film that forms on the membrane preserves the active part of the vaccine in a kind of suspended animation, protected from degradation even at high temperature. Flushing the membrane with water rehydrates the vaccine from the membrane in an instant.

Isis Innovation, Oxford University's technology transfer company, is working with the inventors to put a commercial strategy in place for the development of the technology.

(Oxford University/ib)

Cloud seeding – make your own rain

"More cloud seeding for China", "China wants to modify the weather and seed clouds" – headlines like these appeared in international magazines in March 2010. However, as a glance at the map reveals, cloud seeding is by no means solely a Chinese affair. The list of countries using this technology is headed by the USA, followed by industrialised countries such as Germany, France and Spain. Now developing countries and emerging economies – such as China – have discovered this technology for themselves. India, South Africa and Zimbabwe also try to use cloud seeding to modify their weather conditions. This kind of work is usually paid for by the governments.

How do you seed clouds?

Clouds precipitate out when the small water droplets or ice crystals of which they are composed have reached a certain size and fall to the ground due to gravity. A cloud that is composed of droplets and has air temperatures near or warmer than the freezing point is called a *warm cloud*, whereas one that is composed of ice crystals is termed a *cold cloud*. In order to achieve that droplets or ice crystals in a cloud grow in size and precipitate out, aerosols are dispersed in the cloud with the aid of airplanes, ground generators or pyrotechnic flares.

Cold clouds are seeded with silver iodide or dry ice; warm clouds are seeded with aerosols such as calcium oxide or potassium oxide salt solutions.

Photo: laif

A Chinese meteorological department worker prepares to fire artillery shells for cloud seeding and rainmaking to ease the drought and heat in Yongchuan county, Chongqing, China.

Water vapour in the warm clouds can attach to the particles that are injected into the clouds, leading to the formation of small drops, which may grow into larger drops which eventually precipitate out.

Silver iodide nuclei introduced into cold clouds increase the probability that large numbers of small ice particles are produced. These ice particles grow at the expense of the vapour from surrounding super-cooled water droplets. If the clouds are vigorous enough to potentially produce hail, then many silver iodide nuclei are introduced into the cold clouds to help prevent the formation of large hailstones. Hail damage can thus be prevented. Dry ice is used to induce snowfall from cold clouds, but is also used to increase rainfall and suppress hail depending on the requirements of the programme sponsor. Dry ice, when introduced into the cloud, creates ice crystals as does silver iodide, but the pathway toward ice crystal formation is slightly different. To people on the ground no harm is done, as the end result is the same.

Cloud seeding for farming?

It is questionable how far cloud seeding for farming can be a sustainable solution. According to Tom DeFelice, PhD of the Weather Modification Association – WMA – in California/USA, no environmentally harmful effects arising from silver iodide, nor salts washed into the soil with the raindrops have been observed. However, he sees a need to continue the scientific assessment of the impacts such practices might have on the environment.

In most regions of the developing world, cloud seeding may fail simply due to a lack of infrastructure. A lack of technical resources means that for most of the developing countries it is currently not an option. However, in industrialised countries and emerging economies the technology has been used for years. *(ib)*

In brief

PPP to improve maize harvests

Public and private agriculture organisations announced in February 2010 an alliance called Improved Maize for African Soils (IMAS). IMAS will improve food security and livelihoods in sub-Saharan Africa by creating and sharing new maize varieties that use fertiliser more efficiently and help smallholder farmers get higher yields, even where soils are poor and little commercial fertiliser is used.

The collaboration will be led by the International Maize and Wheat Improvement Center (CIMMYT) and funded with 19.5 million US dollars in grants from the Bill & Melinda Gates Foundation and USAID. The project's other partners – the DuPont Business, Pioneer Hi-Bred, the Kenya Agricultural Research Institute (KARI), and the South African Agricultural Research Council (ARC) – are also providing in-kind contributions including staff, infrastructure, seed, traits, technology, training and know-how. *(Cimmyt/ib)*

CIP-China Center launched

In February 2010 China and the International Potato Center (known by its Spanish acronym, CIP) launched a new Center to boost potato and sweetpotato capacity across China, Asia, and the Pacific. The new Center is called CIP-China Center for Asia and the Pacific (CCCAP). Located in Beijing, the Center will host an international array of scientists and scholars dedicated to potato and sweetpotato research. Their focus will be on advancing ways these crops can more fully contribute to food security and income generation in China and the greater Asia-Pacific region. *(CIP/ib)*

Imprint

Rural 21 –
The International Journal for Rural Development

Published by:
DLG-Verlags-GmbH
Frankfurt, Germany

Advisory council:
Dr Albert Engel, GTZ; Dr Reinhard Grandke, DLG; Dr Christoph Kohlmeyer; Karl-Martin Lüth, DLG; Mathias Mogge, Welthungerhilfe; Dr Hansjörg Neun, CTA; Dr Stefan Schmitz, BMZ; Dr Beate Wilhelm, InWEnt

Editor in chief:
Silvia Richter
s.richter@dlg.org
Phone: +49-30-39848857

Editorial staff:
Angelika Wilcke, a.wilcke@dlg.org
Ines Buck, i.buck@dlg.org

Editorial office:
DLG-Verlags-GmbH
Eschborner Landstraße 122
60489 Frankfurt, Germany

Translated by:
Christopher Hay
Tazir International Services

Distribution, advertising:
DLG-Verlags-GmbH
Dr. Michaela Roland
Eschborner Landstraße 122
60489 Frankfurt, Germany
m.roland@dlg.org

Layout:
Petra Obermeier

Printed by:
GREISERDRUCK GmbH & Co. KG
Karlsruher Straße 22
76437 Rastatt, Germany

Rural 21 is published six times per year. The subscription rate is 49.– Euro (Germany), 51.– Euro (international) and 8.30 Euro per issue, plus postage.