INTERNATIONAL

Sowing application for farmers

International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) in partnership with Microsoft has developed a new sowing application for farmers combined with a personalised village advisory dashboard for Andhra Pradesh. These applications are expected to help farmers cope up with the climatic changes and bring radical improvements for small-holder farmers in the state. The sowing application is to help farmers achieve optimal harvests by advising on the best time to sow crops depending on the weather conditions, soil and other indicators. This has been made possible through a partnership among the ICRISAT, Microsoft and the Andhra Pradesh government.

'Bringing a lot of scattered data together and developing an analytical tool that is comprehensive and gives accurate predictions to the farmers, is urgently needed. We are excited to work with Microsoft to enhance incomes and improve the lives of small-holder farmers, and this is going to boost our digital agriculture initiative in a big way,' said David Bergvinson, Director General of ICRISAT.

ICRISAT has adopted Microsoft Cortana Intelligence Suite including Machine Learning and Power BI or Business Intelligence, to empower farmers and government officials with technology and promote digital farming practices in the state.

'The Sowing App and Personalized Village Advisory Dashboard are developed to provide powerful cloud-based predictive analytics to empower farmers with crucial information and insights to help reduce crop failures and increase yield, in turn, reducing stress and generating better income,' said Anil Bhansali, Managing Director of Microsoft India (R&D) Pvt. Ltd.

The sowing application utilises powerful artificial intelligence to interface with weather forecasting models provided by the US-based aWhere Inc. and extensive data including rainfall over the last 45 years as well as 10 years of groundnut sowing progress data for Kurnool district. These data are then downscaled to build predictability and guide farmers to pick the ideal sowing week. When combined with other data collected from the Rythu Kosam project, it can create rich datasets that can be processed to build predictive models for the farmers, said ICRISAT in a statement.

Similarly, the personalised village advisory dashboard provides an instant overview across several environmental factors that determine a healthy crop yield. In the pilot that has been recently launched, information will be sent to farmers about the sowing date via SMS in Telugu. Data collected manually from the farms in 13 districts of the state by ICRISAT field officers for Rythu Kosam have been uploaded to Microsoft's Azure Cloud. Using powerful Business Intelligence (BI) tools, this dashboard provides important insights around soil health, fertiliser recommendations and 7-days weather forecast derived from the world's best available weather observations systems and global forecast models.

These data are then downscaled for the highest possible accuracy at the village level, to transform how small-holder farmers tackle climatic change to drive effective decision-making.

http://www.financialexpress.com

Graphene filter to solve water crisis

A new type of graphene-based filter could be the key to manage the global water crisis, a study has revealed. The new graphene filter, which has been developed by Monash University, Australia and the University of Kentucky, the United States, allows water and other liquids to be filtered nine times faster than the current leading commercial filter. According to the World Economic Forum's Global Risks Report, lack of access to safe, clean water is the biggest risk to society over the coming decade. Yet, some of these risks could be mitigated by the development of this filter, which is so strong and stable that it can be used for extended periods in the harshest corrosive environments, and with less maintenance than other filters on the market.

The research team was led by the Associate Professor, Mainak Majumder, from Monash University. Majumder said that the key to making their filter was developing a viscous form of graphene oxide that could be spread very thinly with a blade. In addition, he said that 'This technique creates a uniform arrangement in the graphene, and that evenness gives our filter special properties'.

This technique allows the filters to be produced much faster and in larger sizes, which is critical for developing commercial applications. The graphene-based filter could be used to filter chemicals, viruses or bacteria from a range of liquids. It could be used to purify water, dairy products or wine or in the production of pharmaceuticals. This is the first time that a graphene filter has been able to be produced on an industrial scale – a problem that has plagued the scientific community for years.

Research Team Member and PhD Candidate, Abozar Akbari, said that the scientists had known for years that graphene filters had impressive qualities, but in the past they had been difficult and expensive to produce.

The team's new filter can filter out anything bigger than 1 nm, which is about 100,000 times smaller than the width of a human hair. The research has gathered interest from a number of companies in the United States and the Asia Pacific, the largest and fastest-growing markets for nano-filtration technologies.

http://phys.org

ASIA-PACIFIC

INDIA

Environmentally friendly technology brings electricity to rural households

A new disruptive technology is being spearheaded by the Indian Institute of Technology (IIT) Madras which promises to brighten the lives of 300 million

Indians who have no access to assured electric supply even today. The revolutionary new approach to supply electricity is being perfected amid the sand dunes of Jodhpur district.

Professor Bhaskar Ramamurthi (Director of IIT, Madras) calls it potentially a game changer technology. 'It is not a new invention but the world had abandoned using DC power to electrify homes', he said. Today in India, the out-of-the-box thinkers from IIT Madras are reviving DC power as a potential solution to India's electricity woes. The novel Indian technology also helps to cut down greenhouse emissions and is very environment-friendly and hence under Energy Minister, Piyush Goyal's leadership the Ministry of Power is pushing hard to field test the technological fix being offered by IIT, Madras.

The system is fairly straightforward but with a key twist in the tail. Houses that have no electric supply are provided with a simple one square meter solar panel. The electricity generated by the panel is stored in four regular lead-acid batteries and the electrical appliances instead of running on AC power run on DC power. In most solar power solutions or in battery backed-up systems, 'inverters' have to be deployed that convert DC power to AC power so that regular electrical appliances can be run.

In Phalodi, this off-grid power solution is totally run on DC power. This makes the whole system from 25% to 30% more efficient and brings down power consumption by almost 50%. It costs about Rs. 25,000 to install the entire 'inverter-less system', said an ex-IIT Madras Engineer and Project Manager for the Phalodi project, Surbhi Maheshwari, who asserts that 'even during the peak of the heat wave' the IIT Madras system did not break down and helped the locals get much-needed relief. Each beneficiary house in Phalodi gets one ceiling fan, one LED tube light, an LED bulb and cell phone charging point all run on DC power.

Maheshwari said that 'as of now, 1800 homes have been successfully connected and another 2200 will be done in the next few months'.

IIT Madras has mastered this technology in the last few years but the real proof that it works came home during the devastating floods that hit Chennai in 2015.

Professor Ashok Jhunjhunwala, from the Electrical Engineering Department, had installed a small 125-W solar system at his home. He recalls that for almost 3 days the entire campus of IIT in Chennai went without electricity in the aftermath of the heavy rains, the only home that had uninterrupted power was his own where he had installed the 'decentralized DC solar system'.

http://www.dnaindia.com

Technology for making jackfruit powder

In an effort to explore the full potential of jackfruit, which still remains underexploited as a food crop in the country, the Krishi Vigyan Kendra (KVK) attached to the Indian Council of Agricultural Research has developed a unique technology, enabling the common man to produce whole jackfruit powder. Robert, Senior Scientist and Head of the KVK Centre run by the Christian Agency for Rural Development (CARD) at Thelliyoor near Thiruvalla, told *The Hindu* that popularisation of the new technology, which itself was a simple and smart process, would ensure no wastage of jackfruit in Kerala.

"We have developed a smart way of tapping the potential of jackfruit which could make every Kerala household a hub for processing jackfruit. Our attempt is to ensure that no jackfruit is wasted in the State so that an estimated loss of this indigenous fruit to the tune of Rs.15,000 crore could be added to the State's coffers, besides enriching the health of every rural household," Robert said.

The whole jackfruit powder could be used as a raw material for developing health drinks and food products for patients, children and elderly people. The process of making jackfruit powder involved dehydration of the raw jack, after removing its rind portion, and no artificial food additives or preservatives were used in the process, said Rincy Abraham, Subject Matter Specialist, KVK.

http://www.thehindu.com

Hybrid solar lighting device

Technologists at Kolkata-based NB Institute for Rural Technology (NBIRT) have developed, what is billed world's first hybrid solar lighting device. The device uses a combination of passive and active energy to light up homes without electricity. Union Science and Technology Minister, Harsh Vardhan, who unveiled the system, said that the low cost, micro solar dome named '*Surya Jyoti*' would be a boon to millions of Indians, who do not have reliable access to electricity. The device has been developed under the aegis of Department of Science and Technology.

The micro solar dome captures sunlight through a transparent semi-spherical upper dome and concentrates it inside a dark room. The light passes through a sun-tube with a layer of high-reflective coating on the inner wall of the passage. It also contains a lower dome, with a shutter at the bottom, that can be closed if light is not required during day time. It is leak proof and works for almost 18 hours a day – throughout the day and 6 hours after sunset. The device has undergone extensive testing at TERI University, IIT Mumbai, Indian Institute of Engineering Science and Technology, Kolkata and field trials were conducted in slums of Delhi, Mumbai, Kolkata and Bengaluru. TERI has confirmed that the illumination level of the light goes as high as a 15-W LED bulb.

The minister said that the photovoltaic micro solar dome costs about Rs. 1200, whereas the non-photovoltaic version is around Rs. 500. He also said that the cost is expected to get further reduced once the manufacturing is scaled up to commercial scale. Professor Gon Chaudhuri, Director of NBIRT, said that it took 18 months of research to make the device, which is now ready for transfer of technology to any manufacturer.

'Conventional solar devices do not capture passive energy. It works only through storage battery. But here, it is a combination. It is hybrid. That is during day light, you are not using the battery or the solar panels. Sunlight is used in a guided mode. This is the difference between *Surya Jyoti* and conventional solar lights. When you work with photovoltaic (PV), it is called active, whereas when it works with direct sunshine, it is called passive. So, this combination gives you 18 hours of light – active 6 hours and passive 12 hours', explained Professor Gon Chaudhuri. He also said that the device can be operated through conventional switch or using a remote control. He said that it is maintenance-free and has a life of 15 years, whereas the life of photovoltaic panel is of 25 years.

http://www.indiansciencejournal.in

Green technology for water purification

Indian scientists have developed an eco-friendly nanotechnology for water-softening applications that could be used in civic water treatment plants for generating potable water, said the official of a technical institute. The team, from Institute of Advance Study in Science & Technology (IASST) in Assam's Guwahati, crafted a biopolymer using a naturally occurring substance, called chitosan (obtained from the hard outer skeleton of shellfish, including crab, lobster and shrimp) as a backbone for the carbon nanoparticles to sit on.

'In the biopolymer, nanoparticles are the functional parts of the technology. They remove calcium and magnesium components of water through ion exchange, the same process that is used by common water purifiers', Devasish Chowdhury, Associate Professor, Physical Sciences Division, IASST, told IANS. 'This material, we report, is the first of its kind with potential to act as a biodegradable and green material for water-softening applications,' he said.

Published online on 30 March in the Journal Nanoscale, the work involved IASST's Upama Baruah and Achyut Konwar. Although convention water-softening techniques use synthetic resins, Chowdhury said that the novel technology is biodegradable as well. 'We have applied it to pond-water sample successfully. This could be used in civic water treatment plants since they do not have very effective water-softening methods and the resulting treated water is very crude,' he added.

http://timesofindia.indiatimes.com

Arsenic filter for safe drinking water

The Indian Institute of Technology Kharagpur has developed an ultra-low cost eco-friendly laterite-based arsenic filter for providing safe drinking water. The innovation has won Sirshendu De, the Head of Chemical Engineering Department, the Innovation Award 2016 from the Indian Desalination Association (South Zone).

'In India and Bangladesh, it is generally agreed that arsenic contamination of groundwater is of geological origin and derives from the geological strata. More than 200 million people are affected worldwide by arsenic menace and over 100 million people in India and Bangladesh are exposed to arsenic contamination risk. The need of the hour is an ultra-low cost, easy-to-handle solution for rural households', said De.

The indigenous material developed by De is capable of adsorbing arsenic to the extent of 32 mg/g. 'It is made from naturally occurring red laterite soil. This material has undergone chemical treatment to enhance its capabilities to adsorb arsenic. Moreover, an optimised design of a filter, with the material, has been formulated as well that enjoys a plethora of advantages,' De added.

'The ultra-low cost of the filter is more appropriate for the socio-economic conditions of our country, especially when the filter has no power requirement. The arsenic concentration of filtrate is always within the WHO drinking water permissible limit, independent of the ground water concentration. In addition, the filter comparatively has extremely long life of about 5 years with no regeneration of the adsorbent (filter medium) required during its lifetime. The filter has facilities such as removal of arsenic (below 10 ppb), iron (below 0.3 ppm) and bacteriological contamination (>98%) together in a single unit. On exhaustion of the filter, the medium can be safely dumped without any risk of leaking and further contamination', he explained.

http://timesofindia.indiatimes.com

INDONESIA

Safer drinking water with simple technologies

Nazava Water Filters, the winner of the 2016 Ashden Award for Sustainable Energy and Water, are helping to tackle the problem of access to safe drinking water in Indonesia, where women struggle to get safe drinking water for their families, and where around 15,000 children under the age of five die from diarrhoea and other water-borne diseases every year.

The company has developed a low-cost water filter made using two locally available transparent plastic containers stacked one on top of another with a ceramic filter candle in between. The filter candle blocks pathogens and solid particles from passing through and reduces chemical contamination, thereby improving both the taste and odour of the water. Safe drinking water is dispensed through a tap in the lower container, making the filter a functional and aspirational household item for rural households, available in different shapes, sizes and colours.

The most popular filter costs $20, which can be paid either in cash or in instalments, which means this household-level approach provides a cheaper and more reliable alternative to boiling or buying treated water, especially in isolated areas or on small islands. Eliminating the use of fuel to boil water cuts greenhouse gas emissions, saving ~10,000 tonnes/year CO_2. Till date, over 50,000 filters have been sold through an effective network of >120 women resellers, including community health workers and midwives working with the Ministry of Health, benefitting 200,000 people with affordable access to safe drinking water.

Runner up in the 2016 Ashden Award for Sustainable Energy and Water, 1001 Fontaines is a French NGO that sets up water

treatment kiosks in rural villages across Cambodia, where household income is <$2 a day. Using a community-scale, decentralised approach appropriate for supplying safe drinking water to rural and peri-urban areas, the kiosks – that cost around $25,000 to set up – filter and treat surface or ground water (from rivers, lakes, ponds or tube wells) using solar-powered Ultraviolet sterilisation techniques. At the same time, this creates jobs and supports income generation for local entrepreneurs who are trained to run these kiosks as social enterprises that produce, distribute and deliver large 20 l bottles of safe drinking water to homes and primary schools. Till date, some 140 kiosks have been set up, providing 70 million litres of water per year to over 250,000 people in homes and close to 100,000 children in schools.

http://www.theecologist.org

JAPAN

Low-cost drinking water technology

The Japan International Cooperation Agency (JICA) is supporting the pilot testing of a water purifying technology in the Philippines in a move to share Japanese know-how and expertise in addressing developmental challenges including water supply in areas deprived of safe, affordable water. The technology called 'Aqua Cube' was pilot-tested recently in two far-flung and low-income barangays in Sagay City, Negros Occidental.

Aqua Cube, developed by Japanese company Murakami Manufacturing Co. Ltd, features a compact, all-in-one package (treatment, generator, water tank and simple operation and maintenance). The purification capacity of the equipment is 2,000 l/h. It was introduced in the Philippines and other countries by Japanese marketing company INADA, Inc. When implemented, the Aqua Cube technology could process raw water from irrigation channels, rivers and creeks. It has auto-cleaning function and can produce clean drinking water for 600 people in an hour. The initiative is part of JICA's Verification Survey with the Private Sector for Disseminating Japanese Technologies, a component of Japan's Official Development Assistance (ODA) where Japanese companies work with the government agencies to share technologies that can help to address the needs of developing countries.

JICA said that they welcome the support of the Sagay City's LGU to the technology and lauded the LGU's effort in prioritising safe drinking water supply to sustain development. JICA has added that aside from providing safe and affordable water supply, the project also aims to address the vulnerability of drinking water sources during disasters like Typhoon Yolanda and the recent El Nino phenomenon. In Japan, the technology was developed to ensure stable, safe water supply during emergencies.

The local government of Sagay City said that the technology could help to ensure the health of the people of Sagay since it could purify the water from deep wells commonly contaminated with bacteria. The water supply system in Negros Occidental Province only covers 53% of the population (2012 data) and many of the poor areas without water system rely on boiled rain water or boiled water from wells for household use. The local residents also shared that the improved water quality helped extend the shelf-life of buko pie products (a specialty Filipino baked coconut pie), a livelihood source in the barangays. The food product's shelf-life was extended from few days to a week, thereby helping to increase the sales by 50%.

http://www.jica.go.jp

PHILIPPINES

Water-saving technology for irrigation system

The head of the Philippines' food security and agricultural modernisation agency is considering using a water-saving technology developed at the International Rice Research Institute (IRRI) for the country's national irrigation. Edel Guiza, Secretary of the Presidential Assistant for Food Security and Agricultural Modernization, visited IRRI on 19 May to study the measures that will help the government assist rice farmers affected by the El Niño-induced drought in the southern Philippines.

Guiza, along with officials of the National Irrigation Administration and the National Food Authority, were briefed on the water-saving technology called alternate wetting and drying (AWD) by Bruce Tolentino, IRRI Deputy Director General for Communication and Partnerships; and James Quilty and Jun Correa, Head and Field Operations Manager, respectively, of the Zeigler Experiment Station. AWD helps farmers to reduce the amount of water they use by eliminating the traditional method of keeping their rice fields continuously flooded. Instead, the water level is allowed to drop to 10–15 cm below the soil surface before reflooding the field. A perforated water tube, which could be made from PVC pipes or bamboo, is used by the farmers to monitor the water level below the soil.

AWD is regarded as one of the most important rice cultivation methods that can dramatically save freshwater irrigation in the upcoming decades. It not only conserves water but also mitigates greenhouse gas emissions while maintaining rice yields. But in some countries, its adoption by farmers remains limited. 'From our experience, the key to getting the AWD system adopted is that it has to be done on a large scale and there has to be incentives for irrigation', explained Quilty. 'Most irrigation systems in the Philippines currently charge farmers a flat rate, regardless of the actual amount of water they use. But, if the farmers are saving water then the cost should be reduced'.

http://news.irri.org

New farm technology for rice

Two locally developed technologies will dramatically lower processing time for drying and milling rice. The Philippine Center for Postharvest Development and Mechanization (PhilMech) has developed a fluidised bed drying system and the brown rice huller that are seen to benefit the local farming community. PhilMech is an attached agency of the Department of Agriculture (DA).

Rex Bingabing, Executive Director of PhilMech, said that the fluidised bed drying system was built to accommodate large volumes of high-moisture paddy rice for drying during the rainy months when drying under the sun is not possible. The technology allows hot air or gas flow to pass through wet paddy rice for a short duration which results to fluidisation on the drying bed, eliminating grain clumping and results to uniform efficient drying. PhilMech field tests show the optimal drying time for palay with 24% moisture content to 14% final moisture content using the fluidised bed dryer can be attained in about 3 hours, compared to the 8–12 h required in conventional mechanical drying.

Powered by a biomass furnace that uses rice hull as energy source, the fluidised bed dryer that has a capacity to dry 500 kg/h of wet paddy rice at a cost of P0.63/kg. The fully automated dryer requires low energy, and made of locally available materials. The brown rice huller, on the other hand, was developed to address the milling needs of farmers and retailers as a response to growing demand from consumers. The power requirement of the 95-kg huller is 373 W from a single-phase electric motor, much lower than the conventional rubber-roll huller so the cost of milling is reduced.

http://www.philstar.com

REPUBLIC OF KOREA

Smart farm systems service

KT has launched its smart farm service that provides enhanced greenhouse control systems at reduced installation costs, the nation's second-largest telecom company said. KT, which has pushed to diversify its service portfolio under its GiGA wired and wireless networks brand, said that it will develop and offer more system services for farms based on big data analysis technologies.

'We have focussed on inconveniences at farms with services that actually benefit them', said Song Jae-ho, Senior Vice President of KT Future Convergence Office, during a media forum in central Seoul, on Thursday. 'We will take a leading role in supporting farms to boost profitability by providing big data services that offer optimal information on cultivation'. The company said that the KT GiGA Smart Farm system service collects environmental data such as temperature, humidity, solar irradiance, concentration rate of CO_2 and quality of soil at cultivation facilities using sensors embedded in Internet of Things (IoT) devices. The system will analyse the collected data and run control systems accordingly, establishing the optimal environment for crops, KT said.

'We have applied our smart farm technologies developed at the KT Institute of Convergence Technology to lighten the burden of early investment', the telecom company said. 'In this way, we have reduced the expenses of introducing smart farm systems by up to 40%'. KT said that its integrated smart farm control centre monitors connected cultivation facilities around the clock. It has also strengthened security functions and adopted machine-learning technology to enable customised control of each greenhouse. Under cooperation with the agriculture ministry, KT will open 10 smart farm field training and support centres nationwide to aid farm owners in learning how to use complicated information and communication technology services.

http://www.koreatimes.co.kr

EUROPE

Solar-powered device provides drinking water, internet and electricity

An Italian-Spanish start-up called Watly has invented a solar-powered computer by the same name that can provide safe drinking water, electricity and internet access in remote areas. The system is currently being tested in Ghana and is expected to help in the development of rural areas in Sub-Saharan Africa.

The device has photovoltaic panels on its surface through which it takes solar energy and changes it into electricity via an enclosed 140 kWh battery, which then charges a patented water treatment system – where the water is boiled and distilled – that can deliver up to 5,000 l of purified water a day. It also powers a connectivity hub that offers internet connection within an 800-m area and a charging station for electronic and mobile devices. The final design of the machine will be showcased to prospective customers and investors in July this year. The project has received £1.4m ($2m) from the European Union's Horizon 2020 research funding programme.

'The project could have a huge social and economic impact especially in Africa. It aims to bring clean energy and clean water to people in countries that are in desperate need of both vital resources', explained Attisani. The company is planning to open branches in Nigeria and Sudan after its success in Ghana and expects to place 10,000 units across Africa offering around 50,000 jobs to locals.

http://www.ibtimes.co.uk

SWEDEN

Solar cells help purify water

Researchers at Lund University in Sweden have developed a water purification plant that provides clean water far beyond the reach of the electrical grid – thanks to solar cells. With the help of Nobel Peace Prize recipient, Muhammad Yunus, these small and portable solar cell stations have now been placed across rural Bangladesh.

'750 million people lack access to clean water across the globe. Providing safe drinking water is one of the biggest challenges and one of the most important goals for humanity', said Inventor Kenneth Persson, Professor of Water Resources Engineering at Lund University. The environmental company Watersprint, founded in 2013 by Kenneth Persson and Ola Hansson, Engineer, has patented the technology that helps to purify water by combining UV–LED technology with intelligent software and Wi-Fi. Its system of 12 V is so effective that it can be run by a single solar panel. The solar cells also charge its battery, which means that the portable facility can be used around the clock and in rural areas without access to electricity.

Nobel Prize winner, Muhammad Yunus and his organization Yunus Centre have

ordered portable units as part of a pilot project. In October, the first unit was installed and by now, another nine units have been delivered to the project in Bangladesh.

The portable purification units, so-called Micro Production Centres (MPC), are managed by local suppliers and help to create jobs for young, unemployed people who run the small facilities and sell clean water in exchange for a small fee. A large part of the population in Bangladesh currently use water contaminated by arsenic. 'Thanks to these portable units, communities can now purchase inexpensive, clean water and at the same time – in accordance with Muhammad Yunus's model – a lot of them can make a small profit by running the plants themselves', said Kenneth Persson.

Watersprint recently signed a contract with the United Nations about placing 500 portable units in Bangladesh. The units can be connected to Wi-Fi and they include software that monitors the machine. In case of malfunction, the unit will send out alerts via text message to any mobile phone that is connected to it, as well as through the LED lights on the machine.

https://www.sciencedaily.com

UK

New agricultural device using space technology

Space technology is to be put to work on Earth – in a device for testing soil quality, in research involving the University of Strathclyde. The agricultural monitoring system, consisting of a mobile rover platform with a robotic arm which carries a soil sensing instrument, will be based on technology previously developed for use in exploration on Mars.

The Strathclyde researchers, working with partners in the UK and China, will demonstrate in trials the feasibility of the device's agricultural operation by using an integrated, force feedback-controlled robotic system on the ground during the project. The project for the device, known as the AgriRover, is funded through the UK Space Agency's International Partnerships Space Programme (IPSP). Professor Xiu Yan, of Strathclyde's Space Mechatronic Systems Technology Laboratory (SMeSTech), in the Department of Design, Manufacture and Engineering Management, is the Principal Investigator in the research. He said that 'Advanced machinery has been used in agriculture worldwide for centuries but a range of factors are making innovation in this area more important than ever, including environmental considerations, demographic changes, urbanisation, sustainable farming, increasing competition and the need to provide food for a rapidly growing global population.

'Robotic technology will be a key technological enabler for precision farming and this project is a combination of frontier research programmes in space robotic technologies'. It focusses on a unique soil sensing technology, developed and built with UK capability; it is also based on space instrumentation and the deployment of a UK-developed, intuitive master robotic control system. 'By harnessing space technology for a new application in farming, and engaging in a valuable research collaboration with China, this project will deliver many benefits around the world'.

http://phys.org

Nanotechnology-based waterless toilet

A toilet that does not need water, a sewage system or external power but instead uses nanotechnology to treat human waste, produce clean water and keep smells at bay is being developed by a British University. The innovative toilet uses a rotating mechanism to move waste into a holding chamber containing nano elements. The mechanism also blocks odours and keeps waste out of sight.

'Once the waste is in the holding chamber we use membranes that take water out as vapour, which can then be condensed and available for people to use in their homes', said Alison Parker, Lead Researcher on the project. 'The pathogens remain in the waste at the bottom of the holding chamber, so the water is basically pure and clean'.

Cranfield University is developing the toilet as part of the global 'Reinvent the Toilet Challenge' launched by the Bill and Melinda Gates Foundation. Parker said that despite 'significant' interest from developed countries, the toilet is being designed with those in mind who have no access to adequate toilets. Cranfield University said that its toilet is designed for a household of up to 10 people and will cost just $0.05 per day per user. A replaceable bag containing solid waste coated with a biodegradable nano-polymer which blocks odour will be collected periodically by a local operator, said Cranfield University. Initial field testing of the toilet is likely to take place later this year, Parker said.

http://www.abc.net.au

NORTH AMERICA

USA

Nanotechnology makes cheap, improved, water filters

Researchers have developed nano-scaled membranes that could potentially filter contaminants out of water faster and cheaper than the current methods. Baoxia Mi, an Assistant Professor of Environmental Engineering at the University of California, Berkeley, is developing a water filter comprised of membranes made up of layers of graphene 100,000 times thinner than a strand of human hair.

'We made it from graphite, which is a material that we use in pencils for example, so it is cheap and relatively abundant. So, we can use that and the process that we use to make from the graphite to the graphene oxide is actually quite scalable', said Mi. By scalable, Mi means that these membranes could potentially be adapted to filter water from a household faucet, as well as large systems used to treat waste water on an industrial scale.

The membranes are much like a maze for water molecules. The water enters the maze and passes through a series of layers separated by spaces specifically designed to remove different types of contaminants. 'In order to remove different targeted molecules, the most direct way of thinking about it is to control the spacing that we have between the layers', added Mi.

http://www.reuters.com