

Iraq uses nuclear technology to improve crop productivity and adapt to climate change



(Photo: IAEA)

A new drought-tolerant wheat variety developed with the support of the IAEA and the Food and Agriculture Organization of the United Nations (FAO) has increased yields fourfold in Iraq. This mutant variety now accounts for close to two thirds of all the wheat produced in the country.

Iraq is increasingly making use of nuclear technology to improve its crop yields and cope with the consequences of a changing climate. Researchers in the country have developed new drought-tolerant plant varieties and improved water and soil management.

These developments have helped enhance food production and adapt to climate change, said Ibrahim Bakri Abdulrazzaq, Director General of Baghdad's Agricultural Research Service, which is subordinate to Iraq's Ministry of Science and Technology. "We have developed efficient packages of technology that aim to overcome the most pressing problems in the area of agriculture."

Iraq's rangelands, where shepherds herd their sheep and cattle, have seen warmer temperatures and less rainfall since the early 2000s. Without a vegetative cover, they have become

less fertile and more susceptible to erosion, affecting the country's rain-fed agriculture and the wheat-producing provinces, Abdulrazzaq explained.

From 2007 to 2011, Abdulrazzaq and his colleagues worked alongside experts from the IAEA and FAO to find solutions to these challenges through induced mutation breeding. This technique involves exposing plant seeds and cuttings to radiation to generate genetic variability and then selecting the improved agronomic traits of interest.

Iraqi scientists used the technique to develop four improved varieties of traditional crops that tolerate both drought and salty soil — conditions typical of dry areas that hinder plant growth. The varieties are also resistant to lodging — when stems or roots are displaced from their vertical and proper placement — and seed shattering, both major causes of yield loss in crops.

"All the results have gone directly to the farmers. Now, the farmers tell us they want the new plants," Abdulrazzaq said. "They are even ready to pay more because they know

the wheat and the barley are salt-tolerant, drought-tolerant and have high productivity."

Whereas the conventional variety of Iraqi wheat only produces one tonne per hectare, the new variety developed through mutation breeding boasts a productivity of four tonnes per hectare. Almost 65% of the wheat produced in Iraq today comes from these new varieties.

These new varieties are also more resistant to dust storms — another problem farmers increasingly face. "Some years ago, we had 17 dust storms per year," Abdulrazzaq said. "Now, partly because of the unprotected rangelands, we have more than a hundred dust storms. And this affects the fertility of the soil, water resources and human beings."

More than food

Iraq has also collaborated with the IAEA in applying nuclear technology in other fields, such as nuclear medicine, radiotherapy and industry, including the construction of oil pipes using non-destructive testing methods. Equally important are the decommissioning and environmental remediation of Iraq's nuclear complex destroyed in 2003.

Since 2006, the IAEA has been working with Iraqi officials to reduce the radiological risk to the public and the environment by decommissioning old installations and remediating decontaminated areas and disposal sites.

"The project is a big undertaking," said Eric Howell, Managing Director of the environmental risk assessment company Facilia Projects participating in the project. "It touches on all the relevant fields you could think of: from regulatory support, radiation safety to radioactive waste management. The IAEA has played an integral role in

coordinating the decommissioning work in the country.”

Iraqi and IAEA experts discussed these and other areas of technical cooperation during a meeting held in Vienna in August 2016 to chart a new plan of enhanced collaboration, said

Abdulghani Shakhashiro, Programme Management Officer at the IAEA.

Meanwhile, scientists and researchers like Abdulrazzaq are working to help Iraq move a step closer to the United Nations Sustainable Development Goals. “ Sometimes,

Iraq gets forgotten. But with more involved stakeholders and an improved security situation, the story can always change,” Howell said.

— *By Laura Gil*

New mobile App to help doctors evaluate cancer in women

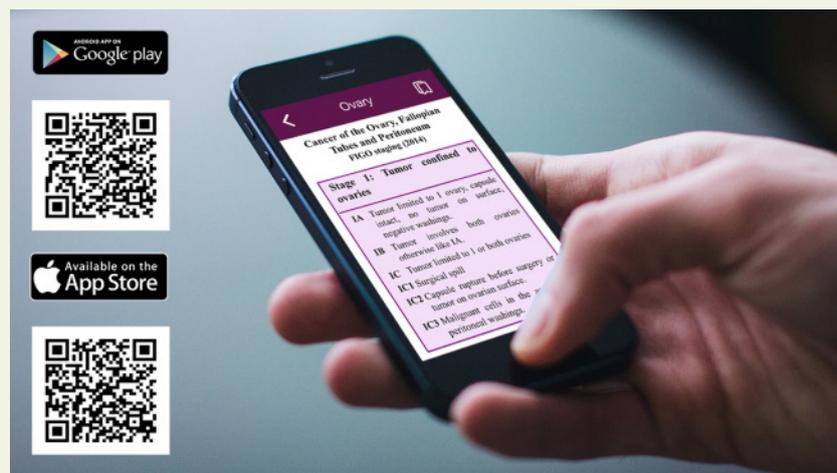
Optimizing cancer care for women is the aim of a new mobile app designed to help doctors evaluate more quickly and accurately the extent of cancer in female reproductive organs and select the most appropriate treatment. The app is available for use on iPhone and Android devices.

“One of the major challenges faced by clinicians is to determine the most effective treatments for their patient, ensuring optimal conditions at minimal risk,” said Diana Paez, Head of the Nuclear Medicine and Diagnostic Imaging Section at the IAEA.

“Technological innovations like this gynaecological cancer staging app help to address that challenge by bringing key information right to a doctor’s fingertips.” The app also includes investigation and management strategies based on best practices as endorsed by the International Federation of Gynecology and Obstetrics (FIGO).

Cancer is one of the leading causes of death worldwide, with approximately 14 million new cases and 8 million cancer-related deaths each year. Gynaecological cancers encompass a diverse group of tumours originating in the female reproductive organs — the vulva, vagina, cervix, uterus, fallopian tubes and the ovaries. It is estimated that every year over 1 million cases and half a million deaths worldwide are due to gynaecological cancers.

“Pivotal elements for addressing the cancer burden worldwide are early detection and accurate diagnosis, precise evaluation of disease extent and appropriate selection of a treatment approach,” Paez said.



(Photo: IAEA)

If cancer is diagnosed, doctors can use the new app to further plan treatment according to the globally recognized cancer staging and management guidelines published by FIGO. These guidelines represent a standardized system based on expert consensus and are regularly updated to reflect evolving medical knowledge of gynaecological cancers. They constitute a system of criteria that draw on a wide range of medical tests and key variables related to the tumour, including its size and location and whether the cancer cells have spread to the lymph nodes or other parts of the body (metastasis).

These key variables are considered together, giving particular consideration to any spread outside the original location of the tumour. The results are typically expressed as stages ranging from one to four, with several substages. The doctors then use the stages to decide whether surgery, radiotherapy, chemotherapy or any other form of treatment is most appropriate for the patient.

The new app is useful for a range of medical specialists, including gynaecologists, oncologists, pathologists and surgeons.

“Physicians can plug in the key details about a patient’s tumour into the app, even when the app is offline, and interactively and quickly find the information they need,” said Neerja Bhatla, a gynaecologist from FIGO. “While it’s a small step, it’s an important one, because it helps to further shorten the gap in access to quality care worldwide.”

Cancer management is an important strand of the IAEA’s work worldwide. It contributes to helping countries achieve the United Nations Sustainable Development Goals and, in particular, the target of reducing the burden of non-communicable diseases, such as cancer, by one third by 2030.

— *By Nicole Jawerth*