

Sci-tech Solutions to Solve Africa's Food Crisis

Dialogue

By SHEN Ben & LONG Yun

For 41 years, Ghanaian plant biologist Felix Dapare Dakora has been focused on finding cost-effective and environmentally safe alternatives to nitrogen fertilizer, which are affordable for resource-poor farmers, as a solution to the problem of soil infertility in Africa. Currently, he is a Research Chair in Agro-chemurgy and Plant Symbioses at the Tshwane University of Technology, South Africa.

Knowledge is the best charity
As the ancient Chinese saying goes, "Give a man a fish, and you feed him for a day. Teach a man to fish, and you feed him for a lifetime." Dakora is passionate about using his knowledge to help address the food crisis in Africa. From his perspective, the food crisis is still quite severe, affecting basic survival needs and impeding development. He opposes solely providing food aid to Africa, believing that it could not solve the problem at its core. For Africa, mastering advanced science and technology is the key to solving the food crisis.

Dakora emphasizes that self-sufficiency in food production is crucial for Africa's further development. From his perspective, the significant potential of Africa's vast land for food production can be tapped through technological innovation to fundamentally address the food crisis. In his work titled *Biological Nitrogen Fixation (BNF): Towards Poverty Alleviation through Sustainable Agriculture*, Dakora explains how to utilize BNF technology to drive solutions for Africa's food problems.



Professor Felix Dapare Dakora speaks at the 2023 ZGC Forum. (PHOTO: 2023 ZGC Forum)

Additionally, Dakora applies his research to environmental protection and addressing global climate change. He noted that microorganisms in leguminous plants can be turned into bio-fertilizers, which have a smaller ecological impact compared to commonly used chemical fertilizers. He applauded China's efforts in climate change mitigation and is willing to collaborate with China.

Communication and collaboration lead to successful research

According to Dakora, "There can be no successful academic research without exchange and cooperation with colleagues worldwide."

Starting from his student days, Dakora recognized the importance of learning and exchanging ideas with fellow researchers worldwide. He firmly believed that early collaboration and learning in foreign laboratories with colleagues

from other countries would expand their visions and master new technologies. He had studied and worked in many countries like the U.S., Canada and Australia. Even after returning to Africa, he maintained long-term cooperative relationships with colleagues from these countries.

Dakora also encouraged his students to go abroad for their studies.

He noted that students from developing countries, who remain in their familiar laboratories, tend to become less confident. When students return from labs in other countries, they will realize that their work is on par with peers in other countries, which influences their research direction in a positive way.

At the same time, Dakora didn't position African scholars solely as collaboration seekers. He emphasized that scholars worldwide also have a strong

desire to collaborate with Africa, especially in fields like botany and zoology, due to Africa's biodiversity.

Long-standing Friendship between China and Africa

Over the past decades, Dakora has visited China for exchanges more than 20 times, forging a deep friendship with the Chinese people and making significant contributions to Sino-African technological cooperation and cultural exchanges.

He is very optimistic about the prospects of China-Africa cooperation, noting that an increasing number of African students are choosing to study and work in China, engaging in technological collaborations. Dakora believes that such exchanges between Chinese and African students contribute to the mutual understanding of culture and national conditions, further promoting future cooperation between China and Africa in all respects.

According to Dakora, China has in the past encountered some of the issues that African countries face, such as food shortages and food security crises. Now, China has successfully resolved these problems. "Learning from a country with similar experiences is in Africa's best interest, as it's more efficient and easier to help Africa address the current food crisis compared to starting from scratch," he said.

Dakora envisions closer academic exchanges and cooperation between Africa and China in the future. He plans to engage in extensive collaboration with China in areas such as food crops and climate change.

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Letter to the Editor

Beautiful China Through My Eyes

By Tom Daniel Sari

I'm Tom Daniel Sari and work in Beijing for a large financial consultancy. I've been working across China since 2018 and have visited many areas with their unique features. These include Beijing, Inner Mongolia, Shanxi & Shaanxi, Hebei, Henan, Jiangsu, Guizhou, Taiwan and Chongqing. I could reminisce for days about what is beautiful about all these areas in particular and China overall, but let's be more concise.

One reason why I have always admired Chinese culture is the great variety that is present and the different ways this is shown by both the people and the environment. Let me give you a few examples. Inner Mongolia is a very industrious and vast region in China. When I visited Hohhot and Baotou for business, I talked to one local person on the train and learned that there are few foreigners in this region. Yet despite this, while there I was treated with kindness from the locals and never felt threatened, excluded, or unwelcome. I would have missed the chance to appreciate the great grass plains of Inner Mongolia, had I not spoken to the man on the train and exchanged contacts.

The same is true for the southern province Guizhou, with beautiful nature and warm-hearted people. In Guiyang, you can drive out of this city for 15 minutes and find yourself in fantastic nature with much fewer tourists than Yunnan, worth a visit for your next vacation.

To focus more on the environmental aspect of what makes Chinese culture beautiful in my eyes, every province of China has its own distinct features and effective ways to preserve nature. Huangguoshu in Guizhou is a large wa-



Mr. Tom Daniel Sari. (COURTESY PHOTO)

terfall and national park about 100 kilometers south of Guiyang. To let visitors appreciate this natural beauty there is a whole garden area similar to Suzhou Gardens, including various pavilions and classic southern Chinese architecture mixed in with the local minority's characteristics. This harmony of overall Chinese design, which is influenced by cultures of all 56 ethnic groups and regional specialties, is what makes China and its culture not only beautiful but unique.

Every province is part of something greater, but has its own regional specialties and harmonizes into something new. Experiencing China feels like visiting a continent, not a single country.

Of course, you cannot talk about what is beautiful about Chinese culture without mentioning the food. There are too many examples to mention, as every region has its delicious specialties, and I've been trying to eat all of them. One of my favorite dishes is a pungent but delicious dish called Luoshifen (noodle soup), a famous traditional dish in Guangxi. I recommend everyone give it a try — don't be afraid of its unique smell!

The author is from Germany and works for McKinsey & Company, Beijing.

Traditional Eastern Wisdom

Operations Research Originates in Transport of Military Rations

By ZONG Shihan

When he was a local dignitary of the Song Dynasty, Shen Kuo faced a crucial challenge of grain transportation while leading his troops against the Western Xia Dynasty's invasion around 1080. It was urgent for him to find a more efficient method to transport war supplies.

To find a solution, General Shen analyzed the proportion between logistics personnel and soldiers during different marching days, as well as the advantages and disadvantages of using livestock and manpower to transport rations. These analyses were documented in his epic book, *Dream Pool Essays*.

The first method involved using manpower. Based on the situation at the time, one logistics staffer could carry 37.5kg of rice, while one soldier carried five days of solid food. So, if one logistics staffer supplied one soldier, they could march for 18 days one way, or nine days round trip. Three logistics staff supplying one soldier allowed for 31 days one way, or 16 days round trip. When a logistics staff's rice was almost used up, let him return first.

However, three logistics staff per soldier was the limit, according to Shen. This was because to mobilize an army of one hundred thousand, it would require three 300,000 logistics staff for grain transportation, making it difficult to scale up further.

The second method was utilizing livestock. Normally, a camel could carry 150kg of rice, a horse or a mule could carry 81.25kg of rice, and a donkey could carry 50kg of rice.

Compared with manpower, there were advantages and disadvantages. Livestock could carry more food than manpower, streamlining soldiers' needs and raising combat effectiveness. However, during the march, the animals needed extra time and effort to graze, otherwise they would become weak and even die, resulting in the loss of grain carried.

Because of higher costs and lower efficiency of self-transportation, Shen emphasized the importance of seizing enemy grain. Although it was difficult to requisition grain from enemy territories, it could ensure the frontline supply, reducing the pressure on logistic personnel and livestock.

To resolve this military logistics problem actually opened a door to modern operation research ideas, aiming at the overall optimum and seeking a better action plan.



Shen Kuo (1031-1095), Chinese military tactician, statesman and scientist in the Northern Song Dynasty. (PHOTO: VCG)

Education Options for Foreign Minors in China

Service Info

By ZONG Shihan

Education facilities for foreign minors are crucial for attracting international talents to China, and because the national and local governments place



A teacher wears the school badge for an African student at the opening ceremony of an international school in Chaoyang district, Beijing. (PHOTO: VCG)

great value on education, they make a lot of efforts to meet diverse educational needs. Aside from embassy schools for diplomatic personnel, foreigners have three main options in China: schools for children of foreign nationals, local public schools, and private schools.

Schools for children of foreign nationals are educational institutions established by foreign entities, internation-

al organizations, or legally resident foreigners in China. These schools admit children of foreign nationals with residence permits and follow educational models from their home countries. They offer an education aligned with their country's standards, while enabling interactions with global peers.

Local public schools follow China's national curriculum. They provide foreign minors an opportunity to experience the authentic China's education system and culture, while interacting with local students. Some public senior high schools also offer specific international classes for foreign students. While this offers a valuable cross-cultural experience, non-Chinese-speaking students may face challenges in adapting to the language and educational framework.

Private schools are another option. These independently operated schools in China often offer flexible curricula and teaching approaches. Some provide bilingual education by combining Chinese curricula with international principles.

Foreign children's education management in China follows the principle of territorial jurisdiction. Each province, city, or autonomous region formulates

specific policies based on local education resources.

For example, in Beijing, relevant notifications can be found on the official website of the Beijing Municipal Education Commission.

According to *Administrative Measures for Enrollment and Cultivation of International Students in Kindergartens, Primary and Middle Schools in Beijing Municipality*, schools with corresponding education and teaching conditions can enroll international students in accordance with relevant regulations.

For foreign students wishing to study in China, it is advisable to prepare in advance. Specific requirements can be consulted to the local educational administration departments.

According to *2022 China International School Report* released by New School Insight, a multilateral media, research and consulting firm, as of 2022, there were 142 schools for children of foreign nationals and 562 private schools with international characteristics in China. Chinese public schools qualified to enroll foreign students welcome all foreign children. China remains committed to expanding education options for the children of expats.

ly of Switzerland's ABB, Germany's KUKA, Japan's Fanuc and Yaskawa Electric. At the World Conference on Artificial Intelligence in 2022, CloudMinds Robotics released a new-generation product — a bipedal robot equipped with 60 joints, which can already walk well and coordinate its hands quite naturally and smoothly.

Today, on the production line of CloudMinds Robotics, robots are capable of doing all the work previously done by humans. The industrial transformation of "machines producing machines" is on the horizon.

Humanoid Robotics Development Enters Fast Lane

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"We thus have established a complete set of architectures to develop core motors that are more adaptable to service robot scenarios and requirements," said Luo Cheng, an engineer from CloudMinds Robotics. He introduced the use of high-performance amorphous magnetic materials can provide more stable torque output and higher efficiency while making the motor volume further

miniaturized and lightweight; the smallest of it can be 35 millimeters thick in diameter.

This makes it far more easy to manufacture SCA through implementing the designing and industrialization methodologies of smart phones.

Domestic manufacturing

On March 31, 2020, CloudMinds Robotics's industrial base broke ground in Shanghai Maqiao Artificial Intelli-

gence Innovation Pilot Zone. "Now, there are more than 100 robotics companies, research institutes and other organizations that have used SCA to develop robots with different forms and functions," said Wang Bing, co-founder of CloudMinds Robotics, adding that, "The annual production of robot joints can realize 10 million sets."

The localized manufacturing of SCA is breaking the long-term monop-