To strengthen ties between Niger and India in areas of agriculture, Mr Ibrahima Guimba-Saidou, Minister - Special Advisor to the President of the Republic of Niger, recently met representatives of the Indian Council of Agricultural Research (ICAR) in New Delhi.

Mr Saïdou, who is also the CEO of Niger’s National Agency for Information Society, met Mr Sushil Kumar, Additional Secretary, Department of Agricultural Research and Education (DARE) and Secretary, ICAR, along with senior officials from the two countries. Dr Peter Carberry, Director General, ICRISAT, and Dr Arvind Padhee, Director Country Relations, ICRISAT, were also present in the meetings. Mr Saïdou’s visit to India, following an invitation from Dr Carberry, saw knowledge exchange between the two countries in areas of research and development in dryland agriculture. The minister also visited facilities for start-up incubation and innovation centers.

Besides meetings with Indian government representatives, Mr Saïdou also met CGIAR center heads, experts and agri-entrepreneurs. Potential for South-South collaboration to strengthen Africa-India connections were explored.

(L-R): Mr Ravi Prakash, Deputy Secretary, Protocol, International Cooperation and International Relations, DARE; Dr J Mishra, ADG-IT, ICAR; Dr A Arunachalam, ADG, International Relations, ICAR; Mr Sushil Kumar, Additional Secretary, DARE and Secretary, ICAR; Mr Ibrahima Guimba-Saidou; Dr Peter Carberry, Director General, ICRISAT; Dr A K Padhee, Director Country Relations, ICRISAT and Mr Boureima Souleymane, Counsellor, Embassy of the Republic of Niger to India.
Representatives from eight Asian countries meet to tackle Fall Armyworm

Over 100 participants from eight South and South-East Asian countries attended the “Regional Workshop on Fall Armyworm Management in Asia” organized in Hyderabad. The Fall Armyworm (FAW) is one of the most destructive crop pests and has invaded crops in India and other countries in the region including Bangladesh, Thailand, Myanmar and Sri Lanka.

Speaking at the opening day of the three-day workshop, Katherine Hadda, US Consul General in Hyderabad, said, “The US Government is working to address the Fall Armyworm in several African countries. As the FAW has emerged in South and South-East Asia, collaboration is urgently required to manage its spread and minimize crop loss. Information on FAW’s outbreak, along with advance warning systems, can be extremely helpful to both farmers and policy makers. This workshop aims to foster collaboration between national and regional institutions as well as the private sector to support farmers in making informed decisions on FAW management.”

Dr Trilochan Mohapatra, Secretary, Department of Agricultural Research and Education & Director General, Indian Council of Agricultural Research, added, “The Government of India is committed to speedy and effective solutions to protect the interests of farmers and for the food security of the country. We have noted with concern the entry of the Fall Armyworm in the country and responded quickly with appropriate measures including advisories and monitoring. Given the nature of the insect and the extensive damage it can cause, there is a need to collaborate and learn from international experience. As we look for ways to protect our crops, this type of meeting is very beneficial to researchers, policy makers, extension workers and ultimately millions of smallholder farmers in the country as well as in the whole South Asia region.”

The workshop is jointly convened by the US Agency for International Development (USAID), with technical expertise of International Maize and Wheat Improvement Center (CIMMYT), ICRISAT and resource persons from international and national research and development institutions. During the workshop, participants shared their experiences, best practices, approaches and challenges managing FAW in their respective countries.

“The agricultural research community has been working intensively to take on one of the biggest challenges facing farmers across Africa and Asia, in the form of the insect pest, the Fall Armyworm. We need innovative approaches and cutting-edge science and more than that, we need regional co-operation to fight this battle together,” said Dr Kiran K Sharma, Deputy Director General (Research), ICRISAT and Director, CRP-Grain Legumes and Dryland Cereals.

For more: https://www.icrisat.org/fall-armyworm-nipping-a-problem-in-the-bud/

Facts on FAW
It is a lepidopteran pest that feeds in large numbers on the leaves and stems of more than 80 plant species, causing major damage to economically important cultivated crops and grasses such as maize, rice, sorghum and sugarcane but also other vegetable crops and cotton.

▪ First reported in West Africa in 2016
▪ Quickly assumed epidemic proportions by spreading to over 44 African countries
▪ In India, it was first spotted in Karnataka in 2018.
National food and nutrition investment in Mali to get a boost

Mali’s next food security investment plan would be more sensitive to agriculture and nutrition, and requires involvement of all key actors including ICRISAT in its formulation, said Dr Djibril Bagayoko, Head, Nutrition Coordination, Ministry of Health and Hygiene of Mali.

Leading a delegation, Dr Bagayoko met ICRISAT scientific staff to discuss a tool for planning and monitoring nutrition in Mali. The meeting focused on ongoing processes of developing the country’s next national food and nutrition investment plan, upcoming Scaling Up Nutrition (SUN) forum in Mali and partnership opportunities between ICRISAT and the Nutrition Coordination Unit.

The next SUN forum is being hosted at Bamako. At the preliminary meeting, organized to discuss partnership opportunities, latest advances in sorghum breeding and aflatoxin management were also presented.

During the introductory session, the regional Research Program and its major themes (Crop improvement, Integrated crop management, Systems analysis, Policy and impact) were presented by Ms Agathe Diama, Head, Regional Information, West and Central Africa. She underlined the importance of nutrition and its integration into the overall program through development of nutri-cereals and nutri-legumes and highlighted the achievements of the Smart Food campaign since 2017.

Dr Bagayoko committed to advocate inclusion of sorghum and millet in Mali’s Food and Nutrition Investment Plan. “Millet and sorghum are important sources of nutrients that can significantly improve the nutritional situation in Mali. It is unfortunate they are not included as major crops in the country’s national food security investment plan. These crops should benefit from better investment,” he said. He urged ICRISAT to build a case for millet, sorghum and groundnut as the country embarks on the development of a new plan that is more sensitive to agriculture and nutrition.

“In partnership with the Institut d’Economie Rurale (IER), we are improving sorghum protein quality by increasing levels of essential amino acids (lysine) in the crop. This breakthrough will help enhance protein content and digestibility of sorghum while helping correct protein deficiencies,” said Dr Aboubacar Toure, sorghum breeder, ICRISAT. He also touched upon recent developments in iron and zinc biofortified sorghum and millet.

Given that malnutrition is a major concern in Mali, Dr Bagayoko stressed the need to shift focus from food security to nutrition security. “It is time to change the paradigm of nutrition at all levels, including among decision-makers,” he said.

Dr Keita Djeneba Konaté, Scientific Officer, ICRISAT Pathology Laboratory in Mali, detailed the resources available and spoke about increased access to affordable technologies for testing and analysis as part of the national response against aflatoxin.

Scaling Up Nutrition Forum: ICRISAT will be actively involved in the next SUN Forum in Mali and in consultations as well as projects of the Nutrition Planning and Coordination Unit in the country. The focal point for this is Ms Agathe Diama and an ICRISAT team including Dr Haile Desmae, Dr Aboubacar Toure, Dr Baloua Nebie, Dr Keita Djeneba Konaté, Dr Jummai O Yila and Dr Nadine Worou. For more on Smart Food, click here.

Please click for ICRISAT’s work on sorghum, pearl millet and small millets.

From left to right: Presentation of the Nutrition Coordination and Monitoring Tool in Mali by Dr Bagayoko; Dr Ramadjita Tabo, Regional Director for West and Central Africa, ICRISAT makes a point; presentation on aflatoxin management in groundnut by Dr Konaté; and presentation of ICRISAT and the Smart Food Campaign by Ms Diama.
Tapping opportunities in Nigeria for high-end agricultural research

Dr Peter Carberry, Director General, ICRISAT, recently interacted with an inspirational women’s group involved in processing sorghum and groundnut into a range of products. During the meeting in Gwarmai village, Nigeria, the group demonstrated traditional and improved groundnut oil processing and small ruminant sheds.

Dr Carberry exchanged ideas and reaffirmed alliances with several stakeholders and institutional partners during this visit. “Nigeria is a huge country with great opportunities as well as challenges for agriculture that need R4D inputs and significant donor funding,” Dr Carberry said, while meeting Dr Nteranya Sanginga, Director General, International Institute of Tropical Agriculture (IITA). The discussions were about strengthening ICRISAT-IITA collaboration in the Sahel.

Dr Carberry also interacted with representatives of the Irish Embassy, the Bill & Melinda Gates Foundation, USAID, International Fertilizer Development Center, Alliance for a Green Revolution in Africa (AGRA), International Food Policy Research Institute (IFPRI) and FAO. During these meetings, Dr Carberry proposed integrating crop and livestock interventions to manage recurrent conflicts, access to and overuse of resources.

The Minjibir Research Farms of the Institute of Agricultural Research, Kano, provide an opportunity to look at ICRISAT’s long-term research work on conservation agriculture and sorghum improvement. Opportunities include livestock feed preparation with stalks, groundnut haulms and supplements.

Dr Carberry said, “ICRISAT in Nigeria is very well-placed to deliver on its breeding mandate and systems research in the semi-arid region. What is needed is a boost to this presence with additional resources.”
To contribute to food and nutrition security in seven countries in the Sahel and to improve farmer livelihoods, **Sorghum and Millet Compact** activities were launched in Mali and Senegal. The Compact aims to link last-mile populations to value chains. The Compact is part of the African Development Bank’s plan to transform agriculture in seven Sahelian countries – Burkina Faso, Chad, Mali, Niger, Nigeria, Senegal and Sudan – through the Technologies for African Agricultural Transformation (TAAT) program.

**Equip farmers to improve yields**

Low yields of sorghum and millets are a major concern for farmers in the Sahel. “A comprehensive management program has been designed to assist farmers to invest an additional US$ 151 per ha in improved seeds, water harvesting and Integrated Soil Fertility Management. This will increase average yields to 1.8 tons per ha and steadily reduce *Striga* infestation, resulting in even greater mid-term gains,” said ICRISAT scientist, Dr Dougbedji Fatondji, who is coordinating the Sorghum and Millet Compact. The Compact targets about 40% to 50% of African farmers with technologies relevant to boosting agricultural productivity and self-sufficiency by 2025.

In the Sahel, low agricultural productivity and lack of value addition are among the main causes of malnutrition, unemployment and poverty. The agricultural sector accounts for 50% to 70% of employment in African countries, but produces only 25% of Africa’s Gross Domestic Product (GDP). Yields of sorghum and millet, the main staple food crops in the Sahel region, are low due to insufficient access to seeds of improved varieties, fertilizers and other agricultural inputs, inappropriate farming practices, declining soil fertility, lack of marketing and extreme weather events.

**About the Sorghum and Millet Compact**

TAAT is a flagship program of the “Feed Africa” initiative alongside with other four initiatives that make up the “High-5s”. The main objective of the program is to improve the business of agriculture across Africa by raising agricultural productivity, mitigating risks and promoting diversification and processing in 18 agricultural value chains within eight Priority Intervention Areas (PIA) including sorghum and millet. The Compact aims to scale up proven technologies, sustainable intensification, and improve profitability of sorghum and millet.

**Launches at Bamako (Mali) and Thiès (Senegal)**

At the Bamako launch, six motorcycles were given to the Sorghum and Millet Compact partners. “These motorbikes will help us reach the last mile where access is often difficult by car,” said Dr Abdoulaye Diallo, Sorghum Breeder at the Institut d’économie rurale (IER) and Compact country Focal Point, on behalf of the beneficiaries.

In Thiès, Senegal, Dr Alioune Fall, Director General of the Senegalese Institute of Agricultural Research (ISRA), said that TAAT fits seamlessly into the country’s existing government programs. As Compact early achievement, he said that 1 ton of breeder seed, 40 tons of foundation seed and 70 tons of certified seed were produced.

During a visit to the Compact seed multiplication site in Bambey, Dr Cyril Diatta, Sorghum Breeder at the Centre for International Research on Development and Sustainable Agriculture, the Compact country Director, said the motorcycle will help them reach farmers in remote areas.
National de Recherches Agronomiques de Bambey (CNRA, Bambey), spoke of the sorghum varieties being disseminated. “Farmers are very appreciative of the ‘Darou’ variety (ISRA-S-622B) because it produces quality grains without tannin, quality fodder and sweet grain for human consumption. We have developed this variety for large-scale dissemination in the Sudano-Sahelian zone where the rainfall is between 600 mm and 800 mm. In Senegal, this zone includes Kaolack, Kaffrine and the North of Tambacounda regions,” said Dr Diatta.

Dr Ousmane Sy, Millet Breeder, CNRA, Bambey, emphasized on the preference of farmers for short-duration millet varieties such as GB 8735 (Origin: ICRISAT). “GB 8735, bio-fortified with Zinc and Iron, is preferred because of its earliness; also, its white and big grains are suitable for processing. In addition, the good exertion of the head prevents millet headminer attacks,” said Dr Sy.

The launches in Bamako (16-17 April) and Thiès (23-24 April) brought together experts and stakeholders from key areas including research, extension, seed production, farmers and women groups, development partners, processing and agricultural input suppliers, civil society and the media.

**TAAT website:** [http://taat-africa.org/](http://taat-africa.org/)

---

**Project:** TAAT’s Sorghum and Millet Compact  
**Donor:** African Development Bank (AFDB)  
**Partners:** International Institute of Tropical Agriculture (IITA), International Fertilizer Development Center (IFDC), International Water Management Institute (IWMI), African Agricultural Technology Foundation (AATF), International Livestock Research Institute (ILRI), Forum for Agricultural Research in Africa (FARA), Alliance for a Green Revolution in Africa (AGRA), Institut de l’Environnement et de Recherches Agricoles (INERA), Institut Tchadien de Recherche Agronomique pour le Développement (ITRAD), Institut d’Économie Rurale (IER), Institut National de la Recherche Agronomique du Niger (INRAN), Institute for Agricultural Research and Development Liaison Services (NAERLS), Institut Sénégalais de Recherches Agricoles (ISRA), Agricultural Research Corporation (ARC), Government Agencies and ICRISAT.
The NITI Aayog recently commended the impact of community best practices for watershed management, in Jhansi, Uttar Pradesh, India.

“Local community in the water scarce Parasai-Sindh region of Jhansi, #UttarPradesh increased groundwater level by 2-5 meters & made 100 acres of land cultivable by constructing check dams, farm ponds and renovating existing structures in 8 locations. #BestWaterPractices” – said a recent Facebook post from NITI Aayog’s handle.

The Parasai-Sindh watershed of Babina block, Jhansi, was jointly developed by ICAR-Central Agroforestry Research Institute, Jhansi, and ICRISAT Development Center, ICRISAT, with the involvement of the local community between 2012 and 2016. The project focused on rainwater harvesting, productivity enhancement interventions and agroforestry works.

Renovation of traditional water-harvesting tanks and construction of check dams on a major stream in the village helped increase the storage capacity for rainwater to nearly 100,000 m$^3$. These water-harvesting structures saved over 200,000 m$^3$ of runoff, on average, every year, raising the groundwater table by 2–5 meters. This benefited crop intensification (from 80% to 140%) and enhanced crop yield (20–30%) and production, both in *Kharif* and *Rabi* seasons. Nearly 100 ha of fallow land in upland areas were also brought under cultivation with enhanced groundwater availability.

The intervention subsequently reduced fodder scarcity and enhanced milk production. Overall, by the end of the 4-year project, household income in this region more than doubled.

ICRISAT, with over 40 years of expertise in watershed development, has supported watershed-based community initiatives in more than 300 locations across Asia and Africa.
**Breakthroughs in the lab**

**Genetic secrets of peanut varieties unveiled**

Peanuts address nutritional demands in underdeveloped countries as they are a rich source of proteins and fatty acids. In a significant development, an international team of researchers led by plant geneticists at the Hyderabad-based International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has decoded the complete set of chromosomes of two widely cultivated peanut varieties belonging to the subspecies **hypogaea** and **fastigiata**.

Genetic decoding – known as the reference genome sequence – helps in understanding cell-level mechanisms which make one variety score better than the other. For peanuts, the deciding factors are high oil and protein content, disease and heat resistance and high yield.

Gene sequencing is a complex and exhaustive process running for many years. The process involves several stages: high-quality DNA is isolated from the target plant and cut into bits. It is then placed in a sequencing machine. With the help of special tools and bioinformatics programs, gene sequence is synthesized.

Peanuts, with their farming history of more than 6000 years, have complex genomes. In this study, the scientists found that the peanut genome sequence was comparable in size to that of the human genome, which had a little over 3 billion DNA base pairs with 83709 genes that control its traits. During this process, the team discovered that the peanut variety was a tetraploid — which means that the cultivated groundnut genome is home to two different sub-species genomes. They also found that an exchange of genomes was occurring with one dominating the other.

“The cultivated peanut genome is home to both the genomes of the sub-species. By living and coordinating together, this dual diploid genome decides the quality of crops we see in the fields,” said Dr Rajeev Varshney, Research Program Director, Genetic Gains, ICRISAT.

“The tetraploid nature is a result of natural hybridisation (crossing) of two wild species called **Arachis duranensis** and **Arachis ipaensis,**” explained Dr Varshney, while speaking to India Science Wire.

Genome referencing provides researchers access to all the peanut genes, which, in turn, will boost gene discovery and marker development studies. “It will accelerate development of superior peanut varieties with high pod and oil yield, greater resistance to diseases, nutrition-rich, aflatoxin-free, and improved oil quality seeds,” added Dr Manish Pandey, Senior Scientist at ICRISAT.

This study will help expand genetic base for sustainable and resilient groundnut production to face the challenges brought about by climate changes.

The study involved scientists from research institutes in China, Taiwan, Australia, USA, Argentina, Brazil, Japan, France and Korea, besides India. The results were published in two papers in the journal Nature Genetics. The Indian team included Manish K Pandey, Rajeev K Varshney, Vanika Garg, Amir W Khan, Prasad Bajaj and Annapurna Chitikineni (ICRISAT); Polavarapu Bilhan Kavikishor (Osmania University) and Senjuti Sinharoy (National Institute of Plant Genome Research, New Delhi).

New technologies for a new breed of researchers
ICRISAT’s CEGSB conducts two-week training in next generation genomics for PJTSAU scientists

To accelerate crop improvement in Telangana, ICRISAT’s Center of Excellence in Genomics and Systems Biology (CEGSB) trained a group of young scientists from the State’s Professor Jayashankar Telangana State Agricultural University (PJTSAU) on next-generation genomics approaches.

Advocating adoption of latest genomics technologies, Dr V Praveen Rao, Vice-Chancellor, PJTSAU, said, “It is time we trained our young scientists in the latest genomics and molecular breeding approaches, for they will be the torchbearers for advancing crop improvement program in State.”

CEGSB and PJTSAU organized the training at ICRISAT during 6-17 May, 2019. The program, partially supported by the CRP Grain Legumes and Dryland Cereals (GLDC) and CGIAR Platform on Excellence in Breeding, is the 14th course organized by CEGSB in its endeavor to build capacity in modern genomics and molecular breeding across institutions.

In his inaugural address, Dr Peter Carberry, Director General, ICRISAT, said ICRISAT is working to put modern approaches into breeding programs. “It is exciting to see so many young scientists, especially women, from the state agriculture university keen to learn and adopt new technologies in their breeding programs. It is a win-win situation for both ICRISAT and PJTSAU.”

During the training program, a one-day international workshop ‘Genomic Selection for Crop Improvement’, was held on 15 May. The workshop brought renowned scientists including Professor Wallace Cowling from The University of Western Australia; Professor John Hickey of The Roslin Institute, University of Edinburgh (UK); Professor Ben Hayes and Professor Lee Hickey from The University of Queensland (Australia) to talk about advances in methodologies, optimization of models and applications of genomic selection from examples of different crops, livestock and poultry.

Participants of 14th training course on next generation genomics for crop improvement.
From lab to the field

Keeping the grass green – Farmers in south India harness benefits of green fodder

Effective utilization of green fodder for greater benefits was the focus of demonstrations among farmers in south India. Farmers in Dharwad, Karnataka, learnt usage of balanced feed got during a demonstration on silage-making by scientists. Silage comprising green fodder, mainly in lean periods, is essential for high levels of livestock productivity and also helps farmers maximize benefits.

Interacting with about 50 farmers in Kadabagatti village in May, Dr Prakashkumar Rathod, Visiting Scientist, ICRISAT Development Center, said silage can be made with thick stem crops like sorghum, maize, pearl millet, napier and other legumes harvested at 50% flowering to milk or dough stage. Silage is compacted green fodder, stored in airtight conditions, for later use. These demonstrations were part of the Karnataka Bhoosamruddhi Project.

Green fodder is ensiled under anaerobic conditions for 45 days in pits, trenches, bunkers and tower silos of different types and sizes. Lately, silo bags of various sizes (100 kg, 200 kg, 500 kg and 1000 kg) are also available.

Farmers also learnt that livestock diets must comprise approximately 60-70% green fodder, 20-30% dry fodder and 5-10% supplementary feed to provide about 16-20% crude protein and 65% crude fiber. “Since green fodder is essential in all seasons, enabling farmers about its effective utilization becomes crucial,” Dr Rathod said.
Increasing production in agriculture is often a very long and arduous process. Agronomists, soil scientists and hydrologists who implement land and water interventions are lucky if they see a 15% increase in yield after years of working on a specific site.

But what if you were able to achieve a more than 500% increase in just three years, specifically in an area where there had been virtually no crop production in the past, all while making pastoralist more resilient to climatic changes and reducing the risk of water related disasters?

The lowlands in Afar, Ethiopia are not always easy places to be food secure. The area experiences the extremes of water variability, with severe droughts in the dry seasons and flooding from upland rainfall in the wet seasons. While there is a great deal of land available, the problems caused by rainwater runoff, especially flowing from the highland areas, and lack of infrastructure for irrigation, make this area inhospitable for crops.

Many communities in the area depend on raising livestock for food security, with pastoralists traveling vast distances to get fodder for their animals. While this livelihood practice has been prevalent in this region for many decades, the increase in floods and droughts, with 2015 being characterized by major droughts and flash floods happening in August of 2018, means that there is less food for animals and an increased insecurity and risk to pastoralist livelihoods.

Simple interventions, dramatic outcomes

In order to take advantage of the seasonal flooding that occurs in the area, GIZ invested in building concrete water spreading weirs (i.e. a wall that diverts water from its course) in Chifra district in Afar in 2015. These weirs are about 1.5 meters tall and are placed in a cascade down a slight slope, following the contour of the landscape.

As the flood water flows down from the highlands, they bump against the weirs and flow backwards or sideways, depositing both water and nutrient rich silt on the ground up-slope from the weir.

Recognizing the potential to grow crops on this suddenly nutrient and water rich soil, GIZ brought in researchers from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), who co-led the WLE Research Theme on Land and Water Solutions for Sustainable Agriculture, to develop a crop-livestock system and assess how best to cultivate this newly arable land.

By mapping the water and nutrient deposits created by the captured flood water at a landscape scale, communities in collaboration with ICRISAT were able to plant and grow high yield fodder and high value crops (like maize, sorghum, teff, legumes and sesame) in newly fertility areas.

The results were stark. 50 ha of formerly uncultivated land where there had previously been no agricultural crops were suddenly covered in productive biomass, with yields of maize being as high as 8 tonnes per ha. All with zero fertilizer inputs due to regular depositions of sediment from upstream.

The local community, consisting of over 50 households, were able to use these crops for their own food consumption and as feed for the livestock on which they traditionally depend. Furthermore, they established their own governance structure for managing and protecting the landscape by distributing fodder in times of need to surrounding pastoralists through a cut-and-carry system; doing so ensured that livestock would not ruin the crops that were growing and reduced potential conflicts with the surrounding communities.

Click here for more: https://www.icrisat.org/vulnerable-to-verdant-turning-flood-risk-into-farm-resource/

About the author:
Mia Signs, Communications Officer, WLE
New groundnut varieties for improved resilience and market competitiveness

Sayilesi Gwizima, 59, from Mchinji district, central Malawi, grows CG 7 groundnut variety. Not unlike many farmers, Gwizima fell for the variety’s large seed size and high fat content, which makes for high returns at the market. In the recent past however, Gwizima noticed that CG7 is too susceptible to Groundnut Rosette Disease (GRD), which thrives in drought conditions.

Esnart Jere, another groundnut farmer, from Mzimba district, northern Malawi, is equally frustrated. She lost almost half the produce from her 1.2 hectare groundnut farm as a combined result of GRD and erratic rainfall experienced during the 2017-2018 growing season. “CG 7 is the best groundnut variety I have ever grown. It has a lot of fat so it weighs a lot more than most of the varieties, and that means a lot of money at the market. In addition to that, there is a huge market for it in the oil manufacturing companies. Last season, however, I lost over half of my produce, due to rosette,” she said.

Seven new improved groundnut varieties released by ICRISAT in collaboration with the Department of Agricultural Research Services (DARS) are likely to skew the odds back in the smallholder farmer’s favor, as they are early maturing and resistant to GRD and other foliar diseases, hence responsive to challenges associated with late planting.

It is common practice among smallholder farmers in Malawi to plant groundnut at least a week after the first planting rains. For the majority of farmers, especially in the central region, priority to plant with the first rains is usually given to maize, as it is the major food crop in the country. This practice has resulted in declining groundnut productivity among many smallholder farmers in Malawi, as late planting exposes groundnut crop to GRD and other abiotic stresses.

The new varieties were released in more than four countries, hence well adapted to a wide range of environments. They also have a higher yield potential, tolerance to abiotic stresses, better seed quality and weight, hence giving smallholder farmers an edge in the market.

The released varieties, includes CG 8 (ICGV-SM 08501), CG 9 (ICGV-SM 08503), CG 10 (ICGV-SM 01724) and CG 11 (ICGV-SM 01731), which are medium duration Virginia varieties, and mature between 120-130 days, are well adapted to mid-altitude agro-ecologies, while CG 12 (ICGV-SM 01514), CG 13 (ICGV-SM 99551) and CG 14 (ICGV-SM 99556), which are short duration Spanish varieties, maturing within 90-110 days, are well adapted for low-altitude agro-ecologies.

ICRISAT Malawi Country Director Dr Patrick Okori said that ICRISAT had released the new varieties in response to the current climatic conditions, as well as smallholder farmers’ groundnut planting habits. “Agricultural research must take a pivotal role to identify technologies that can improve farmer productivity. We have therefore taken a responsive stance by observing how farmers treat groundnut in terms of planting time and tried to incorporate that in our breeding programing, so that we can respond better to their needs,” Dr Okori said.

Meanwhile, ICRISAT, through the Irish Aid-funded Malawi Seed Industry Development project (MSIDP II), is scaling up adoption of the varieties through partnerships, direct farmer engagement and investments in seed production. ■

Lawrence Lazarus
Communications Officer, ICRISAT-Malawi
To check for aflatoxin contamination in their products, groundnut value chain stakeholders in Bangladesh attended a hands-on training program. Participants learnt to use the ELISA kit and were informed of the dangers of aflatoxin contamination. Forty participants including staff of PRAN Agro Industries, Partex Agro Limited, Bombay Agro Limited, Government staff from Bangladesh Agriculture Development Corporation, Department of Agricultural Extension and Bangladesh Agricultural Research Institute (BARI) participated. The training was conducted by Dr Hari Kishan Sudini, Groundnut Pathologist, ICRISAT. The program held on 8 April in Joydebpur, Bangladesh was part of the project – ‘Promoting peanut based food supplements through partnerships to treat malnutrition in Bangladesh’.

A field day was also held on 9 April at Char Belgachha, Jamalpur, to train 200 farmers on varietal technologies, groundnut production technologies and drying and storage measures. This was part of the project ‘Enhancing groundnut productivity and profitability for smallholder farmers in Asia through varietal technologies’.

The events were jointly organized by BARI and ICRISAT.

Funders: OPEC Fund for International Development (OFID), US Agency for International Development-IKP Park (USAID-IKP)

CRP: Grain Legumes and Dryland Cereals

Partners: BARI, PRAN Agro Industries-Dhaka, ICRISAT and local NGOs based in Bangladesh
Technology for development

From ‘ABC’ to the ‘Ds’ of agriculture – Digital, Disruption and Dissemination

Experts at the 11th ICT4D Conference called for global cooperation in digital agriculture

Information and Communications Technologies (ICT) are disrupting agriculture for good but are not made widely available, echoed participants at the recently concluded ICT4D Conference. Amidst demonstrations of groundbreaking technologies, they called for greater cooperation between institutions, both governmental and non-governmental, in key areas like artificial intelligence and big data for the benefit of smallholder farmers.

“We shouldn’t think that ICT is only for computer scientists in the lab. In these past three days, we have learnt that ICT is everywhere, in agriculture, education, and health etc.,” said Mr Frank Tumwebaze, Minister for Information and Communication Technology & National Guidance of Uganda, where the conference was held.

ICT for Development (ICT4D) conferences are organized by a consortium led by the Catholic Relief Services (CRS). At the conference in Kampala, Uganda, held during 30 April – 2 May, 2019, discussions were held about development in 10 sectors or tracks. ICRISAT, a consortium partner, led the agriculture track. Themed ‘Global Digital Development’, the conference had over 900 participants from about 440 organizations in 88 countries.

“There is a steady increase in the number of presentations from start-up technology firms and their service offerings are now more mature. The focus earlier was registering farmers into digital platforms. It now has shifted to engaging farmers to provide access to data, inputs, financial services, and to build their capacity for production and marketing,” said Dr Shaun Ferris, Director, Agriculture, CRS.

The highlight of the agriculture track was a panel discussion “From Data to Information – Challenges, Opportunities and Jobs in Agriculture for ESA in the New Information Economy.” The panel elicited varied perspectives on digital agriculture from researchers, governments, donors, practitioners and entrepreneurs.

One of the panel members, Dr Anthony Whitbread, Research Program Director, Innovation Systems for the Drylands, ICRISAT, recounted that while great strides have been made in data flows such as earth observation, mapping of crops and parcel boundaries, and grided downsampled weather products, the challenge of translating this data into actionable, contextualized decision support that could be applied by the smallholder remains.

Mr Ram Dhulipala, Head, Digital Agriculture at ICRISAT, showcased the Digital Seed Roadmap tools developed by ICRISAT as part of the Tropical Legumes III and HOPE II projects. Mr Satish Nagaraji, Senior Manager, Digital Agriculture, ICRISAT, presented the MEASURE platform developed by ICRISAT’s ihub start-up partner Verdentum.

Mr Nagaraji also detailed how skills of groundnut and tomato farmers in Andhra Pradesh are being developed through digital interventions. Participants appreciated the Plantix application, developed by ICRISAT’s ihub partner PEAT, which was presented by Dr Srikanth Rupavatharam, Scientist – Digital Agriculture, ICRISAT. Plantix is using AI-based tools in real time to monitor the Fall Armyworm. Plantix has been downloaded more than 7 million times and has a regular user base of over 2 million farmers in India alone.

Dr Pierre C Sibiry Traore, Head GIS and Remote Sensing, ICRISAT-Mali, presented the project Nurturing Africa’s Digital Revolution for Agriculture (NADIRA). A highly innovative project, NADIRA develops the use of Earth Observation (EO) in contractual smallholder agriculture, improves risk management, efficiency, productivity, financial security and inclusive welfare benefits for all value chain stakeholders.

Mr Ram Dhulipala, Head, Digital Agriculture at ICRISAT, showcased the Digital Seed Roadmap tools developed by ICRISAT as part of the Tropical Legumes III and HOPE II projects. Mr Satish Nagaraji, Senior Manager, Digital Agriculture, ICRISAT, presented the MEASURE platform developed by ICRISAT’s ihub start-up partner Verdentum.

Mr Nagaraji also detailed how skills of groundnut and tomato farmers in Andhra Pradesh are being developed through digital interventions. Participants appreciated the Plantix application, developed by ICRISAT’s ihub partner PEAT, which was presented by Dr Srikanth Rupavatharam, Scientist – Digital Agriculture, ICRISAT. Plantix is using AI-based tools in real time to monitor the Fall Armyworm. Plantix has been downloaded more than 7 million times and has a regular user base of over 2 million farmers in India alone.

Dr Pierre C Sibiry Traore, Head GIS and Remote Sensing, ICRISAT-Mali, presented the project Nurturing Africa’s Digital Revolution for Agriculture (NADIRA). A highly innovative project, NADIRA develops the use of Earth Observation (EO) in contractual smallholder agriculture, improves risk management, efficiency, productivity, financial security and inclusive welfare benefits for all value chain stakeholders.
A database to help entrepreneurs identify and embrace new technologies

A dynamic pan-Indian database of Intellectual Property-protected technologies developed by Public Research Institutions from the agricultural sector is being created by ICRISAT with support from the Department of Science and Technology, Government of India. The database is designed to help entrepreneurs identify and embrace innovative technologies.

To facilitate the work a Local Project Advisory Committee meeting was held. Members discussed the mapping status of Intellectual Property Rights (IPR) policy and agriculture-related IPR in Indian academic and research institutions. The importance of developing indicators for better implementation of the National IPR Policy-2016 in academic/research institutions in the agricultural domain and bridging the gap between technology developers and technology seekers was also discussed.

Members from research fraternities and government offices participated in the meeting. The DST was represented by Dr Parveen Arora, and Dr HB Singh. Dr R Kalpana Sastry, Professor Tata Institute of Social Sciences, Hyderabad, and Ex-Director ICAR-NAARM, Hyderabad, chaired the meeting. The meeting was held on 2 May at the Agribusiness and Innovation Platform office, ICRISAT and was organized by its Intellectual Property Facilitation Cell. Dr Surya Mani Tripathi, Legal Counsel, ICRISAT, is the project coordinator.

---

**Project:** Mapping of IPRs and its Management in Academic/Research Institutions: A study on Agricultural Research Sector in India

**Funder:** Department of Science and Technology (DST), Government of India.

**Partners:** ICRISAT

**CRP:** Bilateral Project Mapped to FP2 of CRP-GLDC
Several thousand waiting tons

Balancing pigeonpea interests across two continents

Ashish Goswami looks reflectively at the large godown, in Arusha, Tanzania, the white bags accentuating the lines of concern on his face. When the going is good, there would be over 200 people working in that space. Now, two security guards open up the locked door for us to take a look at the lonely bags gathered silently in the storehouse. The company Ashish works with is one of the leading exporters of pigeonpea from Tanzania. The raw pigeonpea exports go mainly to India, where, known as toor or arhar, they form an important part of the daily diet of millions of Indians.

The past couple of years have been tumultuous for the global pigeonpea industry. India is the highest consumer and was also the highest importer of this legume. Approximately 50% of these imports come from Myanmar, while another 50% come from Africa – with Tanzania contributing the maximum. There was increased domestic production – pigeonpea production in India almost doubled in 2016-17 from the previous years. Along with this there was a change in trade regulations by the Indian government to support domestic farmers/production leading to a drastic dip in exports of pulses to India. This led to off-set producer prices in Tanzania. As much as 90,000 tons valued at about US$80 million, were being exported to India from Tanzania two years ago. In the previous year, it was just about 30,000 tons. Farmers in Tanzania produce pigeonpea with their eye on exports. So this year, exporters are holding much of the previous years’ stock after processing and hoping for movement.

About 50 kilometers away, the same concern is mirrored in the eyes of farmers of Kikatiti. They practice maize and pigeonpea intercropping, mostly with their eye on the market. Across most of sub-Saharan Africa, maize is easily procured and consumed as a staple. Traditional pigeonpea variety (Babati white) grown by farmers however, succumbed to Fusarium wilt. High-yielding

Kikatiti farmers who were motivated to grow pigeonpea.

Right now, we have one thousand tons of pigeonpea packed and ready. We are hoping that soon a window will open up for sending several such batches to India.

– Ashish Goswami,
Manager, Export Trading Company Ltd. Tanzania
wilt-resistant varieties introduced a few decades ago from Kenya through the years, became increasingly popular fetching a good market price and progressing well as a complementary crop to maize. While experts put consumption rates in the African region at 67%, small farmers are usually growing these to reach export companies. Now with trade changes, procurement rates have fallen at least by 50% and the farmers are unsure about the season ahead. “Why has this happened?” they ask us. “What should we do now?”

Dr Stephen Lyimo, known in the scientific community as the ‘father of pigeonpea’ in Tanzania, is visibly upset as he talks to them and facilitates the discussion. “I told these very farmers to cultivate pigeonpea; we helped them with better seed varieties and they got a good profit till two years ago. Now after the export market has fallen, these same farmers are affected. I owe them an answer.” As he explains the global trade dynamics, the group listens unsure of what to make of it. Most of them, small and marginal farmers, own about 2 hectares of land on an average. It seems they would like to continue their maize and pigeonpea crops this year as well. Thousands of miles away, actors beyond their sphere and policies beyond their country, would now decide the fate of their crop.

In Babati District in Manyara region, it was evident that pigeonpea farmers have not stopped producing the crop despite the decline in prices from farm gate price of TSh 2800 (about US$2) in 2014 to a mere TSh 300 (US$0.13) in 2018. Veronica P Aloyce, a farmer in Gendi Barazani sells her pigeonpea produce at TSh 300/kg but apparently, purchases dehulled pigeonpea at TSh 7000/kg for her restaurant where she prepares pigeonpea products for local customers. Dehulling loss is a mere 20% and she feels that she makes a huge loss because of her incapacity to dehull by herself. Perhaps one of the constraints to consumption of pigeonpea is the lack of avenues for local value addition.

It’s a catch-22 for institutions like ICRISAT that are working both with Indian and African farmers. In 2015-16, prices of pulses became a major political issue in India. Farmers in the country motivated to cultivate pulses to achieve self-sufficiency, found prices dropping due to imports. The Government of India had to step in and limit import agreements with Tanzania to deal with huge buffer stocks from previous years’ production/imports in India. This had a cascading effect on farmers in other countries. ICRISAT has also been promoting improved pigeonpea varieties through the NARS across different Indian states and with good rates of adoption.

Step back to Tanzania, companies are now provided a window each year, when they can export to India. The market for processed pigeonpea is still available in countries such as Canada, USA, UK and UAE, but this market is relatively small, compared to the raw pigeonpea that only India imports. Ashish who procures the best quality pigeonpea available in Tanzania for his company from farmers of Arusha, now obtains them at between 400 – 900 TSh per kg, (US$1 = 2300 TS), with the reduced trade prospects. This is not viable for farmers. During the previous season, many farmers did not even harvest their crop as the price they were offered would not even cover the cost of harvesting. For companies, with possible storage for about a year or a little more, if a window does not open up for imports, it is unlikely they can hold on indefinitely. This puts the fate of millions of farmers, cultivating pigeonpea on 273,597 ha across Tanzania at risk – a scenario, which they are not in a situation to face.

Domestic consumption has huge potential, however. The Smart Food project has taken on the challenge in Tanzania to reduce the risks to farmers by building domestic demand and expanding markets. At the same time this will focus on diversifying staples with more nutritious and environmentally sustainable crops for the drylands. An analysis by the Smart Food project economist showed that schools in Tanzania have a potential to create a market for 700 metric tons of pigeonpea per week valued at US$300,000 and 140 metric tons of sorghum and finger millet per week valued at US$200,000.

Some concerted efforts were taken to deal with this situation. One, the Government of Tanzania initiated a process to encourage domestic consumption of pigeonpea. This was through procuring this for schools. About 79 institutions were roped in to take this effort forward. Also, the government encouraged schools to procure pigeonpea and included it in the cooked meals for school children. These efforts reached about 23,000 farm families through 79 institutions.

Pigeonpea recipes were piloted through the Smart Food project led by ICRISAT in Tanzania, with positive feedback from rural schools where over 2,000 students were surveyed noting that 87% of students changed their perception of pigeonpea and 91% voted to keep them in their school meals. The project in collaboration with the Somni project undertook similar analyses with

![Stephen Lyimo talking to farmers of Kikatiti about pigeonpea.](image-url)
entrepreneurs and the food service industry in urban markets of Arusha, also identifying strong domestic consumer acceptance.

Also, a series of initiatives were taken to push more export market within Africa, in countries such as Malawi and Mozambique. “The domestic market for pigeonpea has huge potential. Rather than focusing our attention on the exports, by increasing consumption we can make a big difference to the incomes of smallholder farmers,” says Dr Moses Siambi, Research Program Director, East and Southern Africa, ICRISAT. These efforts however, still need to be further strengthened to boost consumption within the country. The volatile prices dominated by an export-oriented market indicate an uncertain future for farmers.

How is this being dealt with? Farmers in Tanzania consume pigeonpea both as green peas and dry grain. In coastal areas during Ramadan, green pigeonpea is one of the preferred relishes. However, use of mechanical shellers and dehullers at community level will help increase utilization. Promotion of simple recipes at household and community levels will enhance price stability and nutritional security.

The long-term production and import trends in India indicate that soon India is going to open imports. However, this may still not be a complete solution from both nutrition as well as the economic perspectives for Tanzania. For long-term sustainability, food product diversification, value addition, local consumption and looking for alternative markets will remain the key.

Jayashree Balasubramanian
Lead - Communications and Library
Strategic Marketing & Communication
How scientists use seeds to mitigate effects of climate change

According to the Global Panel on Agriculture and Food Systems for Nutrition, global food production is expected to decrease two percent every decade until 2050. People in sub-Saharan Africa and India who depend on small scale farms for their food will be disproportionately affected by climate change. But plant breeders from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) are increasing their efforts to breed crops that are resilient and can survive in extreme weather conditions.

Innovations and advancements in the crop breeding of traditional grains can play a role in mitigating the effects of a changing climate on food production, hunger, and the livelihoods of farmers in developing parts of the world. Food Tank had the chance to speak with crop physiologist at ICRISAT, Dr. Jana Kholova. She says, “There are tools to dissect and quantify the environmental impacts on the crops and this can help to develop highly targeted products to these particular circumstances.”

Along with fellow crop physiologists Dr Myriam Adam and Dr Vincent Vadez, Kholova is currently working on developing sorghum varieties that match both the culture and climate of farming regions throughout India. She particularly focuses her work on farming regions in Mali that are vulnerable to climate change.

She tells Food Tank, “There are a lot of new tools available to understand the customers’ demands and production environments and accordingly develop suitable cultivars much faster using advanced genotyping and biotechnology tools and precise phenotyping methods.”

When introducing new seed varieties to smallholder farmers, it is important to consider their environments, both culturally and ecologically, says Kholova. Sorghum is the fourth most important cereal crop in Mali and something many farmers are familiar with. One barrier crop physiologists face is encouraging farmers to adopt new varieties developed in the lab. It is common that farmers who lack access to supplies like fertilizers, seeds, and even manpower are much slower to plant smart crops as it poses too much of a risk. Kholova wishes farmers were more involved in the crop breeding process, and laments to Food Tank, “The turnover of cultivars—especially for the harshest environments—is tragic. Some of the cultivars are more than 40 years old and still dominate large areas. In many cases, farmers still grow landraces that they inherited from their ancestors.”

The Paris Climate Agreement of 2015 “calls on countries to combat climate change and to accelerate and intensify the actions and investments needed for a sustainable low carbon future” and was signed by 200 nations across the world. While protecting the world from a changing climate is a daunting task that will take many years to achieve, crop breeders and scientists like Dr. Kholova are doing what they can to fight malnutrition each harvest season. Credit is due to the scientists like her around the world working hard to ensure that rural communities will be able to sustain their livelihoods and avoid hunger during a time of critical climate turmoil.

This story first appeared in
Farm production: Are we growing enough pulses?

**We are moving towards self-sufficiency. The annual pulses production averaged 23.7 million tonnes in the past three years, an 80% increase over the average of the three-year period ending 2003-04. This was led by chickpea, whose share in pulses production is 43%.**

Are we self-sufficient in pulses?” Peter Carberry, the director-general of the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), the Hyderabad-based institute, asked Narendra Pratap Singh, the director of Kanpur’s Indian Institute of Pulses Research (IIPR), during his presentation earlier this month. Singh replied we are moving “towards” self-sufficiency. Although there has been a step up in the production of pulses to an average of 24 million tonnes in the past three years, Singh estimates the demand at about 32 million tonnes, which is why we import 5.5-6.5 million tonnes annually.

Carberry’s was a pertinent question because the shortage of pulses was acutely felt in 2015 and 2016. Production fell sharply due to bad weather. That and (suspected) cartelisation of traders boosted prices. Pigeon pea (tur) sold for ₹8,798 per quintal, wholesale, towards the end of 2015, nearly double the price prevailing in last quarter of 2014. That of black gram (urad) rose 80% between the two periods. Chickpea or chana was less affected but its price at ₹8,553 per quintal at the end of 2016 was 87% higher than in the last quarter of 2015.

With consumers getting restive and prices becoming an issue in state assembly elections, the government stepped in with policy support. Seed hubs were established in the main 150 pulses-growing districts. Central agricultural research institutes and state agricultural universities stepped up production of breeder seeds. These were multiplied by seed corporations and extension agencies called KVKs for sale to farmers. Subsidy was given only for less-than-10-year-old seed varieties. These were not only high-yielding, but also pest- and disease-resistant. Seed availability persuaded farmers to replace old with new.

Support prices for pulses went up. They have risen by 46% for chickpea, 52% for mung bean and 30% for pigeon pea over the past five years. The government started procuring pulses. That of pigeon pea rose from 45,000 tonnes in 2015-16 to 9 lakh tonnes the next year. It fell to 2.58 lakh tonnes in 2017-18 and an equal amount the previous year. Seven states procured 3.64 lakh tonnes of chickpea in 2014-15 under their price support schemes.

Because of these measures, annual pulses production has averaged 23.7 million tonnes in the past three years, an 80% increase over the average of the three-year period ending 2003-04. This was led by chickpea whose share in pulses production is 43%. Its output doubled from 5.14 million tonnes to 10.27 million tonnes during these two periods.

With 63% of global production, India leads in the cultivation of chickpea—a crop grown in 52 countries. Madhya Pradesh contributes the most to the country’s chickpea production. It is the “chickpea bowl of the world,” says Pooran Gaur, ICRISAT’s Research Programme Director for Asia, and a chickpea breeder.

A report in this space on April 19 (https://bit.ly/2UrzBeE) detailed how chickpea, a winter season crop of north India, elbowed out of that region by the Green Revolution in rice and wheat, and adapted to Andhra Pradesh, despite its warm weather. While average productivity is the highest in that state, Madhya Pradesh is the largest producer. It has shown continuous increases in area, production and yield. The area under chickpea in the state has increased eight-fold from an annual average of 64,700 hectares between 1971 and 1980 to over 3 million hectares.

The support that the government gave for pulses production after their prices spiked four years ago wouldn’t have been effective if seed technology wasn’t available.

The support that the government gave for pulses production after their prices spiked four years ago wouldn’t have been effective if seed technology wasn’t available. Mohammad Yasin, principal scientist at the Rafi Ahmed Kidwai College of Agriculture in Sehore near Bhopal, attributes Madhya Pradesh’s fascination for chickpea to the 54 improved varieties that were released since the 1960s, of which 21 are currently in the seed production system and 15 are popular. Most of the lines were developed at ICRISAT and adapted to local
conditions at the agricultural research stations in Madhya Pradesh and Maharashtra before release. They are high-yielding and have maturities ranging from 85-120 days. The early maturing ones, which are harvested in March, can escape summer heat at the pod-filling stage. Most of them are resistant to wilt. The state’s farmers can comfortably grow two crops a year of soybean and chickpea.

SK Rao, vice-chancellor of the state agricultural university in Gwalior, and a chickpea breeder, says good management practices are necessary to harness yield gains from genetic improvements. The adoption of line-sowing with seed drills has resulted in better germination (than when broadcast) as seeds are placed at right depths, get the required moisture and the plant population is denser. In the Malwa region, growers of extra bold seed Kabuli chana, the only variety allowed to be exported, have adopted integrated pest management practices and give water and nutrients in precise quantities through drip pipes, as they get premium prices. A hundred grains of these varieties weigh 45-50 gm, compared to desi chana varieties that weigh 15-27 gm.

The state’s policies have been helpful. In Karnataka, varieties released elsewhere need the endorsement of an official committee for local sowing. In Madhya Pradesh, there is no such restriction. It also has a good seed production system, growing out of a 25-year-old programme at the agricultural university in Jabalpur which was funded by the Indian Council of Agricultural Research (ICAR).

About 60% of the chickpea varieties sown in the state are new and improved, says Gaur. In Andhra Pradesh, almost 100% of the varieties are new, but chickpea is a relatively new crop there.

The soybean-chickpea cycle, while profitable, has had deleterious consequences, too. In parts of Madhya Pradesh where it’s alternated with soybean, the soil has been depleted of molybdenum, an element that enables leguminous plants to activate enzymes in their nodules, which help absorb and store nitrogen from the air. Studies by SC Gupta, principal scientist (soil science) at Rafi Ahmed Kidwai College of Agriculture, have shown that by coating 1 kg of seed with just 1 gm of ammonium molybdate—an extra cost of ₹400 per hectare—chickpea yield can go up by 3 quintals. This innovation was accepted and the government supplied the micronutrient at a discount for two years under the National Food Security Mission. But farmers couldn’t get it in the last planting season because of the government’s inability to contract supplies in time.

Madhya Pradesh’s average chickpea productivity is 1,160 kg per hectare, higher than the national average of 972 kg. Within the state, average yields are higher in Chhindwara area (CM Kamal Nath’s constituency), though the 16 districts of the Malwa and Vindhya plateaus, of which Indore and Bhopal, respectively, are best known, have larger areas under chickpea and higher production. Chickpea is unique among pulses, in that only 15% of the output is used as dal, says Singh. About 60% is consumed as besan or added to atta to fortify it with fibre and protein. The rest is used as seed—it takes 80-100 kg of seed to sow a hectare.

The production of pigeon pea has also doubled—from 2.36 million tonnes in 2003-04 to nearly 5 million tonnes in 2016-17. But it has not stabilised.

The development of a summer variety, which matures in 55-60 days, has expanded the mung bean area in Punjab and Haryana because of the prohibition on early planting of rice, to conserve groundwater. The crop is grown after wheat, and being a legume crop, helps improve soil fertility. Summer mung bean production has doubled over the past 15 years, though the output of the rainy season (kharif) crop has been declining for much of that period.

To stabilise prices, higher pulses output will have to be complemented with better storage technologies. Whole pulses don’t keep long. In the presence of moisture, they get infested with bruchids (lice-like pests) called ghun in Hindi. These enter during the flowering stage and get encapsulated in the seed coat. Singh recommends irradiating whole pulses with low doses of gamma rays. The IIPR has found the machines used by Kanpur tanneries to decontaminate leather to be effective. Gaur says triple-layer bags, developed by Purdue University of the US, are a low-cost, effective and insecticide-free method of storing pulses. They cut off oxygen supply and prevent insect infestation. Developed under a project funded by the Bill & Melinda Gates Foundation, the bags have been used effectively to store cowpea (lobia) in Africa. The Odisha government has given 60,000 of these bags to farmers in the state this year for storing groundnut. ICRISAT has recommended these for pulses as well.

By: Vivian Fernandes

The article first appeared in the Financial Express