‘Learning by doing’ helps mothers tackle undernutrition in Malawi – showing significant improvements in just 3 weeks.

Malnourished children under two in rural Malawi whose mothers were trained in diet diversity, hygiene and food safety have shown significant improvements of their nutrition and health in just three weeks. The study published in the Journal of Public Health Nutrition, Cambridge University Press (https://doi.org/10.1017/S1368980017003652), on January 17, 2018, demonstrates the rapid impact a properly designed nutrition education intervention can have.

Under-nutrition is a persistent and complicated problem in the developing world, where imbalance in nutrition intake is a major problem. Growth impairment resulting from malnutrition is among the highest in Malawi, where over 37% of children are stunted (Malawi Demographic and Health Survey, 2016). Now, a study conducted in rural Malawi has taken on this challenge: in just 21 days, children whose mothers were given comprehensive training on diversified complementary diets, water, sanitation and hygiene (WASH) practices, and food safety, showed significant improvement in wasting, underweight and mid-upper arm circumference (MUAC), all important measures of under-nutrition. This nutrition research was conducted amongst mothers of children of under two years of age, in the districts of Mzimba and Balaka in Malawi, by a team of scientists from International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), and the Lilongwe University of Agriculture and Natural Resources (LUANAR), in Malawi. This research was
supported by the Mc Knight Foundation and the CGIAR Research Programs on Agriculture for Nutrition and Health (A4NH) and Grain Legumes.

The lack of diet diversity is a major concern for the majority of Malawian families who are smallholder farmers, growing crops for both food and income. According to the Food and Agriculture Organization of the United Nations (UNFAO), more than half of the Malawian population lives in poverty, with high food insecurity. Typically, farmers grow maize, relying on the same for their food. Other crops, when grown, are almost always grown for commercial purposes, with only recent interventions encouraging the use of millets and groundnuts for dietary diversity. Women carry out an estimated half of all farming work, alongside the majority of other household tasks and childcare, but often have limited control over household resources.

During the study, scientists ensured that they used locally available foods and practices to develop a model that could significantly improve nutrition amongst young children. Using the food group approach, they developed a porridge recipe that combined nutritionally rich cereals and legumes like finger millet and pigeonpea, in addition to maize, groundnut, carrots, amaranth leaves to complement breastfeeding and provide all amino acids and vitamins and minerals required for child growth. Significantly, the methodology followed in the intervention moves beyond knowledge transfer and instead focused on the participation of mothers who were already raising healthy children to lead cooking and training sessions for mothers with undernourished children. Also known as the positive deviant or Hearth model, this method of ‘learning by doing’ has the benefit of using stakeholders’ knowledge and practices, in order to encourage adoption and ensure continued results outside the duration of the study.

Carried out in the 2014-15 post harvest period among 179 mothers and their children, in-depth data from the study indicates the first significant scope of low-cost nutrition, food safety and hygiene training and the impact such simple practices can have on children’s health. While incidence of diarrhoea almost entirely disappeared, impact on wasting showed progressive improvements on days 7, 14, and 21, with the largest impact observed on the last. Similar trend were noticed in other indices, though the study period was too short for observing effects on stunting. “Using the ‘food group approach’ in addition to basic training on WASH practices, we were able to achieve significant improvements in measures of under-nutrition in just 21 days. If this model were to be scaled with the help of public and private development partners, the gains made could be significant in eradication malnutrition in Africa,” said S. Anitha, an ICRISAT scientist leading the study.

The study also indicates a huge area of concern on food safety, since more than half the urine samples of children studied indicated aflatoxin contamination, though this did not exert significant effect on nutrition outcomes per se. In conclusion, the research points to new direction and approaches for achieving better health outcomes amongst low-income countries in sub-Saharan Africa.
Achieving better nutrition, one cookery class at a time

A recently published research paper reveals how technology, knowledge and effective communication can help to address dietary misconceptions and encourage better nutritional practices in rural settings. The paper reports on the success of the innovative methodology used for knowledge transfer (collective cooking) among women in rural communities in Mali during the An Be Jigi (‘Hope for All’ in Bambara) nutrition project. The intervention, driven primarily by women, resulted in a significant increase in adoption of the use of whole grain sorghum for food preparation, especially for young children.

When the An Be Jigi project began in 2006, women and children in the Koulikoro region of Mali suffered from malnutrition, low growth and anemia. Despite sorghum and millets – cereals rich in iron and zinc being a significant component of the local diets, researchers found that uptake of these essential minerals was low because of the way the grains were cooked.

For example, to prepare a local dish Tô, women pounded the sorghum grains for decortication (removal of the seed coat). The women explained that decortication was considered essential as incompletely pounded grains were considered a sign of laziness on the part of the cook in their community. Decortication also imparted a wealthier status to the family. Unfortunately, the removal of bran also resulted in about 50% loss of iron and zinc.

To solve this issue, the project team developed alternative methods of cooking whole grain sorghum (without pounding out the bran): soaking and drying the grains before grinding in a mill. They also created new recipes that used the flour obtained by this method. For spreading these ideas among the main stakeholders of community nutrition – the women (especially young mothers) – the team conducted group cooking (cuisines collectives) sessions to teach women the recipes and discuss child nutrition and hygiene issues. Several remarkable women came forward to become nutrition leaders in their regions, conducting workshops and information sessions. They explained that using whole grain not only increased the nutritive value of their food, it also freed up the time that the women would otherwise spend pounding the grain in a mortar and pestle.

Aminata Sanogo and Assa Kayentoo are two such nutrition leaders who use the local idiom to explain the science behind nutrition, growth and health. To make an impact on a largely illiterate audience, they use pictures, drawings and examples drawn from day-to-day life (“Proteins are essential – like the bricks to build a house”).

During these sessions, apart from learning new, wholesome recipes, women could also discuss among themselves other problems and difficulties. This led to greater understanding of the workings of rural communities, the roles played by women in the family and the age-old perceptions associated with food. A post-project survey in 2015 revealed practical problems faced by the rural women in including whole grain in their diets, such as not having a flour mill close by for grinding the whole grain sorghum into flour, and having to depend on men to drive them to the mill.

Nevertheless, the work done by An Be Jigi has resulted in a significant increase in the consumption of whole grain sorghum in the region, especially among young children.
The above-mentioned paper about the study, conducted after conclusion of the project, revealed that over 71% of the women were feeding whole grain to their children at least every other day. About 56% of families were having whole grain diets every day.

By reaching out to the women in novel ways and digging deep to understand their motivations for adopting certain cooking practices, *An Be Jigi* researchers have broken new ground in social science research. They have shown that knowledge and technology sharing reaps richer rewards with a cultural understanding of the local milieu.

Mothers in the Koulikoro region of Mali are leading by example to create a more capable younger generation. While some challenges still exist – removing gender-based distinctions on activities (e.g. riding motorbikes) – women like Aminata, Assa and others have contributed immensely to changing the mindsets and practices of villagers in Mali, giving the children a solid base for a stronger, healthier adulthood.

**Partners:** Malian National Agricultural Research Institute, IER (Institut d’Economie Rurale); Helen Keller International; McKnight Foundation; Association Malienne d’Eveil au Développement Durable (AMEDD); Union Locale des Producteurs de Céréales de Dioila (ULPC); Coopérative pour la Promotion de la Filière Semence de Siby (COPROSEM); Wageningen University (Netherlands); Institut de Recherche pour le Développement (IRD, France); Département de Technologie Alimentaire of IRSAT (Burkina Faso); ICRISAT.

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In the tribal communities of Jawhar in Maharashtra, farmer lives are improving through better practices like growing legumes such as chickpea in rice fallows and using low-cost but high-value vegetable production systems adapted to the harsh climate conditions in these areas. In this new video of the UN’s Food and Agriculture Organization (FAO), Asia and the Pacific, ICRISAT is featured as a key nutrition partner helping promote food system diversity in India. FAO is helping its member countries improve nutrition from the ground up. The video shows how farmers are being supported to improve farm and diet diversity.
Indian smallholder farmers could soon benefit from the growing confectionary peanut market, as the first-ever high oleic groundnut varieties adapted to India are ready for release

To respond to the growing demands for high oleic peanuts, groundnut scientists from the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and partners across India have just developed the first-ever oleic-rich peanuts in Spanish and Virginia bunch types, adapted to Indian farm conditions.

Until now, Indian groundnut farmers have not benefited from the fast growing global confectionary market, as they could not supply high oleic content peanuts as required by the confectionary industry. High oleic peanuts have tenfold lower oxidation compared to normal peanuts, improving its shelf-life from 2 to 9 months. It avoids rancidity and high oleic peanuts have much better flavour. Oleic acid or omega-9 fatty acid which can be found in olive and nuts like almonds also have important health benefits.

Groundnut breeder Dr Janila who led this demand-driven breeding programme since 2011 explains, “Six years ago, we had foreseen this new market demand for high oleic content and we wanted to incorporate this market trait into popular local varieties grown by Indian farmers, by crossing with an American runner type variety rich in oleic acid (Sunoleic 95R). Thanks to new advancements in molecular research and crop improvement tools[1], we have rapidly and cost-effectively identified a handful of very promising lines adapted to Indian agroecologies.

These high oleic varieties have the quality the industry wants and have shown excellent performance in the fields.”

Currently, Indian groundnut farmers grow bunch type groundnut varieties adapted to rainfed environments, early maturing and with rapid filling of the pods after flash rains. Such groundnuts are however low in oleic acid, around 45 to 50% of total fatty acids. Certain groundnut varieties grown in America and in Australia are much richer in oleic acid (above 80%) thanks to specific mutations in the gene coding the enzyme fatty acid desaturase or FAD, which blocks the conversion from oleic acid to linoleic acid.

At present, multinational confectionary companies are sourcing tons of high oleic peanuts from Australia for their Asian processing units, in order to respond to the growing Asian market of peanut-based confectionary products like chocolate bars and breakfast cereals.

Knowing the cost of importing peanuts and rising global groundnut prices, leading food companies are seeking opportunities to locally source high oleic peanuts from India and other countries in Asia and Africa where they operate. Such market pull for high oleic groundnut varieties would improve incomes of many smallholder groundnut farmers.
This strategic market-driven research is an on-going collaboration between ICRISAT, Indian Council of Agricultural Research (ICAR)-Directorate of Groundnut Research (DGR) in Junagadh, Gujarat, the Main Oilseeds Research Station of Junagadh Agricultural University (JAU), Palam Research Station of Telangana State Agricultural University, Oilseeds Department of Tamil Nadu Agricultural University (TNAU) in Coimatore Department of Regional Agricultural Research Station and the Regional Agricultural Research Station of Acharya NG Ranga Agricultural University (ANGRAU) in Tirupati, Andhra Pradesh.

Breeders were able to cut down costs and crop selection time from hybridization to national testing trials from 10 to 6 years, thanks to several innovations including rapid-generation advancement, the use of single nucleotide platform (SNP) marker-assisted selection to screen oleic acid-rich FAD mutants among thousands candidate lines and near infrared reflectance spectroscopy (NIRS) for robust and non-destructive phenotyping. Since 2016, best-bet lines have been tested across India and shared with partners in Asia-Pacific region and African countries that include, Tanzania, Uganda, Ghana, Mali, Nigeria, Myanmar and Australia. The improved lines show similar or even superior productivity than the current check varieties grown by local farmers.

Sixteen high oleic lines have been tested in a national multi-location trial, for their agronomic performance and market quality, under the All India Coordinated Research Program on Groundnut during 2017. It was the first-ever “specialty” trial in India for groundnuts. Results from 2016 multi-location testing show well-adapted lines for the major groundnut producing States of India (Gujarat, Tamil Nadu, Telangana and Andhra Pradesh), that perform better than farmer-preferred local varieties (from 5-15% up to 84% yield increase) and oleic content over 80%.

Recent sensory testing of these newly bred high oleic lines, conducted in collaboration with a global confectionary food company, has revealed equivalent flavour quality to the confectionary high oleic peanuts normally used by the industry.

As nationwide trial was conducted with all the major national research partners, scientists recommend a fast-track official release to start certified seed production from this year. “With such results, there is now a real potential for smallholder groundnut farmers from India, but also other Asian and African countries to supply new markets, like the confectionary industry, with locally produced high oleic peanuts. This can be a win-win situation as farmers would benefit from a premium price and food companies would tap into a local supply instead of using expensive imported peanuts”, says Dr Janila. “We have to be ready for scaling up this innovation.”

ICRISAT is engaged with an innovative farmer organization from Gujarat, Khedut Foods and Feeds, a Gujarat company, which works with 8,000 small farmers with average farm size between 1 to 2.5 acres. This farmer organization is already engaged in seed multiplication and production of good quality commodity to meet food safety standards as they understand farmers need to grow what the market wants. Khedut proposes premium prices for farmers that respect good crop management practices (incorporate organic soil matter in the soil, avoid drought, storage and harvest conditions) to prevent aflatoxin contamination, another prerequisite of the food industry.

This research enabling the fast-track development, testing and commercialization of ‘high oleic’ groundnut varieties that can be grown in the 4.8 million hectares of groundnut belts of India has been funded by the National Mission of Oilseeds and Oil Palm (NMOOP), Department of Agriculture and Cooperation (DoAC) of Government of India.


Oil super rich groundnut ICGV 03043 ready to quench India’s thirst for peanut oil

“I’m very pleased with new groundnut variety ICGV 03043 because its seed rate is low, it requires less fertilizer and pesticides, and takes less time to weed compared to K6, the variety I normally cultivate. Threshing is also a lot easier because of its thin stem,” says Mr Narasimha Reddy, groundnut farmer from Sri Rangapur village of Wanaparthy district, a 2-hour drive from Hyderabad in Telangana State Read more on Agri-buzz blog

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First-ever high oleic peanuts adapted to India

A perfect example of demand-driven crop research that will benefit smallholder farmers.

This work contributes to UN Sustainable Development Goals.

New technique helps create better crops faster than conventional breeding methods

Dr Damaris Odeny, Biotechnology expert for the Eastern and Southern Africa region at the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) explains how ICRISAT uses a new plant breeding system called speed breeding to develop new productive and resilient crop varieties in a much faster way.

With specific controlled growth environmental conditions in greenhouses, plant breeders can grow several generations in a year, thus saving time and money when testing promising high-yielding lines with much needed traits such as disease tolerance.

Researchers at ICRISAT are working to figure out different ways to speed up crop breeding. See below for a case study released recently.

Modernizing our crop breeding management: How better data management leads to faster and cheaper plant breeding. A case study of our collaboration with Integrated Breeding Platform (IBP).

For more information: http://www.integratedbreeding.net/attachment/1629/Case-study_ICRISAT_vFINAL.pdf

Contact: Dr Abishek Rathore, Theme Leader, Statistics, Bioinformatics and Data Management
Website: www.IntegratedBreeding.net.
The CGIAR Research Program on Grain Legumes and Dryland Cereals Agri-food Systems (CRP GLDC) launched focused on increasing the productivity, profitability, resilience and marketability of critical and nutritious grain legume and cereal crops grown in Sub Saharan Africa and South Asia. This second phase CRP combines the lessons learned from three phase 1 CRPs: Dryland Cereals, Grain Legumes, and Dryland Systems. CRP-GLDC is a Research for Development investment of US$413 million over five years (2018-2022).

CRP-GLDC is one of 12 CRPs delivering to the CGIAR’s Strategy and Results Framework (SRF) 2016–2030. By 2030, CGIAR and its partners will aim for 150 million fewer hungry people, 100 million fewer poor people, at least 50% of whom are women, and 190 million ha less degraded land (http://www.cgiar.org/about-us/our-programs/).

The CRP has prioritized integrated research for development on six legume (chickpea, cowpea, pigeonpea, groundnut, lentil, soybean) and three cereal (sorghum, pearl millet, finger millet) crops grown in semi-arid and sub-humid dryland agroecologies.

CRP-GLDC will be managed by the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), supported by the International Institute of Tropical Agriculture (IITA), World Agroforestry Center (ICRAF), International Center for Agricultural Research in the Dry Areas (ICARDA), International Livestock Research Institute (ILRI), International Water Management Institute (IWMI) and Bioversity International. These CGIAR partners will lead key programs of the CRP along with Australia’s Commonwealth Scientific and Industrial Research Organization (CSIRO), the French-Agriculture Research for Development (CIRAD), and Institute of Research for Development-France (IRD).

For further information, please contact:
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This work contributes to UN Sustainable Development Goals
**In the media**

**Access to quality seeds: the example of local seed ventures in Malawi**

**Jérôme Bossuet**

22 January 2018

For sub-Saharan African smallholder farmers, poor harvests can frequently be attributed largely to poor quality seed, but providing varied, high-quality seed is one of the most efficient and cost-effective strategies for boosting green sustainable growth. In Malawi, over the past 15 years, an innovative seed revolving fund has gradually given rise to a local, privately-owned seed industry that has provided a platform for relaunching the country’s groundnut production.

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**Interview**

Food Tank discussed agricultural challenges faced by farmers in the semi-arid tropics, potential solutions and ICRISAT’s focus on the entire agricultural value chain with Dr David Bergvinson, Director General ICRISAT. Dr Bergvinson also reflected on the role of digital technology in agriculture to better manage on-field and market risks for both farmers and consumers.

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HYDERABAD: With booming population and burgeoning urbanisation, the water bodies are becoming increasingly filthy and unfit for human utilisation. Lakes and rivers are turning into giant gutters carrying waste and sewage. To provide a solution to this problem, the International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) has been working on a new concept called Constructed Wetlands (CW).

The project, researchers say, will greatly help improve the quality of water bodies that are currently being choked by gallons of untreated sewage disposed into them. In the highly-developed Hyderabad itself, only 50 per cent of the whopping 1,450 million litres of sewage generated every day is treated at STPs. Most of the untreated sewage is let out into water bodies -- mostly into Musi River.

The situation, needless to say, is worse in rest of the State compared to the capital city. Almost none of the 73 urban local bodies in Telangana, and more than 8,600 gram panchayats, have STPs. The result is sewage mixing with water bodies on an everyday basis, affecting surface water, groundwater, aquatic life, now, ICRISAT, as part of an India- European Union project to treat sewage water, has developed around 30 constructed wetlands across the country, including three in Telangana. Researches have shown that a properly designed ‘constructed wetland’ can reduce pollution causing substances.

Solution to water crisis
“Currently, waste water is also being used for agricultural purpose which is dangerous,” says Suhas P Wani, ICRISAT’s Asia research program director. Wani adds that these wetlands can be created on open lands and near lakes that have illegal sewage outflows. The constructed wetlands requires a 1-meter deep pit measuring 20 meters in length and breadth each and a tank of similar measurement to store treated water.

What are constructed wetlands?
Constructed wetlands are made by digging up a portion of earth in which gravel, sand, mud are added in layers and are topped with plants. Few selective plant species, known for their ability to absorb pollutants, are used. The process involves collection of sewage in the wetland before reaching the water bodies. It’s then treated using natural filters like sand, gravel, pebbles and plants to remove the impurities. It takes three days for polluted water to get filtered and leave the wetland so that process is effective.
Enabling Marginalized Farmers to Have a Say in Crop Cultivar Selection

In Indervelly village, North Telangana, India, a few weeks after the last rains in mid-November, cotton seeds are ripening, ready for harvest and farmers are getting their fields ready for post-rainy (rabi) crops such as chickpea and sorghum. Sorghum is often cultivated in the less fertile plots, but is still an important food crop for the marginalized families of this region. Here, delicious rotis (soft flatbreads) are made with flour of the local landrace of this dryland cereal. Yet, sorghum yields are very low in this region (less than 900 kg per hectare) as only 20% of rabi sorghum fields are planted with improved varieties. Farmers still prefer local landraces mainly because of their grain qualities determining the unique taste.

"Farmers' adoption of improved crops varieties will be higher if they can choose a variety suiting their particular needs, and if they feel a sense of participation and ownership in the varietal selection process", says ICRISAT crop physiologist Jana Kholova. "It is of utmost importance that the variety fits the local farming conditions: e.g. inputs (rainfed/irrigated, fertilized/non-fertilized), soil (shallow/deep) and so on."

On-farm farmers’ participatory varietal selection/improvement is a successful method used to boost the adoption of cultivars in many countries; however, this approach is not effectively used to develop crop for under-privileged social sections in India. Studies have shown that lack of resources (fertilizers, irrigation, seeds, even manpower) plays a significant role in inhibiting adoption of improved varieties by farmers. Especially, smallholder farmers from socially underprivileged sections cannot afford to take the risk of trying out new cultivars which may ultimately not fit their needs; as a result, they are slower to adopt new varieties.

To achieve satisfactorily high rates of adoption, crop scientists need to understand the preferences and cultural background of the farmers and provide them the range of variety choice relevant to their farm situations and their crop management practices. In short, smallholder farmers need to be included in the process of testing and adopting new varieties.

Dr Kholova from GEMS has initiated efforts to involve farmers in remote areas of Telangana State (Pataguda village in Adilabad district) in farm testing of lines pre-screened for better production in low-input crop management practice. Feedback from the farmers will stimulate development of a larger testing network and inform crop improvement programs to develop cultivars more adapted to farmers’ needs. This would ultimately increase adoption of improved varieties of rabi sorghum with greater impact on sorghum yield, nutrition and farmers’ income.

The initial part of the experiment involved:

- Screening 50 sorghum lines for agronomic performance and adaptability to local farming conditions
- Planting the six (best-bet) selected cultivars back in the farmers’ field along with the local landrace (called Persa Jonna locally) and standard rabi sorghum cultivar (Maldandi) as checks.
- Analyzing the farmers’ feedback based on his/her preferences (look/feel/taste/yield).

The farmers participatory approach experiment is, as of now, in the initial stages, with the scientists trying to lay the baseline for a more rigorous study which will involve analysis of multiple socio-agro-ecosystem aspects. The scientists foresee that, with time and a greater trust between them and the traditionally marginalized farmers, these shall have more impact on the crop improvement decision-making process. This approach requires crop scientists to confront the reality of crops grown in the marginal land in the farmers’ fields.

Breeding programs of agricultural research institutes such as ICRISAT, when developing elite lines with drought/pest-resistance, high yields, and other beneficial traits, have to start with the end-user demand. By analyzing the main drivers of adoption of rabi sorghum, and by devising participatory crop breeding protocols that truly take into account farmers’ preferences, Dr Jana Kholova and her colleagues at ICRISAT are hoping that these adapted lines reach the most vulnerable sections of farmers.

Authors

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This work contributes to UN Sustainable Development Goals

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Views of African Youth on Agribusiness

Sarah Laura Mango, Agricultural Officer, County Government of Saiya- Ministry of Agriculture

Moses Njenga Njogu, Farm manager, Kenya Ordnance Factories Corporation

Lydia Asiimwe, Marketer, Afribanana Products Ltd, Uganda

Itayi Chidzungu, Economist, Ministry of Industry and Commerce, Zimbabwe

Rebeka Talohole Shiimi, Senior P. Secretary, Ministry of Industrialization, Trade & SME Development, Namibia

Mansour Chokri, President, Association Pinna APDPE, Tunisia
Establishing millet private industry collaborations globally

Over 100 millet companies displayed their products at the Organics and Millets International Trade Fair and conference at Bengaluru, India. “Buyer Seller Meet’ (B2B), an integral part of the Trade Fair brought together international and domestic buyers (including exporters, wholesalers and retailers), suppliers and farmer groups to negotiate trade and marketing.

ICRISAT organized delegations of private industry and government representatives from Kenya, Zimbabwe and Iran, to expose them to millet products, companies, processing equipment and research institutes. This is likely to lead to collaborations between the countries, which can fast track establishing stronger millet processing industries overseas.

Nutrition, sustainable agriculture, new markets and future foods were some topics covered during the scientific conference organized by the Indian Institute of Millets Research, IIMR.

Millets were hailed as a Smart Food and the challenges and opportunities around promoting millets were discussed.

‘Millet Industry WhatsApp group’ was initiated and promoted by ICRISAT to facilitate knowledge sharing on market opportunities in India and overseas, research advances being made and to connect industry across the country and along the value chain.

Dr Anitha Seetha, Senior Scientist – Nutrition, ICRISAT emphasized the value of diversifying children’s diets with millets to overcome malnutrition.
“Millets are important to help overcome and manage the rising non-communicable diseases like diabetes but we still need to create modern tasty products with millets and do the right marketing so we can reach the masses and really be able to have an impact on these diseases,” says Joanna Kane-Potaka, Director External Relations & Strategic Marketing, ICRISAT.
New Publications

Evaluating the effect of remote sensing image spatial resolution on soil exchangeable potassium prediction models in smallholder farm settings

Authors: Xu Y, Smith SE, Grunwald S, Abd-Elrahman A and Wani SP


Abstract: The objective of this research is to analyze the spatial resolution effects of different remote sensing images on soil prediction models in two smallholder farms in Southern India called Kothapally (Telangana State), and Masuti (Karnataka State), and provide empirical guidelines to choose the appropriate remote sensing images in DSM. Bayesian kriging (BK) was utilized to characterize the spatial pattern of exchangeable potassium (Kex) in the topsoil (0–15 cm) at different spatial resolutions by incorporating spectral indices from Landsat 8 (30 m), RapidEye (5 m), and WorldView-2/GeoEye-1/Pléiades-1A images (2 m). Some spectral indices such as band reflectances, band ratios, Crust Index and Atmospherically Resistant Vegetation Index from multiple images showed relatively strong correlations with soil Kex in two study areas.

http://oar.icrisat.org/10119/

Socioeconomic Analysis on Problems and Prospects of Major Pulse Productions and Consumption in Bihar, India

Authors: Kumari M, Bhattarai M, Meena LK, Bairwa SL, Rahaman SM and Kumar S

Published: 2017, International Journal of Current Microbiology and Applied Sciences, 6 (6). pp. 3150-3161. ISSN 23197692

Abstract: The main objective of this paper is to appraise the existing situation of major pulse production and consumption with adoption of technologies and its impact on crop productivity, income, and other socio-economic issues. The average productivity of improved variety of chickpea in adopted villages was estimated at 9.5 quintal/ha & for local variety it was 8.5 q/ha. For pigeon pea the productivity was 18to 19 quintal/ha. The per capita income in the adopted village was more than that of control village accounted 54% of income from the crop enterprises and from pulses its share was estimated only 10 to 12 percent of total farm income. Human labor accounted highest cost in pulse cultivation (farm family contributed about 52 percent of total labor). Comparative cost and benefit analysis indicated that pulse crop were more remunerative in Bihar. Constraints analysis indicates that the non-availability of seeds of high-yielding varieties in the desired quantities was perhaps one of the major constraints followed by moisture stress, high pod borer incidence, and shortage of labor during harvesting and threshing and some of variety found not suitable in flood affected area etc in pulse production. The share of consumption expenditure on pulses was only 15.60 percent of total food expenditure/household. It is suggested that major future expansion of area under pulse crops may take place in rice fallows, (1.2 million ha) where there is no other crop to compete with periods, low productivity, and stagnation in production technology has acted as disincentives for pulses production.

http://oar.icrisat.org/10120/

Effect of grain moisture content on the physical properties of some selected sorghum varieties

Authors: Adinoyi A, Ajeigbe HA, Angarawai II and Kunihya A

Published: 2017, International Journal of Scientific & Engineering Research, 8 (6). pp. 1796-1805. ISSN 2229-5518

Abstract: Determination of physical characteristics of grain of biomaterials is important in the design of harvesting, handling, and processing equipment. This helps in understanding the problem of separating grains from undesirable materials during threshing and winnowing, as well as in designing post-harvest handling equipments. Physical properties of sorghum grains from ten varieties (7 released and 3 breeding lines) were investigated under three different grain moisture content of 10%, 20% and 30% dry basis (d.b.). Results from the experiment revealed wide variation among the sorghum varieties on the physical properties measured. Arithmetic Mean Diameter ranged from 4.233 mm to 4.872 mm, while the Geometric Mean Diameter of the varieties ranged from 4.215 mm to 4.864 mm. Sphericity for the different sorghum varieties fall within the range of 0.86 to 0.96. It was also observed that the surface areas of the sorghum varieties are between 52.2 mm² to 70.00 mm². The results further showed that Aspect ratio ranged from 0.84 to 0.94 and the Angle of repose for the sorghum varieties were from 31.510 to 34.250. Result from the study revealed that, increase in moisture content led to increase in the surface area, arithmetic mean diameter, geometric mean diameter, sphericity and angle of repose. Variety and changes in moisture content significantly affected the physical properties determined.

http://oar.icrisat.org/10122/

Genetic Diversity Analysis among Inbred Lines of Pearl millet [Pennisetum glaucum (L.) R. Br.] Based on Grain Yield and Yield Component Characters

Authors: Ramya AR, Ahamed ML and Srivastava RK

Published: 2017, International Journal of Current Microbiology and Applied Sciences, 6 (6). pp. 2240-2250. ISSN 23197692

Abstract: An experiment was conducted to assess genetic divergence among 60 inbred lines included 27 maintainer (B-) and 33 restorer (R-) lines of pearl millet based on quantitative data of grain yield and its ten component traits using hierarchical cluster and principal component analysis (PCA). The PCA identified four principal components (PCs) with Eigen value greater than 1.00 and accounted for 70.97 per cent of total variation. Most important traits in PC1 are days to 50 per cent flowering, plant height, ear length, ear diameter, grain yield per plant, fresh stover yield per plant, dry matter yield per plant and grain harvest index and captured 26.85 per cent of total variation. PC2 was represented by ear diameter and dry matter yield per plant and contributed 18.06% of total variation. Two characters,
grain yield per plant and grain harvest index contributed positively on all the first four PCs. Cluster analysis grouped the inbred lines into eight clusters and the characters, plant height, 1000 grain weight, dry matter yield per plant and productive tillers per plant contributed maximum towards genetic divergence. The grouping patterns of parental lines in PCA and cluster analysis were almost in agreement with each other with minor deviations. The study noticed maximum inter cluster distance between lines of cluster I and II with cluster VII, indicating that lines included in these clusters may have high heterotic response and produce better segregants when used in Pearl millet hybridization programme.

http://oar.icrisat.org/10126/

Potency of constructed wetlands for deportation of pathogens index from rural, urban and industrial wastewater

Authors: Kaushal M, Patil MD and Wani SP
Published: 2017, International Journal of Environmental Science and Technology. pp. 1-12. ISSN 1735-1472
Abstract: The study was conducted to evaluate seasonal performance of constructed wetland systems in removing Escherichia coli, Enterococci and total coliforms under continuous hydraulic flow. Results displayed that all three wetlands gain recognition in removing pathogen load with high removal efficacy till water reaches output ports. Removal efficiencies were even higher, 66–93, 78–92 and 80–94% for E. coli, Enterococci and total coliforms, respectively, within constructed wetlands. Remarkably at shorter temporal scales in CW-A, greater homogeneity of pathogen concentrations was assessed at wetland outlet sites. In outlet ports, results displayed a highly effective removal of E. coli concentration 80–90% (June 2015), 86–92% (October 2015) and 79–92% (February 2016), Enterococci 80–94% (June 2015), 83–94% (October 2015) and 80–94% (February 2016) and total coliforms 85–93% (June 2015), 87–95% (October 2015) and 88–96% (February 2016). Positive correlation was observed between bacterial indicators (E. coli–Enterococci, r = 0.038; p < 0.01 and E. coli–total coliforms, r = 0.142; p < 0.01). Removal of bacterial indicators in constructed wetland was also displayed by PCA in which three-component analysis of variance was 98.39% and showed a clear decrease in measured parameter gradients toward samples from outlet ports. Constructed wetlands provide cost-effective treatment systems for reducing the pathogen load in wastewater in variable agro-climatic conditions and thus improve water quality.

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News feed

Millets trade fair in Karnataka rakes Rs 107 crore business (Business Standard)
IIMR signs deals with ‘millet-preneurs’ (Deccan Chronicle)
Bengaluru gives a big thumbs-up to namma millet (Times of India)
Millet fair wows milling crowds (Indian Express)
Centre has approved 2018 as Year Of Millets, says Sadananda Gowda (Financial Express)
Beer bonanza: Rasanga sees billions from sorghum crops (the-star.co.ke)
Brewers gear up to serve millet beer at global trade fair (Deccan Herald)
Nigeria: Investing in Food Security (The Guardian)
African Orphan Crops Consortium Tackles 101 Crop Genomes, Training in Africa (Genome Web)
An army of worms is invading Africa (The Economist)
Scientists are breeding super-nutritious crops to help solve global hunger (The Conversation)
Bengaluru: Millets in mid-day meals, Akshaya Patra starts pilot (Deccan Chronicle)

Readers’ Comments

Improving or raising income of the farmers is the best way of realizing SDGz. Value addition to coarse cereals by processing into germinated, fermented products, beverages and alcoholics has tremendous potentials. It will also improve over all nutrition. Rgds

Jagir Singh Samra, Ex-CEO,
National Rainfed Area Authority, GOI
**New Projects**

**Project title:** Enhancing Groundnut Productivity and Profitability for Smallholder Farmers in Asia through Varietal Technologies  
**Project funder:** The OPEC Fund for International Development (OFID)  
**Principal investigator:** P Janila  
**Grant duration:** Jan 2018 – Dec 2019

**Project title:** Transforming India’s Green Revolution by Research and Empowerment for Sustainable food Supplies (TIGR2ESS)  
**Project funder:** BBSRC through University of Cambridge  
**Principal investigator:** Anthony Whitbread  
**Grant duration:** Oct 2017 – Dec 2021

**Project title:** Assessing the Potential of Agriculture and Rangelands in AFAR through managing Floods and onsite Rainwater management for Transforming Livelihoods of (Agro)pastoral communities in AFAR Region  
**Project funder:** GIZ-Ethiopia  
**Principal investigator:** T Amede  
**Grant duration:** Nov 2017 – Nov 2018

**Project title:** Initial support to LAUNCH Food Innovators – Smart Foods Myanmar and Tanzania  
**Project funder:** Australian Department of Foreign Affairs and Trade (DFAT) through AECOM Services Pty Ltd  
**Principal investigator:** Joanna Kane-Potaka  
**Grant duration:** Dec 2017 – Oct 2018

**Project title:** Increasing Agricultural Productivity through System Intensification and Science-led Interventions in Rice Fallows of Odisha, India  
**Project funder:** Agriculture and Farmers’ Empowerment Department, Govt. of Odisha  
**Principal investigator:** CV Sameer Kumar / SP Wani  
**Grant duration:** 2016 – 2018

**Project title:** Enhancing Community Resilience and Inclusive Market Systems in Zvishavane and Mberengwa Districts of Zimbabwe (ECRIMS)  
**Project funder:** UNDP through CARE International  
**Principal investigator:** K Mazvimavi  
**Grant duration:** Oct 2017 – Oct 2020

**Project title:** Appui au Ministère de l’Environnement et du Développement Durable dans le cadre de la mise en œuvre du PARC-DAD  
Support to the Ministry of Environment and Sustainable Development in the implementation of PARC-DAD

**Project title:** Nurturing Africa’s Digital Revolution for Agriculture (NADiRA)  
**Project funder:** EU through MANOBI S.A.  
**Principal investigator:** H Ajeigbe, PCS Traore  
**Grant duration:** Nov 2017 – Oct 2020

**Sad news**

Former **DDG Dr YL Nene** passes away  
![Dr Nene](image)

Noted plant pathologist Dr Yeshwant Lakshman Nene, former Deputy Director General (1989-1996) of ICRISAT, passed away on 15 January 2018. He was 81. Internationally recognized as a leader in grain legumes research, and an authority on pulses pathology and international agriculture, Dr Nene spent 22 years at ICRISAT (1974-96). Dr Nene joined ICRISAT as Principal Plant Pathologist in the Pulses Improvement Program. As DDG, he identified wilt/root complex in chickpea, and wilt and sterility mosaic in pigeonpea as the priority areas of research in these crops. His landmark contribution was resolving the ‘wilt complex’ problem in chickpea. He determined that the wilt complex, in fact, included several distinct diseases that included wilt and several other root rots.

As Chairman Emeritus of the Asian Agri-History Foundation, he helped publish numerous articles, conference proceedings, books and medieval texts (translated from Sanskrit, Farsi, etc. into English) on ancient agricultural history. He has authored, edited, or co-authored a total of 440 publications. His research articles have been published in 52 journals. Dr Nene will be remembered as an accomplished scientist and an active spokesperson for Indian agricultural heritage. ICRISAT offers condolences to his family.