Building resilient agri-food systems in East and Southern Africa

Research Impact Highlights - 2020

Cover photo: C Wangari, ICRISAT
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I t is with great pleasure that we share ICRISAT East and Southern Africa highlights of research progress and stories of transformation achieved in 2020. The year was very critical as it marked the end of ICRISAT’s 10-year Global Strategy - Inclusive Market-Oriented Development for Smallholder Farmers in the Tropical Drylands; and the development of a refreshed 5-year Strategy (2021-2025). At the same time, the year presented unprecedented challenges as the world grappled with COVID-19 pandemic. Yet, the Institution remained steadfast in its delivery of science-led solutions to ensure productivity and resilient agri-food systems in the semi-arid tropics.

Notable progress was made in completing the setting up of the Crop Improvement Modernization hub in the region which will drive the breeding agenda in the coming years. The hub deploys modern tools and advanced breeding technologies such as genomics, big data, breeding and seed management systems that responds to markets.

It is gratifying to see that some of our interventions in 2020 provided short and medium responses to mitigate the impacts of COVID-19 on food and nutrition security. The ESA team and its partners, for example, promoted approaches such as community seed banks and seed revolving funds, while also linking with the private sector, to ensure that the released improved seed is available in the farming communities. Digital platform was deployed to continue delivering on research and reaching out to farming communities.

We acknowledge the valuable contributions of our hosting governments and institutions; funding and implementation partners. In our refreshed 5-year Strategy, we reaffirm our commitment to reduce hunger, malnutrition, poverty and degraded environment in drylands of Africa and Asia.
Message from the Regional & Research Program Director

Dr Rebbie Harawa,
Regional & Research Program Director,
ICRISAT East & Southern Africa Region

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### 2020 Headlines

**Development and deployment of new cultivars**

- **Pine Millet**
  - 53 Fe dense (> 60 ppm) lines identified in the Fe biofortification program.
  - Identified a total of 84 fixed lines

- **Sorghum**
  - New hybrid variety released in partnership with Seed Co. in Zimbabwe. Disease-resistant, suited for brewing, food and forage uses and is adaptable to diverse agro-ecologies

- **Groundnut**
  - 3 new Spanish groundnut varieties were validated and cleared for wide cultivation in Malawi
  - Produced 45 MT of breeder seed

- **Pigeonpea**
  - Developed and evaluated 20 medium and 30 long elite lines in Kenya which are Fusarium wilt-tolerant, double podded

- **Finger Millet**
  - 3 varieties released in Malawi for the first time.
  - Average yield of 2176 kg/ha compared to 350-500 kg/ha for local varieties
  - Identified 30 Fe-dense fixed lines

- **Chickpea**
  - 3 varieties released in Malawi
  - 41 chickpea lines evaluated suitable for mechanical harvest to reduce drudgery to women with high yielding, big seed, early maturity, drought resistance.

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- Identified a total of 84 fixed lines

- **Crop Protection**
  - Fall army worm: 246 accessions of sorghum screened for resistance to fall army worm in Malawi.

A total of 16,975 farmers in Kenya benefitted from 37.6 t of improved seed and were trained on GAPs.
1,470 Kenyan farmers trained on recommended harvesting and storage practices to maintain high quality sorghum, millets and legumes grain and seed.
Digital platforms used to reach farming households during COVID-19 lockdowns

- In Kenya we leveraged SourceTrace digital platforms to disseminate nutrition information and farm advisories on GAPS, weather advisories, market. A total of 918,374 messages were delivered to 20,222 households; out of which 12,133 (60%) were women-headed.
- Over 22,000 households and 2,000 frontline workers were reached in Malawi with agriculture, nutrition, and health messages.

Reducing Environmental Degradation

- We worked with partners to deploy integrated watershed management in the dry highlands (Yewol watershed) and lowlands (Afar) of Ethiopia. Between 2010 and 2020, cultivated and vegetation lands coverage increased by 44% and 16%, respectively; and bare lands decreased by 59%.

Developing climate change resilience and mitigation

- Gains made in Smart Water Management tools and Agricultural Innovation Platforms in Zimbabwe, Tanzania and Mozambique increased crop yields from 28-313 % and income by 43-94%; in farmer households.
ICRISAT- ESA Crop Improvement Modernization Programmes continue to focus on generating science solutions that will contribute to the region’s ability to deliver on the agricultural development goals. The crop improvement team generate productivity enhancing agri-innovations of ICRISAT mandate crops which include nutrient dense, stress-resilient crop varieties that are adapted to Semi-Arid Tropics (SAT) and are preferred by end users.
Efforts to develop superior sorghum and pearl millet hybrids

To enhance productivity of sorghum and millets, several open pollinated varieties (OPVs) have been developed and released over the years by ICRISAT and partners. However, greater productivity enhancement opportunities exist from sorghum and pearl millet hybrids which have shown 15-40% yield advantage over OPVs.

A few sorghum hybrids have been released in Sudan, Tanzania, Kenya, and some countries in the SADC region, while several potential pearl millet hybrids are in advanced testing in Kenya and Tanzania.

In spite of this potential, sorghum and pearl millet hybrid industry has been limited by lack of a viable hybrid seed production system. The key to the success in hybrid development depends on adaptation and diversity of the hybrid parents to realize desired heterosis.

Both public research institutions and private seed companies involved in sorghum and pearl millet improvement and seed production in ESA have limited capacity to develop hybrid parents. It is for this reason that ICRISAT partnered with eight seed companies and other public sector institutions in the region to form a Sorghum and Pearl Millet Hybrid Parents Research Consortium (SPMHPRC). Under the consortium, the institute took up the role of developing hybrid parents, and delegated the responsibility for development, testing and release of hybrids to the public sector institutions and private sector seed companies. This strategy has already started bearing fruits as a new sorghum hybrid was released in Zimbabwe in 2020.

Sorghum Hybrid released in Zimbabwe

A partnership between ICRISAT and Seed Co private seed company has resulted to a release of a new sorghum hybrid named as SCXH102. The hybrid is disease-resistant and is best suited for brewing, food and forage uses and is adaptable to diverse agro-ecologies in Zimbabwe. ICRISAT ESA breeding team supplied sorghum inbred lines to Seed Co - a primary and founding member of the Sorghum and pearl millet hybrid parents research consortium and a leading producer and marketer of certified crop seeds in Zimbabwe and in ESA region.

A variety of hybrid test crosses were done and, in the end, SCXH102 was chosen as the best performing cross. The hybrid underwent extensive multi-location trials in Lowveld (semi-arid), Middleveld and Highveld ecologies of Zimbabwe for over three consecutive cropping seasons.

SCXH102 demonstrated superior and consistent performance during the evaluation period. It outperformed all the check hybrids and open pollinated varieties used in the trials and has a yield potential of 4-8 t/ha.
Genomics breeding tools and techniques used to conquer weeds and diseases affecting cereals and legumes productivity

Striga attacks most cereals including maize, sorghum, millet, and rice. With respect to sorghum, the team worked together with the University of Nairobi and Kenyatta University and identified more Striga resistant lines among traditional cultivars and wild relatives. Similar work was done in finger millet in collaboration with Kenya Agricultural and Livestock Research Organization (KALRO)-Kisii.

DNA analysis in both sorghum and finger millet revealed that the new sources of resistance are superior to what is currently known.

One of the most devastating diseases of sorghum, especially in western Kenya, is anthracnose disease, which presents as small red spots on the surfaces of the plant that are visible around the time that the plants begin to flower. Through a collaboration with The Commonwealth Scientific and Industrial Research Organisation (CSIRO)-Australia and the University of Nairobi, the team compared sorghum varieties with known gene variations against those for which the variations are absent. They found a good match between certain gene variants and resistance to the disease. “This finding will make it easier in the future to select plants that are resistant to the disease at seedling stage without necessarily

Dr. Damaris Odeny with her team members at the genomics lab in Nairobi, Kenya

Genomics team supports the region’s breeding program by using new tools and techniques to study genomes of plants. “We work with a team of young scientists, mostly PhD and MSc students, who are studying the unique genes and gene variants that would result in superior higher yielding cultivars that are resistant to weeds and diseases”, reported Dr. Damaris Odeny, the Head of Genomics in Eastern and Southern Africa.

The team used different approaches to gain more insights into Striga resistance in both sorghum and finger millet. Striga, also called witch weed, is a problematic weed, especially in western Kenya.
Striga – considered the most devastating weed of sorghum in Africa.

Symptoms of anthracnose disease in sorghum.

growing them in the field, which is not only time consuming, but also resource and labour intensive”, reports Dr. Odeny.

Besides the Striga work in finger millet, the genomics team also collaborated with Maseno University in western Kenya to understand how finger millet fights blast disease, which can strike at any stage of finger millet growth but is most devastating if it attacks from flowering stage onwards. “We discovered that there were particularly some wild relatives that resisted the disease and were therefore good material to include in breeding programs”, Dr. Odeny adds.

Similar discovery was made in groundnut for a devastating groundnut disease, popularly referred to as Groundnut Rosette Disease (GRD), which is unique to Africa. This work was done in collaboration with National Semi Arid Resources Research Institute (NaSARRI)-Uganda and resistance to GRD was identified from cultivated groundnut and not wild relatives.
Testing Sorghum Crop Wild Relatives and Landraces in Kenya

For producers in Kenya, drought negatively impacts sorghum, which is their second most important grain crop after maize. A team of plant science researchers from a swath of institutions—the University of Nairobi, ICRISAT, and KALRO—set out to find new sources of the “stay-green” trait that indicates sorghum is resisting death due to drought.

The study was implemented by Ms. Grace Ochieng, a University of Nairobi postgraduate student attached to ICRISAT.

“The average rainfall in a season in Kenya is 250 mm, and it’s poorly distributed and irregular,” explains Prof. Kahi Ngugi, a plant breeder and associate professor at the University of Nairobi, and a co-author on the paper. “Though farmers prefer to grow maize to sorghum, sorghum guarantees at least some grain yield, even in the worst drought-affected seasons.”

In the recent study undertaken as part of Ms. Ochieng’s MSc. thesis, the authors tested 16 improved sorghum varieties, 9 landraces, and 17 crop wild relatives alongside known sources of “stay-green” traits. Unlike wild relatives, landraces are domesticated, locally adapted crops that haven’t undergone formal genetic improvement. Though scientists have already identified three “stay-green” sources—B35 and E36-1 from Ethiopia and SC56 from Sudan—the goal is to avoid dependence on a narrow genetic base by broadening their knowledge of “stay-green” traits to help farmers continue producing grain yields even under increased drought stress.

The selected genetic material was tested under water-stressed and non-water-stressed trials where the sorghum was watered for 14 days after seeding to encourage germination, and then received no irrigation thereafter. The team then rated the sorghum for its display of the “stay-green” trait, genotyped all the varieties, and discovered 9 local landraces and 2 crop wild relatives were far better performing than the previous genotypes associated with stay-green traits.

“What surprised me most was that there are many local landraces and crop wild relatives that are more drought tolerant than the conventionally used drought-tolerant sources, like B35 and E36-1,” says Prof. Ngugi. An added bonus is that those highly resistant phenotypes also produced greater yield than traditional sorghum sources.

The team’s next steps include identifying specific single-nucleotide polymorphism (SNP) markers to

Ms Grace Ochieng at a stay-green sorghum experiment plot.
make it easier to integrate the newly identified traits into locally adapted lines. “If funds and time allow, we shall test these genotypes across many locations and in many replications to obtain credible genotype by environment data,” Prof. Ngugi says.

The team has made incredible strides with just one study of sorghum crop wild relatives and landraces, tapping into new sources of genetic diversity for a highly relevant grain. Soon, Prof. Ngugi hopes to take the findings from this exploratory study and combine increased drought tolerance with other important sorghum characteristics, like increased disease and pest resistance.

Original article featured on CSA News, March 2021 issue, and written by DJ McCauley

**Improved chickpea varieties released in Malawi**

After five years of on-station and on-farm evaluations, three chickpea varieties (one kabuli- ICCV 96329; and two desi - ICCV 97105, and ICCV 97114) were released in Malawi in 2020. ICRISAT ESA legumes breeding team, through the Malawi Seed Industry Development Project (MSIDP), conducted evaluations to test the varieties for adaptability, yield, nutrition, and climate resilience, resulting to the first ever release of improved chickpea varieties in the country.

“The three varieties have a high yield potential of up to 3 t/ha, they are resistant to fusarium wilt and are suitable for multiple cropping systems”, reported Dr. Ganga Rao, Legumes Breeder at ICRISAT. The varieties were bred by the team at ICRISAT-Patancheru and tested for regional adaptability by breeding program in Kenya, and further tested for suitability to agro-ecologies in Malawi.
ICRISAT realizes that for its research efforts to have impact, the innovations generated must be delivered to the smallholder farmers. ICRISAT ESA has designed and is implementing unique models for delivery of improved seed and other agri-innovations. The ESA team, for example, use and promote approaches such as community seed banks, seed revolving funds and quality declared seeds, while also linking with the private sector, to ensure that the released improved seed is available in the farming communities.
Creating business opportunities for sorghum farmers in Tanzania

CRISAT has been working in Tanzania to build capacities of smallholder farmers to grow sorghum and millets for increased food and nutrition security, and household incomes. For the last 11 years, CRISAT has reached over 100,000 farmers in Tanzania, introducing them to over 200 varieties of sorghum and millets and educating them on recommended crop management practices. One of the major components of this work has been linking farmers to markets. This is with the view that markets are key driving forces for accelerating adoption of agricultural innovations and would provide the pull for the improved sorghum and millets varieties.

During the 2019/2020 season, CRISAT facilitated signing of contracts between farmers and the Tanzania-based Kibaigwa Flours and Supplies (KFS), a company that is involved in aggregating and supplying sorghum grain to flour processors and to Tanzania Breweries for making sorghum lager beer. Over 2,000 small-scale sorghum farmers benefited from that linkage and it is expected that over 16,000 more smallholder sorghum and millets farmers have been included in the 2020/21 contract to meet the growing grain demand.

To meet the demand for seed, CRISAT trained 180 producers of Quality Declared Seed (QDS) across the 9 districts. Mr. Godfrey Makala is one such farmer, and here is his story.

Mr. Godfrey Makala with his wife outside their new modern house, which he built from his sorghum and millets venture.

Godfrey, a farmer living in Mukulu village, Iramba District of Central Tanzania, has transitioned from being a peasant farmer to a medium scale farmer through growing a variety of crops, including sorghum and millets. Godfrey, who also grows maize and keeps poultry, cows, and goats, started the journey with CRISAT in 2015, through an IFAD funded, Sorghum for Multiple Uses (SMU) project.

Prior to working with CRISAT, Godfrey would only harvest 4 bags of 100kg sorghum per acre and 3 bags of finger millet from his local unimproved varieties. However, as he planted the new improved varieties (e.g. Macia, U15, Okoa & Shibe); and followed recommended soil and crop management practices (e.g. use of manure and tied ridges), his sorghum yields increased to 10 bags of 100 kg/acre and finger millet to 8 bags of 100 kgs/acre.

In 2017 and 2018 seasons, Godfrey was trained on Quality Declared Seeds (QDS) production of sorghum and millets. He is now among the best QDS producers in Iramba district growing improved sorghum varieties (Macia and Tegemeo) and finger millet variety - U15. He has expanded his land from 3 acres to 10 acres and now has an increased income which has enabled him to construct a modern house as shown in the picture above.
More income opportunities emerge from groundnut seed production for Malawi farmers

ICRISAT team in Malawi, in partnership with the national programmes and the private sector, use the Seed Revolving Fund (SRF) approach to ensure that high quality seeds of under invested crops (dryland legumes and cereals) are produced and delivered to smallholder farmers. The SRF involves multiplication of early generation seed (breeder and foundation/basic), which is then sold to certified seed producers for onward dissemination through civil and private agencies. The seed bulking or multiplication of early generation seed is done by involving smallholder farmers, who are trained on farming as a business. ICRISAT would provide them with early generation seed, supervise the production and harvesting process; and buy the seed back at a premium price, thereby, increasing farm-household income. Private companies would then buy this early generation seed and use it to produce, package and sell certified seed.
In 2015, Ms. Malita Phiri, a member of Chiyembe Farmers’ Club started producing groundnut seed of the variety CG7, and after two years, her fortunes changed. Speaking from the comfort of her iron sheet roofed house in Mchinji district, central Malawi, Malita recalls the inconveniences that came with living in a grass thatched house, especially during the rainy season.

“Whenever it rained at night, we would wake up and starting moving food and other household items away from the leaking spots. It was such an inconvenient way of life. But since joining ICRISAT supported farmer clubs, I have earned enough money to build a good iron-sheet roofed house which is supplied with solar powered electricity” Malita says.

For Malita, the groundnut seed revolving fund is a real change-maker. The proceeds of her seed multiplication activity have helped her to make her farming profitable. She has gained a sense of entrepreneurship and her family is food secure. Through the Farmers’ Association, Malita was able to access improved technologies (seed and other inputs) which have enabled her to fully realize the benefit of groundnut seed production.

Malita is one of the many farmers to be trained by ICRISAT on groundnut seed production, enabling her to become a seed producer for ICRISAT’s SRF. Other smallholder farmers have similar stories of how new technologies can change one’s fortunes.

SRF has had a remarkable journey since 2008 and as at 2020, it has grown to become a key source of one of the most important ingredients of farming - improved seed. Some of the key results of the SRF in 2019/2020 cropping season in Malawi is illustrated below.
Working with seed companies to boost availability of seed in Tanzania

To address challenges of limited production and supply of early generation seed, ICRISAT is committed to replicate the SRF model that has been successfully implemented in Malawi, in other countries in the region, with modifications where necessary. The intention is to involve public and private partners at each stage of the seed value chain where each player is well rewarded.

In Tanzania, the institute has partnered with Mbozi Highlands Company Ltd (MHEG), which is one of the main seed companies involved in the seed revolving fund in the country. The seed company is working to enhance the production, promotion, marketing and adoption of high yielding newly released varieties of groundnut and sorghum in Tanzania, with a focus on increasing the number of youth and women.
participating in specific nodes along the seed value chains. The seed company Managing Director Mr. Aron Mwalughelo emphasizes his commitment to work closely with women and youth groups to develop and sustain seed business hubs for both crops in the Southern Highlands of Tanzania.

For the first year of activity (2019-2020 cropping season), the seed farmer groups produced, cleaned, and delivered seeds to MHEG as agreed in the contract. Eight groups produced 1.2t and 4.8t certified seed of groundnut and sorghum, respectively. Seed samples were collected and tested by TOSCI (Tanzania Official Seed Certification Institute) for the seed germination and other quality related attributes. The seed quality check by TOSCI is a clear indication that the seed company is committed to quality seed supply to its clients.

Due to an increase in demand for seed based on the orders received for 2020/21 cropping season (the order is about 10 tons while available stock is at 4.4 tons), the company took the bold step to address this gap through irrigated sorghum seed production. MHEG opted to work with a women group to produce irrigated sorghum seeds on 5 acres in Momba District, Tanzania. To sustain seed sale and business, MHEG is in the process of rebranding and will be conducting seed promotion activities.

**Water spreading weirs help restore agro-pastoral systems in Afar, Ethiopia**

*Flood spreading weirs and sediment accumulation in the flood plain.*

Photos: Desta Glew, ICRISAT
In partnership with local and bilateral partners, ICRISAT has over the years deployed integrated watershed management (IWM) in the dry highlands (Yewol mountain watershed) and lowlands (Afar flood water spreading weirs) of Ethiopia.

Afar in Ethiopia is a drought prone area characterized by low rainfall, high temperature and suffers from flash floods that emerge from adjacent mountains. In 2015, ICRISAT and partners introduced a flood barrier - water spreading weirs (WSWs) - in Afar to convert floods to a productive use. WSWs resulted in deposition of sediments where sand deposition was higher in the upside of upstream weir whereas silt and clay deposition was prominent at the central location between the two weirs.

WSWs created different farming zones following soil moisture regime that would affect grain and biomass yield. In good potential zones with high moisture content, the WSW-based farming enabled higher food production - both grain and biomass, respectively, while in low potential zones there was a complete crop grain failure. The system has enabled pastoralists to produce huge amount of biomass and grain during short and long growing seasons which would be stored and utilized during succeeding dry periods.

The practice has ensured a visible recovery of degraded rangelands. The agro-pastoralists continue to affirm the significant contribution of flood water spreading weirs (WSW) to reduce soil erosion and gully formation. Between 2010 and 2020, cultivated and vegetation lands coverage increased by 44% and 16%, respectively and the bare lands were decreased by 59%; partly due to the initiatives by ICRISAT and partners.

Farmers also reported improved livestock productivity - a major source of food and income for the pastoral and agro-pastoralist livelihoods, making WSWs key contributor in alleviating shortage of feed and water problems. In 2020, 81.8 % of the beneficiaries confirmed that livestock productivity increased after the construction of the WSWs. Significant annual income differences (p > 0.05%) from selling of livestock between project beneficiary and non-beneficiary agro-pastoral communities was observed in 2020. Project beneficiary agro-pastoralists earned a higher annual income (averagely 800 USD) than the non-beneficiaries (averagely 390 USD). The considerable variation in incomes is highly likely due to adoption of crop-livestock technologies and management practices leading to improved and sustained livelihood condition.

Change in land use/cover in 2010, 2015 and 2020 using flood water spreading weirs.
Transforming smallholder irrigation into profitable and self-sustaining systems in southern Africa

The use of the two synergistic interventions – Smart Water Management tools (the Chameleon and the FullStop Wetting Front Detector) and Agricultural Innovation Platforms reveal big gains accrued from using simple technologies embedded in a wider learning environment. Some of the immediate outcomes reported from project sites in Mozambique, Tanzania and Zimbabwe pointed to increased crop yields ranging from 28-313 %, income increase of 43-94% in farmer households, 43–60% increase in off-farm income due to less time spent irrigating and 40–85% of farmers reducing their irrigation frequency.

These interventions are being implemented under a project titled “Transforming smallholder irrigation into profitable and self-sustaining systems through outscaling in southern Africa (TISA)” implemented by ICRISAT and partners and is based on the premise that the transition from subsistence – to business-focused farming is essential to maintain infrastructure for sustainable irrigation.

The project utilized two separate interventions to investigate what leverage points could change farmer behaviours to transform schemes with continuous improvement for profitability and sustainability:

- Introducing Smart Water Management tools to facilitate farmer’s learning about soil moisture and nutrient management; and
- Agricultural Innovation Platforms to bring together irrigators and stakeholders to generate a vision for the scheme and identify barriers to higher profitability, actions to overcome them and who to best implement them.

The agricultural water management research shows that application of simple-to-use soil monitoring tools provided critical information for farmer
learning, facilitating decision-making, and learning about soil-water-nutrient dynamics that led to improved water productivity. The farmers increased their crop production using the tools and better irrigation infrastructure. Learning was a critical contributor to the project’s impacts with individual farmers learning by holding soil monitoring tools in their hands, making immediate and informed decisions. This led to experimentation and further adaptation. Farmers retained nutrients in the root zone by reducing irrigation frequency, number of siphons, and event duration.

The Agricultural Innovation Platform processes reinforced this learning and innovation by connecting farmers to new information sources as well as to input and output markets, leading to increased farmers’ income and overall well-being. At other scales, farmer organizations and local governments learnt, as did extension officers and government officials, leading to systemic changes.
Embracing cooperative business models for profitability of dryland crops

Since 2015, ICRISAT, through the Feed the Future Kenya Accelerated Value Chain Development (AVCD) Program has been working to create business opportunities for drought tolerant crops value chain actors in Kenya. In 2020, ICRISAT in partnership with County governments worked with of over 100 representatives of farmer producer organizations and other value chain actors to help them run as cooperatives and empowering the members to take advantage of the business opportunities available. Other value chain entrepreneurs including youth groups, millers and aggregators were also trained to help them increase their incomes through improved business management skills.

“We started by conducting a needs assessment for six FPOs from our three mandate counties in Kenya – Kitui, Makueni and Taita Taveta”, reported Ms. Winfred Ithewa, Marketing Consultant, ICRISAT. “The assessment was directed towards finding out their current strength in organization structure, contract farming, collective marketing, and business aspects of the cooperatives including access to finance, market access and branding as well as...
business planning. We then structured the capacity development interventions based on the results of the needs assessment exercise”.

The team has been able to successfully support the FPO’s to develop their own business plans and marketing strategies by the project consultant. Collective marketing structures were developed during capacity building sessions to enable FPOs organize their activities to strategically position themselves in a competitive environment full of middlemen/ brokers.

According to Mr. Kivindu, the quality of grain produced by the cooperative’s members has greatly improved since they received post-harvest training by ICRISAT staff. “Our members now know that they must use quality seeds and adhere to the post-harvest handling guidelines in order to produce good quality grain” he says. “The cooperative has formed a grain selection team that ensures that only the best quality grain is deposited in the aggregation centre”. This, he says, has led to an increase in demand of their produce.

Last season (2020), the cooperative aggregated grain from 30 of their active members which was sold for about Kshs. 300,000 and the funds deposited to individual members mobile money (Mpesa) accounts. This has attracted more farmers in the area to join the cooperative which now has a membership of about 500 farmers.

The cooperative with the help of ICRISAT has set up a community seed bank, which is fed by 25 trained seed producers, to ensure that members have access to the quality seed of best seed varieties and other inputs.
A digital platform used to promote resilience among farming communities in Kenya

In a bid to mitigate COVID 19’s impact on food and nutrition security, ICRISAT used a digital platform called SourceTrace to deliver extension advisory on good agricultural practices, post-harvest handling, nutrition and weather and market information to farming communities in Kenya. Through the platform, we managed to reach over 20,000 farmers across three counties – Kitui, Makueni and Taita Taveta counties of Kenya. Timely delivery of weather advisory messages to farmers helped to avert some risk associated with crop failure and damage by drought periods. Similarly, the nutrition messages were designed to remind the communities of the importance of consumption of diverse foods for improved health and immunity.

The institute, in addition, trained members of farmer producer organizations (FPOs) on online marketing using the SourceTrace platform to expand their market for the aggregated grain. The FPO members were given orientation on how to place orders and close sales online. The objective of the online marketing platform was to expand the market for aggregated grain to reach customers far and wide. About 4,000 members of the FPOs were profiled into the SourceTrace including information about farm size for each crop and expected quantities for purposes of market linkage.

Results from an Annual survey carried out by ICRISAT to gauge impact of the SMS advisories revealed that 62.5% of the sampled beneficiaries received the SMS’ which were appreciated by a majority of recipients. Nutrition messages were the most appreciated at 54.2%, followed by GAPs messages at 20.7%. For those who received the text messages, 30% reported to have changed the way they feed their children and are practicing complementary feeding with diverse foods, while 34.4% reported to have changed the practices on how they produce their crops by applying improved agronomic practices.
ICRISAT’s programmatic response to mitigate impacts of COVID 19 in Eastern and Southern Africa

The COVID-19 pandemic which started in early 2020 continues to spread around the globe causing disruptions not only in healthcare systems, but also overall people’s livelihoods in unprecedented fashion. In ESA, ICRISAT joined governments and international organizations to tackle the challenges of spiralling food and nutrition insecurity. A three-phased strategy was developed as follows.

Phase 1: Recovery and Coping Phase

Emphasis has been on conducting vulnerability analyses and developing coping and preventive measures. For example, in July 2020, ICRISAT carried out a study to assess effects of the COVID-19 pandemic on different actors across the drought tolerant crops (DTC) value chain in Kenya. Some of the key findings of the study include reduced access to inputs such as seeds and fertilizers due to restricted movements during lockdowns. Overall, 56.8% of farmers had expected poor yield from the 2020 season as compared to the 2019. However, communities hailed digital platforms which ICRISAT deployed as their major source of extension information and advisories to farmers during this pandemic. The study provides an opportunity to public and private sector to jointly increase investment of e-extension, and digital messaging for technology dissemination.

Phase 2: Adaptive Phase

ICRISAT has a long-standing experience of developing adaptation strategies and in modelling future scenarios of change. These include seed systems to deliver nutrient-dense crops like millet, sorghum, groundnut, chickpea, pigeonpea, cowpea and common bean, collectively called dryland cereals.
and legumes. Over time, improved varieties of crops render farming resilient to climate stresses, help improve nutritional outcomes and improve soil health. In the short run, they boost yields, ensure food sufficiency in farmer households and increase earnings. In Malawi, 3,256 MT of certified seed of groundnut (1352 MT), common bean (1880 MT), sorghum (17 MT) and pigeonpea (7 MT) was produced to enhance crop productivity. The seed is enough to cover around 54,266 ha with improved varieties. Other strategies include development of farm and landscape strategies and geospatial maps to guide natural resource management.

Phase 3: Transformative Phase

This focuses on increasing resilience of dryland farming by developing system, policy and technology options and building capacities. They include our technical capacities to generate products and innovations such as crop improvement technologies and development of evidence-based risk-reducing policies. In Zimbabwe for example, ICRISAT is catalysing policy changes within Zimbabwe’s Ministry of Lands, Agriculture, Water and Rural Resettlement (MLAWRR), where government has declared a widescale promotion of ICRISAT’s water sensor irrigation technologies to 30 irrigation plots in the whole of Matabeleland North province.

ICRISAT also became the source of knowledge through development of knowledge products on solutions to livelihood challenges focusing on recovery interventions to medium and long-term interventions. These include newsletter articles and blogs as listed below:

- Resilient rural women of the drylands https://www.icrisat.org/resilient-rural-women-of-the-drylands/
- Enabling agricultural innovation systems to promote appropriate technologies and practices for farmers, rural youth and women during COVID-19 http://www.fao.org/3/ca9470en/CA9470EN.pdf
- Gendered impacts of COVID-19 and equitable policy responses in agriculture, food security and nutrition https://reliefweb.int/sites/reliefweb.int/files/resources/CA9198EN.pdf
List of Publications in 2020

Crop Improvement


Integrated Crop and Natural Resources Management subsection


*1 ICRISAT East and Southern Africa

Research Impact Highlights 2020


Integrated Crop and Natural Resources Management


Systems & Policy Analysis


Nutrition & Behavior Change Communications


Monograph


Books
