Africa RISING

Transforming African agriculture through sustainable intensification

A farmer in northern Ghana shows off his maize harvest. He confesses that using the Aflasafe biocontrol product offered to him through the Africa RISING project greatly enhanced the quality of his maize harvest. Photo credit: Jonathan Odhong'/IITA.

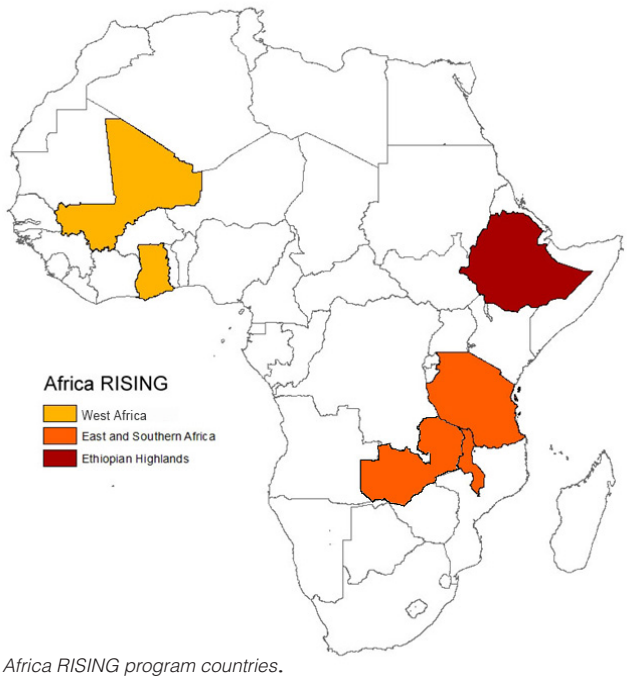
The Africa Research in Sustainable Intensification for the Next Generation (Africa RISING) program comprises three regional research-in-development projects supported by the United States Agency for International Development as part of the US Government's Feed the Future initiative. Inaugurated in late 2011, and currently in its second phase (starting September 2016), the purpose of Africa RISING is to provide pathways out of hunger and poverty for smallholder farm families through sustainably intensified farming systems that sufficiently improve food, nutrition, and income security, particularly for women and children, and conserve or enhance the natural resource base.

The three regional projects are:

- Africa RISING East and Southern Africa Project (Sustainable intensification of cereal–legume–livestock integrated farming systems in East and Southern Africa). Implemented in Tanzania, Malawi, and Zambia, led by the International Institute of Tropical Agriculture (IITA).
- Africa RISING Ethiopian Highlands Project (Sustainable intensification of crop–livestock systems to improve food security and farm income diversification in the Ethiopian highlands). Led by the International Livestock Research Institute (ILRI).
- Africa RISING West Africa Project (Sustainable Intensification of Key Farming Systems in the Guinea-Sudano Sahelian Zone of West Africa). Implemented in Ghana and Mali, led IITA.

The International Food Policy Research Institute (IFPRI) is responsible for data management, evaluation, and impact assessment across all three projects.

The program's focus is on sustainable intensification of production from small-scale, crop–livestock farming systems, through integrated multidisciplinary research to deliver a basket of technological innovations that will be disseminated to farmers through complementary development partnerships. The demand-driven research ensures that the program's outputs are ultimately scaled to receptive and informed beneficiary households.



Africa RISING program countries.

Implementing partners are drawn from international and national agricultural research and extension systems, development organizations, farmers, community-based organizations, and input/output dealers. Guided by the farming systems, national priorities and the household typologies identified during Phase 1, the program aims to scale Africa RISING innovations to at least 1.1 million households by 2021. The evidence base generated through this widespread dissemination will help catalyze further partnerships that will put the promising technologies and integrated interventions into the hands of millions of rural people in Africa.

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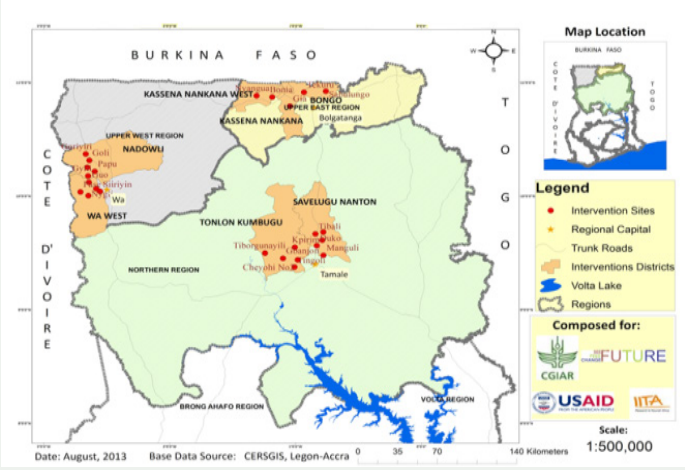
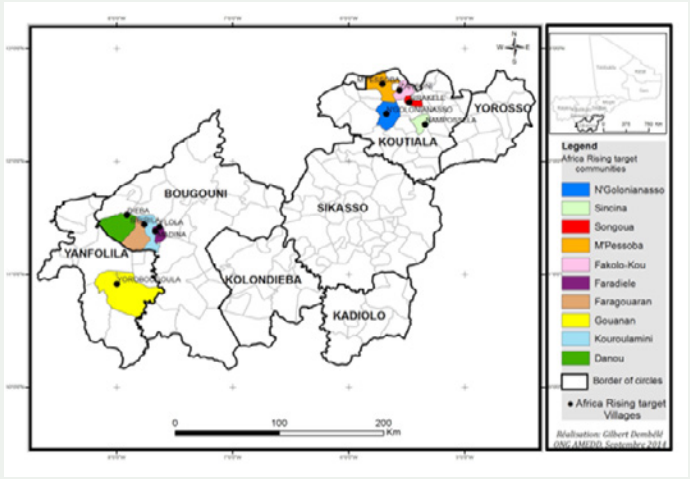
The Africa RISING West Africa Project





Project intervention sites. Activities are being implemented within 25 communities in three regions of northern Ghana (Upper East, Upper West, and Northern) and in nine villages in the Bougouni and Koutiala districts of the Sikasso Region in southern Mali.

The project is operating in the Guinea and Sudano–Sahelian zones of northern Ghana and southern Mali. In Phase 1 (2011–2016), research activities aimed at establishing the best-bet technologies that would deliver adoptable development solutions to smallholder farm families were tested and validated through participatory research approaches together with the farming communities. Phase 2 of the project (2016–2021) will combine continuity with evolutionary change to ensure that the technologies identified in Phase 1 drive wider adoption at scale through effective development partnerships. The project envisions that, by 2021, over 100,000 smallholder farm households in Ghana and Mali will benefit from Africa RISING technologies.

Based on the experiences and lessons learned from Phase 1, expected outcomes of the Africa RISING West Africa Project in Phase 2 are:

- **Outcome 1:** Farmers and farming communities in the project area are practicing more productive, resilient, profitable, and sustainably intensified crop–livestock systems linked to markets.
- **Outcome 2:** More farmers and farm families are adopting technologies and practices to improve nutrition, food and feed safety, postharvest handling, and value addition.
- **Outcome 3:** Farmers and other value chain actors have greater and equitable access to production assets and markets (input and output) through enabling institutions and policies.
- **Outcome 4:** Effective partnerships are built with farmers, local communities, and research and development partners in the private and public sectors to ensure delivery and uptake at scale of sustainable intensification technologies, innovations, and practices.

Characteristics and challenges of the Africa RISING West Africa Project implementation sites

The farming systems in the Guinea and Sudano-Sahelian zones of West Africa are dominated by small-scale, resource-poor farmers whose livelihoods depend on rain-fed crop, livestock, and crop livestock farming systems. The main staple crops are cereals (maize, rice, sorghum, pearl millet), and legumes (groundnut, cowpea, soybean, Bambara nut, pigeon pea).

Cereals are either grown in pure stands or intercropped/rotated with legumes and a variety of vegetables. Crop yields on farmers' fields are generally poor due to variable rainfall, declining soil fertility, use of low yielding crop varieties, almost non-existent mechanization, high cost of inputs, postharvest losses, labor constraints that lead to poor growing conditions (late sowing, suboptimal plant populations, inadequate control of pests and weeds, particularly Striga), and low use of organic or mineral fertilizers.

Cattle, sheep, goats, pigs, chicken, guinea fowl, turkeys, and ducks are reared for meat, milk, land preparation, transport, manure, and cash. The animals are mostly managed under extensive and semi-intensive systems with limited feed, shelter, health care, and breeding management. Productivity of the animals is low due to seasonal shortages in quality feed and watering points linked to degradation of the environment. Improved livestock breeds are also not very accessible to farmers while commercial feeds are expensive and thus unaffordable. Farmers in this farming system are also confronted by high livestock mortality rates occasioned by limited access to veterinary services and inappropriate husbandry (feeding, health care, housing) practices.

In general, the crop and livestock enterprises are weakly integrated, and thus do not mutually reinforce each other.

The diets of most rural poor farm families is often dominated by the intake of basic staple foods (e.g., maize, rice, millet, and sorghum) which are usually deficient in micronutrients such as vitamin A, iron, and zinc needed to prevent malnutrition. The nutritional status of most farm household members, especially pregnant women, breastfeeding mothers, and children below 24 months of age, is therefore poor, leading to chronic malnutrition. Nearly 25% of children in the intervention communities in Ghana are reported to be stunted, underweight, and anemic with lifelong consequences. The causes for the inadequate diets lie in low income, unsuitable food processing, storage and feeding practices, and poor nutrition knowledge.

Farmers have difficulties in accessing input and output markets. Enabling institutions and policies are also lacking. Due to inadequacies of traditional promotional and scaling-up/out pathways, there is a large unmet demand for information about improved agricultural technologies and for access to the technologies themselves, especially by women. This has led to low adoption of improved technologies and best practices to reduce food insecurity, poverty, and natural resource degradation.

Project interventions

Through a participatory and demand-driven approach to research, project partners are implementing adaptive research on various technologies and working with development organizations to get them into the hands of farmers at scale. The activities include testing and disseminating: (i) improved crop varieties (drought and *Striga* resistant food and feed crops); (ii) appropriate agronomic practices (planting density, cereal–legume rotations and intercropping, multiple cropping, increasing cropping cycles within a season, efficient use of input resources and agroforestry); (iii) climate-smart land management practices (conservation agriculture, physical barriers to soil and water loss, *in-situ* water harvesting, and soil cover crops); (iv) improved animal husbandry practices (semi-intensive and intensive management); and (v) technologies for reducing pre- and postharvest losses. The project also facilitates linkages between farmers and input/output markets. The objective is to build well-integrated and productive crop and livestock enterprises that minimize natural resource degradation.

To diversify household nutrition, the project is introducing new nutritious food preparation techniques based on locally available ingredients for household members, particularly children. Nutrition field schools are being used to promote knowledge exchange on best practices for processing and storage of cereals, legumes, and vegetable-based foods.

Group and individual trainings are conducted to strengthen the capacities of all actors (farmers, research and extension staff, input and output dealers, and policy makers). Academic training at the MSc and PhD level is applied to address important knowledge gaps, and to develop the "next" generation of scientists. Information exchange is being promoted through field days, radio programs, exchange visits, and video shows.

The project gives special attention to gender equality and underprivileged groups within the society. Enabling policies and institutions to improve access to input and output markets, formation of effective partnerships, and access to knowledge and information are advocated for, especially through operational level R4D/Innovation platforms.

Gender cuts across all the research outputs for the second phase of the Africa RISING and is considered an imperative element for ensuring the usability of sustainable intensification technologies developed and validated by the project. Photo credit: Michael Dakwa/Team1000words Ltd.

Sheep feed on a supplement feed mixture in Tibali, Northern Region, Ghana. The Africa RISING project is training farmers in northern Ghana on affordable supplementary feeding options for small ruminants especially during the lean season. Photo credit: Jonathan Odhong'/IITA.

The technology park concept is an experimental and demonstration methodology uniquely used by the Africa RISING projects in Ghana and Mali. The parks, which are jointly managed by researchers and farmers' groups in the communities, help the project team to evaluate and demonstrate new technologies, provide hands-on training for farmers, facilitate knowledge flow among farmers, train undergraduate and graduate students, and determine farmer preferences for technologies. Over 200 experiments by the Africa RISING project have been demonstrated to the farming communities through the technology parks. Photo credit: Jonathan Odhong'/IITA.

Technologies validated by the project during Phase I

Broad category	Validated flagship technologies	Validation sites
New crops and varieties to overcome existing biotic and abiotic stresses and improve productivity per unit land area	New, high-yielding crop varieties, e.g.: • Drought and Striga tolerant, extra-early, and early-maturing maize, • Nutrient-efficient rice • Aflatoxin resistant groundnut • Sorghum hybrids • Early-maturing cowpea • Dual-purpose cowpea • Short-duration soybean • Medium soybean • High yielding and disease-resistant varieties of vegetables (okra, roselle, tomato, eggplant, and pepper)	Ghana (Northern, Upper West, and Upper East regions) and Mali (Bougouni and Koutiala districts)
Agronomic practices to increase grain and fodder yield and soil nitrogen content	Cereal–legume intercropping Cereal–legume rotations Dual-purpose food legumes Cereal–vegetable intercropping	Ghana (Northern, Upper West, and Upper East regions) and Mali (Bougouni and Koutiala districts)
Integrated soil fertility management as a cost-effective approach to replenish soil fertility	Optimized N and P fertilizer rates Fertilizer micro-dosing Livestock corralling for manure/urine Cereal–legume rotations Cereal–legume intercropping	Ghana (Northern, Upper West, and Upper East regions) and Mali (Bougouni and Koutiala districts)
Land management technologies to reduce soil loss and enhance water utilization	*In-situ* water harvesting Physical barriers to reduce soil erosion Contour bunding with trees	Ghana (Northern, and Upper East regions) and Mali (Bougouni and Koutiala districts)
Agroforestry technologies to increase fruit, vegetable, and feed production per unit land area and conserve soil and water	New provenances of indigenous trees (*Adansonia digitata, Ziziphus mauritania, Tamarindus indica*) Grafting Pruning management Contour bunding with trees	Mali (Bougouni and Koutiala districts)
Improved livestock feed, and feeding, housing, health and breeding management packages	Sheep/goat flock feeding Sheep/goat health care Housing for poultry Guinea fowl brooding management Stover quality improvement	Ghana (Northern, and Upper East regions)
Pre- and postharvest technologies to reduce food waste and improve food safety	Grain storage in PICS bags and plastic drums Aflasafe application in maize and groundnut fields	Ghana (Northern, and Upper East regions)

Partners

Mali

Association Malienne d'Eveil et de Developpement Durable (AMEDD), Centre d'Appui a l'Autopromotion pour le Developpement-ci-apresaenommee (CAAD), Compagnie Malienne de Developpement des Textiles (CMDT), Fédération Nationale pour l'Agriculture Biologique et Équitable (FENABE), Group de Recherches d'Action et d'Assistance pour le Developpement Communautaire (GRAADECOM), International Crops Research Institute for the Semi-arid Tropics (ICRISAT), the International Food Policy Research Institute (IFPRI), International Institute of Tropical Agriculture (IITA), Institut d'Economie Rurale (IER), Institut Polytechnique Rural-De Formation et de Recherche Appliquee Katibougou (IPR-IFRA), International Livestock Research Institute (ILRI), Wageningen University and Research Centre (WUR), World Agroforestry Centre (ICRAF), and World Vegetable Center (WorldVeg).

Ghana

Adventist Development and Relief Agency (ADRA-Ghana) AMSIG Marketing Company (AMSIG), Animal Research Institute-Ghana (ARI), Agricultural Technology Transfer Project (ATT) , Association of Church-based Development Non-governmental Organization (ACEDEP), Christian Children's Fund of Canada (CCFC-Ghana), Care Ghana, Catholic Relief Services (CRS), Farm Radio, IFood Security through the International Center for Tropical Agriculture (CIAT), Crops Research Institute (CRI), Food Security through Cooperatives in Northern Ghana (FOSTERING), the Grains and Legumes Development Board (GLDB), Grameen Foundation, International Food Policy Research Institute (IFPRI), International Institute of Tropical Agriculture (IITA), International Livestock Research Institute (ILRI), International Water Management Institute (IWMI), Kwame Nkrumah University of Science and Technology (KNUST), Ghana Ministry of Food and Agriculture (MoFA), Ghana Ministry of Health (MoH), Savanna Agricultural Research Institute (SARI), Seed Producers Association of Ghana (SEEDPAG), Science and Technology Policy Research Institute (STEPRI), Soil Research Institute (SRI), University for Development Studies (UDS), Veterinary Services Division, Wageningen University and Research Centre (WUR), and World Vegetable Center (WorldVeg).

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