

Excellence in Agronomy- Solutions for Agricultural Transformation (EiA)

Initiative Lead and Co-Lead	Primary CGIAR Action Area	Estimated 2022 - 2024 Budget
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Challenge

Smallholder farming represents over 80% of the world's farms, mostly located in the Global South, and supplies 50% of the global food (<https://bit.ly/3tmuZsG>; <https://bit.ly/3mOoXOU>; <https://bit.ly/3e2hckB>). Smallholder farming is characterized by low and variable yields and profitability (<https://bit.ly/3gbA9nu>; <https://bit.ly/3gdbq2b>), from which 80% live in water-scarce areas, and reinforced by climate change, low resource use efficiencies and declining soil health, resulting in negative impacts on food/nutrition security, equitable livelihoods, and ecosystem health (<https://bit.ly/2Qp4P9Z>; <https://bit.ly/2OOyOaU>). Sound agronomy is key to achieving resilient agri-food systems but its uptake is hampered by technical and social constraints, confounded by ineffective scaling (<https://bit.ly/3uLADom>; <https://bit.ly/3gdYL3Y>). Genetic gain expression is also hindered by poor agronomy (<https://bit.ly/32gQdw7>).

Agronomy is perceived as being too site-specific for global research but this impression is outdated. Modern agronomy spans local relevance and impact at scale through advancements in diagnostics, data science, geospatial analytics, remote sensing, and understanding economic, social, and gender barriers. Predictive agronomy entails integrating crop, soil, nutrient, and water management in a spatially explicit framework to guide action towards sustainable intensification (<https://bit.ly/3gk2dVE>; <https://bit.ly/3mOrU1W>). Adaptive scaling models built via co-creation from scaling partners and enabled by innovation systems embedded in multi-actor partnerships will facilitate uptake of agronomic solutions at scale.

Research is needed to: (i) Develop reusable tools and approaches to prioritize best-fit agronomic solutions, leveraging existing and generating new data, tools, and analytics to maximize return on investment and minimize risk; (ii) Assess the climate adaptation/mitigation and sustainability impacts of agronomic solutions over space and time; (iii) Innovate to increase the efficiency and efficacy of agronomic research workflows; and (iv) optimize the Use Case models to deliver on scaling objectives.

Objective

The vision of success of EiA is to deliver by 2030 higher and more stable yields through agronomic gain for millions of smallholder farming households in prioritized farming systems, with emphasis on women and young farmers for measurable impact on food/nutrition security, income, water use, soil health and climate resilience. Although there is no generally accepted definition, in this context, smallholder households are defined as those managing 5 ha or less, using mainly family labor, and achieving their livelihoods mainly from on-farm production. Agronomic gain is conceptualized around a set of Key Performance Indicators (KPIs) with anticipated improvement in terms of average crop yields and profitability, reduced yield variability, improved resource (nutrients, water, labour) use efficiency, and restored soil health.

The overarching objective is to deliver gender- and youth-responsive agronomic solutions to smallholder farmers via demand-driven Use Cases in prioritized regions, underpinned by large pools of actionable data and decision support tools. This primary goal will be achieved through (i) a CGIAR-wide alliance to diagnose and resolve the technical and social constraints hampering inclusive sustainable intensification of smallholder agriculture in a changing climate, thus valorizing the currently available expertise and assets of the CGIAR, as detailed in the recent Agronomy Program Assessment report (<https://bit.ly/3smVjkY>), (ii) the use of data-intensive and gender responsive agronomic solutions that are tailored to the diverse needs and circumstances of smallholder farmers, (iii) deep engagement with public and private sector research and scaling partners with inclusive impact pathways and co-ownership of innovations, and (iv) backstopping of key enabling actors in partner networks by targeted capacity development efforts.

Theory of Change

Agronomy - the integrative science of cropping systems ecology and crop production - provides the foundation for productive, profitable, and sustainable agriculture under a changing climate. Nevertheless, the transformative potential of sound agronomy has not materialized across much of the Global South partly because research has often narrowly focused on technology development and not fully embraced the power of ex-ante priority setting, modern data systems and analytics, and end user targeting. Moreover, technological scaling has often been relegated to the end of the innovation process rather than incorporated as an essential design element, facilitating co-creation with partners.

Building on increasing demand for agronomy solutions and advances in science and technology, EiA 2030 will address these challenges and deliver agronomic gain at scale, while unlocking the gains in genetic potential from breeding. Taking advantage of progress made through the EiA Incubation Phase (2020-2022), this will be achieved by (i) prioritizing key farming systems and demand-driven entry points where needs are urgent and science-led progress within reach, (ii) leveraging data and novel tools to develop and validate inclusive agronomic solutions at scale, (iii) investing in innovation research to address complex problems, supported by non-CGIAR Advanced Research Institutes, and (iv) co-creating solutions with public and private sector demand partners through Use Cases, formulated around specific demand and innovation systems, and supported by National Agricultural Research Systems (NARS).

By focussing on scaling partners with substantial reach, EiA's agronomic solutions will improve crop productivity and livelihoods for millions of households (at least 40% female-headed) while enhancing resource use efficiencies, increasing climate resilience and reducing greenhouse gas emissions, and rehabilitating soil health.

The ToC diagram (<https://bit.ly/3nt6Yhc>) refers to Initiatives EiA is planning to continue engaging with, including ST- Harnessing Digital Technologies for Timely Decision-Making across Food, Land, and Water Systems, ST- National Policies and Strategies for Food, Land and Water Systems Transformation, ST- Enabling gender and social equality through resilient and inclusive agri-food systems, ST- Transforming food systems from greenhouse gas sources to sinks (S2S), RAFS- Plant Health and Rapid Response to protect Food and Livelihood Security, RAFS- Sustainable Intensification of Mixed Farming Systems, GI- Enabling Traits, Tools and Technology Services for Genetic Gains, and RAFS-Regional Integrated Initiatives.



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Highlights

- Agenda setting: Data-intensive prioritization logic and ex-ante impact assessment to identify opportunities for country-x-farming system combinations with high potential uptake of gender- and youth-responsive agronomic solutions, supported through a pipeline of agronomic product profiles, assembled over time and enriched through innovation research projects.
- Data and tools: A coordinated approach to data compilation, interpretation and governance, backstopped by cutting-edge digital products and services, allowing for accurate predictive agronomic impacts and leading to more rapid and complete adoption of agronomic solutions, including integration of novel tools and approaches among national agricultural research partners.
- Monitoring, evaluation, and learning (MEL) and feedback: Development of a real-time agronomic gain Key Performance Indicator (KPI) framework for strategic decision-making that prioritizes effective scaling and multi-disciplinary assessment of temporal and spatial levers of sustainability, inclusivity, and climate adaptation/mitigation (e.g., long-term observatories; panel studies; field, farm, community, and landscape-level assessments).
- Use Case model: Building on the EiA Incubation Phase (Exhibit 1, <https://bit.ly/32hKq9p>), deployment of Use Cases, with their specific Theories of Change, formulated around demand from public and private scaling partners with large impact targets, and innovation systems, inclusive of service providers and NARS partners, and supported by innovation research.
- EiA Global and Regional: Operationalization through EiA Global, hosting global functions, including prioritization, demand mapping, ex-ante analytics, data governance and tools, cultural change, and agronomic gain assessment, and connected EiA Regional components, aiming at keeping track of demand, co-creating agronomic solutions with private and public scaling partners, and providing 'One-Stop-Shop' services.

Work Packages

Scope of Work		3-year Outcomes
ORGANIZE	ORGANIZE hosts the functions related to internal organization and external partnerships. This work package (WP) organizes prioritization, demand mapping, and foresight, manages the other WPs through providing critical input on who to engage, what to innovate for, and how to support, leads strategic communication, and manages interactions with other Initiatives.	ORGANIZE: By 2024, 11 CGIAR Centers with agronomy expertise collectively decide on an agronomy at scale research portfolio, based on prioritization and partner demand, share data, tools, and learning, and cooperate to co-create agronomic solutions through at least 20 Use Cases, and monitor progress against agronomic gain KPIs.
TRANSFORM	TRANSFORM hosts core functions of EiA, including assembly of data and tools and their governance, following open and FAIR principles; application of existing analytics and turn-key solutions developed for specific Use Cases; supply of information on the climate impacts, inclusivity, and sustainability of agronomic solutions; and NARS capacity strengthening.	TRANSFORM: By 2024, all research and scaling partners engaged in EiA use available data, tools, and turnkey solutions to support the co-creation of locally relevant agronomic solutions, integrate climate-smart, inclusivity, and sustainability principles in such solutions, and generate primary data on their performance using common protocols.
INNOVATE	INNOVATE addresses key knowledge gaps and facilitates innovation in agronomy research with engagement from public and private sector partners and non-CGIAR ARIs, based on Use Case needs, requirements for the assessment of agronomic gain KPIs, or needs for increasing the efficiency, efficacy, gender- and youth-responsiveness, and cost-effectiveness of research workflows.	INNOVATE: By 2024, at least 5 non-CGIAR Advanced Research Institutes with complementary expertise in geo-nutrition, farming systems analytics, remote sensing, or other relevant research areas, and at least 10 NARS partners, cooperate with EiA through at least 10 innovation research projects and deliver results that are added to the TRANSFORM infrastructure.
DELIVER	DDELIVER hosts the co-creation, including development and technical and user experience validation, and deployment of gender- and youth-responsive agronomy solutions, inclusive of mechanization, to smallholder farmers via scaling partners through demand-driven Use Cases, formulated around inclusive innovation systems and operating within defined extension networks and farming systems.	DELIVER: By 2024, at least 20 public and private scaling partners integrate agronomic solutions in their respective initiatives, targeting at least 1 million farmers through extension agents or other social or technological information networks , and use common ME&L concepts to report the performance of these solutions against agronomic gain KPIs.

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Impact Area Contributions

Nutrition, health & food security	Millions of smallholder farming households will adopt agronomic solutions that increase yields and yield quality of key staple crops, legumes, and perennial cash crops within prioritized farming systems by at least 50%, on average. The risk of underperformance of agronomic solutions will be reduced by at least 25%.
Poverty reduction, livelihoods & jobs	Millions of smallholder farming households will adopt agronomic solutions that generate a 'living income'. Such living income will not only allow households to cross the poverty line but also invest in improving their overall livelihood status. Jobs will be created through service delivery initiatives.
Gender equality, youth & social inclusion	At least 40% of smallholder farmers engaged will be female and several tens of thousands of young people will provide agronomic services to smallholder farmers, allowing both groups to exit poverty.
Climate adaptation & greenhouse gas reduction	Millions of smallholder farming households will adopt agronomic solutions that reduce climate-related yield losses to an average 25% of target yields, while reducing product-based greenhouse gas emission intensities (ton CO2-equivalent) by at least 25%.
Environmental health & biodiversity	Millions of farming households will adopt agronomic solutions that increase resource (nutrient, water, and/or labor) use efficiencies by at least 25%; millions of hectares of agricultural land will be converted to sustainable land use through the adoption of practices that surpass thresholds for soil properties below which soil degradation occurs.

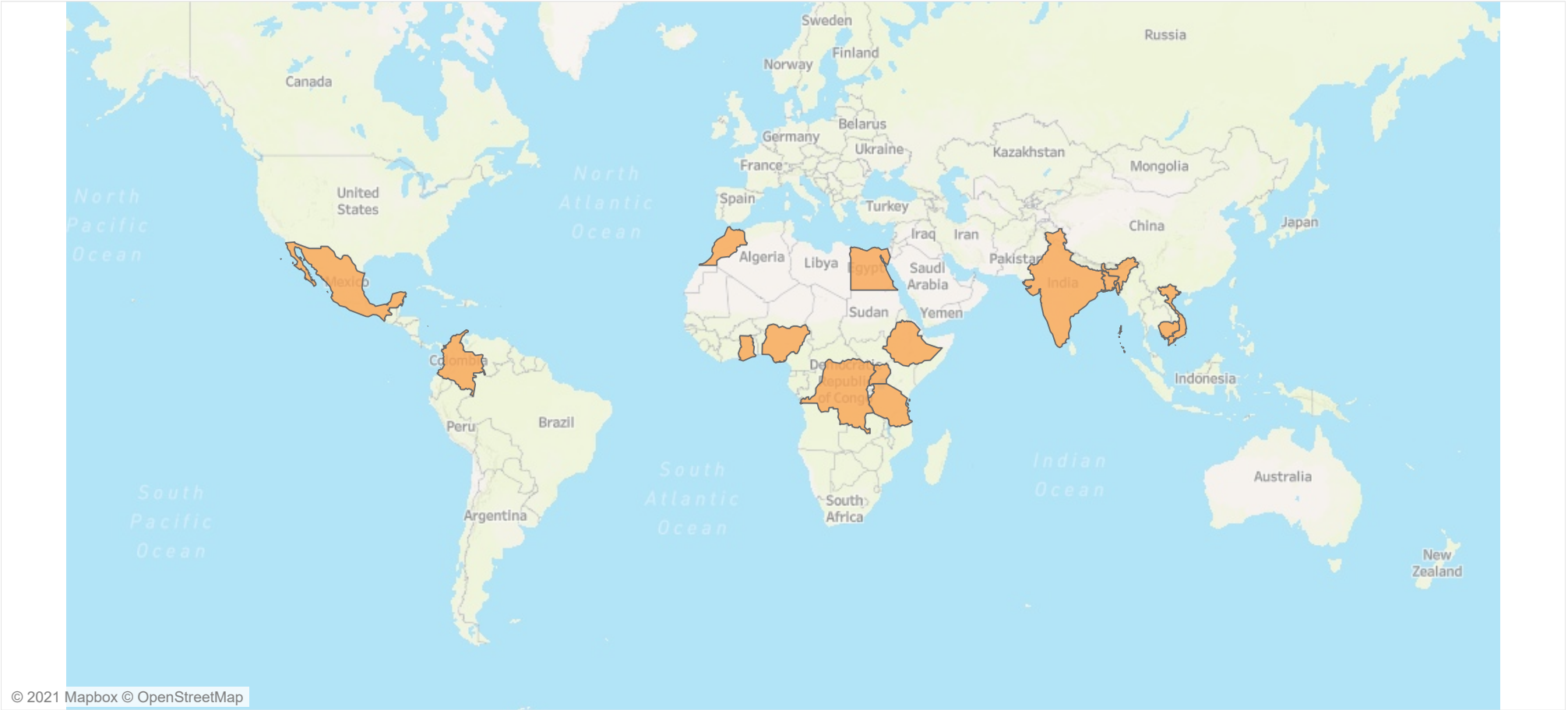
Impact on SDGs



Regions

Global	Central and West Asia and North Africa (CWANA), East and Southern Africa (ESA), Latin America and the Caribbean (LAC), South Asia (SA), South East Asia and the Pacific (SEA), West and Central Africa (WCA)
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Countries





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Innovations

Gender- and youth-responsive digital agronomic decision support tools for bespoke nutrient management and associated agronomic practices to improve staple crop and legume productivity and profitability and resource use efficiency for integration in public and private extension networks through extension agents (e.g., Rice Crop Manager, Nutrient Expert, AKILIMO).
Real-time and digitally enabled feedback loops, aiming at collecting within-season feedback at scale on the technical and user experience-related performance of gender- and youth-responsive agronomic solutions, for assisting research partners in improving alignment of their content and presentation to end-user needs.
A coherent, common data infrastructure and governance framework that facilitates the use of consistent standards, workflows, approaches to enable open and FAIR data through born-FAIR data collection, workflows, and capacity enhancement and its efficient leveraging for analysis and visualization by CGIAR researchers and other stakeholders engaged in agronomy at scale.
Water technologies to overcome physical and economic water scarcity in rainfed and irrigated agriculture through access (micro-irrigation technology), application (e.g. drip and partial root zone drying) and management (e.g. alternate wetting and drying for rice, 'IRWI App', advising on the water needs based on key crop, soil, and micro-irrigation system properties).
New and diversified cropping practices and systems that increase resource use efficiency, profitability, and on-farm diet diversity, reduce risk and green gas emissions, and enhance sustainability for smallholders, and that are scalable and readily adopted by facilitation through innovation systems and strategic partnerships at local, regional, and global scale.

Key Partners

Demand	Government	Active for the Incubation Phase: Public extension services of Ethiopia, Egypt, Mexico, Colombia, and Peru
	International NGO	Active through the Incubation Phase: Digital Green, Sasakawa Africa Association; Discussions on-going with: Rainforest Alliance, The Nature Conservancy
	Multilateral	Discussions on-going with: AGRA, World Bank, African Development Bank, FAO
	Private Sector	Digital service providers (Business-to-Consumers or Business-to-Business): Active through the Incubation Phase: ARIFU, iSDA; Discussions on-going with: eProd, One Acre Fund, AgroCares, CropNuts Limited, ClimateEdge Multinationals: Active through the Incubation Phase: International Fertilizer Association, representing the fertilizer industry; Discussion on-going with: Bayer, OLAM
	Public Private Partnership	Active through the Incubation Phase: Direct Seeded Rice Consortium (DSRC); Convergence platform led by JEEViKA and Bahir Agricultural University, India
Innovation	Academic, Training and Research	Local and regional universities in the target countries
		National Agricultural Research Systems in the target countries; (sub)-regional organizations (e.g., FARA)
		Non-CGIAR International Institutes: African Plant Nutrition Intitute, IFDC, ICIPE, ISRIC, Rothamsted Research
		Universities in the North: Cornell University, Michigan State University, University of Florida, Wageningen University and Research (WUR), Swedish Agricultural University (SLU), ETH-Zurich, CSIRO Australia, University of Queensland, CATIE
	Other	All demand partners (see section 12.1) will co-invest in improving the readiness of innovations to contribute to impact at scale
Scaling	Government	Public sector scaling partners interested in specific turnkey solutions, identified through new opportunities during the implementaiton of the first business cycle
	International NGO	Non-governmental scaling partners interested in specific turnkey solutions, identified through new opportunities during the implementaiton of the first business cycle
	Other	Any other partnership opportunites identified during the first business cycle that can take agronomy solutions to scale
		EiA will work based on demand from scaling partners so our scaling partners are our demand partners
	Private Sector	Private sector scaling partners interested in specific turnkey solutions, identified through new opportunities during the implementaiton of the first business cycle

Excellence in Agronomy– Solutions for Agricultural Transformation (EiA) : theory of change

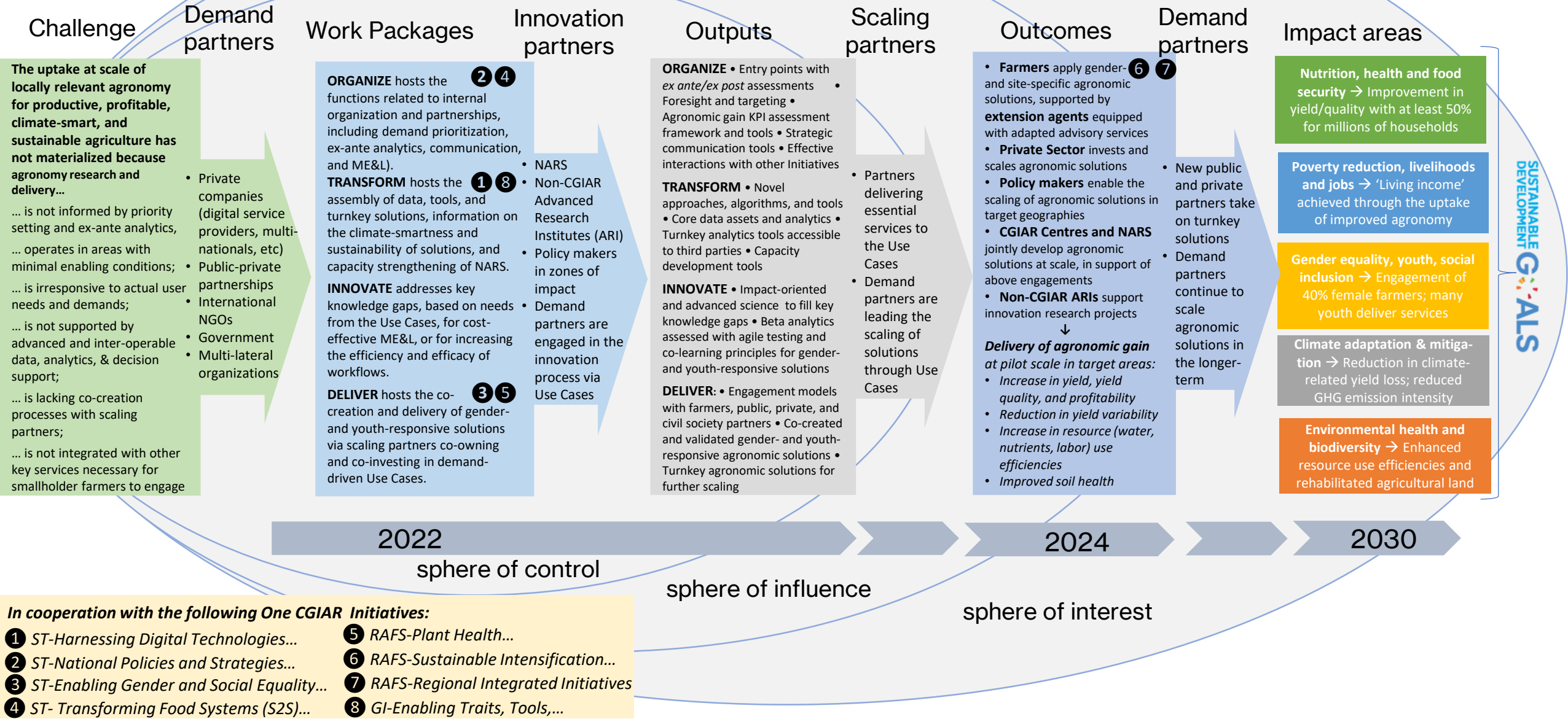


Exhibit 1: Use Cases active through the Excellence in Agronomy Incubation Phase (2020-2022)



Summary description of the 10 Use Cases, currently active through the Incubation Phase of the Excellence in Agronomy Initiative. Information is presented on the demand partner (top left), the target countries (top right), and the specific demand and cropping systems. The impact targets across the Use Cases are about 15 million households. Each Use Case is formulated around actual demand for agronomy solutions from a public or private scaling partner, facilitating a scaling network in specific target geographies, and a solution co-creation process, ultimately delivering turnkey solutions for scaling to other interest parties. *More information is available via b.Vanlauwe@cqi-ar.org.*

