CGIAR CRP Plan of Work and Budget (POWB) 2020

RICE

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Cover page

Name of the CRP: Rice

Name of the Lead CGIAR Center: IRRI

Flagship lead institutions (CGIAR Centers or lead partners):

Flagship 1: Accelerating impact and equity

Flagship 2: Upgrading rice value chains

Flagship 3: Sustainable farming systems

Flagship 4: Global Rice Array

Flagship 5: New rice varieties

Other participating CGIAR Centers: AfricaRice, CIAT, CIRAD, IRD, IRRI, JIRCAS

1_Adjustments/ Changes to Your Theories of Change (ToC), if relevant (max. 500 words)

There are no major modifications to the overall of theory of change, except for FP5 (new rice varieties) which will emphasize the modernization of its breeding programs in order to accelerate the development and delivery of improved varieties to our partners and farmers. To test the validity of our overall theory of change, we will emphasize in the last two years of RICE the collection, analysis, and reporting of adoption and impact of RICE technologies, tools, policies, etc. Complementary to studying successes of adoption, IRRI will lead an analysis of under-reported so-called 'failures' around scaling and mechanisms to constructively learn from them so that RICE, and the CGIAR in general, is more cognizant of the complexities of impact pathways and the role that the CGIAR is best placed to play as one moves from the sphere of control to the spheres of influence and interest.

The new cluster of activity in FP1 "Agri-food Policy Support" which was created in 2019 is fully functional and will engage in providing policy support to the external environment and to guide the RICE CRP as a whole. We will also invest in increased foresight analysis of the rice and food value chains to develop new priorities for research post-21 and redefine our theories of change for the next business cycles.

The rice value chain upgrading trajectory remains relevant and effective in understanding change and for comparative analysis across value chains within countries, and across countries and continents. Our focus on rice commodity value chains will gradually change to rice-based food systems. This implies that consumers are increasingly being considered as being part of the system and that the focus is shifting towards rice-based diets and nutrition outcomes.

In FP5 (new rice varieties), a new CoA 5.6 'modernization of rice breeding' will be RICE's major interface with the EiB platform and the Crops to End Hunger initiative. To accelerate the development and delivery of improved rice germplasm to our partners and to farmers, CoA 5.6 will lead the development of market segmentation, targeted product profiles, stage gating, benchmarking and monitoring of genetic gain, etc.

2_Plans and Expected Progress Towards Outcomes (max. 2000 words)

The plans of work and prioritized activities in 2020 were developed during flagship-level workshops and one RICE-central workshop in 2019. During these workshops, anticipated availability of funding and probability of high performance (in terms of the proposed activities leading to uptake and impact) were part of the debates on selecting priority activities. More information is provided in the Flagship Project folders of RICE at GRiSP.NET (open access).

In FP1, during the last two years of CRP RICE, a focus will be on documenting and communicating outcomes and impacts, providing solid evidences for underlying impact pathways and theories of change, and reinforcing the case that investment in RICE RD at global scale has made significant impact on the SLOs and SDGs (poverty, food and nutrition security, environmental sustainability, climate change, gender and equity). Specifically, a partnership will be established with University of Arizona to conduct the impact assessment of stress-tolerant varieties (STRVs) in Asia. Stress-tolerant rice varieties (STRVs) are believed to be widely diffused in the flood- and drought-prone rice regions of South Asia and Sub-Saharan Africa. However, there is no systematic study of their adoption and impact on reducing yield loss from weather shocks. As far as foresight activities are concerned, an operational system with up to date global and regional rice market analysis will be established and maintained. The IRRI Global Rice Model (IGRM) and other foresight models will be made to contribution for the purpose. The system is expected to provide technical support for the implementation of the National and the Regional Agricultural Investment for Food and Nutrition Security in West Africa. It will also contribute to the development of the "Continental investment plan for accelerating rice self-sufficiency in Africa" (CIPRiSSA) for new countries in Africa.

FP2 will release a major study on the state of rice value chain upgrading in 15 West African countries

which is the fruit of 10 years of research under GRiSP-RICE through a successful collaboration between CIRAD, IRRI, and AfricaRice. If additional budget from the World Bank is received, this study will be extended to East Africa (CIRAD, IRRI, AfricaRice). FP2 will study the coordination in the modern rice value chain (INPHB and Aderiz) and performance of medium scale processing units (women organizations, private units, farmer organizations) in Côte d'Ivoire (CIRAD). A study on rainfed rice in Senegal will focus on the role of lowland rice and women in livelihoods and changing role of rice in diets (CIRAD). To support RICE FP5 (rice variety development), FP 2 will develop gender-responsive product profiles with national partners and private sector in East Africa (Tanzania, Kenya, Uganda, Madagascar, Mozambique), Cambodia, Bangladesh, East India and spillover of digital product profiling methodology to AfricaRice (IRRI, AfricaRice). An analysis will be made of determinants of product profiles designed by farm households in Southeast and South Asia (eastern India, Bangladesh, Philippines and Cambodia), and of women's intra household decision-making power (WIDMP) and its determinants in digital product profiling in Southeast and South Asia (eastern India, Bangladesh, Philippines and Cambodia) (IRRI). In the domain of postharvest, FP2 will support skill enhancement of equipment manufacturers in Africa (Cote d'Ivoire, Ethiopia, Madagascar, Mozambique and Nigeria) to develop business opportunities through the construction and installation of Mini-ASI threshers, GEM parboiling systems and Gasifier cook stoves for local users (AfricaRice). It will also support skill enhancement of partner research and development organizations in Cote d'Ivoire, Ethiopia, Nigeria and Tanzania on the demonstration and scaling out of improved seeds, Mini-ASI threshers, GEM parboiling systems and Gasifier cookstoves (AfricaRice). Moreover, it will finalize the documentation of the vocational training for agricultural machinery mechanics and the BS course for Agricultural Engineering in Cambodia, documenting the lessons learned and synthesizing conclusions for projects in Africa (Burundi) (IRRI). FP2 is currently verifying the new GrainSafe Dryer with one ton capacity in the Philippines, Cambodia, Myanmar, Sri Lanka, Senegal and Assam, India. In 2020 it will expand the verification to Vietnam, Thailand and Burundi and also develop a unit with 5t capacity in collaboration with GrainPro. A new controller for the dryer will be optimized and commercialized (IRRI).

FP3 will collaborate with FP1 in documenting adoption and impact of various FP3 technologies, and will embark on documenting and analyzing case studies of so-called failures around scaling up of specific FP3 technologies (IRRI led). It will institutionalize Rice Crop Manager in the Philippines by making it a Department of Agriculture digital advisory service. It will develop the Easy Harvest system based on country needs in India, Thailand, Vietnam and the Philippines. In Africa, FP3 will develop new areas for the SMART-Valleys approach for increases of yield and household income by the adoption of the approach compared to non-SMART-Valleys farmers in the project sites (Benin, Sierra Leone, Liberia and Togo; AfricaRice). The Smart-Valleys approach and alternate wetting and drying (AWD) will be validated in Burkina Faso. The sustainability of rice fields—e.g. lands maintained or not, yield levels—developed in the GRiSP (phase 1 of RICE CRP) in Benin and Togo will be assessed. An assessment will be made of multidimensional sustainability indicators in Nigeria, Senegal, Madagascar, Uganda, and Kenya. RiceAdvice and good agricultural practices will be disseminated with partners, and the potential for adoption of these practices by the women and poor will be assessed. We will conduct a participatory evaluation of mechanization options in Madagascar and Ivory Coast, and assess potential consequences of labor displacement of the women. The effect of improved crop and farmyard manure management

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will be confirmed for increasing yield and P use efficiency of the subsequent upland rice in the central highland of Madagascar. Finally, we will assess intensification options for reducing GHG reduction and mosquito density in lowland environments in Ivory Coast.

In FP4, both the antenna set panel and the reference panel will be evaluated in Colombia and Madagascar. In Colombia, the antenna set panels will be analyzed in a blast hot spot area. A fully automated image analysis framework for drone images will be developed for high-throughput phenotyping. Additionally, machine learning models will be further validated to be able to classify rice breeding lines infected by Hoja blanca Virus (RHBV) using multispectral images collected from FLAR breeding trials. In our activities on the genetics of rice plant interactions with the biotic environment, best pathotypes will evaluated and selected to inform breeding panels. The PathoTracer Platform for rice pathogen monitoring will be calibrated and validated, and subsequently used to to monitor diseases in Africa, Asia and Latin America. In Africa, the platform will be customized to regional diseases, for example blast and RYMV. Blast isolates will be phenotyped on near-isogenic lines and genotyped for major Avirulent genes. For RYMV we will phenotype on major genes and sequence virus fragments. Additionally, species for brown spot disease will be characterized in Burkina Faso and Mali and soil microbiome will be characterized in three different countries. In Asia, efforts will continue to monitor bacterial blight in Pakistan, India, Myanmar, Cambodia, Vietnam, Philippines, Indonesia, and we will make efforts to include new partners in Bangladesh, Thailand, and Nepal. In Latin America, studies will be initiated in collaboration with Fedearroz on bacterial grain rot caused by Burkholderia glumae, including sequencing of strains and developing molecular markers. All information will ultimately be available through PathoTracer.

To discover new genomic associations, the MAGIC and PRAY panels will be tested for yield across various environments and data collected will be analyzed with the GWAS platform developed in Galaxy to identify new genomic regions and further isolate the alleles to improve yield under stress. A GWAS module will be integrated in the Rice Genome Hub. Controlled vocabularies will be developed for phenotype data collected from images (tested in drones) and integrated with the work from the community of practice on Ontologies from the Big Data Platform. The semantic work will contribute to an "Image Ontologies" working group which will be potentially developed with the collaborations of GIS, drones, crop ontologies and other related groups, all through the Big Data Platform.

FP5 will continue to make significant developments with the modernization of market-driven rice breeding programs. Market segments will be defined in order to develop, deliver, and position the right products in the right markets to maximize impact and increase the variety replacement rate. Targeted product profiles will be developed and breeding pipelines defined and characterized. Pre-breeding will be separated from core breeding operations. A unified breeding strategy will be developed as the basis for product development which is expected to increase the rate of genetic gain across all breeding programs by improving at least one component of the breeders' equation, with yields 2-5% higher than the best check. Material advancement in national systems for testing in variety release pipelines will be conducted. Efforts will be enhanced to improve and standardize experimental designs and data management through full digitization of the data collection system and global adoption of modern breeding information management systems (B4R, EBS).

 In Africa, the minicore of O. glaberrima will be evaluated for grain quality traits and climate resilient traits, and the MAGIC indica panel will be evaluated to identify QTLs for yield potential traits. Popular varieties in African countries will be fingerprinted using 96 SNPs. Breeding panels will be evaluated to initiate genomic selection. Multi-location yield testing and screening for biotic and abiotic stresses and grain quality traits of at least 1000 lines will be conducted. Across Institutes (AfricaRice, CIAT, CIRAD, and IRRI), germplasm will be analyzed for micro-nutrient contents (Fe and Zn) will and efforts will be made to improve mineral content and to reduce the glycemic index (GI) of rice.

3_Financial Plan for the coming year, including use of W1/2 (max. 500 words)

W1,2 funding provides the backbone of RICE and catalyzes impact through strategic investments along the whole impact pathway, from upstream research to downstream development of business models and multistakeholder partnerships for innovation and scaling out. W1,2 investments cover both the research and product development component of the impact pathway as well as the strengthening of the enabling environment (as per Theory of Change). The long-term nature of W1,2 funding provides the continuity to the program, and guarantees not only short-term impacts (as derived from most bilateral projects) but also long-term impacts on 5-10 year time scales. Most W1,2 funds are used to support key RICE and flagship project staff, key MEL activities across all projects and funding sources, gender analyses and gender mainstreaming, and partnership building for scaling out and achieving impact at scale, and new initiatives (such as farm diversification, value-chain analyses). In 2020, we will make special investments in adoption and impact studies, including the documentation of so-called failures in outscaling, and in foresight analyses. Some highlight activities supported by W1,2 in 2020 are:

FP1:
· Updated foresight analysis and projections on the global and regional rice market
· Impact case studies that will analyze and generate evidences for underlying impact pathways and theories of change

FP2:
· Finalize and publish the assessment of the state of rice value chain upgrading in West Africa and extend the assessment to East Africa
· Expand verification of new GrainSafe Dryer with one ton capacity to Vietnam, Thailand and Burundi and develop a unit with 5t capacity in collaboration with GrainPro.
· Several studies on the adoption of sustainable rice straw management by Vietnamese farmers in the Mekong Delta
· Technology transfer of pop-rice to West-Africa and Asia

FP3:
· Analysis of 'failures' around scaling and outreach mechanisms.
· In Madagascar: participatory evaluation of mechanization options, and assessing potential

consequences of labor displacement of the women; assessment of multidimensional sustainability indicators; farm diversification trials and assessment of potential impact on on-farm diets.

· Development of policy brief regarding the Inland Valley mapping/use and Smart-valleys, and sharing with national partners in Benin and Togo.

FP4:

· Evaluation of the reference and antenna panel in multiple sites; genotyping of the antenna and reference panels; development of phenotyping tools

· GXEXM analysis of array data generated in 2018-2019

· Pathogen screening, sequencing and phenotyping in multiple sites and controlled conditions

· Characterization of population diversity and development of diagnostic tools for blast and brown spot disease

· Characterization of rice and blast diversity in Vietnam

FP5:

· Development and deployment of innovative breeding strategies, tools and technologies to accelerate the rate of genetic gain

· Establish a global market segmentation framework to define product profiles that are fully aligned with market needs

· Conduct precision phenotyping for key biotic, abiotic, grain and nutrition traits

Additional explanations for table 3 (optional):

TABLES

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestones	Indicate of the following	Means of verification	CGIAR Cross-Cutting Markers for the milestone				Assessment of risk to achieve that milestone (L/M/H)	For medium/high please select the main risk from the list
						for gender	for youth	for CapDev	for CC		
F1	• {primary} CC Increased capacity for innovations in partner research organizations	F1 Outcome: Foresight analyses and priority setting used by RICE and partner scientists to develop and target technology options	2020 - Operational system with up to date global and regional rice market analysis	New/ changed	Reports, peer-reviewed publications, targets domain maps, RICE Management Information System updates	0	0	0	0	Low	

• {primary} Optimized consumption of diverse nutrient-rich foods	F1 Outcome: Improved role in decision making by women and youth in rice value chains as evidenced by empowerment measures at key action sites	2020 - Learning from effective business models synthesized and communicated	New/ changed	Women empowerment indicators in RICE Management Information System; case stories; reports	2	1	1	0	Low	
• {primary} CC Increased capacity for innovation in partner development organizations and in poor and vulnerable communities	F1 Outcome: Well functioning multistakeholder platforms and seed systems at six action sites (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	2020 - 100% of key regions have at least one functional multi-stakeholder platform or improved seed system at key action sites	New/ changed	report, survey data, RICE progress indicators	1	0	0	0	Low	
• {primary} CC Enhanced individual capacity in partner research organizations through training and exchange • CC Increase	F1 Outcome: Effective networks and mechanisms to provide policy makers with up-to -date and evidence-based information on the rice sector	2020 - At least 2 agri-food policies informed by recommendation from rice science are adopted in Asia, Africa and Latin America and Carribean	New/ changed	Policy brief, official reports, media news,	0	0	0	0	Low	

capacity of beneficiaries to adopt research outputs										
• {primary} CC Increase capacity of beneficiaries to adopt research outputs	F1 Outcome: Effective public and private delivery systems for seeds of improved rice varieties in six countries (Bangladesh, India, Nepal; Nigeria, Senegal, Tanzania)	2020 - Sufficient commercial seed produced by the seed system to provide seeds for at least 15 million farmers, of which at least 50% are women, at the key action sites	Identical to proposal	project reports, news reports	1	0	0	1	Low	
	F1 Outcome: Impacts and adoption of RICE technologies assessed and published	2020 - Adoption and impact studies on NRM technologies, agronomic practices and stress-tolerant varieties - rolling plan based on progress of technologies along the impact pathway	Reworded/ rephrased from proposal	report, data, publications	0	0	0	1	Low	
• {primary} CC Increased capacity for innovations in partner research	F1 Outcome: Functional and effective results-based management system for RICE and its partners	2020 - Reflective learning workshops on Monitoring Evaluation Learning Impact Assessment and Gender" held to guide and adjust RICE work plan	Reworded/ rephrased from proposal	Workshop report	1	1	1	0	Low	

	organizations										
F2	• Diversified enterprise opportunities	F2 Outcome: Diversified enterprise opportunities generated through upgraded value chains in at least six action sites (Myanmar, Vietnam, Cote d'Ivoire, Uganda, Kenya and Madagascar)	2020 - Upgraded value chains in at least three action sites	New/ changed	Project reports (including training records), publications, press articles, curricula, training materials, and digital tools.	1	1	2	1	Low	
	• Improved access to financial and other services	F2 Outcome: Income of value chain actors increased by 10% in at least six action sites (Myanmar, Vietnam, Cote d'Ivoire, Uganda, Kenya and Madagascar)	2020 - Income of value-chain actors increased by 10% in at least three action sites because of increased value chain services	Reworded/ rephrased from proposal	Reports, case study documentation, significant change stories, RICE indicators.	1	1	1	0	Medium	2. Financial
	• Reduce pre- and post-harvest losses, including those caused by climate change	F2 Outcome: Income by value-chain actors increased by 10% through adoption of at least one of the postharvest or value addition practices or	2020 - Income by value-chain actors increased by 10% through adoption of at least one of the postharvest or value addition practices or technologies in at least three action sites	Reworded/ rephrased from proposal	Reports, case study documentation, significant change stories, RICE indicators.	1	1	1	1	Medium	2. Financial

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	technologies in at least six action sites (Vietnam, Myanmar, Indonesia, India, Uganda, Kenya, Madagascar, Cote d'Ivoire, Nigeria and Mozambique)									
• Increased value capture by producers	F2 Outcome: Value chain development supported for improved processing and novel (by-)products from rice in at least six action sites (Vietnam, Cambodia, Philippines, India, Myanmar and Cote d'Ivoire)	2020 - Value chain development supported for improved processing and novel (by-)products from rice in at least three action sites	Reworded/ rephrased from proposal	Project reports (including training records), training materials and project website.	0	1	2	1	Medium	2. Financial
• CC Increased capacity for innovations in partner research organizations	F2 Outcome: Partner research and development organizations' capacity in rice value chain upgrading increased in at least six countries (Vietnam, Myanmar, Indonesia, India,	2020 - Partner research and development organizations' capacity in rice value chain upgrading increased in at least three countries	Reworded/ rephrased from proposal	Training materials	0	1	2	0	Low	

	Cambodia, Philippines, Thailand, Sri Lanka, Bangladesh, Nepal, Tanzania, Burundi, Uganda, Kenya, Madagascar, Cote d'Ivoire, Nigeria and Mozambique)									
F3	• Closed yield gaps through improved agronomic and animal husbandry practices	F3 Outcome: Improved management practices that reduce yield gap by 10-15% developed and disseminated at eight action sites (Nigeria, Senegal, Tanzania, Madagascar, Vietnam, Indonesia, Bangladesh, Myanmar)	2020 - Potential adoption of improved practices by the women and poor assessed, and strategies developed for enhancing their adoption rate	Reworded/ rephrased from proposal	Reports, case study documentation	1	0	0	0	Low
	• More efficient use of inputs •Enhanced conservation of habitats and resources •More productive and equitable	F3 Outcome: Improved management practices that increase input use efficiency by 5% developed and disseminated at eight action sites (Nigeria, Senegal, Tanzania, Madagascar, Vietnam,	2020 - Male and female farmers participating in demonstration increase input use efficiency by 5% at six action sites	Reworded/ rephrased from proposal	Reports, case study documentation	1	0	1	1	Low

management of natural resources	Indonesia, Bangladesh, Myanmar)									
• Increased livelihood opportunities	F3 Outcome: Options to diversity rice farms with other crops, animals, or trees developed and disseminated at six action sites (Cote d?Ivoire, Madagascar, Tanzania, India, Bangladesh, Myanmar) (together with other CRPs)	2020 - Out- and up-scaling approaches for diversification options identified at four action sites	New/ changed	Reports, case study documentation	0	0	0	0	Low	
• Increased access to diverse nutrient-rich foods	F3 Outcome: Diversified on-farm diets sourced through diversified farming systems at four action sites (Cote d?Ivoire, Madagascar, Bangladesh, Myanmar) (together with other CRPs)	2020 - Potential impact of farm diversification on on-farm diets established at four action sites	New/ changed	Reports, case study documentation	1	0	0	0	Low	
• Reduced net	F3 Outcome: Improved	2020 - Climate-smart technologies	Reworded/	Reports, case						

greenhouse gas emissions from agriculture, forests and other forms of land-use (More sustainably managed agro-ecosystems) • CC Reduced net greenhouse gas emissions from agriculture, forests and other forms of land-use (Mitigation and adaptation achieved)	rice management practices that reduce GHG by 5% disseminated at three action sites (Bangladesh, Philippines, Vietnam)	to reduce GHG emissions tested at climate-smart villages through CCAFS, and scaled out through CCAFS networks	rephrased from proposal	study documentation.	0	0	1	2	Medium	2. Financial
• CC Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)	F3 Outcome: Results of completed farming systems analyses used to focus development activities on key opportunities for adapting to climate risks at eight action sites (Nigeria, Senegal,	2020 - A basket of options on climate-smart technologies communicated to national policy framework (with FP1)	New/ changed	Reports, case study documentation	0	0	0	2	Medium	

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	Tanzania, Madagascar, Vietnam, Indonesia, Bangladesh, Myanmar)									
• CC Technologies that reduce women`s labor and energy expenditure adopted	F3 Outcome: Value chain actors including farmers and service providers using new mechanization options designed to increase women?s labor productivity at seven action sites (Nigeria, Senegal, Tanzania, Vietnam, Indonesia, Bangladesh, Myanmar)	2020 - Consequences of labor displacement of the women and poor assessed, and strategies developed to assist women with more remunerative use of their labor	New/ changed	Reports, case study documentation	2	1	0	0	Low	
F4 • Enhanced adaptive capacity to climate risks (More sustainably managed agro-ecosystems)	F4 Outcome: Predicted global rice production risks used to guide development and targeting of climate change-adapted technologies at least for the most vulnerable rice agroecosystems	2020 - Information on the impact of environmental factors (climate, soil, biotic stress) on rice production used to predict global rice production risks and to guide development and deployment of climate smart technologies.	Reworded/ rephrased from proposal	Information published in peer-reviewed journals, models and results used and available in open access repositories	0	0	0	0	High	2. Financial

• CC Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)	F4 Outcome: Characterized pathogens populations and diversity used to predict varietal deployment for at least 3 major rice diseases	2020 - (i) Rice/soil microbiome interaction characterized and beneficial microorganisms identified (ii) Efficiency of available disease resistance genes validated	Reworded/ rephrased from proposal	Existence of trials, reports, management options communicated in various (E) outlets	0	0	0	0	Low	
• Adoption of CGIAR materials with enhanced genetic gains	F4 Outcome: At least 5 major QTLs/genes that are stable across environment and management, for all rice mega-environments, integrated in the respective varietal development pipelines	2020 - Contribution of G, E and M to QTL/gene effect determined	Reworded/ rephrased from proposal	Publications, reports, open access data bases (eg SNP Seek)	0	0	0	1	Medium	2. Financial
• Increased conservation and use of genetic resources	F4 Outcome: A functional rice data hub providing open access phenotypic and genotypic information and data analysis tools for users worldwide	2020 - Semantic rice knowledge network established (at least version 1)	Reworded/ rephrased from proposal	Available open access data hub with array data in it	0	0	0	0	Medium	2. Financial

F5		F5 Outcome: Rice diversity in rice gene banks used globally for identification of traits and discovery of new genes	2020 - 40% of targeted traits/donors/QTLs/genes identification achieved, diversity annually, 80% of the new diversity analysis accessions sequenced Links directly to GBP subsetting activity	Reworded/ rephrased from proposal	Genes, markers etc described in publications and reports, and curated in open access databases (eg SNP-Seek)	0	0	0	0	Low	
		F5 Outcome: Novel tools for precision biotech breeding based on genetic diversity shared open access and globally, including protocols for gene editing and genetic transformation	2020 - 50% of the targeted breeding tools and resources developed and used in breeding programs. Use of gene editing for the validation of genes involved in adsorption of cadmium.	Reworded/ rephrased from proposal	Tools described in publications and reports, available online, documented use in reports	0	0	0	0	Low	
	• Adoption of CGIAR materials with enhanced genetic gains	F5 Outcome: New rice varieties resulting in 1.3 % genetic gain in intensive systems	2020 - Historical genetic gain values established for major breeding sub programs; improve rate of GG by improving at least one component of the breeders' equation; 10 lines nominated for release with 2- 5% higher yield better than the best check, and meeting national quality requirements, in intensive	New/ changed	Existence of lines and new varieties, line development and variety release tracking in RICE Management Information System	0	0	0	0	Low	

		systems.								
• CC Enhanced capacity to deal with climatic risks and extremes (Mitigation and adaptation achieved)	F5 Outcome: Rice varieties with 20, 15, 10% reduction in yield loss caused by factors induced by climate change, in mega deltas, rainfed lowlands, and uplands, respectively	2020 - 10, 10, 5 varieties released with 15, 10, 10 % higher yield, and meeting national quality requirements, in mega deltas, rainfed lowlands, and uplands, respectively; 5-10 elite breeding lines and/or varieties combining tolerance of two of the relevant stresses in the three ecosystems developed, having 10-20% reduction in yield losses	Reworded/ rephrased from proposal	Existence of lines and new varieties, line development and variety release tracking in RICE Management Information System	0	0	0	0	Medium	5. Weather
• Increased access to diverse nutrient-rich foods	F5 Outcome: High quality and high nutritious rice varieties that are preferred by men and women farmers and consumers	2020 - Identify breeding lines possessing low chalk (0-5%), higher head rice recovery (60% HRR), better cooking quality lines in irrigated and stress prone areas.	Reworded/ rephrased from proposal	Existence of lines and new varieties, line development and variety release tracking in RICE Management Information System	0	0	0	0	Low	
• Increased conservation and use of genetic	F5 Outcome: Standardized design, data collection, analysis and management	2020 - Develop market segment; establish maturity groups (identify standard checks for different environments); develop product	New/ changed	Baseline data sets, reports, official product profiles	0	0	0	0	Low	

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	resources	implemented across the program	profiles; breeding pipelines defined and characterized; separation of pre-breeding from core breeding operations; improve rate of GG through optimization of one component of the breeders' equation; data management; breeders' reference panel established								

Table 2B: Planned Evaluations/Reviews, Impact Assessments and Learning Exercises

CRP	FP	Status	Planned studies/learning exercises in the coming year	Geographic scope	Who is commissioning this study
Rice	F1	On Going	Impact Assessment of RiceAdvice and ARICA varieties in Nigeria, Mali and Guinea.		RICE PMU
Rice	F3	On Going	Adoption of improved rice management practices in Southeast Asia		
Rice	F1	On Going	Impact assessment of stress-tolerant rice varieties: Evaluating impact through remote sensing and econometric methods		RICE CRP
Rice	F1	On Going	Estimating the differential effects in portfolios of agronomic practices: Case of Three reduction-Three Gains (3R3G) / 1 Must do 5 Reductions (1M5R) in Vietnam		RICE CRP
Rice	F1	On Going	Dissemination and Adoption of Bundled Agronomic Practices		RICE CRP

Rice	F1	On Going	Monitoring, Evaluation, Learning, Impact Assessment and Gender workshop 2020		RICE CRP
Rice	F1	On Going	Documenting RICE and CCAFS contribution in the development of Rice Restructuring strategy for Vietnam and its approval as policy document		RICE

Table 2C: Planned major new collaborations (CGIAR internal, or with non-CGIAR collaborators)

Name of Platform/CRP or non-CGIAR collaborator	Brief description of collaboration (give and take among CRPs/Platforms/non-CGIAR collaborator) and value added (e.g. scientific or efficiency benefits)
BARI - Bangladesh Agricultural Research Institute	Designing, testing and promoting climate-smart cropping system research and development activities
CSIRO - Commonwealth Scientific and Industrial Research Organisation	Collaboration on various value chain upgrading technologies.
CTA - The Technical Centre for Agricultural and Rural Cooperation	Collaboration on youth capacity building and employment
Cornell University	Collaboration on sustainable rice straw management.
ECOWAS - Economic Community of West African States	Collaboration on regional youth employment strategy

FAO - Food and Agriculture Organization of the United Nations	Collaboration on climate mitigation, adaptation and resilience, and socio-economic improvements of rice value chains
Ghent University	Collaboration with Prof. Hans De Steur, Faculty of Bioscience Engineering, Department of Agricultural Economics on novel methodologies for consumer research.
GrainPro - GrainPro Inc	GrainPro Inc. is a leading global company founded in 1992 in Concord, Massachusetts specializing in Ultra Hermetic technology used in storage, transport, and drying agri-solutions. They now have partnerships in 115 different locations worldwide; working with people from a rich variety of cultures and backgrounds (https://grainpro.com/en/). The company is now expanding its collaboration on storage technologies to AfricaRice.
IARI - Indian Agricultural Research Institute	Collaboration on sustainable rice straw management.
IDB - Islamic Development Bank	Implementation of Rice Value Chain Development Program in 5 African countries
IIAM - Instituto de Investigacao Agraria de Mozambique	The Agricultural Research Institute of Mozambique (IIAM) is a public entity that carries out research, development and dissemination of agricultural technology. It operates under the Ministry of Agriculture and Food Security. IIAM is a partner in the implementation of ESAParboil.
NCSU - North Carolina State University	Assessing the returns to IRRI investments in Bangladesh

Syngenta Foundation for Sustainable Agriculture	Collaboration on youth capacity building and employment
Thünen Institute - Johann Heinrich von Thünen Institute	Collaboration on farming system analysis in Africa
UEM - Universidade Eduardo Mondlane	Eduardo Mondlane University (Universidade Eduardo Mondlane) is the oldest institution set up as a center for higher education; it is located in Maputo (www.uem.mz<http://www.uem.mz>). Eduardo Mondlane University is a partner in the implementation of ESAParboil.
University of Arizona	- Impact assessment of Submergence-tolerant varieties in Bangladesh and India - Impact assessment of 3 reduction- 3 Gains / 1 Must do 5 reductions technologies in Vietnam
University of Arkansas	Collaboration with Prof. Alvaro Durand-Morat on foresight modeling of policy sequencing in rice value chain upgrading in Africa.
University of Kassel	Detection of insects in storage by sound patterns.
EiB	Information sharing on product profiling through data repository.

KU - Kasetsart University	Collaboration on choice experiments on climate labels and sensory evaluation in rice.
Repoblikan'l Madagasikara / Republic of Madagascar	Office National de Nutrition (ONN), The National Office of Nutrition (ONN) is a structure attached to the Prime Minister's Office in Madagascar. ONN is in charge of monitoring the implementation of the National Nutrition Policy in collaboration with the ministerial structures and the United Nations Institutions. It also coordinates the multi-sector and multi-stakeholder interventions in nutrition and food security (https://www.office-nutrition.mg/). ONN is a partner in the implementation of ESAParboil.
ETH-Zurich - Swiss Federal Institute of Technology	Collaboration with Future Cities Laboratory (FCL), Singapore on urban-rural food systems. A joint project proposal "Agropolitan Territories in Monsoon Asia" has been submitted.
CARDI - Cambodian Agricultural Research and Development Institute	Collaboration on product profiling to support rice breeding at CARDI (supported by bilateral funds from VERDE project).
CRF - Cambodian Rice Federation	A survey with 25 CRF members has been conducted in 2019 and further collaboration to support CRF in developing repositioning and restructuring strategy has been planned.
ISRA - Institut Senegalais de Recherche Agricole	We will collaborate with ISRA's Bureau d'Analyse Macro-Economique (BAME) to implement a survey to understand the dynamics of rainfed rice in Casamance. It will enable identifying the regions and business models (technologies, coordination mechanisms) that would favor rainfed rice production and marketing in this region.
CII - Confederation of Indian Industry	Collaboration on sustainable use of by-products in rice.

ISSER - Institute of Statistical, Social and Economic Research, University of Ghana	Collaboration with ISSER from the University of Ghana to provide information to regional policy makers about the drivers of successful large-scale investment in rice value chains in West Africa.
Africa Harvest Biotech Foundation International	Africa Harvest Biotech Foundation International is a not-for-profit foundation (https://africaharvest.org/) headquartered in Nairobi. It uses science and technology, gender-sensitive, appropriate agricultural technologies and innovative institutional approaches to improve the livelihoods of rural communities, particularly smallholder farmers. It is the main EARiSS project partner at the regional level.
MAER - Ministère de l'Agriculture et de l'Equipment Rural (Senegal)	We will collaborate with the Société de Développement Agricole et Industriel du Sénégal (SODAGRI) to implement a survey to understand the dynamics of rainfed rice in Casamance. It will enable identifying the regions and business models (technologies, coordination mechanisms) that would favor rainfed rice production and marketing in this region.
KALRO - Kenya Agricultural and Livestock Research Organization	Kenya Agriculture and Livestock Research Organization (http://www.kalro.org/) is Kenya's premier agriculture and livestock research body. It is our partner in implementing EARiSS project activities in Kenya.
Hue University	Collaboration with Dr Nguyen Hoang Diem My, Lecturer and Researcher at the University of Economics, Hue University on evidence-based policy making on certification of sustainably-produced rice in Vietnam.
MASA - Ministério da Agricultura e Segurança Alimentar (Mozambique) / Ministry of Agriculture and Food Security	Ministry of Agriculture and Food Security, Mozambique (Ministério da Agricultura e Segurança Alimentar (MASA)) has a mission to contribute to food and nutrition security and the income of agricultural producers in a competitive manner, ensuring social and gender equity (http://www.masa.gov.mz/). MASA is a partner in the implementation of ESAParboil.

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Ministry of Agriculture and Rural Development (Mozambique)	Collaboration on rice value chain upgrading.
AU - University of Antananarivo / Université d'Antananarivo	University of Antananarivo, Madagascar (Université d'Antananarivo) is the primary public university of Madagascar, located in the capital Antananarivo (http://www.univ-antananarivo.mg/). In the context of implementing the ESAParboil project, we will specifically partner with the laboratory of Biochemisty Applied to Food Science and Nutrition within the Faculty of Science.
MEDA - Mennonite Economic Development Associates	Mennonite Economic Development Associates (MEDA) is an international economic development organization whose mission is to create business solutions to poverty. Founded in 1953 by a group of Mennonite entrepreneurs, we partner with people living in poverty to start or grow small and medium-sized businesses in developing regions around the world (https://www.meda.org/).
EIAR - Ethiopian Institute of Agricultural Research	Ethiopian Institute of Agricultural Research (EIAR) has a mission to conduct research that will provide market competitive agricultural technologies that will contribute to increased agricultural productivity and nutrition quality , sustainable food security, economic development, and conservation of natural resource and the environment in Ethiopia (https://www.facebook.com/EIARPR/). The institution is host to Fogera National Rice Research and Training Center (FNRRTC) in Bahir Dar.
DLG - Deutsche Landwirtschaftsgesellschaft / German agriculture society	Organization of mechanization and postharvest seminar along the AGRITECHNICA ASIA 2020, Bangkok, May 2020.

NIAB - National Institute of Agricultural Botany	Value-chain support for increasing nutritious rice consumption in the Philippines and Thailand under BBSRC grant led by Prof. Lesley Boyd.
UAC - University of Abomey Calavi	Collaboration with Rose Fiamohe (former AfricaRice) on rice value chain upgrading strategies in Africa.
Agrisud International.	A reinforcement in relationship with this NGO will be conducted in order to build communication supports focused on pilot farmers and extension services.
GSDM - Groupement Semis Direct Madagascar / Madagascar Direct Seeding Group	A reinforcement in relationship with this NGO will be conducted in order to build communication supports focused on pilot farmers and extension services.
BigData	documenting the impact and what the main opportunities are for the CGIAR science to support farmers through the digitalization of extension services
IITA	Joint preparation for Excellence in Agronomy intiative.
CIAT	Joint preparation for Excellence in Agronomy intiative.
CIMMYT	Joint preparation for Excellence in Agronomy intiative.

CIP	Joint preparation for Excellence in Agronomy intiative.
ICRAF	Joint preparation for Excellence in Agronomy intiative.
ICARDA	Joint preparation for Excellence in Agronomy intiative.
Africa Harvest Biotech Foundation International	Africa Harvest organizes training on fabrication and use of weeders in partnership with private sector
KALRO - Kenya Agricultural and Livestock Research Organization	KALRO conducts research and development activities related to diagnosis, and piloting and dissemination of innovations together with AfricaRice
NARO - National Agricultural Research Organisation (Uganda)	NARO conducts research and development activities related to diagnosis, and piloting and dissemination of innovations together with AfricaRice
FOFIFA - Centre National de Recherche Appliqué au Développement Rural	NARO conducts research and development activities related to diagnosis, and piloting and dissemination of innovations together with AfricaRice

University of Reading	Collaboration with Prof Eleanor Fisher on how one assesses impact of agricultural research.
Queen's University	Prof Marcus Taylor will work on impact of rice technologies and progress towards SDGs work with Prof Fisher from University of Reading and IRRI
CSIRO - Commonwealth Scientific and Industrial Research Organisation	Collaboration on synergies and trade-offs between SDGs and rice research.
IARI - Indian Agricultural Research Institute	IARI is involved in exploring how to encourage a move away from rice-growing in Punjab and Harayana (conversion to other crops such as high value crops) and focus rice-growing in other parts of India
CII - Confederation of Indian Industry	Condedration of Indian Industry is involved in exploring how to encourage a move away from rice-growing in Punjab and Harayana (conversion to other crops such as high value crops) and focus rice-growing in other parts of India
USTTB - University of Sciences, Techniques and Technologies of Bamako	CIRAD and University of Bamako in Mali for collecting disease samples to identify fungal species causing brown spot diseases (CoA4.3).
Columbia University	CIRAD: Depending on the available data to the AgMIP group, they will adapt actual rice crop models in order to set up an strategy for TPE design for breeding programs.

BRRI - Bangladesh Rice Research Insitute	To collaborate regarding sample collection and disease characterization
CARDI - Cambodian Agricultural Research and Development Institute	To collaborate regarding sample collection and disease characterization
RUA - Royal University of Agriculture	In Cambodia, to collaborate regarding sample collection and disease characterization
Indian Institute of Rice Research	To collaborate regarding sample collection and disease characterization
INERA - Institut de l'Environnement et de Recherches Agricoles (Burkina Faso)	For the evaluation of the Global Rice Array, for characterizing soil microbiome (CoA4.3) and for collecting disease samples to identify fungal species causing brown spot diseases (CoA4.3).
BigData	Collaboration on the Image Ontologies and also on the Rice Genome Hub.
KGF - Krishi Gobeshona Foundation	For development of short duration cold tolerant rice varieties for Haor areas of Bangladesh
RRTC - Rice Research and Training Center	For collaboration with Egypt on hybrid rice research
EiB	For initiating improvements in breeding programs under the Crops to End Hunger (CtEH) Initiative

EIAR - Ethiopian Institute of Agricultural Research	For hybrid rice projects

Table 3: Planned Budget

	Planned Budget				Comments on major changes
	W1/W2	W3/Bilateral	Center Own fund	Total	
F1	$3,060,240.62	$9,275,349.82	$0.00	$12,335,590.40	
F2	$1,397,348.77	$1,586,832.90	$0.00	$2,984,181.70	
F3	$2,270,918.78	$11,226,703.92	$0.00	$13,497,622.70	
F4	$2,782,169.02	$2,686,974.72	$0.00	$5,469,143.70	
F5	$3,133,700.61	$21,037,028.58	$0.00	$24,170,729.20	

CRP Management & Support Cost	$1,271,622.00	$0.00	$0.00	$1,271,622.00	
Strategic Competitive Research grant	$0.00	$0.00	$0.00	$0.00	
CRP Total	$13,915,999.80	$45,812,889.94	$0.00	$59,728,889.70	