

GLDC

Plan of Work and Budget 2020



RESEARCH PROGRAM ON Grain Legumes and Dryland Cereals



Alliance



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List of Acronyms

AVCD	Accelerated Value Chain Development
BGM	Botrytis grey mold
BMS	Breeding Management System
CC	Climate change
CIAT	International Center for Tropical Agriculture
CIRAD	Centre de Coopération Internationale en Recherche Agronomique pour le Développement
CIMMYT	International Maize and Wheat Improvement Center
CLARISA	CGIAR Level Agricultural Results Interoperable System Architecture
CNGs	Crop Network Groups
CRP	CGIAR Research Program
DC	Dryland Cereals
DEME	Design, Execution, Monitoring, and Evaluation
GL	Grain Legumes
CSIRO	Commonwealth Scientific and Industrial Research Organisation
EiB	Excellence in Breeding platform
FAW	Fall Armyworm
Fe	Iron
FFS	Farmer Field Schools
FP	Flagship Program
GLDC	Grain Legumes and Dryland Cereals
GOBI	Genomic Open-Source Breeding Informatics
GS	Genomic Selection
HOPE	Harnessing Opportunities for Productivity Enhancement of Sorghum and Millets in Sub-Saharan Africa and South Asia
HTPG	High Throughput Genotyping Platform
IBP	Integrated Breeding Platform
ICARDA	International Center for Agricultural Research in the Dry Areas
ICRAF	World Agroforestry
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IDM	Integrated Disease Management

IITA	International Institute of Tropical Agriculture
ILRI	International Livestock Research Institute
IN	International Nursery
IPM	Integrated Pest Management
IRD	Institut de recherche pour le développement IWMI International Water Management Institute
MARLO	Managing Agricultural Research for Learning and Outcomes
MEL	Monitoring, Evaluation & Learning
MELIA	Monitoring, Evaluation, Learning, and Impact Assessment
MISST	Malawi Improved Seed Systems and Technologies
MPAB	Markets and Partnerships in Agri-business
NARS	National Agricultural Research System
PABRA	Pan-African Bean Research Alliance
PMU	Program Management Unit
POWB	Plan of Work and Budget
PPs	Product Profiles
QC	Quality Control
QTLs	Quantitative Trait Loci
RGA	Rapid Generation Advance
SA	South Asia
SDG	Sustainable Development Goals
SI	Sustainable Intensification
SLU	Swedish University of Agricultural Sciences
SMO	System Management Office
SNP	Single Nucleotide Polymorphism
SSA	Sub-Saharan Africa
Sub-IDO	Sub-Intermediate Development Goals
TE	Transpiration Efficiency
TL III	Tropical Legumes III
ToC	Theory of Change
TPE	Target Populations of Environments
VPD	Vapor Pressure Deficit

WCA West and Central Africa
WUR Wageningen University of Research
Zn Zinc

Cover Page

CGIAR Research Program on Grain Legumes and Dryland Cereals

Lead CGIAR Center: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

Flagship 1: Priority Setting & Impact Acceleration

CGIAR center: International Institute of Tropical Agriculture (IITA)

Flagship 3: Integrated Farm and Household Management

CGIAR center: World Agroforestry (ICRAF)

Flagship 4: Variety and Hybrid Development

CGIAR center: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

Flagship 5: Pre-breeding and Trait Discovery

CGIAR center: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT)

Flagship 6: Common Bean

CGIAR center: The Alliance of Biodiversity and CIAT (International Center for Tropical Agriculture)

Other participating CGIAR centers:

- International Center for Agricultural Research in the Dry Areas (ICARDA)
- International Institute of Tropical Agriculture (IITA)
- World Agroforestry (ICRAF)
- International Livestock Research Institute (ILRI)
- International Water Management Institute (IWMI)
- The Alliance of Biodiversity and CIAT (International Center for Tropical Agriculture)

Other participating research institutions:

- Commonwealth Scientific and Industrial Research Organisation (CSIRO)
- Institut de recherche pour le développement (IRD)
- Centre de Coopération Internationale en Recherche Agronomique pour le Développement (CIRAD)

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1_Adjustments/ Changes to your Theories of Change (ToC)

The Theory of Change for FP1 remains largely unchanged and the team is making efforts to ensure that adequate progress is made towards the set outcome targets. For FP3, no adjustment was made to date, but some changes may occur following the flagship meeting in the first quarter of 2020 when the ToC will be revisited. Similarly, there are currently no major changes in the Theories of Change (ToC) for FP4 and FP5.

2_Plans and Expected Progress Towards Outcomes

Flagship Program 1: Priority Setting & Impact Acceleration

Following the multidimensional ex-ante evaluations (i.e., economic, poverty, and nutrition security) of GLDC research and technology options that have been carried out since 2017, FP1 will conduct further analytical work to synthesize the results in order to identify priority areas of GLDC research with greater economic, poverty, and nutritional impacts in the target countries and regions. This aims at sharpening the focus on lines of research and technologies that have the greatest potential for adoption and impacts on smallholder farmers in the drylands of sub-Saharan Africa (SSA) and South Asia (SA). Priority setting will also be informed by the work on prioritization of varietal attributes and Product Profiles (PPs) that will define the most important end-user preferred traits of GLDC crops to be targeted by breeders in FP4 and FP5. These priority traits that will drive technology adoption by farmers, including women, will be identified as part of a larger effort to assess market and household demands shaping the uptake and market potential of agricultural technologies and production. The PPs will feature the preferences of different actors along the value chain, including women, and are directly actionable within FP4 and FP5 for developing new technologies based on the demands and needs of households in the target regions. The work on the potential impact of GLDC crops on urban nutrition will enhance our understanding of food choice motives in high density urban settlements and will provide a critical entry point to target urban malnutrition. The disaggregated results by gender and age will directly inform the PPs and enable targeted partnership planning with private sector actors to provide nutritious food to vulnerable urban consumers.

Strategic gender research (youth transitions in the drylands of SSA and SA and identifying opportunities for and constraints to enhancing gender equity, etc.) will support GLDC in pursuit of integration, inclusion and equity among women and youth beneficiaries and stakeholders to strengthen the relevance and targeting of research outputs and boost development impacts. Gender and Youth research issues have also been integrated into the work on trait prioritization and PPs, while addressing the overarching gender research questions. An idealized scaling framework was developed in 2019 that encapsulates key elements considered important in promoting the large-scale adoption and, in turn, impacts of GLDC technologies. This framework was used to evaluate four GLDC case study projects [Harnessing Opportunities for Productivity Enhancement of Sorghum and Millets in Sub-Saharan Africa and South Asia (HOPE), Tropical Legumes III (TL III), Accelerated Value Chain Development (AVCD), and Malawi Improved Seed Systems and Technologies (MISST)] and has now been expanded to make it more comprehensive for supporting and enhancing GLDC's scaling approaches and impacts. Following the evaluation and synthesis of GLDC scaling approaches, associated adoption, impact evidence and building on the integrated and multifaceted impact assessment and learning strategy, FP1 will conduct three main streams of work to execute the strategy: (a) assess the spatial extent of the adoption of GLDC crops; (b) assess the soil health impacts of that adoption via a systematic review of evidence; and (c) estimate the nutritional impacts associated with such adoption through the same systematic review strategy. The soil health impacts of the adoption of GLDC crops will be carried out in collaboration with FP3. These outcome and impact studies are an evidence of increased investment and commitment by GLDC brought about through the impact assessment and learning strategy.

Flagship Program 3: Integrated Farm and Household Management

In the area of biotic and abiotic stresses, biological control agents against the cowpea pod borer, which have showed great potential in reducing pest populations in experimental releases in Benin and Burkina Faso, will also be released in Mali, Niger and Nigeria. In general, our pest control approach devoid of

chemical insecticides will benefit women cowpea farmers who have much less access to conventional pesticides and be particularly attractive to the youth as a sustainable approach. The five sorghum accessions that showed resistance to the fall armyworm (FAW) with scores ranging from 2 to 3, on a 1 to 9 scale, will be further studied to understand the underlying mechanisms of resistance, and the information passed on to breeders.

Preferred varieties and crop diversity combinations and sequences have been identified through participatory cropping systems trials across agro-ecologies. The legume systems technology will be validated on farmers' fields to establish the relationship between systems (intercropping, rotation, etc.) advantages and resource requirements of the component crop genotypes for efficient resource use and increased productivity. These activities have a major capacity building component that has allowed farmers to gain knowledge and skills on crop mixes and best crop production practices. Efforts will continue to promote and scale up adoption to increase diversity within cropping systems and to improve soil management practices. In addition, integrated farm household datasets have been collected in Burkina Faso and Ethiopia with a focus on variables on livelihood typologies, innovation adoption, impacts of legume-based technological interventions on smallholder production and livelihood performance to develop a decision support system. An agent-based model and nutrient balance/flow models will be used to assess ex-ante impacts of innovation practices on crop production efficiency and household livelihoods and identify best-fit options. A map-based guide on options for farm designs to improve nutrient stocks and effective nutrient cycles will be developed for stakeholders.

At the household and farm levels, good progress has been made on parameterizing and validating farming systems models for SA and SSA. A hands-on capacity of national agricultural research system (NARS) and regional project partners has been facilitated. We work with extension systems to mainstream systems tools for decision support to better target sustainable intensification interventions. A comprehensive farming systems sustainability assessment framework and tool have been developed and tested in Nalgonda district, Telangana (India) to support the co-designing of resilient farming systems in GLDC regions. Significant progress has been made in building capacity in system dynamics tools to support value chain actors and policy makers to boost the integration of smallholders into agricultural value chains. From 2020 and beyond, promotion of an evidence-based portfolio of options for sustainable intensification and systems decision support tools to enable policy makers, development actors and smallholders to enhance the resilience of farming systems and improve rural livelihoods aligning with targets of the Sustainable Development Goals (SDG) will continue.

During the FP3 meeting scheduled early next year, researchable questions and identification of data needs focusing on women participation and empowerment will further enhance the gender aspects. The FP3 ToC will be revised to analyse how each output fits in and contributes to this for developing clear behavioral change assumptions needed from the actors (next users) for achieved outputs of the program to be translated into outcomes by capacitating some of these actors. Regarding markets and partnerships in the agri-business area, new opportunities around sorghum/millet utilization to improve the nutritional security and resilience of smallholder households will be jointly identified. Finally, FP3 will work with FP1 on institutions and impact, and with FP4 and FP5 on systems modelling scenarios for information on desirable crop traits under a changing climate scenario, besides continuing to work on dissemination of varieties and providing feedback.

Flagship Program 4: Variety and Hybrid Development

The ecosystem and drivers for success with adoption achieved by the public sector that resulted in a remarkable adoption rate of over 95% of new legume varieties in Myanmar and Bangladesh will be studied using an Agri-food system and business model lens in a joint study with the Markets and Partnerships in Agri-business (MPAB) cross-cutting theme. In the absence of 'seed marketing units' of CGIAR and NARS breeding programs, market information is often limited. FP4 prioritized market studies by FP1 will provide feedback to design PPs of GLDC crops for the target countries. With close engagement with Module 1 of the Excellence in Breeding (EiB) platform to design Crop Product Profiles, a critical first step towards modernizing CGIAR and NARS crop breeding programs has been the establishment of Crop Network Groups (CNGs). Crop breeders also engage with EiB to deploy process innovations in crop breeding and testing pipelines to enhance genetic gains and improve operational efficiencies, thus

adopting best practices to deliver crop products. The Pan-African Bean Research Alliance (PABRA) model of FP 6 will be adopted for furthering the scope of these CNGs.

Investments in Phase 1 of CRP-Grain Legumes (CRP-GL) and CRP-Dryland Cereals (CRP-DC) were realized in 2018 and 2019 with the commercialization of new cultivars of GLDC crops – biofortified sorghum, lentil and pearl millet with enhanced grain iron (Fe) and zinc (Zn) content; high oleic groundnut for the food industry; high protein soybean and machine harvestable chickpea and lentils driving women and youth entrepreneurship and early-maturing cowpea varieties. This flagship will partner with the private seed sector and other institutions to increase the production of early generation seed and promote the adoption of these new varieties so that producers and consumers reap their benefits. The crop Product Profiles were designed with available information from the markets and engagement with stakeholders besides the data from production ecology requirements.

The GLDC crop breeding programs will develop breeding populations to deliver target ecology-specific crop products. The breeding pipeline for heat tolerance in chickpea and pearl millet; low nutrient adaptation in cowpea; early maturity in eight GLDC crops; and high Transpiration Efficiency (TE) under high Vapor Pressure Deficit (VPD) in sorghum will be the focus areas of research for climate change adaptation. Towards managing efficient crop breeding programs, the rate of genetic gains of GLDC breeding programs will be assessed in the breeding pipelines using the tools developed by EiB. Since the International Nursery (IN) trial system is an integral part of crop improvement programs that engage the CGIAR and NARS, FP4 will work towards establishing an efficient system of trials, collection of data, validation and analysis; and sharing of phenotypic data using android-based field books and BMS. The GLDC crop breeding programs have successfully used the High Throughput Genotyping Platform (HTPG) in forward breeding and plan to deploy Quality Control (QC) using the Single Nucleotide Polymorphism (SNP) platform to assess the genetic purity of lines moving from testing to early generation seed increase, and parents used in hybridization.

Flagship Program 5: Pre-breeding and Trait Discovery

The focus of FP5 will be on exploiting the untapped genetic resources of cultivated germplasm, wild relatives and landraces by developing and using cutting-edge tools and techniques for trait discovery, trait mapping, trait characterization/dissection and deployment in breeding to accelerate the rate of realized genetic gains in GLDC crops under mixed cereal-legume-tree-livestock systems of the semi-arid and sub-humid regions of SSA and SA. Recent technological and resource advances in genomics, genetics, trait discovery, breeding, Rapid Generation Advancement (RGA) and rapid achievement of homozygosity in major cereal crops provide excellent opportunities in GLDC crops working closely through FP4. In 2020, FP5 will focus on trait discovery, functional validation of traits and pre-breeding by exploiting natural and/or systematically induced variations for prioritized traits in combination with modern genomics, transgenics, phenomics and breeding tools for accelerated, precise, cost-effective and efficient breeding of new varieties in the future.

Pre-breeding will focus on advancing prioritized traits through ongoing activities that explore the natural diversity in wild/unadapted germplasm, especially on advancing work on resistance to *Botrytis* grey mold (BGM) in chickpea and blast and heat tolerance in pearl millet by using the wild germplasm in ongoing activities that are partially supported by bilateral projects. In addition, the focus will be on characterization and advancement of already created transgenic events (such as *Bt* in pigeonpea) for traits in which natural diversity is not available. Trait discovery will focus on mapping and dissection of at least one top priority trait in each target crop including the development, validation and deployment of molecular markers for at least one priority trait in three GLDC crops. In addition, development and validation of genomic selection (GS) in two GLDC mandate crops will be planned. The development and validation of QC panels for germplasm/breeding lines will be priorities in four GLDC crops. Advancing introgression (molecular breeding) lines in one cereal and one legume harboring QTLs/genomic regions controlling the desired traits in elite lines will be carried out. Enabling technologies will continue to establish the proof of concept in genome editing; proof of concept/deployment of second-generation transformation (QuickCrop from Corteva AgriScience) in sorghum and pearl millet; systematic mutant population and RGA in at least two GLDC crops. Refining the reference genome assembly in pearl millet will be achieved in collaboration with Corteva

AgriScience. FP5 will also work closely with other FPs and cross-cutting themes to deliver on joint activities. In addition, it will continue capacity development activities by supporting the training of students and researchers (especially NARS partners) by organizing training courses, seminars, workshops, symposia, exchange visits, data management, etc. The knowledge generated from FP5 activities will not only be applied to modernizing crop improvement but also be disseminated in the form of reports, datasets, scientific publications, presentations, and shared knowledge with partners.

Flagship Program 6: Common Bean

The revised proposal for FP6 on Common Bean submitted by CIAT was approved by the System Management Office (SMO) in May 2018 to be integrated within CRP-GLDC and led by CIAT as part of the current CGIAR Research Portfolio. FP6: Common Bean was approved by the CGIAR System Council in November 2018 and incorporated within CRP-GLDC in January 2019. This new FP focusing on common bean will expand the activities and contribute to GLDC outcomes and the respective sub-IDs. Sub-IDs 1.3.1, 1.4.1 and 1.4.3 correspond to FP4 and FP5, and sub-IDs 1.3.4 and 2.1.1 to FP 3 in GLDC. Sub-IDO 1.3.1 also corresponds to FP 2. While the FP will host only one center and focus on one crop, collaboration will be ensured by the five clusters carrying research activities interlinked with those in GLDC. The flagship's performance and accountability will be the responsibility of CIAT as per the proposal (<https://hdl.handle.net/20.500.11766/10245>). The key milestones for 2020 focus on inclusion of survey data in PPs, consolidation of foresight studies, establishment of business platforms with the analysis of value chain and capacity development for entrepreneurs, in addition to several others in the areas of pre-breeding and breeding, as listed in the FP's full plan of work 2020 that is available in Annex-1.

Cross-cutting Themes

Capacity Development

GLDC flagships and cross-cutting themes have planned substantial capacity development activities in 2020 that are intended to reach over 18,000 beneficiaries through field days and over 17,000 via Farmer Field Schools (FFS). More than 5,000 people will participate in workshops or training courses. Another highlight will be the training of 24 PhD students until the end of the program. The Capacity Development Task Force will on demand support these activities as required.

Besides, the Task Force will focus on three critical activities:

- **Conduct a workshop on integrated, impact and transformation-oriented R4D design.** This activity will be driven by all the three cross-cutting themes and will target scientists of all flagships. The intention will be to revisit specific sub-ToCs of the FPs to identify constraining capacity gaps in the ToC. We see this effort as contributing to the development of integrated project proposals as facilitated by the MPAB theme which can further provide inputs into the One CGIAR process.
- **Populate the E-learning Platform.** The existing GLDC E-learning platform will be improved in design and functionality and will be populated with learning material provided by flagship scientists. The Task Force will support the adaptation of existing training material to suit E-learning experiences. In addition, there will be an exchange of content with the ICARDA E-learning platform as well as the agSKILLED platform.
- **Support appropriate mapping of capacity development activities.** The Task Force will continue to raise awareness on the diversity of capacity development and will support flagship scientists in mapping their activities to capacity development.

Gender and Youth

Gender integration in the GLDC research portfolio has been prioritized for 2020, based on the lessons drawn from 2019 and cross-FP discussions during the GLDC Science Meeting in 2019. Aligned to the breeding program is the analysis of gender responsiveness in product and customer profiling. There are global initiatives, including EiB and the gender and breeding initiative, that are working towards greater cooperation and partnerships to develop methodologies and approaches for customer and product profiling as a critical input in the breeding stage gate process. This is cross-cutting for crops and centers in

the GLDC. A methodology designed by ICRISAT-WCA initiated in 2019 will continue the work in 2020.

We propose to investigate the concept of plant meats as a priority and with a futuristic outlook. The gender team will be contributing to exploring the role youth would play in developing plant meat value chains. The question of dietary preferences and acceptance of plant meats among women and youth who are likely to be key consumers, will also be investigated in 2020.

A team of gender scientists and FP3 leaders together with biophysical scientists in the team will collaborate on a joint training on 'Gender integration into FP3 activities. The capacity of gender research and management of qualitative data for FP3 as well as the institutional arrangements for the delivery of gender research will be enhanced.

Gender dynamics in seed systems will continue to be a priority in 2020. The role of women and youth and institutional arrangements in a commodity corridor concept will be among the methodological approaches tested in 2020 under FP4. Some key research questions relevant to youth participation in scaling of GLDC technologies to be addressed include the following: which scaling framework is appropriate, and under what assumptions, and what institutional transformation of systems/institutions enable adoption and lead to empowerment of women and young people?

Under FP5, discussions have begun on how we can unpack the gendered impacts of 'gender responsive traits' like rancidity, labor saving, and iron and zinc content among women/community members.

Markets and Partnerships in Agri-business (MPAB)

This cross-cutting theme will use identified market opportunities for GLDC farmers and crops to marshal integrated research and development responses for their advancement by GLDC flagships and partner organizations. This also involves looking "over the horizon" at emerging trends in the medium to long term that can inform strategy in trait discovery (FP5) and breeding (FP4).

For 2020, the MPAB work is mapped across all the GLDC FPs. With FP1, CoA 1.3, it will collaborate on value chains, markets and technology to: (i) enhance the effectiveness of interventions to promote the use of GLDC crops by consumers and industry; and (ii) understand the seed business and factors associated with scaling of selected GLDC varieties in India, Bangladesh and Myanmar. With FP3, MPAB will collaborate on ongoing farming systems modelling work to explore emerging sorghum and millet utilization options and identify promising market entry points for these crops. With FP4, it will support ongoing work on sorghum fodder utilization to explore enterprise scaling options. With FP4 and FP5, it will collaborate to understand the future scenarios and impact pathways for "game changing" traits, exploring future industry, consumer and policy choices and responses. In addition, it will examine the impact of the global demand for pigeon pea as a plant-based meat in Southern Africa with a view to identifying trait and breeding implications and market intervention options.

A key part of the MPAB approach is to support and invest in small market opportunity scoping studies that can serve as the basis to develop proposals for integrated research and development projects. Integration refers to the marshalling of different types of scientific expertise from across the FPs (economics, agronomy, plant breeding and trait discovery) as well as the development of partnerships with industry, civil society and policy bodies that need to collaborate with GLDC to take ahead identified opportunities. In 2020, a key focus will be scenario development and stakeholder engagement / proposal development workshops that focus on recent scoping studies on the introduction of legislation on blended flour (sorghum and millets) in Kenya. The activities will involve experts from across the flagship to develop an integrated research and development project to help operationalize the value add of CRP.

TABLES

Table 2A: Planned Milestones (0= not targeted; 1= significant; 2= Principal)

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
1	Increased resilience of agro-ecosystems and communities, especially those including smallholders	FP1.01. Improved targeting and responsiveness of research to market and household demands in the face of climate change for greater technology adoption, food and nutrition security, resilience, and poverty reduction	Ex-ante evaluation of GLDC research and technology options completed and working papers published on the potential poverty and nutrition security impacts to guide priority setting	Same as 2019	Foresight and ex-ante evaluation working papers and the final results that will be shared with GLDC researchers and stakeholders at the annual review and planning meeting	0	0	0	1	Low	
1	Increased availability of diverse nutrient-rich foods	FP1.01. Improved targeting and responsiveness of research to market and household demands in the face of climate change for greater technology adoption, food and nutrition security, resilience, and poverty reduction	Multidimensional ex-ante evaluation of GLDC research and technology options completed and results shared with GLDC staff and partners	Reworded/rephrased from proposal	Refined GLDC program with adjusted work plans for 2021 featuring priority research options and countries	NA	NA	NA	NA	Medium	4. Internal resources - risk that key staff, infrastructure or equipment not available at time needed
1	Increased livelihood opportunities	FP1.02. Market and household demand identified, and trade-offs assessed for more inclusive value chains that improve income and nutrition status in target regions	Diversity of farm household preferences vis-a-vis market demand by context outlined in view of research in GLDC	Reworded/rephrased from proposal	Types of market demands and value chain-based interventions identified	NA	NA	NA	NA	Medium	4. Internal resources - risk that key staff, infrastructure or equipment not available at time needed

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
1	Increased livelihood opportunities	FP1.02. Market and household demand identified, and trade-offs assessed for more inclusive value chains that improve income and nutrition status in target regions	Shared learning across GLDC stakeholders and FPs on implications of diverse targets' aspirations and future scenarios leading to strategic adjustments	Same as 2019	Report on diversity of target group preferences and match and mismatch of GLDC research targets based on meetings and workshops across GLDC	1	1	1	0	Low	
1	Increased livelihood opportunities	FP1.02. Market and household demand identified, and trade-offs assessed for more inclusive value chains that improve income and nutrition status in target regions	Underlying principles established for diversity assessment and matching of technologies across contexts	Identical to proposal	Published options of how to meet the needs of diverse target groups in GLDC research and scaling	NA	NA	NA	NA	Medium	4. Internal resources - risk hat key staff, infrastructure or equipment not available at time needed
1	Improved capacity of women and young people to participate in decision-making	FP1.03. Inclusive and equitable technologies and innovation systems established for accelerated and broadened impact across the agri-food system	Inclusive and equitable innovation systems to accelerate impacts on women and young people designed and piloted underlying design principles proven	Same as 2019	Reports on innovation systems for empowering women and youth; sex disaggregated and gender relevant datasets; policy brief [paper] on gender and social analysis informing intervention design	NA	NA	NA	NA	Medium	6. External environment (political, economic, legal, market) - e.g. risk of non- delivery due to conflict, economic/ market changes

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
1	Improved capacity of women and young people to participate in decision-making	FP1.03. Inclusive and equitable technologies and innovation systems established for accelerated and broadened impact across the agri-food system	Inclusive and equitable innovation systems tested and adjusted to different biophysical and socioeconomic contexts, including policy interactions	Same as 2019	Reports on the performance of innovation systems for women and youth in different contexts, including recommendations for enabling environments; synthesis report [paper] on improved capacities and skills for women and youth	2	1	1	0	Medium	6. External environment (political, economic, legal, market) - e.g. risk of non-delivery due to conflict, economic/market changes
1	Improved capacity of women and young people to participate in decision-making	FP1.03. Inclusive and equitable technologies and innovation systems established for accelerated and broadened impact across the agri-food system	Functioning innovation systems established across GLDC sites operating and sustainably; designing of scaling systems in collaboration with CoA 1.4	Discontinued	Scaling out strategy for innovation systems for women and youth documented; number of women and youth impacted by interventions documented	NA	NA	NA	NA	Medium	6. External environment (political, economic, legal, market) - e.g. risk of non-delivery due to conflict, economic/market changes
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	Joint systematic review with CoA 1.2	Same as 2019	Review protocol	NA	NA	NA	NA	Low	

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	Scaling toolkit for Design, Execution, Monitoring, and Evaluation (DEME) content agreed upon to support improved horizontal and vertical scaling of GLDC commodities and management practices	Same as 2019	Scaling toolkit framework	NA	NA	NA	NA	Medium	4. Internal Resources - risk that key staff, infrastructure or equipment not available at time needed
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	Evaluation designed and implementation underway to evaluate current GLDC scaling approaches and associated impact evidence	Same as 2019	Evaluation design reports	NA	NA	NA	NA	Low	
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	Evaluation documenting the strengths, shortcomings, and key lessons learnt on GLDC scaling approaches and impacts	Same as 2019	Evaluation report	1	1	1	1	Medium	3. Partnership - risk that partners won't be able to deliver a key piece on time

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	Working strategy for evidencing the outcomes and impacts of GLDC	Same as 2019	Strategy	1	1	1	1	Medium	4. Internal resources - risk that key staff, infrastructure or equipment not available at time needed
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	At least two GLDC new scaling projects supported to apply scaling toolkit	Identical to proposal	Project design documents	NA	NA	NA	NA	Medium	6. External environment (political, economic, legal, market) - e.g. risk of non-delivery due to conflict, economic/ market changes
1	Conducive agricultural policy environment	FP1.04. Strong project design, execution, monitoring and evaluation systems and tools consistently applied in GLDC scaling projects, with demonstrable progress in enhanced adoption and impact	The working strategy for evidencing the outcomes and impacts of GLDC implemented	New	Working papers on impact assessment	1	0	1	0	Medium	4. Internal resources - risk that key staff, infrastructure or equipment not available at time needed

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
3	Increased resilience of agro-Ecosystems and communities, especially those including smallholders	FP3.O1. Cropping systems sustainably intensified and diversified	5,000 farmers in project sites increase the diversity within cropping systems and use water and soil management practices developed jointly by farmers and researchers	Reworded/ rephrased from proposal	Research and evaluation reports, training manuals, fact sheets and other extension materials	1	0	NA	1	Medium	3. Partnership - risk that partners won't be able to deliver a key piece on time
3	Increased resilience of agro-ecosystems and communities, especially those including smallholders	FP3.O1. Cropping systems sustainably intensified and diversified	Agricultural system simulation models (agent-based model, nutrient balance/ flow models) used to assess ex-ante impacts of innovation practices on crop production efficiency and household livelihoods, and best-bet options identified	New	Operational models; reports on ex post impact assessment with an efficiency focus; publications (submitted journal article, conference proceeding paper)	NA	NA	NA	NA	Medium	2. Financial - funding not fully confirmed or at risk of being cut
3	Increased resilience of agro-ecosystems and communities, especially those including smallholders	FP3.O1. Cropping systems sustainably intensified and diversified	Participatory field trials under smallholder conditions in different cropping systems under different environments evaluated	New	Reports on field trials and publications	1	0	NA	1	Medium	5. Weather - for example, drought or heavy rain affecting field trials

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
3	Reduced production risk	FP3.O2. Pest and diseases controlled safely and with reduced agro-chemical inputs	Pest and diseases management components for the target; and resource and soil management options in different regions fine-tuned	Same as 2019	Reports	1	1	1	1	Medium	3. Partnership - risk that partners won't be able to deliver a key piece on time
3	Reduced production risk	FP3.O2. Pest and diseases controlled safely and with reduced agro-chemical inputs	Efficacy of selected pest and diseases management; and resource and soil management options confirmed at pilot scale	Same as 2019	Publication and reports	1	1	1	1	Medium	3. Partnership - risk that partners won't be able to deliver a key piece on time
3	Reduced production risk	FP3.O2. Pest and diseases controlled safely and with reduced agro-chemical inputs	Effective pest and disease management components evaluated for controlling target pests; and resource and soil management options evaluated for improved resilience	Reworded/rephrased from proposal	Publication and reports	1	1	1	1	Medium	3. Partnership - risk that partners won't be able to deliver a key piece on time
3	Increased resilience of agro-ecosystems and communities, especially those including smallholders	FP3.O3. Tested, adapted and validated options applied for sustainable intensification and livelihood diversification by farmers	Suite of systems modelling tools/ framework for co-designing resilient farming systems in GLDC regions	Same as 2019	https://www.mdpi.com/2077-0472/9/9/185/htm	1	NA	NA	NA	High	3. Partnership - risk that partners won't be able to deliver a key piece on time

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
3	Increased resilience of agro-ecosystems and communities, especially those including smallholders	FP3.O3. Tested, adapted and validated options applied for sustainable intensification and livelihood diversification by farmers	Portfolios of household activities, enterprises and management practices that materially and equitably enhance livelihoods (as defined at sub-IDO level) while minimizing negative externalities	Identical to proposal	https://cgspace.cgiar.org/handle/10568/105731	1	NA	NA	NA	High	3. Partnership - risk that partners won't be able to deliver a key piece on time
4	Enhanced genetic gains	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	Initial analysis of stress patterns in TPE on few crops are available to better decide on breeding target	Same as 2019	Publication, reports and technical document	0	0	1	1	Low	
4	Increased capacity for innovation in partner research organizations	FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scale and scope	Develop Product Profiles for crops x regions with NARS	Same as 2019	Reports and EiB platform	NA	NA	2	0	Low	

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
4	Closed yield gaps through improved agronomic and animal husbandry practices	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	New suite of resilient varieties released by NARS partners; (Phase 1 investments start being released)	Identical to proposal	Publication, reports, variety registration certificates, and MoA reports	NA	NA	0	0	Low	
4	Increased availability of diverse nutrient-rich foods	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	New varieties with enhanced nutrient levels [Iron (Fe), Zinc (Zn), oil, protein, high oleic] developed	Same as 2019	Publication, reports and technical document	1	1	1	0	Low	
4	Enhanced genetic gains	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	Phase I genetic materials deployed in GLDC crop improvement by CGIAR centers -- 8 crops × 3 trait clusters × 2 regions tested by NARS annually	Same as 2019	Publication, reports and technical document	0	0	1	1	Low	
4	Reduced biological and chemical hazards in the food system	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	Sorghum crop indices measured routinely, and new indices being explored to support breeding decisions	New	Publication, reports and technical document	0	0	1	0	Low	

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
4	Enhanced genetic gains	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	Crop breeding programs develop and use robust quality control mechanisms to safeguard genetic purity of products, reputation and impacts for crop commodities	New	Publication, reports and technical document	NA	NA	1	0	Low	
4	Reduced production risk	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	New varieties with enhanced adaptation to biotic and biotic stresses developed	New	Publication, reports and technical document	NA	NA	1	0	Low	
4	Reduced biological and chemical hazards in the food system	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	New varieties deployed as part of Integrated Pest Management (IPM)/ Integrated Disease Management (IDM) minimize the use of chemicals; will target legumes and susceptible cereals; releasing 2-3 new varieties for each crop biannually per partner country	New	Publication, reports and technical document	NA	NA	1	0	Low	

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
4	Enhanced genetic gains	FP4.O1. New varieties and allied innovations improving productivity and production potential, agribusiness opportunity and stabilizing food supply	Phase I genetic materials deployed in GLDC crop improvement by CGIAR centers – 8 crops × 3 trait clusters × 2 regions tested by NARS annually	Same as 2019	Publication, reports and technical document	NA	NA	1	0	Low	
4	Enhanced genetic gains	FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scale and scope	GLDC crop breeding programs deploy process innovations to enhance selection and operational efficiencies	New	Publication, reports and technical document	NA	NA	1	NA	Low	
5	Increased conservation and use of genetic resources	FP5.O1. Pre-breeding products using genebanks and other sources and modern tools to increase genetic diversity in breeding programs globally	Development/ refinement of technologies to overcome barriers to wide crosses in one crop	Same as 2019	4 Publication/reports/ technical bulletins	NA	NA	1	NA	Medium	1. Research/ science - inherent risk in unknown cutting-edge research or science
5	Increased conservation and use of genetic resources	FP5.O1. Pre-breeding products using genebanks and other sources and modern tools to increase genetic diversity in breeding programs globally	Development/ refinement of technologies to overcome barriers to wide crosses in one crop and transgenic Bt events characterized/ advanced in one legume crop	Same as 2019	https://www.icrisat.org/livestock-value-chain-strengthening-essential-for-improving-production-and-food-security-in-niger-say-scientists/	NA	NA	1	NA	Medium	1. Research/ science - inherent risk in unknown cutting-edge research or science

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
5	Enhanced genetic gains	FP5.02. Trait discovery and development based on genomics and phenomics to generate new markers to support trait integration through the use of modern enabling technologies and forward breeding	Precision phenotyping for key traits for these collections and genotyping to identify novel alleles in two traits in two crops that have limited variability in breeding populations	New	Publication/ reports/ technical document	NA	NA	1	NA	Low	
5	Enhanced genetic gains	FP5.02. Trait discovery and development based on genomics and phenomics to generate new markers to support trait integration through the use of modern enabling technologies and forward breeding	Marker development through a variety of genetic resources for one top priority trait in two legumes and two cereals and 'QC panel' developed and validated in three GLDC crops	Same as 2019	4 Publications/ reports/ technical bulletins	NA	NA	1	NA	Medium	1. Research/ science - inherent risk in unknown cutting-edge research or science
5	Enhanced individual capacity in partner research organizations through training and exchange	FP5.03. Outcome 5.3: National researchers able to apply acquired skills in other pre-breeding programs; development of enabling technologies platforms to be used for rapid trait discovery, trait validation, trait development, and trait introgression	All GLDC trait discovery programs migrate data to IBP, BMS, GOBII to manage genotypic and phenotypic data (FP4.1)	New	2 Publications /reports and technical bulletins	NA	NA	1	NA	Low	

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestone	Source	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		
5	Enhanced genetic gains	FP5.02. Trait discovery and development based on genomics and phenomics to generate new markers to support trait integration through the use of modern enabling technologies and forward breeding	Network of precision phenotyping sites is established across GLDC crops to provide unique and relevant testing locations for key traits (Gain-of-function or loss of function platform in one cereal and two legumes established	Same as 2019	4 publications/reports and 1 database	NA	NA	1	NA	Medium	1. Research/science - inherent risk in unknown cutting-edge research or science
5	Technologies that reduce women’s labor and energy expenditure developed and disseminated	FP5.03. Outcome 5.3: National researchers able to apply the acquired skills in other pre-breeding programs; development of enabling technologies platforms to be used for rapid trait discovery, trait validation, trait development, and trait introgression	Proof of concept completed for genome editing and second-generation transformation platforms in two cereals	Same as 2019	8 publications/report and markers for one key trait in four crops and one fully functional database	NA	NA	1	NA	Medium	1. Research/science - inherent risk in unknown cutting-edge research or science

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

CRP	FP (if not overall CRP)	Status	Planned studies/learning exercises in the coming year	Geographic scope (specify country or region if relevant)	Who is commissioning this study
GLDC	1	Ongoing	Adoption and impacts of improved cowpea varieties in Nigeria (IITA)	Nigeria	IITA
GLDC	1	Ongoing	Adoption and impacts of improved soybean varieties and agronomic practices in Malawi (IITA)	Malawi	IITA
GLDC	1	Ongoing	Analysis of advantages and disadvantages of rice fallow vs rice legumes (ICARDA)	India	ICARDA
GLDC	1	Ongoing	Adoption and impacts of groundnuts in Tanzania and Nigeria (ICRISAT)	Tanzania and Nigeria	ICRISAT
GLDC	1	Ongoing	Adoption and impacts of chickpea in Ethiopia (ICRISAT)	Ethiopia	ICRISAT
GLDC	1	Ongoing	DryDev five country impact assessment (ICRAF)	N/A	ICRAF
GLDC	1	Ongoing	What do we really know about the impacts of improved grain legumes and dryland cereals: A critical review of 18 impact studies (ICRAF)	N/A	ICRAF
GLDC	1	Ongoing	Review of scaling approaches applied in GLDC scaling projects: Tropical Legumes III, Harnessing Opportunities for Productivity Enhancement 2, Feed the Future initiatives and DryDev (ICRAF)	N/A	ICRAF
GLDC	1	Ongoing	Assess the potential nutrition security impacts of GLDC technologies in the drylands of SSA and South Asia	SSA and South Asia	IITA/ICRISAT/ICARDA
GLDC	1	Ongoing	Integrated and multifaceted impact assessment and learning strategy for GLDC	Global	ICRAF
GLDC	3	Ongoing	Sustainability assessment of smallholder's farming system: assessment of the impacts of sustainable intensification (SI) options	Global	SLU/ICRISAT/WUR
GLDC	All	Ongoing	Identify a common set of performance indicators that all projects can report on at the CRP level beyond the CGIAR ones	Global	PMU

Table 2B: Planned Evaluations/Reviews, Impact Assessments and Learning Exercises					
CRP	FP (if not overall CRP)	Status	Planned studies/learning exercises in the coming year	Geographic scope (specify country or region if relevant)	Who is commissioning this study
GLDC	All	Ongoing	Capacity development and Joint learning exercises	Global	PMU
GLDC	All	Ongoing	Ensure real time data visualization based on conceptualized indicator framework [MEL, MARLO, and CGIAR Level Agricultural Results Interoperable System Architecture (CLARISA)]	Global	PMU
GLDC	1	New	Poverty eradication and food security through agriculture in Africa: Rethinking objectives and entry points	Africa	ICRAF/ICRISAT/ CIMMYT

Table 2C: Planned major new collaborations (CGIAR internal, or with non-CGIAR collaborators)	
Name of CRP or non-CGIAR collaborator	Brief description of collaboration (give and take among CRPs/PTFs/non- CGIAR collaborator) and value added (e.g. scientific or efficiency benefits)
Corteva AgriScience	FP5.3 (Enabling technologies) will work with Corteva AgriScience to deploy (from proof of concept to be developed) second generation transformation in sorghum, pearl and pearl millet.
Corteva AgriScience	FP5.1 (Pre-breeding) will collaborate with Corteva AgriScience to refine the reference genome assembly of at least pearl millet.
ICARDA	In 2020, as part of further improving the GLDC E-learning platform, the Capacity Development Task Force will facilitate exchange of content with the ICARDA E-learning and agSKILLED platforms.
ILRI	FP4 has been working with ILRI since 2018 to mainstream fodder quality of GLDC crops, which is critical to sustainable crop-livestock production systems.
Hiphen (initially a start-up from INRA-Avignon)	FP4 will work with Hiphen in the area of drone-based images-assisted crop breeding. Hiphen will assist CGIAR in generating indices from crop breeding plots and data processing pipeline (Cloverfield).

3. Financial Plan for the coming year, including use of W1/2

As per the 2020-2021 FINPLAN, the budget allocated for 2020 is US\$ 10.731 M. FP2 on Transforming Agri-food Systems, which was a part of the approved CRP-GLDC, remains unfunded in 2020. A total of US\$ 42,341,472 as W3/Bilaterals has been mapped by the participating centers for 2020, out of which US\$ 1,092,000 has been mapped to meet the objectives of FP2 by ICRISAT. FP6 (Common Bean) has been integrated within CRP-GLDC and is led by CIAT.

Table 3: Planned budget					
CRP-GLDC	Planned budget 2020 (\$)				Comments on major changes
	W1/2	W3/bilateral	Center Own fund	Total	
FP1	1,412,375	2,381,153	0	3,793,528	Includes FP and CoA Co-Leaders salaries and admin management contribution.
FP2	-	1,092,000	0	1,092,000	Though FP2 is not funded, activities planned under it are being carried out from W3/Bilateral projects.
FP3	2,020,875	10,011,518	0	12,032,393	Includes FP and CoA Co-Leaders salaries and admin management contribution.
FP4	3,051,875	14,659,100	0	17,710,975	
FP5	1,401,875	7,152,042	0	8,553,917	
FP6	1,633,333	7,045,659	0	8,678,992	Includes FP and CoA Co-Leaders salaries and admin management contribution.
CRP Management & Support Cost	364,000	0	0	364,000	Includes PMU management cost and overheads & research support cost.
FP6 Management & Support Cost	81,667			81,667	5% pass through cost.
Strategic Competitive Research Grant (Innovation Fund)	515,000	0	0	515,000	Innovation Fund (IF) will invest in untapped opportunities that can build a strong business case for sustainable and equitable benefits for smallholder producers of GLDC crops. It will be planned at 100%.
Additional cross-cutting activity on Markets and Partnerships in Agri-business (MPAB)	250,000	0	0	250,000	Includes salaries and operational cost.
Total Budget 2020	10,731,000	42,341,472	0	53,072,472	

Note: The budget allocated for 2020 is US\$ 10.731 M (net of CSP). The above budget is expressed at 100% spending levels. For operation purposes, CRP-GLDC is currently planning to spend 90% of this budget until further guidance is received from SMO.

Annex-1

Plan of Work and Budget (POWB) 2020
of
Flagship Program(FP) 6: Common Bean
Led by CIAT

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Flagship Program (FP) 6: Common Bean Led by CIAT

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

FP6: None so far as we have only started and come to join GLDC a bit later.

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

FP6: Scientific highlights in FP-6 should include identification of heat tolerance in interspecific progenies in field trials in Mozambique and Central America. We also hope to confirm superior root penetration capacity in interspecific progenies in field conditions. Testing of genomic selection will continue. Experimentation with mechanization and its application will advance under the AVISA project, and initial data for estimation of Target Populations of Environments will be obtained in Africa. Partnerships will see the reestablishment of a Latin American regional network among a new generation of common bean scientists in nine countries. The Swiss Development Corporation has approved a one-year extension of the current phase of their support to the Pan-African Bean Research Alliance (PABRA) while another phase is under negotiation. Business platforms under PABRA continue to mature with increased participation of service providers and the creation of bean-based products, and PABRA is open to attendance of experts in other crops in bean business platform meetings. Collaboration on gender with focus on young women will be pursued. Capacity building will receive a boost with a post-doctoral fellow with expertise in statistics and genomic analysis.

TABLES

Table 2A: Planned Milestones

[Please include the planned milestone mapped to 2022 CRP outcomes with the means of verification. For each milestone, indicate the level of change from the original proposal, means of verification, CGIAR cross-cutting markers for gender, youth, Capacity Development (CapDev), Climate Change (CC), and likely risk to achievement (Low risk = very likely to be achieved). Please see note on putting a short narrative into section 2 above, to comment on major adjustments and new/changed milestones in addition to the proposals, and if these were linked to the insights/ innovations from the reporting period.]

C1	C2	Column 3	Column 4	Column 5	Column 6	7a	7b	7c	7d	Column 8	Column 9
FP	Mapped to Sub-IDO	2022 FP outcomes (see Note 1)	Milestone (see Note 2)	Indicate of the following (drop down: Milestone 1) Identical to proposal 2) Reworded/ rephrased from proposal 3) new/changed*)	Means of verification (see note 3)	CGIAR Cross-Cutting Markers for the milestone (see Note 4) 0=not targeted; 1=significant; 2=principal, N/A = not applicable				Assessment of risk to achieve that milestone (L/M/H) (see note 5)	For medium/high please select the main risk from the list (Note 6)
						for gender	for youth	for CapDev	For CC		
FP6		General	Researchers and partners applied data from annual stakeholder questionnaire used to update breeding profiles	1	Report on Product Profiles in MEL	1	n/a	n/a	n/a	M	3
FP6		General	Researchers conducted foresight studies which included further elements such as climate, population,	1	Foresight analysis report	1	n/a	n/a	n/a	M	7 Not all desired data may be available

C1	C2	Column 3	Column 4	Column 5	Column 6	7a	7b	7c	7d	Column 8	Column 9
FP	Mapped to Sub-IDO	2022 FP outcomes (see Note 1)	Milestone (see Note 2)	Indicate of the following (drop down: Milestone 1) Identical to proposal 2) Reworded/ rephrased from proposal 3) new/changed*)	Means of verification (see note 3)	CGIAR Cross-Cutting Markers for the milestone (see Note 4) 0=not targeted; 1=significant; 2=principal, N/A = not applicable				Assessment of risk to achieve that milestone (L/M/H) (see note 5)	For medium/high please select the main risk from the list (Note 6)
						for gender	for youth	for CapDev	For CC		
			markets, adoption/ consumption preferences								
FP6		General	Researchers conducted foresight analysis using CIAT data to estimate competitiveness of beans in relation to other crops	1	Foresight analysis report	n/a	n/a	n/a	n/a	L	
FP6	1.3.1	Outcome 1: Increased livelihood opportunities	Researchers produced first breeding lines with non-darkening trait locus introgression in commercial Andean grain types	1	Report on Prebreeding cluster in MEL	n/a	n/a	n/a	n/a	M	1
FP6	1.3.1 D.1.4 B.1.4.	Outcome 1: Increased livelihood opportunities	Five multi-stakeholder bean business platforms established by partners using the Corridor model to support trade	1	Report on up-scaling in MEL	1	1	2	n/a	L	

C1	C2	Column 3	Column 4	Column 5	Column 6	7a	7b	7c	7d	Column 8	Column 9
FP	Mapped to Sub-IDO	2022 FP outcomes (see Note 1)	Milestone (see Note 2)	Indicate of the following (drop down: Milestone 1) Identical to proposal 2) Reworded/ rephrased from proposal 3) new/changed*)	Means of verification (see note 3)	CGIAR Cross-Cutting Markers for the milestone (see Note 4) 0=not targeted; 1=significant; 2=principal, N/A = not applicable				Assessment of risk to achieve that milestone (L/M/H) (see note 5)	For medium/high please select the main risk from the list (Note 6)
						for gender	for youth	for CapDev	For CC		
FP6	1.3.1 D.1.4. B.1.3.	Outcome 1: Increased livelihood opportunities	Capacity training completed with partners with 750 male and female entrepreneurs and farmers	1	Report on up-scaling in MEL	2	1	2	n/a	L	
FP6	1.3.4 D.1.2.	Outcome 2: More efficient use of inputs	Researchers quantified potential for enhanced root penetration from <i>P. coccineus</i>	1	Report on Prebreeding cluster in MEL	n/a	n/a	1	n/a	M	3
FP6	1.4.1 A.1.4.	Outcome 3: Reduced yield losses, including those caused by climate change	Heat tolerance identified in interspecific progenies of common bean and tepary bean	3	Report on breeding and phenotyping in MEL	n/a	n/a	n/a	2	M	1
FP6	1.4.1 A.1.3. B.1.3.	Outcome 3: Reduced yield losses, including those caused by climate change	Researchers and partners developed and disseminated five climate advisories for bean production	1	Report on up-scaling in MEL	1	n/a	n/a	2	L	

C1	C2	Column 3	Column 4	Column 5	Column 6	7a	7b	7c	7d	Column 8	Column 9
FP	Mapped to Sub-IDO	2022 FP outcomes (see Note 1)	Milestone (see Note 2)	Indicate of the following (drop down: Milestone 1) Identical to proposal 2) Reworded/ rephrased from proposal 3) new/changed*)	Means of verification (see note 3)	CGIAR Cross-Cutting Markers for the milestone (see Note 4) 0=not targeted; 1=significant; 2=principal, N/A = not applicable				Assessment of risk to achieve that milestone (L/M/H) (see note 5)	For medium/high please select the main risk from the list (Note 6)
						for gender	for youth	for CapDev	For CC		
FP6	1.4.1 A.1.4. B.1.1.	Outcome 3: Reduced yield losses, including those caused by climate change	Researchers identified and strengthened five functional seed enterprises for delivery of climate-smart varieties and complementary ICM technologies with information targeting hard to reach smallholder farmers	1	Report on up-scaling in MEL	1	1	n/a	2	L	
FP6	1.4.3 A.1.4.	Outcome 4: Enhanced genetic gain	Researchers recovered and analyzed data from GxE trial	1	Report on Product Profiles in MEL	n/a	n/a	n/a	n/a	L	
FP6	1.4.3	Outcome 4: Enhanced genetic gain	Researchers tested genomic selection	1	Report on breeding technology in MEL	n/a	n/a	n/a	n/a	M	1
FP6	1.4.3	Outcome 4: Enhanced genetic gain	Researchers and partners evaluated at least 10,000 DNA samples at Intertek	1	Report on breeding and phenotyping in MEL	n/a	n/a	n/a	n/a	L	

C1	C2	Column 3	Column 4	Column 5	Column 6	7a	7b	7c	7d	Column 8	Column 9
FP	Mapped to Sub-IDO	2022 FP outcomes (see Note 1)	Milestone (see Note 2)	Indicate of the following (drop down: Milestone 1) Identical to proposal 2) Reworded/ rephrased from proposal 3) new/changed*)	Means of verification (see note 3)	CGIAR Cross-Cutting Markers for the milestone (see Note 4) 0=not targeted; 1=significant; 2=principal, N/A = not applicable				Assessment of risk to achieve that milestone (L/M/H) (see note 5)	For medium/high please select the main risk from the list (Note 6)
						for gender	for youth	for CapDev	For CC		
FP6	2.1.1	Outcome 5: Increased availability of nutrient-rich food	1,000 tons of seed of new micro-nutrient bean varieties produced and disseminated by partners	1	Report on up-scaling in MEL	1	n/a	n/a	n/a	L	
	2.1.1	Outcome 5: Increased availability of nutrient-rich food	Six consumer preferred bean varieties including biofortified, that are climate resilient and environmentally friendly developed at CIAT and released by partners	1	Report on breeding and phenotyping in MEL	1	n/a	n/a	2	L	

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

[Please complete the following table to share any impact assessments, adoption studies, evaluations, reviews or other learning exercises that are planned for the coming year, for example to provide evidence for reporting on Outcome-Impact Case Studies. Delete examples provided below and replace with your own. Please make sure that the title of study is self-explanatory. Spell out acronyms every time. (This information will be accessed by readers online who may not be able to see other rows of the table)]

Column 1	Column 2	Column 3	Column 4	Column 5	Column 6
CRP	FP (if not overall CRP)	Status (drop down menu: ongoing, new)	Planned studies/learning exercises in the coming year through Dropdown: ePIA, Adoption survey. Effectiveness study, Qualitative Outcome study, Program evaluation, Synthesis, Other MELIA activity _____ (examples below)	Geographic scope (specify country or region if relevant)	Who is commissioning this study
<i>GLDC</i>	<i>FP6</i>				
<i>GLDC</i>	<i>FP6</i>				
<i>GLDC</i>	<i>FP6</i>				

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

[Please list **most relevant new internal** (among programs, and programs and platforms), **or collaborations with non-CGIAR partners for the coming year (2020)** using the following table. Please make sure that the description is self-explanatory. Spell out acronyms every time. (This information will be accessed by readers online who may not be able to see other rows of the table)]

Name of CRP or non-CGIAR collaborator	Brief description of collaboration (give and take among CRPs/PTFs/non-CGIAR collaborator) and value added (e.g. scientific or efficiency benefits)
KOLFACI – Korean Latin America Food and Agriculture Cooperation Initiative	A 6-year project will be undertaken to create a regional network on drought tolerance in common bean among 9 countries (Bolivia, Colombia, Costa Rica, Dominican Republic, El Salvador, Guatemala, Honduras, Nicaragua, Peru)
ACIAR-University of West Australia	A five-year project which will focus on Rapid breeding for reduced cooking time and enhanced nutritional quality in common bean (<i>Phaseolus vulgaris</i>) among 6 countries of Eastern Africa (Burundi, Ethiopia, Kenya, Rwanda, Tanzania and Uganda).
AVISA (Accelerating Variety Improvement and Seed Systems in Africa)- BMGF supported project	A four year project (starting 2018) focusing on accelerating genetic gain and legumes (including beans) seed access to farmers including beans in three eastern African Countries (Ethiopia, Tanzania and Uganda)

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

[Briefly highlight any important issues regarding the financial plan and highlight any particularly interesting plans for the use of W1/2 in 2018. Indicate FP number in parenthesis, if relevant. Please complete [Table 3: Planned Budget](#).]

Table 3: Planned Budget for FP6: Common Bean

	Planned budget				Comments on major changes																								
	W1/2	W3/bilateral	Center Own fund	Total																									
FP1	N/A	N/A	N/A	N/A																									
FP2	N/A	N/A	N/A	N/A																									
FP3	N/A	N/A	N/A	N/A																									
FP4	N/A	N/A	N/A	N/A																									
FP5	N/A	N/A	N/A	N/A																									
FP6	1,633,333	7,045,659	0	8,678,992	<p>Confirmation of W2 from USAID is pending From proposal (take out when updated)</p> <table border="1"> <thead> <tr> <th>2020</th> <th>Funding needed</th> <th>Funding secured</th> <th>Funding gap</th> </tr> </thead> <tbody> <tr> <td>W1+W2</td> <td>16,000</td> <td>0</td> <td>16,000</td> </tr> <tr> <td>W3</td> <td>4,507,993</td> <td>0</td> <td>4,507,993</td> </tr> <tr> <td>Bilateral</td> <td>7,524,925</td> <td>1,673,498</td> <td>5,851,427</td> </tr> <tr> <td>Other sources</td> <td>0</td> <td>0</td> <td></td> </tr> <tr> <td>Total</td> <td>12,048,918</td> <td>1,673,498</td> <td>10,375,420</td> </tr> </tbody> </table>	2020	Funding needed	Funding secured	Funding gap	W1+W2	16,000	0	16,000	W3	4,507,993	0	4,507,993	Bilateral	7,524,925	1,673,498	5,851,427	Other sources	0	0		Total	12,048,918	1,673,498	10,375,420
2020	Funding needed	Funding secured	Funding gap																										
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Other sources	0	0																											
Total	12,048,918	1,673,498	10,375,420																										
any other main program planned budget outside FPs (if relevant)	N/A	N/A	N/A	N/A	<p>Please state name of line and add rows if needed Example: cross-cutting initiatives, funding reserved for competitive grants, or other strategic investment.</p>																								
FP6 Management & Support Cost (5% Pass through)	81,667	N/A	0	81,667																									
FP6 Total	1,715,000	7,045,659		8,760,659																									



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