# **Annex 2 – Flagship Report Template**

**Flagship annual report - 2018**

**Flagship 4 – Variety Develoment**

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# Progress by flagship

[Please provide brief summary narratives about how each individual CRP Flagship progressed towards the agreed ‘Program outcomes’, introducing Milestones Table to the reader, highlighting (i) major pieces of work and innovations and (ii) any major course corrections. Where relevant, indicate cross-flagship linkages and how one FP built on or worked with another to get results. (max 800 words).

Based on the lessons learnt, the Flagship 4 seeks to establish multi-location testing sites, enhance rate of genetic gain in crop breeding and testing pipelines, modernize the CG and NARES crop breeding programs and replicate successful seed systems such as pearl millet in India and cowpea in Nigeria to achieve two Flagship level outcomes viz., new varieties and allied innovations improving productivity and production, agribusiness and stabilize food supply; and robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scale and scope. Through these outcomes, the Flagship contributes to the two Program level outcomes *viz*, expanded, resilient, and inclusive production, value chain, trading, and consumption of nutritious grain legumes and dryland cereals in target countries; and improved capacity and inclusivity of agri-food system stakeholders to collaboratively develop innovations that respond to the needs of the women, men, and youth in GLDC-based livelihoods and value chains.

The Flagship conducted multi-location testing and national testing to commercialize 73 cultivars of chickpea (11), pigeon pea (3), groundnut (25), cowpea (2), soybean (6), lentil (4), sorghum (6), pearl millets (10) and finger millets (6) breeding lines developed from the Phase 1 of the CRP in sixteen countries of South Asia and sub-Sahara Africa. The commercialization of new cultivars and their adoption contributes to expanded, resilient and inclusive production, value addition, trading and consumption of nutritious grain legumes and dryland cereals in the target countries. Flagship 4 has enhanced its engagement with private seed sector, including small- and medium- seed companies through Crop Network Groups (CNGs) to deliver seeds of new varieties to farmers and achieve expanded production of climate resilient and nutritious GLDC crops. CNGs, a multi-disciplinary engagement of NARS, CG, NGOs, Advanced Research Institutes (ARIs), Private seed and processing sectors and etc. is a platform for crop product design, development, testing and deliver. The CNG is also a platform that meets the continuous capacity building needs and technical support to enhance the genetic gain and operational efficiencies of crop breeding programs and thus important for modernizing the crop breeding programs of CG and NARS. CNGs are a platform to collaboratively develop innovations through engagement of agri-food system stakeholders of GLDC crop commodities.

To enhance the genetic gain, the crop breeding programs are implementing an efficient nursery management and multi-location testing for making advancement decisions. Pan African Multi-location testing by IITA and Soybean Innovation Lab (SIL), and Sorghum and Groundnut varietal trails in WCA by IAVAO network are some examples of the multilocation testing by CNGs.

Biofortified cultivars are delivered by Flagship and the biofortification is mainstreamed in some crop breeding program that make a signification contribution to the Program level outcome on increased consumption of nutritious GLDC crops. Biofortified cultivars of Sorghum, Pearl millet, Finger millet, and Lentil are commercialized by CRP-GLDC. Biofortified varieties in sorghum (Parbhani Shakti in India), lentil (Barimasur 9 in Bangladesh and Khajuro Masuro 4 in Nepal), pearl millet (EUFM 403 in Kenya) were released in 2018.

Crop cultivar segmentation to meet specific markets and/or nutrition needs are driving the entrepreneurship among youth and women. Value addition of biofortified lentils is driving women enterprises in Ethiopia and soybean variety (Favour) with high protein content is driving the youth and women enterprises to supply for school feeding programs in Uganda. Similarly machine harvestable chickpea and lentils offer youth enterprise opportunities to use machines. Varieties that meet the needs of specific processing industry, such as high oleic groundnut varieties, now in national testing in India are preferred by industry for increased shelf-life. These benefits will drive new value chains and strengthened seed systems to meet the seed needs of these specific cultivars.

Improved genetics for climate resilience is a key delivery for the Flagship that contributes to Program Outcome of expanded and resilient production of grain legumes and dryland cereals. Adaptation to water deficit stress is most important adaptation trait targeted for eight crop commodities and heat tolerance is critical for expanding production across seasons, and emerging areas such as off season pearl millet cultivation in WCA and SA that exposes the crop to high temperature at flowering. Heat tolerance in chickpea and pearl millet breeding pipelines is mainstreamed in SA to deliver to specific target sites, and breeding for low nutrient adaptation is targeted in crops like cowpea and cowpea. Early maturity as an escape mechanism to water deficit stress is targeted in GLDC crop commodities, super-early pigeon pea cultivars and early maturing (60 days) cowpea cultivars are under testing. Genotypes with high transpiration efficiency (TE) under high vapor pressure deficit (VPD) in sorghum produced drought tolerant sorghum hybrids with high biomass yields.

The Flagship 4 collaborated with Flagship 5 team to deploy diagnostic SNP markers for rust resistance in Soybean, aphid and bacterial blight in cowpea, one of the *FAD2B* mutant allele conferring high oleic trait and two major QTLs conferring resistance to late leaf spot and rust diseases in groundnut. and hybrid purity testing in pigeon pea. The contribution of Soybean Innovation Lab, University of California (for cowpea) and University of Georgia (for *FAD2B* mutant allele in groundnut) has been valuable in deployment of diagnostic markers in these three crops. Flagship 4 team is collaborating with FP1 and FP2 team for designing crop Product Profiles and the inputs from FP1 team on drivers of adoption will enable the FP4 team to engage with stakeholders to deliver improved genetics of GLDC crops.Genomic selection model using rad-GBS and y-GBS for use in hybrid pearl millet with FP5 team has been initiated.

The Flagship did not have a major course correction; nonetheless the crop breeding program needed better phenotyping tools for diseases, quality traits and low nutrient efficiency. Hotspot screening for diseases relied by crop breeding programs failed sometimes warranting a precise screening method under field or controlled conditions at the crop breeding stations. As fodder quality is a key trait in most of Product Profiles of GLDC crops, Flagship 4 team collaborated with International Livestock Research Institute (ILRI) to systematically deploy fodder quality testing in breeding and testing pipelines of sorghum, pearl millet, finger millet and groundnut. Groundnut breeding program at Mali established NIRS for quality assessment and cowpea program in Nigeria identified a hotspot at NARES site to conduct testing for P-efficiency.

# Variance from Planned Program for this year

(a) Have any promising research areas been significantly expanded? If so, for each example, please explain clearly where the demand came from (promising research results, demand from partners etc.). Where has the money for expansion come from? (max. 150 words)

Biofortification and targeting grain and fodder quality traits to meet market needs have been expanded or mainstreamed in GLDC crop breeding pipelines. Availability of rapid, and non-destructive methods (NIRS, XRF) of phenotyping and access has enabled routine phenotyping for nutrition quality traits in most of the crop breeding programs. Biofortification has been mainstreamed in pearl millet breeding pipeline, and expanded market traits like high oleic trait in groundnut. The investment for biofortification in pearl millet came from Harvest Plus, for sorghum it is from Harvest Plus and Government of India, and for high oleic trait investment came from Government of India and MARS. For market traits, the crop networks can be a platform to attract investment from private sector, particularly from processors requiring a specific quality trait in the commodity. Quality traits can also drive new value chains such as youth and women entrepreneurs for high protein soybean and interest from some start-ups for high oleic groundnut oil. Improved grain Fe and Zn content is a target for seven of the GLDC crop commodities.

Multi-location testing in collaboration with NARES has been expanded for the GLDC crops with support from bilateral projects. Crop Network Groups are expected to attract financial support for testing as they establish themselves as a viable multi-stakeholder platform.

(b) Have any research lines been dropped or significantly cut back? (Please note that cutting research lines which do not seem to be delivering is seen by Funders and System Organization as a sign of good management, not of failure.) If so, please give specific examples and brief reasons. If funding was reallocated to other work, where did the money go? (max. 150 words)

The Flagship has made investments following the prioritization, and focus traits for improvement of GLDC crops (Table FP4.2).

(c) Have any Flagships or specific research areas changed direction? If so, please describe how, and the reason. (max. 150 words)

The Flagship has changed its direction by enhancing its engagement with the crop value chain stakeholders of GLDC crops through crop network groups (CNGs). The CNG model enables a structured and regular (annual) engagement with private seed sector including small- and medium scale seed industries to sustain the seed system innovations. The CNG is a platform that engages through crop product design, development, testing, advancement and delivery. The investment to support CNG came from the Innovation Funds of CRP-GLDC for Africa and wherever an opportunity exists it builds on existing networks like IAVAO network for multi –crop commodities in WCA, hybrid parent research consortium (HPRC) of sorghum, pearl millet and pigeon pea in SA, and CNG for groundnut in Asia as part of the OFID project.

The Flagship plans to further CNGs as they are critical to modernizing the GLDC crop breeding program and seed systems.

# PARTNESHIPS: ACHIEVEMENT AND CHALLENGES

### Highlights of External Partnerships

[Please summarize any interesting highlights, value added and points to improve/ learning points from this year (e.g. on private sector partnerships), and make reference to partnerships reported at the cluster level] (max. 150 words)

The partnership with AGRA (Alliance for a Green Revolution in Africa) and ADVANTA was important for Crop Network Groups in Africa. Syngenta Foundation has been a critical partner in WCA, ESA and SA engaging in testing and delivery of GLDC crops through CNGs.

The CNGs have emerged as most critical platform for the engagement with private seed sector, like ADVANTA, Seed Co etc. in Africa.

Partnership with National Research Organization of Uganda (NARO-NaSSARi), Makerere University, and Center for Behavior Change Communication (CBCC-Kenya) was important to understand gender dynamics in seed systems in Africa.

Partnerships with national program like Panjab Agricultural University, India and Agricultural Research Cooperation, Sudan for lentil heat phenotyping and Bidhan Chandra Krishi Vishwa Vidyalaya, India for disease and low nutrient phenotyping in lentil are critical for crop breeding and testing.

### Cross-CGIAR Partnerships

[Please summarize general points on highlights, value added and points to improve/ learning points from this year and make reference to collaborations reported at the cluster level.] Any points you can include on added value of new structures (e.g. Platforms, CRPs) would be very useful.] (max. 150 words)

The Flagship seeks to engage with Excellence in Breeding (EiB) platform to drive innovation in designing product profiles, adopting stage-gate system, phenotyping and genotyping and as source of knowledge. The High Throughput Genotyping Platform (HTGP) of EiB was deployed by the Flagship in crop breeding pipelines, particularly for early generation testing.

The Flagship seeks its engagement with Gene bank platform to tap novel diversity of GLDC crops and is involved in evaluation the finger millet accessions for fodder quality traits to identify lines for use as parents in breeding program.

The Flagship has established a collaboration with ILRI to test the fodder samples from WCA, ESA and SA of three crop commodities.

Engaging with BigData platform the Flagship has rolled our Digital Seed Road maps to support the seed systems in Africa.

# Table 1: MILESTONEs TABLE 2018

Reference to the Milestone table related to this document.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **FP** | **FP outcomes 2022** | **Summary narrative on progress against each FP outcome this year.** | **Milestone** | **2018 milestones status (complete, extended, cancelled or changed)** | **Main reason for changes in status (if not complete)** | **Provide evidence for completed milestones (refer back to means of verification, and link to evidence wherever possible) or explanation for extended, cancelled or changed.** |
| 4 | FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilize food supply. | Developed of breeding material for improved quality traits and for tolerance to heat, drought, water-logging and shot duration in target crop and shared with the NARES. | 1. Breeding lines from Phase I of the CRP being tested by NARS and CGIAR - 8 crops X 3 trait clusters X 2 regions advanced | Continuing | 7. Other, please state: Testing of the breeding lines by NARS and CGIAR is a continuous process. |  |
| 4 | FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilize food supply. | The elite lines and donors for target traits (Table 4.2) are used as parents in crop hybridization. Heat tolerant donors of chickpea, lentil, pigeon pea, groundnut, cowpea, sorghum, and pearl millet are used in breeding. High Fe and Zn donors are used as parents in seven GLDC crops. | 2. Phase I genetic materials deployed in GLDC crop improvement by CGIAR centers - annually 8 crops X 3 trait clusters X 2 regions tested by NARS. | Continuing | 7. Other, please state: Testing of the breeding lines by NARS and CGIAR is a continuous process |  |
| 4 | FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilize food supply. | NARES and CG partnership commercialized 73 cultivars of chickpea (11), pigeon pea (3), groundnut (25), cowpea (2), soybean (6), lentil (4), sorghum (6), pearl millets (10) and finger millets (6) breeding lines developed from the Phase 1 of the CRP in sixteen countries of South Asia and sub-Sahara Africa | 3. Breeding lines from Phase I enter the National performance trials (NPT) or release - 8 crops X 3 trait clusters-3-4 lines per trait X 2 regions entered in NPT. | Continuing | 7. Other, please state: Testing of the breeding lines by NARS and CGIAR is a continuous process |  |
| 4 | FP4.O1. New varieties & allied innovations improving productivity & production potential, agribusiness opportunity & stabilize food supply. | International training course on Breeding approaches for enhancing genetic gains in Grain Legumes and Dryland Cereals for the NARS partners of ESA, WCA, SA working in nine GLDC crops. The training course topics were tailored based on needs/gaps in knowledge/information to manage an efficient crop breeding and testing pipeline and achieving accelerated genetic gains per unit cost. The uniqueness of this training program was that we had leveraged key capacities of the Indian Agricultural Research Institute (IARI) of Indian Council of Agricultural Research on two important aspects of breeding pipelines, viz., (a) high throughput phenotyping and (b) experience in deploying molecular markers to successfully commercialize 12 Basmati rice varieties. | 4. Nursery management strengthened to support early generation seed availability for evaluations - 9 crops X 2 priority trait clusters (1° & 2°)- 20 lines per trait X 2 regions supplied | Continuing | 7. Other, please state: Testing of the breeding lines by NARS and CGIAR is a continuous process |  |
| 4 | FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scale and scope | Seed value chain studies in Uganda showed potential for lateral and vertical growth for GLDC crops and the seed systems of GLDC crops contribute to country’s economy, and improved household income, food, and nutrition security. Strategies to anchor GLDC seed systems were identified that include policy favoring seed sector, and engagement with seed trade and agro-dealers. | 5. Studies conducted to inform the seed systems strengthening areas for target cereals and legumes - at least 1 study per crop x agrifood systems x region. | Completed |  |  |
| 4 | FP4.O2. Robust and responsive global to national breeding systems produce and deliver novel varieties and allied innovations at appropriate scale and scope | Based on the study report the engagement of seed trade and other value chain actors thorough crop network groups leads to complimentary partner engagement. | 6. Complementary partners engaged to support scaling efforts based on country strategies. | Completed |  |  |

# Table 2: Evidence on Progress towards SRF targets (Sphere of interest)

Instructions:

Please complete this table with any available high-quality evidence on progress that was published or made available in 2018. Do not hesitate to state, “no new evidence available this year”, in column 2 if necessary, since we are trying to demonstrate evidence gaps and the need for additional funding for this area.

For examples of how this information can be phrased and referenced, please see Annex Table A [here](https://www.cgiar.org/wp/wp-content/uploads/2018/10/CGIAR-2017-Performance-Report-ANNEXES.pdf) in the previous CGIAR Annual Performance Report. Please provide information on all relevant SRF targets for a single study or innovation, to the extent possible. Example: please see in the 2017 report Annex Table A how findings from a single rice review have been allocated between targets for adoption, poverty and yield increases. Insofar as possible, please also disaggregate the effect of different innovations (e.g. in the above example NERICA rice could potentially be separated from another group of CGIAR rice varieties).

If the adoption or impact data comes from a relevant innovation or contribution of the CGIAR prior to the CRP start-up (e.g. varieties released before the CRP start-up, which for most CRPs would be approximately 2012), then please support statements with published references, as shown in the 2017 Annual Report Annex Table A above. Nearly all adoption or impact studies fall into the above category. There are (as yet) a few cases (two in 2017) in which the estimated figures for at-scale adoption or impact result from an innovation released within the CRP period, for example some biofortification numbers in 2017. If this is the case, then the statement must be supported by a link to an Outcome/ Impact Case Report **Maturity Level 3** (or if not, with unique identifier from any appropriate repository or publisher website).

|  |  |  |
| --- | --- | --- |
| **SLO Target (2022)** | **Brief summary of new evidence of CGIAR contribution**  [Put N/A if the specific SRF target is not applicable to your FP. Put “No new evidence in 2018” if the target is potentially relevant, but there is no new evidence available**.** *Spell out all acronyms.]*  *Maximum 150 words per entry.* | **Expected additional contribution before end of 2022** (if not already fully covered).  ***Optional narrative. Evidence not required.***  *Max. 100 words* |
| **1.1.** 100 million more farm households have adopted improved varieties, breeds, trees, and/or management practices | 1. The new varieties of GLDC crop commodities, with enhanced nutrition and/or market demand traits drive new seed value chains leading to increased adoption of new varieties in target zones.  2. Stakeholder engagement through crop network groups drives sustainable seed systems and engages private seed sector to supply seed of new varieties that increases adoption of new varieties in target countries.    <https://mel.cgiar.org/preplanning/relatedfiles/id/482/entity/actionsite>  <https://mel.cgiar.org/preplanning/relatedfiles/id/484/entity/actionsite> | 1.Engagement with private seed sector bearing fruits of seed supply chains in target countries. |
| **1.2.** 30 million people, of which 50% are women, assisted to exit poverty | 1. Biofortified varieties drive women entrepreneurship like products for school meal programs using high protein Soybean. (<https://mailchi.mp/illinois/new-published-research-tasty-soy-badjias-in-sils-weekly-digest?e=ef90aaaeb5>)  2. Machine harvestable chickpea and lentil offer opportunities to youth to begin enterprises assisting in harvest and threshing of crops. <http://www.icarda.org/update/lentil-farming-and-gender-norms-ethiopia> (FP4.2.3, FP4.2.64, FP4.2.11)  3. Mechanization, hybrid seed production and biofortification offer scope for entrepreneurship to youth and bring them back in agriculture. |  |
| **2.1.** Improve the rate of yield increase for major food staples from current <1% to 1.2-1.5% per year | 1. Improvement of yield has been primary target while attempting improvement of other traits hence adoption of new varieties at same level of inputs yield higher, for example, 15 elite lentil lines amenable to machine harvest were identified with above 10% yield advantage over the best check and 16 high oleic groundnut lines that were superior in pod yield of up to 20% are in national testing.  <http://oar.icrisat.org/10849/>  <https://mel.cgiar.org/preplanning/relatedfiles/id/482/entity/actionsite> |  |
| **2.2.** 30 million more people, of which 50% are women, meeting minimum dietary energy requirements |  |  |
| **2.3.** 150 million more people, of which 50% are women, without deficiencies in one or more essential micronutrients | Biofortification with iron and zinc content has been mainstreamed across the crops as reflected in target traits of 15 outputs (FP4.2.2-chickpea, FP4.2.41-lentils, FP4.2.4, FP4.2.7 & FP4.2.47-groundnut, FP4.2.52 & FP4.2.57-pigeonpea, FP4.2.25 & FP4.2.60-sorghum, FP4.2.29, FP4.2.31, FP4.2.32, FP4.2.44 & FP4.2.45-pearl millets, FP4.2.38-finger millets). Biofortified varieties in sorghum (Parbhani Shakti in India), lentil (Barimasur 9 in Bangladesh and Khajuro Masuro 4 in Nepal), pearl millet (EUFM 403 in Kenya) were commercialized in 2018.  High Fe and Zn, high protein, high oil are some of the targeted nutritional quality traits.  <https://mel.cgiar.org/preplanning/relatedfiles/id/482/entity/actionsite> |  |
| **3.1.** 5% increase in water and nutrient efficiency in agroecosystems | Achievements from 17 research activities have climate change relevance as these activities dealt with development of breeding material with tolerance to heat, drought, waterlogging and shot duration in target crops.  Adaptation of GLDC crop cultivars to water deficit stress is key target and thus expansion of cultivation of new water deficit stress adapted varieties contributes to increased water use efficiency.  <https://mel.cgiar.org/preplanning/relatedfiles/id/482/entity/actionsite> | Nutrient use efficiency is targeted in some of the GLDC crops and commercialization of products can be expected. |
| **3.2.** Reduction in ‘agriculturally’-related greenhouse gas emissions by 5% |  |  |
| **3.3.** 55 M ha degraded land area restored |  |  |
| **3.4.** 2.5 M ha forest saved from deforestation |  |  |

# Table 3: Condensed list of policy contributions in this reporting year (Sphere of Influence)

[Please list policy contributions here. (Please see the [indicator guidance](https://drive.google.com/file/d/1GYLsseeZOOXF9zXNtpUtE1xeh2gx3Vw2/view) for indicator #I1 number of policies which also includes an explanation of what is covered under the term ‘policy’.)

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Column 1** | Type | Whose policy is this? | Geo Scope | Column 2 | Column 3 | Column 4a | Column 4b | Column 4c | Column 4d | Column 4e |
| Name and description of policy, legal instrument, investment or curriculum to which CGIAR contributed (20-50 words, ideally around 30 words)  *Spell out acronyms in every row* | Define if a) Policy or Strategy, b) Legal Instrument, c) Budget or Investment d) curriculum | Specify if a) Funder, b) Public sector; c) Private Sector, d) Other……. | Specify if Global ,Regional Multi-National, National or sub-National | Level of Maturity | Link to sub-IDOs (max. 2) | CGIAR cross-cutting marker score | | | | Link to OICR (obligatory if Level of Maturity is 2 or 3) or link to evidence (e.g. PDF generated from MIS) |
|  |  |  | gender | youth | capdev | Climate Change |  |
| The revision of guidelines (2013/14) to release crop cultivars with special attributes like improved nutrition and easy snapping trait in Kenya and Uganda enabled release of Finger millet cultivars. Earlier guidelines considered only yield increase as criteria to release crop cultivars that blocked the release of cultivars with special attributes. The current guidelines require the cultivars to be at par with the yield of the control cultivars if they possess special attributes.  In Kenya, EUFM 12 and EUFM 5 cultivars were released based on the criteria of special attributes. EUFM 12 has grain protein content of 9.63 %, which is 25% higher than the normal cultivars (7.7 %) and EUFM 5 is an easy snapping cultivar that reduces drudgery of women.  Similarly in Uganda, NAROMIL 3 with grain Fe content of 8.8 mg/100gm, which is 125% higher than the normal (3.9 mg/100gm) and NAROMIL 5 with grain protein content of  12.2%, which is 58% higher than normal cultivar (7.7%) were released in 2018 based on the special nutrition attributes.  Such revision in policy guidelines to use special attributes as criteria  in release of crop cultivars in other countries will pave way to commercialization of new crop cultivars with special attributes such as enhanced nutrients, machine harvestability, ease of harvesting (snapping trait in Finger millet) etc.  The revised cultivar release guidelines are adopted in Uganda, Kenya and Tanzania and these are unified guidelines for COMESA (Common Market for Eastern and Southern Africa) countries and hope they will be soon adopted by other COMESA countries, Rwanda, Malawi and Zimbabwe.  . | Modified variety release guidelines (2013/14) to release crop cultivars with special attributes |  | Regional | Implemented in some countries that can drive implementation in other countries. |  | Yes | Yes |  | Yes |  |

# Table 4: Condensed list of innovations by stage for this reporting year

Please complete the table below and report the supporting document in MEL unless you have already an external link to be provided.

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **Title of innovation** | **Weblink** | **Innovation Type** | **Stage of innovation** | **Geographic scope (with location)** |
| Please see indicator guidance for details |  | e.g. genetic, |  | e.g. global, regional- West Africa, national- Philippines |
| 1. Speed breeding in lentil and chickpea to enhance rate of genetic gain | In order to accelerate the genetic gain, chickpea and lentil were grown at high density under an extended photoperiod of 22 h light/25.5 °C and 2 h dark/15 °C in a growth chamber. This protocol accelerated the growth with plants taking 31 and 39 days after sowing for the first flowers and pods. Pods at physiological maturity were harvested 64 days after sowing. The harvested plants were oven-dried (30-35°C for 2 days) and planted using the above-described protocol to obtain next generation seeds and thus speed up the generation turnover. This protocol will allow 4-5 generations per year instead of only one or two in conventional greenhouse-based methods (center level).  (CoA 4.2 report) | Genetic | Stage 1 | Global |
| 1. Crop Network Groups (CNGs) as a platform for public-private partnerships (PPPs) | The Crop Network Group (CNG) is a crop improvement network of multi-disciplinary teams from NARS, CG, Advanced Research Institutes (ARIs), NGOs, private seed sector and processing sector. CNG is a platform for product design, strategy, development, testing, advancement and delivery. The CNG will also be a knowledge-sharing platform, facilitating continuous capacity building.  (Innovation fund report) | Genetic | Stage 1 | Global |
|  |  |  |  |  |

Table 5: List of Outcome Cases submitted by CoA Leaders

|  |  |
| --- | --- |
| **Outcome Case** | **Evidence** |
| Title | Please add the MEL Link if the Case was submitted in MEL In case not submitted in MEL please upload together with this Report. |
| 1. Biofortified GLDC crops commodities for nutritional security. | <https://mel.cgiar.org/preplanning/relatedfiles/id/482/entity/actionsite> |
| 2. Strengthening quality seed production and delivery of improved varieties of GLDC crops for better smallholder livelihoods | <https://mel.cgiar.org/preplanning/relatedfiles/id/484/entity/actionsite> |