CGIAR CRP Plan of Work and Budget (POWB)

(Template 2020)

WHEAT Agri-food Systems CRP Plan of Work and Budget (POWB) for 2020

Name of the CRP: AFS-CRP Wheat

Name of the Lead CGIAR Center: CIMMYT

Flagship lead institutions (CGIAR Centers or lead partners): (strategic partners, Phase II Proposal): ICARDA, BBSRC, ICAR (India), ACIAR, INIA (Bolivia), INIA (Uruguay), INRA (Morocco), IRESA (Tunisia), G20 Wheat Initiative

Flagship 1: Enhancing WHEAT's R4D Strategy for Impact

Flagship 2: Novel diversity and tools for improving genetic gains and breeding efficiency

Flagship 3: Better varieties reach farmers faster

Flagship 4: Sustainable intensification of wheat-based farming systems

Other participating CGIAR Centers (with PPA): ICARDA

WHEAT is an Agri-food System CGIAR Research Program launched in 2012 and led by the International Maize and Wheat Improvement Center (CIMMYT). Joining advanced science with field-level research and extension in lower- and middle-income countries, WHEAT works to raise the productivity, production and affordable availability of wheat for 2.5 billion resource-poor consumers who depend on the crop as a staple food. R4D is carried out by a community of more than 200 public and private organizations worldwide; among them national governments, companies, international centers, regional and local agencies and farmers. WHEAT management includes experts from the Australian Centre for International Agricultural Research (ACIAR), the British Biotechnology and Biological Sciences Research Council (BBSRC), the International Center for Agricultural Research in the Dry Areas (ICARDA) and the Indian Council of Agricultural Research (ICAR).

Funding for WHEAT comes from CGIAR System donors and others, including national governments, foundations, development banks and other public and private agencies. The Program thanks all donors and organizations who globally supported its work through their contributions to the **CGIAR system**

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

No further adjustments are planned for 2019-2021, beyond those described in the POWB2019.

Although the Heat and Drought Wheat Improvement Consortium (FP2/FP3) was launched in 2019, attracting funders in collaboration with the G20 Wheat Initiative will take longer than anticipated and will continue in 2020.

WHEAT needs to attract stronger bilateral funding (Turkey) for winter wheat breeding and pre-breeding. To secure breeding and sustainable intensification successes for the future in Pakistan, WHEAT may have to (re)deploy W1&2 funds to enable continuity through new bilateral funding.

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

More WHEAT staff time will go towards inputs, coordination and communication concerning One CGIAR and the 2030 Plan. Though the transition plan to be signed off by SMB end of January 2020 foresees compensatory mechanisms, we are certain that some deliverables under WHEAT will be delayed or of lower quality during 2020 and 2021.

FP1 research is delivering towards three 2022 outcomes.

Foresight & targeting:

- Synthesis/learning products of foresight & targeting work in relation to WHEAT Agri-food Systems (AFS) and plant health monitoring.
- New studies/tools including decision support (crop modeling/bio-economic modelling/trade-off and scenario analysis) and updated GIS/remote sensing-based outputs (Wheat Mega Environments) for enhancing targeting and impact.
- Several publications including on (a) Drivers (including climate change) transforming WHEAT AFS and associated R&D implications; (b) Ex-ante impact assessment of WHEAT AFS innovations; and (c) Spatial and dynamic assessment of (a)biotic stresses affecting WHEAT AFS (including rusts; heat stress).

Impact assessment:

- Tool development and data collection for global assessment of sustainable intensification with initial focus on South Asia.
- Exploration of new study areas such as environmental externalities. Synthesis/learning products in relation to adoption/impact assessment (including remote sensing; meta-analysis).
- Publications on adoption and impacts of WHEAT innovations (including DNA fingerprinting; sustainable intensification and mechanization).

Gender, youth and social inclusiveness:

- Synthesis/learning products of gender work in relation to WHEAT AFS, including from comparative studies like GENNOVATE & feminization of agriculture and the rural economy in eastern India.
- Gender mainstreaming, learning and capacity development.
- New studies/projects to strengthen gender intentional seed delivery.

- Publications on Gender, Youth and Social Inclusion in WHEAT AFS.

Market/value chain development:

- Positioning nutritional agenda and priorities for WHEAT Agri-food Systems.
- New studies/expand project portfolio around pro-poor seed systems/delivery and AFS dynamics/diversity.
- Various publications on markets/value chains in WHEAT AFS (including in relation to value chains, input delivery and service provision).

Publications:

- Overall contributing to 20+ Scopus-recognized journal papers in 2020 linked to WHEAT FP1 – with a focus on relevance, multi-disciplinarity and profile.

Resource mobilization:

- Each WHEAT FP1 Cluster of Activity will strengthen its bilateral project/budget pipeline and explore linkages to One CGIAR and 2022+ portfolio.

FP2 research is driven by two 2022 outcomes.

Key results under *Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools* will be to*:*

- Implement the Enterprise Breeding System (EBS),
- Realize improvements in genebank routine management,
- Curate and encourage greater use of internationally-recognized ontologies, and
- Develop a strategic plan to increase data return rate and electronic data capture by WHEAT and national agricultural research system (NARS) partner scientists.

Progress under FP2 towards the 2022 outcome *Crop researchers worldwide increase use of novel germplasm and tools for validation, refinement and development of products* is driven by:

- International expert workshop on improvements to assessing genetic gain (FP2, FP3).
- Higher and faster genetic gains, as well as increased selection efficiency due to testing new machine learning techniques, such as deep learning, in the context of predicting phenotypes of genetic resources and of screening for new alleles / haplotypes for highly genetically diverse material.
- *G*enetic stocks with new alleles for priority traits provided to breeders and gene editing capacity for wheat maintained.
- Pre-breeding research products, which will be available to CGIAR scientists and partner breeding programs, including semi-elite lines with novel diversity for drought or heat tolerance.
- Training for CIMMYT and ICARDA scientists in new software applications, which will lead to increased uploads of germplasm, phenotypic, and genotypic data onto the centralized internal data management systems provided by B4R/EBS, and access by partner scientists globally to datasets of interest to them, in accordance with FAIR principles.
- Adoption of a genotypic data management system by the wheat genebanks at CIMMYT and ICARDA, in collaboration with the Genebanks Platform.

FP3 researchers aim to deliver on six 2022 outcomes. This year, they aim for these key results:

- All CIMMYT- and ICARDA-based breeding programs will follow up on Breeding Program Assessment Tool (BPAT) reviews by implementing improvement plans. A greater number of variety releases is anticipated, compared to 2019.
- The International Wheat Improvement Network (IWIN) is going into its 52nd year of operation. A second trial of "best-of-the-best" CIMMYT and ICARDA elite lines will go to NARS collaborators in August. IWIN cooperators will receive better phenotyped wheat germplasm and rust screening services will be expanded to all breeding programs. Together, the CIMMYT- and ICARDA-based quality labs will test more elite lines for end-use quality. Durum, winter and spring wheat lines will be characterized for resistance to rusts, soil-borne diseases Septoria, tan spot, Fusarium and wheat blast resistance; as well as for processing quality and nutritional traits (globally, via IWIN & IWYN); and made available to collaborators for adaptive breeding and release to farmers.
- Breeding research on high zinc will expand.
- Breeders will make greater use of alien introgressions to make elite lines higher performing.
- NARS partnerships to maintain precision phenotyping platforms will continue. The Morocco-based heat and drought platform will add root phenotyping capability; the Nanjing-based Fusarium platform starts operations.
- FP2/FP3 scientists will set up a phenotyping hub under the Heat and Drought Wheat Improvement Consortium (HeDWIC) to test heat- and drought-resistant elite lines provided by international Advanced Research Institute partners.
- Breeders' use of marker-assisted selection should continue to grow, supported by the 2019-2020 B4R/EBS breeding management software roll-out at CIMMYT and ICARDA.

FP4 scientists work towards five 2022 outcomes. Planned key results are:

- Respond to South Asia natural resource management/climate change-driven R4D challenges:
    - Monitor best practices to reduce crop residue burning in northwest India with stakeholders;
    - Synthesize and compile lessons learned from innovation hub approaches in South Asia, including their scaling potential;
    - Provide climate and weather related information for NARS/farmer decision support in Bangladesh (with MAIZE); and
    - Identify agronomy and cropping system solutions to reduce the impact of increasing terminal heat on wheat yield in South Asia.
- Develop remote sensing based decision support systems for nutrient and water management of irrigated wheat and assess the efficiency of seed and fertilizer coating with bio-stimulants in Mexico.
- Increase adoption and scaling (with MAIZE):
    - Develop multi-criteria approaches for better targeting and enhanced adoption of technologies (South Asia, sub-Saharan Africa (SSA), Mexico);
    - Implement Scaling Toolkit training; implement scaling approaches for greater adoption of mechanization options in Bangladesh through service provision;
    - Contribute to Government of Ethiopia objective to reach wheat self-sufficiency within 4 years (through systems agronomy for rainfed and irrigated wheat).

- Continue joint CIMMYT-ICARDA efforts to develop a regional sustainable intensification program (North African Sustainable Intensification Program, NASIP), to enable NARS adoption of systems approaches.
- Produce a series of syntheses papers on best management practices options and policy relevance.

CRP Governance and Management

- Contribute to shaping One CGIAR and 2030 Research strategy, in collaboration with the Science Leaders group and specific proposal development actions (e.g. 2Degrees Initiative, Excellence in Agronomy).
- Implement further monitoring, evaluation and learning (MEL) improvements (e.g. 6 Performance Management standards, evidence quality for Table 1 SLO Targets).
- Realize further partner consultations in various world regions about the future priorities of WHEAT R4D 2022+.

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

For 2020, the WHEAT Management Committee will work with the System Management Board (SMB)'s latest FinPlan-recommended income of $13.1M W1&2: that is 90% of W1 + 100% of W2. The System Council has approved $13.818M net of CSP, for WHEAT.

In 2019, WHEAT received 98% of the System Council-approved net of CSP new income. Twice, WHEAT MC agreed to adjust the mid-scenario downwards, buffering for a $2M USAID W2 loss.

Risk of lower than 90% 2020 WHEAT new income: The Australian Centre for International Agricultural Research (ACIAR) may reduce its 2020 W2 contribution, as in 2019 ($150k). In addition, the US Agency for International Development (USAID) may again move some funds from WHEAT W2 to EiB/Crops to End Hunger (although the WHEAT Director has raised this issue with them). However, the **current System Management Office (SMO) partial compensation mechanism should cover for this risk, as in 2019; thus no need to dedicate a reserve to this eventuality**.

Risk of lower total W1 income that negatively affects partial compensation: Unlikely, given the increased World Bank contribution ($30M to $50M p.a.).

The 2019 UK Department for International Development (DFID) W2 contribution was reduced by $300k due to exchange rate change. This may happen again and the partial compensation mechanism does not cover this risk. **WHEAT MC will cover for this risk, under a WHEAT in-year operational reserve (buffer).**

As in 2019-2020, when $1.9M for running and new grants was agreed to late in the year, WHEAT anticipates carryover under Partner Budget from 2020 to 2021. The aim is to lower the total to a maximum of $500k, because W1&2 funds must be fully spent by December 2021.

TABLES

Table 2A: Planned Milestones

FP	Mapped to Sub-IDO	2022 FP outcomes	Milestones	Indicate of the following	Means of verification	CGIAR Cross-Cutting Markers for the milestone				Assessment of risk to achieve that milestone (L/M/H)	For medium/high please select the main risk from the list
						for gender	for youth	for CapDev	for CC		
FP1	• {primary} CC Increase capacity of beneficiaries to adopt research outputs	FP1 Outcome: 1.8 National and regional policy makers improved policy-making and increased investment based on evidence	2020 - Ex-ante/spatial assessment of climate change and other dynamics integral to foresight/ targeting research, showing how they transform agri-rural landscapes	Reworded/ rephrased from proposal	Publications	0	0	1	1	Low	
		FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased	2020 - Adoption and impact studies on technologies- rolling plan based on progress of	Identical to proposal	Publications	1	1	1	1	Low	

		adoption and adaptation of improved technologies	technologies along the theory of change								
		FP1 Outcome: 1.10 Farmers have greater awareness and access to, and increased adoption and adaptation of improved technologies	2020 - Assessment of gender influence on men/women's capacity to innovate in WHEAT AFS-based livelihoods	New/ changed	Publications	2	1	1	0	Low	
		FP1 Outcome: 1.9 Last mile provider (extension partners, farmers organizations, community-based organizations, private sector) increased access and promotion of technologies to farmers	2020 - Benchmarking information of wheat value chain collected in selected countries to support identification of priorities and effective interventions	Identical to proposal	Publications	1	1	0	0	Low	
FP2	• {primary} Adoption of CGIAR materials with enhanced genetic gains	FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products	2020 - Phenotypic, genotypic, and genealogical data from the previous three years published for novel germplasm in accordance with the data management policy	New/ changed	References to Public data repositories	N/A	N/A	2	1	Low	
		FP2 Outcome: 2.4 Crop researchers world-wide	2020 - 1) Lr67 knockouts identified in Reedling.		Progress report	0	0	2	1	Medium	

		increased use of novel germplasm and tools for validation, refinement and development of products	2) screening for rust resistance initiated in greenhouse. 3) guide RNA molecules designed for MLO, vectors made, and transformation initiated in Reedling.	New/ changed							1. Research/science
		FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products	2020 - Novel diversity available for yield potential, drought and heat tolerance in lines from crossing bank accessions with elite lines	Identical to proposal	Report including description of available lines	N/A	N/A	2	1	Low	
		FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products	2020 - Demonstrated use of genomic prediction to save phenotyping costs via 'sparse testing'	Identical to proposal	Report including recommendations	0	0	2	1	Low	
		FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products	2020 - In collaboration with Julius Kuehn Institute and the Wheat Initiative in Berlin, develop global HeDWIC initiatives, including Doctoral Training Program.	New/ changed	Progress report from the HeDWIC initiative	1	1	2	2	Medium	3. Partnership

		FP2 Outcome: 2.4 Crop researchers world-wide increased use of novel germplasm and tools for validation, refinement and development of products	2020 - Assess potential genetic gains if implementing Optimal Contributions Selection (which balances genetic gain with maintaining population diversity) in pre-breeding populations	New/ changed	Report including recommendations	N/A	N/A	2	1	Medium	4. Internal resources
		FP2 Outcome: 2.5 Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools	2020 - Centralized breeding data management system and associated tools deployed to provide breeders with better access to germplasm, genealogical, phenotypic, and genotypic data	Identical to proposal	Link to web site with downloadable software and/or to sites with user manuals and/or reports of adoption	0	0	2	1	Medium	3. Partnership
		FP2 Outcome: 2.5 Breeders develop improved varieties more efficiently through greater access and use of documented germplasm and tools	2020 - Centralized breeding data management system and associated tools enhanced with prioritized functionalities for current and future users	Reworded/ rephrased from proposal	Reports from Software tool development team	0	0	2	1	Medium	3. Partnership

FP3	• {primary} CC Enhanced institutional capacity of partner research organizations	FP3 Outcome: 3.2 Partner breeding teams increased multidisciplinary and multi-institutional collaboration	2020 - High yielding, disease-resistant varieties adopted by farmers, therefore crop losses reduced and less chemicals used in targeted countries.	New/ changed	National Variety Adoption Data and Seed Multiplication data	1	1	2	2	Low	
	• {primary} Adoption of CGIAR materials with enhanced genetic gains	FP3 Outcome: 3.3 Partner breeding teams improved breeding processes by adopting new technologies, methodologies, approaches and genetic resources	2020 - 1. >25 new, more productive, climate resilient, disease resistant varieties released by partner countries for enhancing wheat productivity and resilience. 2. >1000 improved wheat germplasm (varietal candidates) shared to >250 partners through various international trials and nurseries.	New/ changed	National variety release information; information on international trials and nurseries distributed by CIMMYT and ICARDA	0	0	2	2	Low	
	• {primary} CC Increased capacity for innovations in partner	FP3 Outcome: 3.4 CRP commodities enhanced engagement in joint lobbying for speeding-up release of improved varieties	2020 - Fully operational, integrated network of 6-8 precision phenotyping platforms developing and sharing information & germplasm with partners.	New/ changed	Phenotyping platforms annual report.	0	0	2	1	Low	

	research organizations										
	• {primary} Reduced smallholders production risk	FP3 Outcome: 3.6 National regulators of crop variety release improved enabling environment to speeding-up release of improved varieties	2020 - 4-5 WHEAT target countries develop culture of releasing new varieties along with sufficient seed quantity.	New/ changed	Pre-release seed multiplication report from target countries.	0	0	1	1	Medium	6. External environment (political, economic, legal, market)
		FP3 Outcome: 3.7 Extension partners (universities, national/state/provincial governments) increased access and promotion of adoption of improved varieties to farmers, and increased investment in emerging private sector circumstances	2020 - Pre-release seed multiplication used in 3-4 countries to expedite seed availability to new varieties to seed producers.	New/ changed	Seed availability at the time of release for new varieties.	0	0	1	2	Medium	3. Partnership
	• {primary} Reduce pre- and post-harvest losses, including those caused by climate change	FP3 Outcome: 3.12 Non-and-subsistence farmers adopted improved varieties	2020 - Superior varieties released by partner countries adopted by farmers to enhance productivity, climate resilience and reducing crop losses to diseases.	New/ changed	Wheat variety adoption data through surveys or DNA fingerprinting.	1	0	0	2	Low	

FP4	• {primary} CC Enhanced institutional capacity of partner research organizations	FP4 Outcome: 4.4 NARS increased use of participatory approach in system research	2020 - CIMMYT and/or ICARDA have embedded farming systems and participatory approaches with NARS in a series of research projects in countries of interventions	New/ changed	M&E of projects, courses, reports	1	0	2	0	Low	
	• {primary} CC Technologies that reduce women`s labor and energy expenditure adopted	FP4 Outcome: 4.8 Actors in SI increased consideration and integration of gender and social inclusion into policies, processes and practices.	2020 - Adaptive research improves understanding of gender, youth and adoption, adaptation and scaling-up processes, with focus on market demand as trigger of innovation	Identical to proposal	M&E of projects, courses, reports	2	1	0	0	Medium	3. Partnership
	• {primary} Increased access to productive assets, including natural resources	FP4 Outcome: 4.9 Smallholder farmers increased their capacity to adopt and adapt SI practices and products (associated with crosscutting sub-IDO).	2020 - 1) Decision support-, mechanization and other tools, processes improve target groups' ability to seize opp's and avoid losses 2) Improved understanding of complex interaction between the enabling environment and business propositions for ICT services for scaling up, social networking	New/ changed	Adoption studies, project reports	1	1	1	0	Low	

	• {primary} CC Increase capacity of beneficiaries to adopt research outputs	FP4 Outcome: 4.6 Private sector (and public sector) increased provision of services to smallholder farmers to increase their ability to adopt SI practices and products	2020 - Series of last mile collaborators actively involved in promotion and scaling of SI products. Reality check on scaling approaches implemented for development actors	New/ changed	Stakeholder analyses, reports	0	1	1	0	Low	
	• {primary} Closed yield gaps through improved agronomic and animal husbandry practices	FP4 Outcome: 4.10 Smallholder farmers adopted and adapted SI practices and products	2020 - 1) Increase resource use efficiencies (irrigation water, N, P) while maintaining high, stable yields 2) extension of crop mgmt practices that arrest soil degradation 3) reduce labor burden and shortages	New/ changed	Impact assessment, adoption studies, reports	1	1	0	1	Low	

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

CRP	FP	Status	Planned studies/learning exercises in the coming year	Geographic scope	Who is commissioning this study
Wheat	FP3	Ongoing	Evaluate adaptation of the germplasm developed by the winter wheat breeding program (IWWIP)	Global	CIMMYT, ICARDA and TAGEM (Turkey)
W	FP1	New	Synthesis/learning products of foresight & targeting research in relation to • WHEAT Agri-food Systems (e.g. wheat consumption dynamics in Asia and Africa by 2030/2050) & • plant health monitoring (e.g. wheat rusts tracking, wheat blast)	Global	CRP
W	FP1	Ongoing	Tool development and data collection for global assessment of sustainable intensification with initial focus on South Asia	South Asia	CRP
W	FP1/3/4	Ongoing	Ex-ante impact assessment of biological nitrification inhibition (BNI) in wheat, sorghum, Bracchiaria	Global	CIMMYT, JIRCAS
W	FP1	New	Evaluation of the dissemination of wheat blast resistant BARI GOM 33 and benefits to farmers	Bangladesh	CRP
W	FP1	New	Collaborative analysis of gender norms and wheat agriculture in patriarchal contexts	Pakistan, Afghanistan, Ethiopia	CRP
W	FP1	New	Egypt DNA fingerprinting-based impact study	Egypt	CIMMYT
W	FP2,3	New	International expert workshop on improving CIMMYT breeding methodologies	Global	CIMMYT & ICARDA

W	FP4	Ongoing	Synthesis and lessons learned from innovation hub approaches in South Asia, including their scaling potential	South Asia	CIMMYT
W	FP4	New	Refine country collaboration methodology, approach	Mexico, Ethiopia	CIMMYT
W	FP4	Ongoing	Multi-criteria approaches for better targeting and enhanced adoption of technologies	South Asia, SSA, Mexico	CRP
MAIZE, WHEAT	FP4	New	Multi-partner scaling conference and CGIAR Scaling Expert Network meeting	Global	GIZ Scaling Task Force; CIMMYT
WHEAT	FP1,3	New	Replication of long-term European winter wheat impact study for spring wheat in developing countries (WHEAT target geographies)	Global	CRP

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

Name of Platform/CRP or non-CGIAR collaborator	Brief description of collaboration (give and take among CRPs/Platforms/non-CGIAR collaborator) and value added (e.g. scientific or efficiency benefits)
CABI	Plant disease monitoring.
University of Cambridge	Plant disease monitoring/modeling
International Soil Reference and Information Centre	Soil mapping
Pennsylvania State University	Plant disease monitoring
The Nature Conservancy	Crop residue burning

Table 3: Planned Budget

	Planned Budget				Comments on major changes
	W1/W2	W3/Bilateral	Center Own fund	Total	
FP1	$1,349,000	$2,850,000	$0.00	$4,199,000	
FP2	$2,351,640	$5,500,000	$0.00	$7,851,640	
FP3	$5,240,000	$16,200,000	$0.00	$21,440,000	
FP4	$1,835,000	$14,500,000	$0.00	$16,335,000	
CRP Management & Support Cost	$1,100,000	$0.00	$0.00	$0.00	
Strategic Competitive Research grant	$1,750,000	$0.00	$0.00	$0.00	
In-year operational reserve (buffer)	$ 550,000				Cover specific project & FX/currency risks
CRP Total	$14,160,640	$39,050,000	$0.00	$53,210,640	W1&2 incudes carryover within CIMMYT Res (FP 1-4). W3/Bilateral are best estimates, will be updated in 1st quarter reporting to SMO