ICARDA

Science for resilient livelihoods in dry areas

Monitoring and Evaluation Framework

Indicators Reference Manual (IRM)

1st Edition

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Version	Author	Reviewer	Description
1	Innocent Bikara	Enrico Bonaiuti	Content, Structure

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[1] The International Center for Agricultural Research in the Dry Areas (ICARDA)
[2] WorldFish

Introduction

ICARDA implements several W1/W2, W3 and bilateral projects. Wheras every project is designed to meet particular donor requirements, such as reporting against the status of the Plan of Work and Budget (POWB) or performance indicators derived from donor results frameworks, it is difficults to make inference on the level of contribution the projects make towards the achievement of the ICARDA Strategic Plan 2017-2026. To bridge this gap, the M&E Unit initiated the development and mainstreaming of consistent and actionable indicators linked to each of the strategic research priorities and cross-cutting themes in the ICARDA Strategic Plan 2017-2026. The indicators have the unique potential of enabling aggregation of results from various projects, provided they are measured consistently across the projects.

The Indicators Reference Manual (IRM) is formulated through a consultative process. Scientists were invoved in determining which SRPs/CCTs their teams contribute to. Subsequently, the broad consultations were held with teams by their SRP/CCT groups. A presentation of the draft indicators was made to the Program Committee (PC) of the Board of Trustees in November 2019, and the PC strongly endorsed the initiative.

Programs and projects will be able to adopt/retrieve institutional indicators, link customized indicators to institutional indicators, but also have the room to define idiosyncratic indicators. The adopted/linked indicators will provide an avenue for consistent results measurement and reporting of strategic results across ICARDA projects. The IRM is a living document that will be suject to routine review in response to changes in strategic direction, 'new' knowledge of more cost-effective and robust methods and feedback from users. To provide feedback, leave a comment o the online platform here. Additional feedback links are provided for each of the indicators in the Indicator Details table.

List of Indicators

The indicators are categorized into 4 indicator levels (groups) corresponding to the segments of the impact pathway i.e. **activity/process indicators** (variables for tracking planned actions/tasks), **output indicators** (variables for tracking the immediate results from the activities that ICARDA and its partners carry out), **outcome indicators** (variables for tracking the immediate effects resulting from the use of outputs delivered by ICARDA and its partners) and **impact indicators** (variables for measuring or estimating the long-term results). **Error! Reference source not found.** Table 1 contains a matrix of indicators that the M&E Unit has designed for the corresponding SRPs/CCTs. The indicators include 5 process/activity indicators, 9 output-level indicators, 31 outcome-level indicators, and 3 impact-level indicators and (Figure 1).
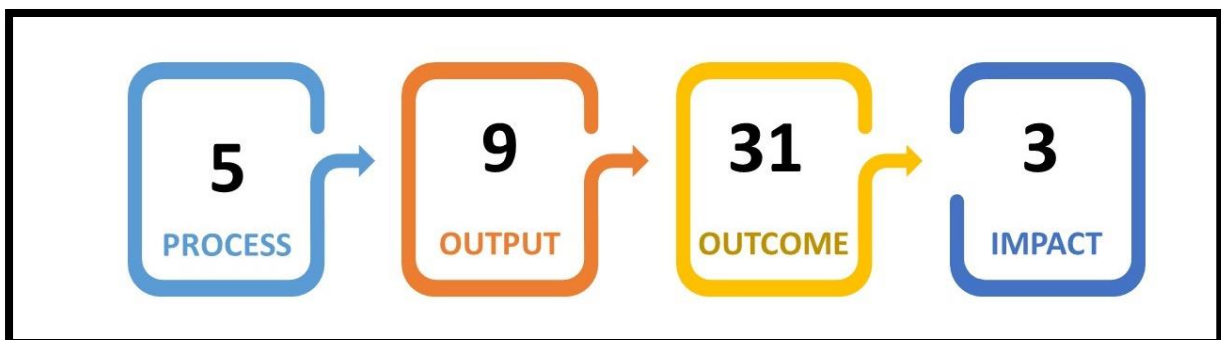

Figure 1: Illustration of the number of indicators and the result levels they are associated with

Table 1: List of Indicators and the corresponding SRPs/CCTs

Indicator ID	INDICATORS	SRP 1	SRP 2	SRP 3	SRP 4	SRP 5	CCT 1	CCT 2	CCT 3	CCT 4
Process Indicators										
PR-1	Monetary value of projects/programs/operations	✔	✔	✔	✔	✔	✔	✔	✔	✔
PR-2	Number of partnerships in which ICARDA is a party	✔	✔	✔	✔	✔	✔	✔	✔	✔
PR-3	Number of accessions in long-term storage and safety duplicated at two levels	✔								
PR-4	Number germplasm requests received	✔								
PR-5	Share of international nurseries recipients reporting performance trial results	✔								
Output Indicators										
OP-1	Number of research and development innovations	✔	✔	✔	✔	✔	✔	✔	✔	✔
OP-2	Number of ICARDA research papers published in peer reviewed journals	✔	✔	✔	✔	✔	✔	✔	✔	✔
OP-3	Number of datasets generated by ICARDA scientists	✔	✔	✔	✔	✔	✔	✔	✔	✔
OP-4	Number of people trained/ Number of people attending capacity development events	✔	✔	✔		✔	✔	✔	✔	✔
OP-5	Number of accessions distributed	✔								
OP-6	Number of International Nurseries distributed		✔	✔						
OP-7	Number of farm households reached with material technology packages		✔	✔			✔	✔		
OP-8.1	Quantity of seed/planting material of improved varieties accessed by farm households		✔	✔			✔	✔		
OP-8.2	Number of improved livestock breeds accessed by farm households		✔	✔			✔	✔		
Outcome Indicators										
OC-1	Number of research and development innovations	✔	✔	✔	✔	✔	✔	✔	✔	✔
OC-2	Alternative Metrics ('Altmetric') Score for ICARDA publications	✔	✔	✔	✔	✔	✔	✔	✔	✔
OC-3	Number of ICARDA-origin crop varieties released by national partners		✔	✔						
OC-4.1	Number of farm households that have adopted improved crop varieities and management practices		✔	✔			✔	✔		
OC-4.2	Number of farm households that have adopted improved livestock breeds and animal husbandry practices		✔	✔			✔	✔		
OC-5	Number of policies, legal instruments or investments modified in design or implementation, informed by ICARDA research	✔	✔	✔	✔	✔	✔	✔	✔	✔

Code	Indicator					
OC-6	Area under ICARDA-promoted improved crop varieties and recommended agronomic management practices	✔	✔		✔	✔
0C-7.1	Yield of ICARDA-mandated crops	✔	✔	✔	✔	✔
0C-7.2	Yield of ICARDA-mandated livestock	✔	✔	✔	✔	✔
OC-7.3	Rate of yield change for ICARDA-mandated crops and livestock	✔	✔	✔	✔	✔
OC-8.1	Diversity of farmers' crop production	✔	✔	✔		
OC-8.2	Rangeland biodiversity	✔	✔	✔		
OC-8.3	Change in rangeland ground cover		✔	✔		
OC-9.1	Share of the improved breeds in total livestock population	✔	✔		✔	
OC-9.2	Share of livestock under improved livestock managment	✔	✔		✔	
OC-10.1	Consumption frequency of ICARDA-mandated crops and livestock	✔	✔		✔	✔
OC-10.2	Quantity of ICARDA-mandated crops and livestock food products consumed	✔	✔		✔	✔
OC-10.3	Percent of people consuming a diet of minimum diversity	✔	✔		✔	✔
OC-11.1	Rain Use Efficiency		✔	✔	✔	
OC-11.2	Biophysical water use productivity (Basic)		✔	✔	✔	
OC-11.3	Biophysical water productivity (Advanced)		✔	✔	✔	
OC-11.4	Absolute amount of water saved per hectare		✔	✔	✔	
OC-11.5	Economic Water productivity (Basic)		✔	✔	✔	
OC-11.6	Economic water productivity (Advanced)		✔	✔	✔	
OC-12.1	Nutrient use efficiency (Basic)		✔	✔		
OC-12.2	Nutrient use efficiency (Advanced)		✔	✔		
OC-13.1	Change in soil macro-nutrient content		✔	✔	✔	
OC-13.2	Change in soil micro-nutrient		✔	✔	✔	
OC-13.3	Change in soil water content		✔	✔	✔	
OC-13.4	Share of farmers that perceive a change in soil attributes or water use efficiency due to adoption of the improved technologies		✔	✔	✔	
OC-14	Change in net income due to adoption of the improved technologies	✔	✔		✔	✔

Impact Indicators										
IP-1	Quantity of greenhouse gas emissions						✔			
IP-2	Number of households assisted to exit poverty by the interventions		✔	✔	✔	✔	✔	✔		
IP-3	Number of people moved from inadequate to adequate intake of micronutrients		✔					✔		

Indicator Details

PR-1: Monetary value of operations	
	Definition: Amount of funds disbursed
	Unit of Measure: United States Dollars (USD)
	Disaggregated by: Country, Office status (Presence or absence of ICARDA office)
	Method of Calculation: Summation of all funds disbursed from all BUSs
	Data sources: OCS
	Data collection method: No special data collection is required for this indicator. The information utilised will be generated through the routine use of OCS for ICARDA management.
	Data collection and reporting responsibility: MEL team and Finance team
	Data Collection and Reporting Frequency: Routine recording in OCS. Quarterly reporting.
	Evidence required: OCS and MEL summary reports
	Rationale: Information generated by tracking this indicator will provide insight of the ICARDA operational landscape, and will provide useful insight for use in the annual report and the financial report. In addition, the information can be used to evaluate the 'ICARDA country office expansion strategy'
	Comments and limitations: The cross-country comparison of project value does not take account of or adjust for the cost of doing business in different countries. As a result two countries could have the same project value but with one of them having a larger scope (outputs) because of a lower cost of doing business in that country.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.
PR-2: Number of partnerships in which ICARDA is a party	
	Definition: A partnership is a recognized relationship between ICARDA and its constituent projects and another institution or entity, with mutually agreed objectives, distinct accountabilities, and reciprocal obligations. A formal partnership is a partnership recorded in a written agreement between ICARDA and one or more external partners, such as a contract, Memorandum of Understanding or Memorandum of Agreement.
	Unit of Measure: Count- Depending on the partnership start data as recorded in MEL, a partnership will be counted as new if it lies within the reporting period
	Disaggregated by: Project, crop/livestock (multiple select), value chain segment, partner category (public, private, CSO), partnership type (formal or collaborating partner), area of partnership (Research, Project Delivery, Policy, Capacity Development, Other) and geographic location (regional, national, sub-national).
	Method of Calculation: N/A
	Data sources: MEL and/or OCS
	Data collection method: Routine recording in MEL and/or OCS. Quarterly reporting.
	Data collection and reporting responsibility: PDGMU and MEL teams
	Data Collection and Reporting Frequency: Annual
	Evidence required: Project documents, preferably agreements uploaded in MEL and/or OCS
	Rationale: This indicator will generate information that informs 'The how' part of the ICARDA pathways to impact. It will generate crucial information on the engagements between ICARDA and the core groups that ICARDA partners with to generate innovative science and solutions; clients that directly use the outputs from our research agenda, including government decision-makers, development partners, investment banks, non-governmental and civil society organizations, and the private sector; and finally, the technology/innovation user groups that are a microcosm of the ultimate beneficiaries who reap the benefits of ICARDA our research.

	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

PR-3: Number of accessions in long-term storage and safety duplicated at two levels

	Definition: Accessions are samples of seeds, planting materials or plants conserved in a genebank. Each accession is distinct, and genetically as close as possible to the sample provided originally.
	Unit of Measure: Count
	Disaggregated by: Crop, Species, Genebank (Lebanon, Morocco), biological status, type of storage
	Crops: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other
	Biological status: Wild, weedy, landraces/traditional cultivars, improved varieties (conventional breeding), breeding lines/research material, genetically modified organism (GMO)
	Type of storage: Seed in cold storage, tissues in-vitro/cryo-preservation, plants in field collections
	Method of Calculation: Summation of count
	Data sources: Genebank
	Data collection method: Routine recording in genebank documentation system.
	Data collection and reporting responsibility: Genebank curator/ Genebank Manager/ Documentation Specialist
	Data Collection and Reporting Frequency: Real-time data recording in genebank documentation system. Quarterly reporting.
	Evidence required: Genebank documentation system, reports (Genebank Online Reporting Tool, ORT)
	Rationale: Plant genetic resources for food and agriculture are essential to sustainable agriculture and food security. The can be used to meet the needs of the present and future needs of crop improvement and adaptation programs. This indicator provides the contribution of the ICARDA genebanks towards long-term availability of plant genetic resources.
	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

PR-4: Number germplasm requests received

	Definition: The indicators records the number of requests received by ICARDA genebank from a wide range of users from the many countries who request for germplasm. Whereas genebanks offer a range of services, such as capacity building and support to national partners, this indicator is designed only to record requests for germplast.
	Unit of Measure: Count
	Disaggregated by: Crop, Entity type (CGIAR, non-CGIAR), entity name, country
	Crops: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other
	Method of Calculation: Summation of count
	Data sources: Emails, Genebank documentation system
	Data collection method: Recording of requests received by direct emails, or from genesys
	Data collection and reporting responsibility: Documentation Specialist/ Genebank Managers
	Data Collection and Reporting Frequency: Real-time data collection. Quarterly reporting
	Evidence required: Genebank documentation system, reports (ORT)
	Rationale: ICARDA is a world leader in the collection and characterization of plant genetic diversity and the provision of this material to breeding programs globally.The activities of

	ICARDA genebanks and the Genebank Platform are targeted specifically to bring about increased conservation and use of genetic resources with the aim of achieving CGIAR System Level Outcomes (Sub-IDO 1.4) and UN Sustainable Development Goals (Target 2.5). Tracking the number of germplast requests helps determine the demand for germplast and if examined closely with indicator OP-5, can help determine whether there is an unmet demand for germplasm.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

PR-5: Share of international nurseries recipients reporting performance trials results

	Definition: This indicator serves to track the proportion of cooperators that receive international nurseries for trials and report back to ICARDA the trial results. ICARDA runs an international nursery trialing system as an integral part of the crop improvement program. It provides the cooperators with the opportunity to evaluate the genetically diverse germplasms generated through conventional and modern breading methodologies under their own agro-ecological conditions and socio-economic contexts.
	Unit of Measure: Percentage
	Disaggregated by: Crop, Entity type (CGIAR, non-CGIAR), entity name, country Crops: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other
	Method of Calculation: $$Share\ of\ cooperators\ reporting\ trial\ results$$ $$= \frac{Number\ of\ cooperators\ reporting\ trial\ results}{Number\ of\ cooperators\ that\ received\ international\ nurseries} \times 100$$
	Data sources: International Nurseries Data Management System (IDMS)
	Data collection method: Routine recording in IDMS
	Data collection and reporting responsibility: Program leader- seed systemsand international nurseries
	Data Collection and Reporting Frequency: Real-time recording in IDMS. Semi-annual reporting.
	Evidence required: IDMS report
	Rationale: It is crucial that ICARDA receives trials results information from cooperators in order to gain a good understanding of the performance of cultivars released in different countries. This provides ICARDA an opportunity to group testing locations into zones with similar environments, and determines whether alternative cultivars are required for particular environments. This metric will therefore be useful in tracking this important aspect.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-1: Number of research and development innovations (Stages 1, 2 and 3)

	Definition: Research and development innovations are new or significantly improved (adaptive) outputs or groups of outputs - including management practices, knowledge or technologies. Innovations could also refer to a significant research findings, methods or tools. A significant improvement is one that allows the management practice, knowledge or technology to serve a new purpose or a new class of users to employ it, for example a new variety, a blend of fertilizer for a particular soil type, or a tool modified to suit a particular management practice. In many circumstances, an innovation may be identical to an output, but outputs may also be grouped together as a single innovation. However, not all outputs can be deemed to be innovations.

	Unit of Measure: Count
	Disaggregated by: Innovation stage, innovation type, project, geographic location (national) i) Innovation stage: *Stage 1*: End of research phase (discovery/proof of concept)-excluding breeding and production systems research captured elsewhere); *Stage 2*: End of piloting phase (*May not be applicable to some innovations*)- the wider testing of this research; and *Stage 3*: Availability for uptake. ii) Innovation type: Genetic (varieties and breeds), Production Systems and Management Practices, Social science, Biophysical research, Research and Communication Methodologies and Tools
	Method of Calculation: Summation of the count of innovations. A technology, practice or approach should be reported each year it is actively in Phase I or Phase II. A technology, practice, or approach reported under Phase III and IV should be counted only once per project and not reported in subsequent years for the same stage of maturity.
	Data sources: Program and project documents and staff
	Data collection method: Document review and internal consultations
	Data collection and reporting responsibility: Project leaders, Research managers (e.g. flagship and cluster leaders, CRP Program Management Unit)
	Data Collection and Reporting Frequency: Continous/routine archiving of evidence on MEL as part of reporting project deliverables and capacity development reporting. Annual reporting.
	Evidence required: • Stages 1 and 2 - self-reported evidence; wherever possible, links should be provided to relevant project reports or publications. • Stage 3 requires some documentation that demonstrates a degree of 'completeness' and 'readiness' of the innovation to be taken up, for example certification process, report or journal article outlining the innovating findings (while acknowledging the time lag it takes for journal articles to come through). Hperlinks/DOIs should be provided to the certification process, report, journal article or the like.
	Rationale: This indicator is meant to measure ICARDA's development and delivery public goods through innovation in scientific excellence, knowledge generation, problem solving, expertise, and advice as well as technological packages that support the building of resilient and profitable farming systems in the global dry areas.
	Comments and limitations: Innovations vary tremendously in their importance and scope, so a simple count of innovations reported may not be an accurate reflection or the relative performance of one country program/project over another. Hence, research managers should not feel under pressure to 'over-report' innovations to boost counts. The main objective of this metric is to capture significant innovations in a database, rather than to place emphasis on the numbers. It is anticipated that the mix of the quantitative and qualitative information related to this indicator can capture ICARDA's significant innovations.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-2: Number of research papers published in peer reviewed journals 🖱️

	Definition: This indicator relates to journal articles published in reputable sources listed in directories such as the ISI Clarivate Analytics Master Journal List (formerly Thomson Reuters), Scimago, Directory of Open Access Journals (DOAJ), or the Open Access Scholarly Publishers Association (OASPA).
	Unit of Measure: Count

	Disaggregated by: Accessibility (open access or restricted access), International Scientific Indexing (ISI) status (ISI or non-ISI)
	Method of Calculation: Summation of the count of peer reviewed journals published in a calendar year.
	Data sources: Primary data for this indicator can be derived from MEL and/or DSpace Repository
	Data collection method: Routine upload of journal articles as deliverables on MEL
	Data collection and reporting responsibility: Research and project leaders ensure that all publications are uploaded to MEL. The M&E Leader subsequently works with Knowledge Management (KM) staff to conduct quality assurance and completion of metadata before submitting to approved repositories.
	Data Collection and Reporting Frequency: Routine upload of journal articles as deliverables in MEL. Quarterly reporting.
	Evidence required: List of the following: Author(s), Date of Publication, Article Title, Journal Title, Volume, Issue, Page Numbers, Open Access status, ISI, DOI or handle, CRP/other Program.
	Rationale: Information generated by this indicator will provide evidence of ICARDA's 'Organizational Goal 1: Enhance scientific quality' by tracking the work of ICARDA research staff publications in high-quality and high-impact refereed journals
	Comments and limitations: ICARDA and other CGIAR centers recognize that many types of publications can be important and useful, including manuals and guides, training videos, infographics, web tools, e.t.c. Nevertheless, research publications that are peer reviewed have undergone a careful review process led by academics working in a similar field and are a traditional way to measure academic quality outputs within the CGIAR, thus the dictinct role of this indicator.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-3: Number of datasets generated

	Definition: This indicator refers to sets of primary data used to support publications and/or that have been prepared and validated but have not been used for publication. The said datasets shall contain a unique identifier for the basic unit of data collection or analysis (e.g unique household ID), metadata that clearly define each of the variables therein and of a digital file format such as Excel spreadsheets, SPSS, STATA files and any other format that may be prescribed by the MEL team. This indicators does not include laboratory notebooks, preliminary analyses, drafts of scientific papers, plans for future research, peer review reports, communications with colleagues, or physical objects, such as laboratory specimens.
	Unit of Measure: Count
	Disaggregated by: Access status, data generarion method Access status: Open access, timeless limited access, limited access to CGIAR, limited access with embargo date Data generarion method: Pen-and-Paper Personal Interview (PAPI), Computer Assisted Personal Interviews (CAPI), Computer Assisted Telephone Interviewing (CATI), Self-administered computer interviews (SACI), Other.
	Method of Calculation: Summation of the count of datasets
	Data sources: MEL, , The CGIAR Genebank Platform
	Data collection method: Upload of datasets as deliverables in MEL and the CGIAR Genebank Platform. The M&E Leader subsequently works with Data Management (DM) staff to conduct quality assurance and completion of metadata before submitting to approved repositories (e.g Dataverse).

	Data collection and reporting responsibility: All Research staff
	Data Collection and Reporting Frequency: Routine uploading of datasets as deliverables in MEL; Quarterly reporting.
	Evidence required: Digital file of a format such as Excel spreadsheets, SPSS, STATA files and any other format and metadata prescribed by the MEL team.
	Rationale: Datasets are important for validation of published research findings and form as a basis for future research or secondary analysis. Pooling datasets of acceptable standard creates a wealth of information that can be revisited from time-to-time to shed new insights on key ICARDA research themes.
	Comments and limitations: The fluidity of what can be called a dataset may pose some challenges. A datset may constitute of any number of variables and any number of observations. The M&E Unit will be keep to verify all submitted datasets and will continously help scientists conform to what this indicator is meant to measure.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-4: Number of people trained
OP-4: Number of people attending capacity development events

	Definition: People trained are individuals who participated in any knowledge or skills imparting sessions through interactions that are intentional, structured and purposed for imparting knowledge or skills.
	• Irrespective of the duration, a training must have been designed to strengthen capacities and enhance specific skills.
	• An individual who attends training on the same training topics/modules in different venues or at different points of time is counted only once. Trainings covered in more than one day or over a long period but meant to complete one module/topic is considered as one training.
	• Do not consider sensitization/awareness meetings as trainings.
	Unit of Measure: Count
	Disaggregated by: Training type, Training subject, Duration of training (short-term, long-term), Target audiences, Delivery method (Face-to-face, online, blended), Gender of trainee (Male, Female), Geographic location (National, sub-national). Training type: Individual degree, Individual non-degree/internship, Seminar/Workshop/Training course, Field training, non-formal activities Short-term training is defined as a training lasting for at least half day during which specified topics or modules are discussed, taught or shared. Short-term training may lead to the award of a certificate of attendance/competence or none at all. Long term training is defined as training that leads to a degree or diploma. Target audiences: Academic institutions (universities, colleges e.t.c), advanced research institutions, CGAIR center/program, CRP and Platforms, Community Based Organizarions (CBO), Farmers (individuals or groups), Financing institutions (including foundations), Government, International agricultural research centres, international development organizations (including development projects), National agricultural research systems (NARES), Non-governmental organizations (NGOs), private sector, regional and sub-regional organizations, rural women, other)
	Method of Calculation: Summation of count
	Data sources: Training reports and registration forms
	Data collection method:

- Registration of all people that attended a training supported by ICARDA resources, transfer the records to MEL;
- On-site registration on MEL through mobile data collection devices and forms.
- Count all trainees who attend at least half of the total expected time or modules for each training type.

Data collection and reporting responsibility: All staff that plan and conduct training

Data Collection and Reporting Frequency: Real-time recording to MEL. Quarterly reporting.

Evidence required: Scanned copies of training registration forms, training report, photograph of trainees, GPS coordinates of training location

Rationale: Capacity development is regarded by CGIAR as an effective vehicle for sustainable development, embedded within CRP strategies and the ICARDA Strategic Plan 2017-2026 as a cross-cutting theme. Capacity Development is reagrded as a strategic enabler of impact for the CGIAR, ICARDA and their partners. This indicator therefore serves the purpose of tracking the capacity development dimension related to the transfer of knowledge and skills through training.

Comments and limitations: This indicator is a count of people trained by training theme. It therefore should not be construed as a unique count of people trained and thus additive and limited to a pre-determined population size.

You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-5: Number of accessions distributed

Definition: Accessions are samples of seeds, planting materials or plants conserved in a genebank. Each accession is distinct, and genetically as close as possible to the sample provided originally. This indicator examines the number of accessions distributes as a proxy for the for their use.

Unit of Measure: Count

Disaggregated by: Crop, entity type (CGIAR, non-CGIAR), entity name
Crops: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other

Method of Calculation: Summation of count

Data sources: Genebank

Data collection method: Routine recording in genebank documentation system

Data collection and reporting responsibility: Genebank curator/ Genebank Manager/ Documentation Specialist

Data Collection and Reporting Frequency: Real-time data collection. Quarterly reporting.

Evidence required: Genebank documentation system, reports (Genebank Online Reporting Tool, ORT)

Rationale: Plant genetic resources for food and agriculture are essential to sustainable agriculture and food security. The can be used to meet the needs of the present and future needs of crop improvement and adaptation programs. This indicator provides the contribution of the ICARDA genebanks towards long-term availability of plant genetic resources.

You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

	OP-6: Number of International Nurseries distributed 🖱️
	Definition: This indicator serves to track the number of international nurseries provided to cooperators. ICARDA runs an international nursery trialing system as an integral part of the crop improvement program. It provides the cooperators with the opportunity to evaluate the genetically diverse germplasms generated through conventional and modern breading methodologies under their own agro-ecological conditions and socio-economic contexts.
	Unit of Measure: Count
	Disaggregated by: Crop, Entity type (CGIAR, non-CGIAR), entity name, country Crops: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other
	Method of Calculation: Summation of count
	Data sources: International Nurseries Data Management System (IDMS)
	Data collection method: Routine recording in IDMS
	Data collection and reporting responsibility: Program leader- seed systemsand international nurseries
	Data Collection and Reporting Frequency: Real-time recording in IDMS. Quarterly reporting.
	Evidence required: IDMS report, Standard Material Transfer Agreements (SMTAs)
	Rationale: The development of improved germplasm and elite genotypes for use by national, regional and international breeding programs is the major objective of the ICARDA crop improvement program. ICARDA holds 'in trust' rich and valuable collections of genetic resources of cereals, food legumes, forages and range species in its genebanks and all the genetic resources are considered international public goods (IPGs) to be made available upon request to national and international researchers, individuals from the private sector, graduate students, farmers, and others around the world for use in breeding, research and education purposes. This indicator therefore serves as a metric to quantify ICARDA's work in facilitating seed and germplasm exchange and movement.
	Comments and limitations: Whereas this indicator is used as a proxy for the use of seed and germplasm, it is likely that some cooperators do not put the received seed and germplasm to use (within reasonable time), imparing the accuracy and utility of the indicator information.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.
	OP-7: Number of farm households reached with material technology packages 🖱️
	Definition: This indicator measures only households reached with material technologies, e.g planting material/seed, breeds of improved livestock, water harvesting equipment e.t.c. Households reached through training for purposes of adopting knowledge-driven technologies and innovations are counted under OP-4. If a household receives both the material technology packages and training, then it would have to be counted both in OP-4, and OP-8, with all individuals in the household counted in the former, but a household counted once even when more than one member of the household receive the material technology package (by type). There are two generic delivery channels for distributing material technology packages: 1) Direct channel**:** Delivery under the direct influence/control of ICARDA staff and/or contracted partners. 2) Indirect channel: Distribution of technology packages occurs without direct control of ICARDA and/or contracted partners' staff but the technology package is a result of ICARDA work; The indirect channel constitutes of 3 sub-channels i.e. i) Farmer-to-farmer diffusion- with or without monetary or in-kind payment;

	ii) Market purchases from designated/licenced/recognized sources e.g. agro-input dealers; seed producers; iii) Government or other non-governmental organizations (NGOs) as part of a public support program. The Government or NGOs may provide the support free of monetary payments by the recipients, involve credit (payment at a future date), or contractual pass-on system to other farmers/households.
	Unit of Measure: Count

	Disaggregated by: Technology package, Gender of the household head or farm plot (Male, Female), Geographic location (national, sub-national)
	 Technology package: Improved seed of ICARDA mandated crops, Improved breeds of ICARDA mandated livestock, water technologies (water harvesting technologies, irrigation technologies).
	 If crop:
	     Crops: Crop (Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat, Other)
	     Variety
	     Planting material/seed category: Certified, Truthfully labelled, Quality guaranteed
	 If livestock:
	     Livestock: Type (Goats, sheep, cattle)
	     Breed
	     Improved trait: (Resistance to parasites and diseases, milk production, meat production, resistance to adverse climatic conditions,…)

	Method of Calculation: Summation of households. A household that receives more than one technology package can be counted for each technology package.
	Data sources: Direct delivery system: Records of distribution events Indirect delivery system: Farm household, Next-user organizations (NARS, private sector companies e.t.c)
	Data collection method: Direct delivery system: Recording of recipients Indirect delivery system: Farm household surveys, Input market surveys; Interviews with next-user organization staff; Review of next-user organization records.
	Data collection and reporting responsibility: Program leaders, project leaders (PLs), country managers, project M&E focal points
	Data Collection and Reporting Frequency: Direct delivery system: Every agricultural season Indirect delivery system: 2 to 4 agricultural seasons. Preferably every two agricultural seasons for crops with one cultivation cycle in a year, and 4 agricultural seasons for crops with more than one cropping season in a year.
	Evidence required: Direct delivery system: Planting material/seed/livestock distribution records Indirect delivery system: Next-user records, Key informant interview transcripts; study protocol, data collection tools, request for proposals (RFP) document/ToR, inception report, dataset, data analysis notes/summary/do-files, final report
	Rationale: Reaching farmers directly or indirectly with material technology packages is a prerequisite for adoption to take place and for scaling-up and scaling-out agricultural technologies. This indicator therefore measures both the direct and the indirect reach of ICARDA-origin agricultural technology packages.

	Comments and limitations:
	This indicator is prone to multiple counting of farm households. Often individuals from the same household may: 1) Obtain planting material technology packages (e.g crop seed/livestock breeds) from the same source during the same agricultural season, 2) Obtain material technology packages from different sources for the same agricultural season; or 3) Obtain material technology packages the same or different sources across agricultural seasons. Data collection and analyses should be designed to detect and account for multiple counting, as a way of determining the accurate unique number of households reached and the intensity and imlications of multiple reach
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OP-8.1: Quantity of seed/planting material of improved varieties accessed by farm households

	Definition: Improved varieties constitute of genetic material that has been tested and found to be of higher-yield, higher in nutritional content, and/or more resilient to climate impacts. This indicator excludes recycled seed of hybrids crops, but includes recycled seed of open-pollinated crops up to the nth generation to be defined by crop (and variety). An addendum will be developed for the later.
	Unit of Measure: Kilograms (conversion factors to be established in case of vegetatively propagated crops)
	Disaggregated by: Crop, Planting material/seed category, Gender of household head or farm/plot (Male, Female), Geographic location (sub-national, national)
	Crop: Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat)
	Planting material/seed category: Certified, Truthfully labelled, Quality guaranteed
	a. Certified Seed/planting material: Certified seed/planting material (the progeny of basic seed) is a category of seed/planting material produced by seed companies (public or private) under contract with selected farmers. The production and distribution of certified seed is designed to maintain sufficient varietal identity and purity. It is grown under prescribed conditions of culture and isolation and is subjected to field and seed inspections prior to approval by the certifying agency.
	b. Truthfully Labelled Seed/planting material: It is the category of seed produced by cultivators and/or private seed companies and sold under truthful labels. This type of seeds does not come under the purview of the certifying agency. The minimum standards (purity, germination rate etc.) for truthfully labelled seed may be determined by the state regulatory agency or left to the discretion of the seed producer. Consumers/farmers monitor adherence to standards and report failure to meet standards, while regulatory agencies oversee the situation and carry out spot checks.
	c. Quality Guaranteed or Declared Seed/planting material: This class of seed is produced from certified seed, usually with minimal inspections and testing. Seed-producing farmers and seed companies are responsible for seed quality, while the government has a monitoring role (e.g. using extension staff for field inspection).
	d. Recycled seed/planting material: This constitutes of farm produce saved for use as seed in subsequent planting cycles. Albeit selection of phenotypically superior produce for use as seed/planting material, recycled seed/planting materials is often of a lower quality compared to the classes of seed listed above, and creates avenues for recurrent disease and pest infestation and reduced potential for continued benefits from genetic traits-especially so for hybrid seed.

	Crop variety type: Hybrid, Open-pollinated a. Hybrid varieties: Hybrid seed is seed/planting material produced by the controlled crosspollination of unlike parents of the same plant species. Because the parents are genetically different, hybrids have 'hybrid vigour' resulting in increased growth, size, yield or other characteristics over those of the parents. However, when a hybrid is pollinated with another hybrid, the offspring will not have hybrid vigour and often have inferior performance. b. Open-pollinated varieties: Open-pollinated varieties are seeds that result from pollination by insects, wind, self-pollination (when both male and female flowers occur on the same plant) or other natural forms of pollination. When open-pollinated varieties are grown in subsequent years (recycled), they result in plants with characteristics or "traits" like the parent plant from which the seeds were harvested.
	Method of Calculation: Summation of quantities including all provided to the same household through multiple reach of the household.
	Data sources: Direct delivery system: Records of distribution events Indirect delivery system: Farm household, Next-user organizations (NARS, private sector companies e.t.c)
	Data collection method: Direct delivery system: Recording of quantities received by recipients of crop technology packages Indirect delivery system: Farm household surveys, Input market surveys; Interviews with next-user organization staff; Review of next-user organization records.
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, project M&E focal points
	Data collection and reporting frequency: Direct delivery system: Every agricultural season Indirect delivery system: 2 to 4 agricultural seasons. Preferably every two agricultural seasons for crops with one cultivation cycle in a year, and 4 agricultural seasons for crops with more than one cropping season in a year.
	Evidence required: Direct delivery system: Planting material/seed distribution records Indirect delivery system: Next-user records, Key informant interview transcripts; study protocol, data collection tools, request for proposals (RFP) document/ToR, inception report, dataset, data analysis notes/summary/do-files, final report
	Rationale: This indicator measures the magnitude/intensity of access to/receipt of crop-based technology dessimanted through improved crop varieties.
	Comments and limitations: This indicator is prone to distortions resulting from multiple reach of some households, and hence potential under-estimation of the quantity of planting materials/seed accepted by each unique household. Data collection and analysis approaches ought to to establish the incideces/prevalence of multiple reach and incremental planting materials/seed received by repeat reach households. In addition, improved crop varieties tend to be input-intensive and require the adoption of improved management practices compared to local varieities. So tracking this indicator alone may not provide a broader understanding on the farm households' capability to maintain the improved crop varieties. Such an indicator is therefore better complemented by indicator OC-4.1.

OP-8.2: Number of improved livestock breeds accessed by farm households

	Definition: Improved livestock breeds are a result of genetic selection and ultimately constitute of genetic material that has been tested and found to be of higher-yield, higher in nutritional content, and/or more resilient to climate impacts.
	Unit of Measure: Count
	Disaggregated by: Livestock type, Improved trait, Gender of the household head or livestock owner (Male, Female), Geographic location (national, sub-national) Livestock type: Goats, Sheep, Cattle Improved trait: Resistance to parasites and diseases, milk production, meat production, resistance to adverse climatic conditions
	Method of Calculation: Summation of the count by breed and livestock type
	Data sources: Direct delivery system: Records of distribution events Indirect delivery system: Farm household, Next-user organizations (NARS, private sector companies e.t.c)
	Data collection method: Direct delivery system: Recording of quantities received by recipients of livestock development support Indirect delivery system: Farm household surveys, Input market surveys; Interviews with next-user organization staff; Review of next-user organization records.
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, project M&E focal points
	Data collection and reporting frequency: Direct delivery system: Routine data collection, semi-annual reporting Indirect delivery system: Annual data collection, annual reporting
	Evidence required: Direct delivery system: Livestock distribution records Indirect delivery system: Next-user records, Key informant interview transcripts; study protocol, data collection tools, request for proposals (RFP) document/ToR, inception report, dataset, data analysis notes/summary/do-files, final report
	Rationale: Improved livestock breeds provide an avenue for delivering the benefits of genetic improvement to farmers. Such breeds enahnce farm households' ability to adapt to future changes in climate and economically important traits help farming households meet consumer demand. This indicator therefore measures the magnitude/intensity of access to/receipt of improved breeds as a way of determinig the scope of aforementioned gains that have been delivered to farm households.
	Comments and limitations: Improved livestock breeds tend to be input-intensive and require the adoption of improved management practices compared to local breeds. So tracking the number of livestock accessed by farm households may not provide a longer-term understanding on the farm households' capability to maintain the improved breeds. Such an indicator is better complemented by indicator OC-4.2.

	OC-1: Number of research and development innovations (Stage 4)
	Definition: Research and development innovations are new or significantly improved (adaptive) outputs or groups of outputs - including management practices, knowledge or technologies. Innovations could also refer to a significant research findings, methods or tools. A significant improvement is one that allows the management practice, knowledge or technology to serve a new purpose or a new class of users to employ it, for example a new variety, a blend of fertilizer for a particular soil type, or a tool modified to suit a particular management practice. In many circumstances, an innovation may be identical to an output, but outputs may also be grouped together as a single innovation. This indicator is meant to track innovations at stage 4 (i.e innovation taken up by next users-actual proven uptake and application). Taken up by next-use means that public-and/or private-sector actors has/have institutionalized or provided support for dissemination, independent of direct ICARDA assistance. This indicator does not therefore refer to uptake by the end user (e.g. farmers).
	Unit of Measure: Count
	Disaggregated by: Innovation type, Next-user organization type, Geographic location (national, sub-national) <u>Innovation type:</u> Genetic (varieties and breeds), Production Systems and Management Practices, Social science, Biophysical research, Research and Communication Methodologies and Tools <u>Next-user organization type:</u> CGIAR, Academic and Research, Development organizations (NGOs, networks and regional organizations), NARES/NARS (National agricultural research and extension systems or National agricultural research systems), CBOs (Community based organizations) and farmers' groups, Private Sector, Foundations and Financial Institutions, Government, Bilateral and Donor governments, Multilateral, Other (Please specify)
	Method of Calculation: Summation of count.
	Data sources: Next-users and end-users
	Data collection method: Survey, key informant interviews and focus group discussions as part of outcome assessment
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, project M&E focal points
	Data Collection and Reporting Frequency: Continous/routine archiving of evidence on MEL as part of reporting project deliverables and capacity development reporting. Annual reporting.
	Evidence required: Outcome case study supported by appropriate evidence.
	Rationale: This indicator is meant to measure ICARDA's development and delivery of international public goods through innovation in scientific excellence, knowledge generation, problem solving, expertise, and advice as well as technological packages that support the building of resilient and profitable farming systems in the dry areas.
	Comments and limitations: • Innovations vary tremendously in their importance and scope, so a simple count of innovations reported may not ba an accurate reflection of the relative performance of ICARDA (research) unit/program over another. It is however anticipated that the mix of the quantitative and qualitative information related to this indicator can capture significant innovations. • Research managers should not feel under pressure to 'over-report' innovations to boost counts. The main objective of this metric is to capture significant innovations in a database, rather than to place emphasis on the numbers.

	• A technology should be counted only once per project and not reported in subsequent years,i.e reported once only during the first reporting year when the technology, practice or approach has demonstrated uptake.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-2: Alternative Metrics ('Altmetric') Score for ICARDA publications

	Definition: Alternative metrics measure the dissemination and citation of publications (including those that are not peer reviewed) in online media, providing an indication of reach and influence.
	Unit of Measure: Number (Integer)
	Disaggregated by: Type of knowledge product (Audio, Blog, Book, Book chapter, Brief, Brochure, Conf. paper, Conf. proceeding, Dataset, Donor report, Image, Journal Article ISI, Journal Article Non-ISI, Manual, Map, Newsletter, Other, poster, Presentation, Report, Software, Template, Thesis, Tool, Training material, Video, Website, Working paper)
	Method of Calculation: The score is derived from an automated algorithm, and represents a weighted count of the amount of attention picked up for a research output. The score is weighted to reflect the relative reach of each type of source (for example, an average newspaper story is more likely to bring attention to the research output than an average tweet). The weights are as listed in the square brackets ([]) below. News [8], Blog [5], Policy document (per source) [3], Patent [3], Wikipedia [3], Twitter (tweets and retweets) [1], Peer review (Publons, Pubpeer) [1], Weibo (not trackable since 2015 but historical data kept) [1], Google+ (not trackable since 2019 but historical data kept) [1], F1000 [1], Syllabi (Open Syllabus) [1], LinkedIn (not trackable since 2014 but historical data kept) [0.5], Facebook (only a curated list of public Pages) [0.25], Reddit [0.25], Pinterest (not trackable since 2013 but historical data kept) [0.25], Q&A (Stack Overflow) [0.25], Youtube [0.25], Number of Mendeley readers [0], Number of Dimensions and Web of Science citations [0]. Further details here. The Altmetric Attention Score always has to be a whole number. This means that mentions that contribute less than 1 to the score sometimes get rounded up to one.
	Data sources: MEL, DSpace
	Data collection method: Automated
	Data collection and reporting responsibility: Knowledge and Data Management team
	Data Collection and Reporting Frequency: Annual
	Evidence required: Publication statistics in CSV format, short narrative about the nature of their Altmetric scores.
	Rationale: • Traditional measures of the dissemination (publication in peer reviewed journals) and use (academic citations) of research can fail to capture its use, influence and dissemination by non-traditional means, for example HTML views and PDF downloads or discussion in news sources, policy documents, science blogs, Wikipedia, Twitter, Facebook and other social media. As these non-traditional sources of information become increasingly important for uptake, including by policy-makers, using alternative metrics ('altmetrics') is useful for measuring dissemination and influence. • Altmetric is particularly useful for non-peer reviewed publications. There is often no permanent stable way to track use of these (although individual projects may track downloads, etc.) and tracking in Altmetric provides material to evidence their importance

which can provide a counterbalance to an exclusive emphasis on peer reviewed publications.

- Tracking Altmetric provides research and administrative staff with ideas for how to better communicate research findings and reach target users.

Comments and limitations:

- Use of Altmetric requires proper archiving and use of stable links, instead of temporary links (e.g. to project websites), which overall encourages more sustainable information management of published materials. This is particularly important for non-peer reviewed publications – for example briefing papers, working papers, games, decision trees – as there is often little incentive to archive these properly and they can become 'lost to history' after projects finish, encouraging reinvention of the wheel and also loss of 'negative results'. Altmetric will be a useful metric if projects/researchers archive knowledge products properly.
- It is recognised that annual reporting cycle/period does not give a full picture of the uptake of publications completed towards the end of the year, since it may take some months for full social media uptake (and years for conventional citations). However alternative periods have been suggested and none have found general acceptance.
- Altmetric has a large number of disaggregates that are evolving over time, creating disparity in the score of knowledge products at different points in time.
- Interpretation of the scores is not straightforward as different types of Altmetrics reflect different sorts of sharing and spread.

| FEEDBACK | You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback. |

OC-3: Number of ICARDA-origin crop varieties released by national partners

Definition: Released varieties are those that have passed through the required national approval process to make the seed of the new variety available for multiplication and onward sale or distribution to farmers.

Unit of Measure: Count

Disaggregated by: Crop (Chickpea, Lentil, Faba beans, grass pea, Spring Barley, Winter barley, Durum wheat, Spring Bread wheat), Winter bread wheat), Seed category (Hybrid, Open Pollinated Variety), Trait enhanced (heat tolerance, moisture stress, drought tolerance, resistance to pest & diseases, and others), country

Method of Calculation: Summation of count

Data sources: National partners such NARES

Data collection method: Consultations with national partners (such as NARES), Review of partner records such as national seed varietal release data

Data collection and reporting responsibility: Seed Systems and International Nurseries

Data Collection and Reporting Frequency: Routine data collection, Annual reporting

Evidence required: Variety release documents

Rationale: Variety release is a key pre-rquisite for taking crop technologies to scale through wide distribution networks. Tracking this indicator will therefore shedlight on the crop technologies available for uptake at scale

Comments and limitations:

| FEEDBACK | You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback. |

OC-4.1: Number of farm households <u>that have adopted</u> improved crop varieities and management practices	🖱️

	Definition: This indicator measures the number of households that allocate part of their farm land to one or more improved varieties of ICARDA-promoted crop varieties and/or crop management practices promoted by ICARDA. Participants in technology demonstrations as part of a group should not be counted under this indicator. The households can immediately be deemed to have adopted if they grow the by paying a monetary or material cost to access the seed/planting material. If the seed/planting material are handed to the farm household without a requirement to pay a monetary or material cost, upon receipt or at a later time, then the farm household can only be deemed to have adopted the subsequently grow the improved variety.
	Unit of Measure: Count
	Disaggregated by: Gender of the household head/farm plot, Crop, Geographic location (National, sub-national), Variety identification method (DNA fingerprinting, expert opinion, visual aid protocols, self-reported)
	Method of Calculation: Summation of the count of households
	Data sources: Project reports, farm households, seed retailers, seed companies
	Data collection method: Document review, farm household surveys, agro-input market surveys, interviews with seed company staff
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, project M&E focal points
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term
	Evidence required: <u>For internal evaluation or research studies:</u> Study protocol, data collection tools, dataset, report; <u>For external evaluation or research studies:</u> Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Adoption is a necessary condition to achieving impact. This metric will serve as an early warning to ICARDA scientists as to whaether the research and development outputs will lead to the scale of impact envisioned.
	Comments and limitations: The variety identification approaches are quite varied and some of the methods may leave room for misclassification of varieties as improved whereas not. However, given the costs and challenges involved with the deployment of more rigorous methods, it is prudent that a wide scope of methods, that may be affordable and provide results of acceptable quality be recommended as well. The disparity in approaches will then be managed through a disaggregation, and as such depending on the level of rigor the end-user of the information requires, then the data can be retrieved and disaggregated accordingly.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-4.2: Number of farm households <u>that have adopted</u> improved livestock breeds and animal husbandry practices	🖱️

	Definition: This indicator measures the number of households that allocate part of their farm land to one or more of the ICARDA-promoted livestock breeds or animal husbandry practices. Participants in technology demonstrations as part of a group should not be counted under this indicator. The households can immediately be deemed to have adopted if they obtain the livestock by paying a monetary or material cost. If the livestock were handouts without a requirement to pay a monetary or material cost, upon receipt or at a later time, then the households can only be deemed to have adopted if it accumulates additional heads of livestock either through reproduction of the handout livestock or through purhase of additional livestock of the same breed.
	Unit of Measure: Count of households
	Disaggregated by: Improved livestock or Improved animal husbandry, Gender of household head or livestock owner, livestock type, improved trait, geographic location (national, sub-national) Livestock type: Goats, sheep, cattle Improved trait: Resistance to parasites and diseases, milk production, meat production, resistance to adverse climatic conditions.
	Method of Calculation: Summation of the count of households rearing ICARDA-mandated livestock.
	Data sources: Project reports, farm households, next-users in the livestock sector
	Data collection method: Document review, farm household surveys, interviews with next-user organizations' staff
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, project M&E focal points
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Adoption is a necessary condition to achieving impact. This metric will serve as an early warning to ICARDA scientists as to whether the livestock research and development outputs will lead to the scale of impact envisioned.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-5: Number of policies, legal instruments or investments modified in design or implementation, informed by ICARDA research	🖱️

	Definition: Number of policies/ strategies/ laws/ regulations/ budgets/ investments/ curricula (and similar) at different scales (international to local) that were modified in design or implementation, with evidence that the change was informed by CGIAR research.

- <u>Policy or Strategy</u>. A policy or strategy could be a written decision or commitment to a particular course of action by an institution (policy); or a (government, NGO, private sector) high level plan outlining how a particular course of action will be carried out (strategy).
- <u>Legal Instrument</u>. Legal instruments include laws, defined as a Bill passed into law by highest elected body (Parliament, Congress or equivalent); or regulations, defined as a

	rule or norm adopted by government and backed up by some threat of consequences, usually negative ones in the form of penalties. • <u>Budget or Investment</u>. A budget or investment is an estimate of funds allocated for development. • <u>Curriculum</u>. Curriculum refers to the planned means and materials with which students will interact for the purpose of achieving identified educational outcomes. This can be at any level of education and target group, ranging from university degree course to farmer-field school
	Unit of Measure: Count
	Disaggregated by: Names of contributing CRPs/Platforms; CGIAR sub-IDO; Policy/investment type; primary organization designing or promulgating the policy, law, investment; geographical scope (national, sub-national), level of maturity (level 1, level 2, level 3); Gender focus, Youth focus, Climate change focus Policy/investment type • Policy or Strategy • Legal Instrument • Budget or Investment • Curriculum Level of maturity: • Level 1= Research taken up by next user (decision maker or intermediary); • Level 2= Policy/Law enacted; • Level 3= Evidence of impact on people and/or natural environment of the changed policy or investment Gender/Youth/climate change focus: • Not targeted, • Significant objective • Principal objective
	Method of Calculation: Summation of count
	Data sources: Policy position papers; Strategic plans, investment plans, curriculum review reports, legal documents. Where independently available sources of evidence are not available, project leaders may also – if appropriate - request formal letters from the relevant authorities or agencies outlining how ICARDA research has been utilized in a particular policy, legal or investment setting.
	Data collection method: Review of and count of unique policies/strategies, legal instruments, budget/investment or curriculum in each of the stages 1 to 3.
	Data collection and reporting responsibility: Program leaders, project leaders, country managers, and project M&E focal points
	Data Collection and Reporting Frequency: Annual
	Evidence required: Stage 1: Outcome/ Impact Case strongly recommended, but optional. If this is not possible, then a short narrative of evidence (max. 200 words) should be accompanied by supporting references and/or links. Stage 2: Outcome-Impact Case Report Stage 3: Outcome-Impact Case Report A wide range of evidence will be accepted. The highest quality evidence will reflect a systematic theory-based approach to testing links and assumptions in the impact pathway, such as contribution analysis.

Rationale: The policy, legal and regulatory enabling environment, as well as education curricula, are critical for development, and influencing this is an important objective of ICARDA and CGIAR research. It is also an important indicator of the "multiplier" effect of the research work.

Comments and limitations:

- The 'number of policies' is not a meaningful quantitative indicator and cannot be used to compare the performance of ICARDA projects. Rather, this indicator helps to create a database of examples and the strength of evidence that is of value.
- Policy change is a highly complex process shaped by a multitude of interacting forces and actors. 'Outright success', in terms of achieving specific, hoped-for changes is rare, and the work that does influence policy is often unique and rarely repeated or replicated, and influences are not always documented.
- Policy changes also tend to occur over long-time frames.
- In addition, policies are often made behind closed doors and it can also be difficult to assess whether or how much any particular actor influenced policies, regulations and laws.
- Care must also be taken in relying on indicators such as citations and references as research will rarely be used directly, but often influences policy-makers more gradually and in less direct ways. Conversely, research may be 'tactically' cited ex-post to justify a decision that has already been made, and where the research simply confirms the 'already held' viewpoint but did not influence it per se. For these reasons, the quality of evidence presented is important.

FEEDBACK

You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-6: Area under ICARDA-promoted improved crop varieties and recommended agronomic management practices

Definition: This indicator measures the area where ICARDA-promoted improved varieties or recommended agronomic management practices are applied during the reporting year. Area of a demonstration or common plot cultivated under improved practices or technologies by participants who are part of a group should not be counted under this indicator.

Unit of Measure: Hectares

Disaggregated by: Nature of intervention (improved varieties, recommended agronomic management practices), gender of the household head or farm plot owner (Male, Female), Geographic location (national, sub-national), area estimation method (self-reported, GPS mesurement), variety identification method (DNA fingerprinting, expert opinion, visual aid protocols, self-reported, remote-sensing).
Variety identification methods: DNA fingerprinting, expert opinion, visual aid protocols, self-reported, remote-sensing

Method of Calculation: Sum of area under each variety and management practice. If same area is under both an improved variety and recommended agronomic management practice, then it will be considered seperately for both, i.e the summation will be for each.

Data sources: Farm households

Data collection method: Farm household surveys

Data collection and reporting responsibility: Program leaders, country managers, project leaders, project M&E focal points

Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term

Evidence required:
For internal evaluation or research studies: Study protocol, data collection tools, dataset, report;

	For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: This indicator tracks successful application of ICARDA technologies and management practices in an effort to achieve impact through improved agricultural productivity.
	Comments and limitations: It is likely that the same area may be planted to improved varieties, and best management practices of one or more kinds applied to the same area. The sum of the indicator values therefore should not be construed to represent exclusive tracts of land.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

0C-7.1: Yield of ICARDA-mandated crops

	Definition: Yield is a measure of the total crop output divided by the total land area planted.
	Unit of Measure: Metric tons *per* hectare;
	Disaggregated by: Crop, crop production system, gender of household head or farm plot owner, geographic location (national, sub-national) Crop production systems: Monocrop, mixed crop, rotation
	Method of Calculation: $$Yield = \frac{Total\ production}{Total\ area\ used\ for\ production}$$ If there is more than one production cycle in the reporting period, the data points for total production and area used for production should be summed each time the land was cultivated. The total produce divided by the sum of area under crop cultivation will provide an estimate of the average yield achieved across the different production cycles. Total production is the amount that is produced, regardless of how it was ultimately used. It therefore includes produce lost after harvest. See guidance here on the use of different methods for estimating crop yield.
	Data sources: Farm households, next-user records, FAO statistics or other reliable national and sub-national statistics
	Data collection method: Farm household surveys, review and analysis of secondary literature and datasets
	Data collection and reporting responsibility: Program leaders, country managers, project leaders, project M&E focal points
	Data Collection and Reporting Frequency: Annual, biannual, baseline, mid-term, end-term
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Closing yield gaps (through optimal crop management practices, improved germplasm, better seed supply systems and stronger support services) is a central part of ICARDA's work. Improving the yield for farm commodities can increase income and contribute to poverty reduction.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-7.2: Yield of ICARDA-mandated livestock

Definition: Yield is a measure of the total livestock output per animal. Weight in kilograms of entire animals which were offtake *per* maximum number in herd, flock. Offtake quantity includes the entire weight of all animals that were sold, slaughtered, gifted or exchanged, including those for home consumption.	
Unit of Measure: Kilograms	
Disaggregated by: Livestock, livestock production system; gender of the household head or flock/herd owner, geographic location (national, sub-national) Livestock: Goats, Sheep, Cattle Livestock production systems: Rangeland; rural mixed crop-livestock; urban/peri-urban; and intensive commercial livestock production	

Method of Calculation:

$$Yield = \frac{Weight\ of\ offtakes}{Maximum\ number\ of\ livestock\ in\ herd\ or\ flock}$$

If there is more than one production cycle in the reporting period, a summation of weight of offtakes and the sum of livestock in the herd or flock across the production cycles should be used, leading to the computation of average livestock yield achieved across the different production cycles.

Data sources: Farm households, next-user records, FAO statistics or other reliable national and sub-national statistics

Data collection method: Farm household surveys, review and analysis of secondary literature and datasets

Data collection and reporting responsibility: Program leaders, country managers, project leaders, project M&E focal points

Data Collection and Reporting Frequency: Annual, biannual, baseline, mid-term, end-term

Evidence required:

For internal evaluation or research studies: Study protocol, data collection tools, dataset, report;

For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset

Rationale: Closing yield gaps through improved livestock breeds and better livestock management practices is one of the mandates of ICARDA. It can lead to increased income and potentially a reduction in poverty rate.

FEEDBACK

You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-7.3: Rate of yield change for ICARDA-mandated crops and livestock

Definition: This indicator measures the rate of change of on-farm yield, achieved through ICARDA's work on germplasm/genetic improvement and promotion of improved agronomic and animal husbandry practices.

Unit of Measure: Percentage change

Disaggregated by: Technology (Crop/livestock), Crop/livestock production system, geographic location (national)

Crop production systems: Monocrop, mixed crop, rotation

Crop: Chickpea, Lentil, Faba beans, grass pea, Spring barley, Winter barley, Durum wheat, Spring Bread wheat

Livestock production system: Rangeland; rural mixed crop-livestock; urban/peri-urban; and intensive commercial livestock production

	Livestock: Goats, Sheep, Cattle

	Method of Calculation:
	Step 1: Compute yield of crops and/or livestock as provided for in indicators OC-7.1 and OC-7.2 respectively.
	Step 2: For each crop variety/animal breed, compute the rate of yield change
	
	$$Rate\ of\ yield\ change = \frac{Yield\ at\ start\ of\ period - Yield\ at\ end\ of\ period}{Period\ (in\ years)} \times 100$$
	
	Step 3: Compute the geometric mean for crops and livestock seperately, using the area planted to the crop variety and tropical livestock units (TLU) as weights respectively.
	Further notes:
	  1. For mixed crop farming, attention should be paid to determination of the crop/variety share of land allocation within the farm;
	  2. The TLU[3] used for the livestock weights are: cattle = 0.7, sheep = 0.1, goats = 0.1

	Data sources: Farm households, Next-user records, FAO statistics or other reliable national and sub-national statistics
	Data collection method: Farm household surveys, document review, secondary literature and datasets review and analysis
	Data collection and reporting responsibility: SEP, M&E Unit
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term
	Evidence required: Reports, datasets
	Rationale: The CGIAR Strategic Results Framework (SRF) identifies the improvement in the rate of yield increase for major food staples as a key pathway towards the achievement of the system level outcome (SLO) on 'Improved food and nutrition security for health'. This metric will therefore be useful in tracking ICARDA's contribution towards the achievement of the said SLO.
	Comments and limitations: The use of area planted and tropical livestock units (TLU) as weights for the geometric means for crops and livestock respectively will help generate a heuristic measure. However, yield gains for less nutritious crops grown on larger tracts of land may appear to be more important than yield gains for more nutritious crops grown on smaller tracts of land whereas the more nutritious crops may lead to a greater impact on the nutrition and health of the population.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-8.1: Change in diversity of farmers' crop production

	Definition: This indicator will track diversity of farmers' crop production at farm-level. Only cultivated crops will be considered in the computation of the diversity index. It thus excludes other plants that are part of the farm vegetation. It also excludes livestock/animals.
	Unit of Measure: Percentage
	Disaggregated by: Geographic location (sub-national, national), agro-ecological zone
	Method of Calculation: Step 1: Compute the Shannon diversity index $$Shannon\ Diversity\ Index\ (SDI) = \sum_{i=1}^{n} -(P_i \times \ln P_i)$$

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[3] Source: Jahnke *et al.* 1988, available here

	P_i is the proportion of a particular crop type and n is the total number of crop types on the farm, as measured by size of land area allocated.
	Step 2: Compute the change in the shannon index across the reporting periods (applicable to all but the first reporting period) $$Change\ in\ diversity = \frac{SDI_{t_n} - SDI_{t_o}}{SDI_{t_o}} \times 100$$ t_0 denotes the first reporting period (e.g baseline) and t_n denotes subsequent reporting periods (e.g mid-term, end-term). Additional notes: The farmers should be helped to estimate the proportion of individual crops by using appropriate visual aids and illustrations. This is will be even more important for mixed crop production systems.
	Data sources: Farm households
	Data collection method: Farm household surveys
	Data collection and reporting responsibility: Program leaders, project leaders, project M&E focal point persons
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term
	Evidence required:
	Rationale: This metric is a proxy for farm risk reduction (e.g market price fluctuation risk) and diversity of farm household diets.
	Comments and limitations: • Crop diversity is often a proxy for risk reduction (diversifying crops speads risks), but in particular context this may have some trade-off with productivity. • It is possible that some farmers with less diverse crop enterprises are better off through specialization and the associated efficiency gains, resulting in higher margins/income that they may use to diversify their diets among other benefits. The extent to which this indicator can be used as proxy to diversify of farm household diets is thus dependent on the accuracy of this analogy that farm households with specialized crop production tend not to increase their expenditure on diversified diets. • This indicator insufficiently captures the context of the farmers' crop production such as if the farmer is practicing crop rotation.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-8.2: Change in rangeland biodiversity

	Definition: This indicator measures species richness, i.e the number of different species in a particular plant community in the rangelands.
	Unit of Measure: Percentage
	Disaggregated by: Climate, vegetation type, family, lifeform, longevity (annual or perennial), geographic location (national, sub-national)
	Method of Calculation: Step 1: Compute the Shannon index $$Shannon\ Diversity\ Index\ (SDI) = \sum_{i=1}^{n} -(P_i \times \ln P_i)$$ P_i is the number of individuals of one particular species found in the plant community (n) divided by the total number of individuals found in the same plant community (N). Step 2: Compute the change in the shannon index across the reporting periods (applicable to all but the first reporting period)

$$Change\ in\ diversity = \frac{SDI_{t_n} - SDI_{t_o}}{SDI_{t_o}} \times 100$$

t_0 denotes the first reporting period (e.g baseline) and t_n denotes subsequent reporting periods (e.g mid-term, end-term).

<u>Additional notes</u>:

The Shannon index increases as both the richness and the evenness of species in the community increase.

	Data sources: Rangelands
	Data collection method: Field-data collection from rangeland. Vegetation cover and species composition must be estimated using the point- quadrats method along definite transects with 100 points per transect. The percentage cover of each species data will be used to calculate the Shannon diversity index.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data collection and reporting frequency: Annual, bi-annual, baseline, mid-term, end-term. It is recommended that data collection is done during the peak season of growth when identification of plant species is much easier.
	Evidence required: Images, data collection forms (raw data), dataset
	Rationale: Rangeland biodiversity is a vital ecological indicators of rangeland sound management and health. This indicator will help form a basis and track priorities for rangeland biodiversity conservation.
	Comments and limitations: Species identification may require the involvement of specialists such as a taxonomist, without whom the information gathered may not be accurate.
FEEDBACK	You may provide feedback by leaving a comment <u>here</u>. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-8.3: Change in rangeland ground cover

	Definition: This indicator is a measure of the percentage of plant cover on the land surface.
	Unit of Measure: Percentage
	Disaggregated by: Geographic location (national, sub-national), Rangeland name, Rangeland area, method (line intercept, digital vegetation charting)

	Method of Calculation:
	<u>Step 1</u>: Compute ground cover using any of the two methods below:
	  1. <u>Line intercept method</u>: Cover is calculated by adding all intercept distances and expressing this total as a proportion of tape length and multiplying by 100.
	  2. <u>Digital vegetation charting method</u>: Ground cover is estimated using a set of protocols for taking digital images and analysing them using specialized image processing software.
	<u>Step 2</u>: Compute the change in the shannon index across the reporting periods (applicable to all but the first reporting period)
	$$Change\ in\ cover = \frac{Cover_{t_n} - Cover_{t_o}}{Cover_{t_o}} \times 100$$
	t_0 denotes the first reporting period (e.g baseline) and t_n denotes subsequent reporting periods (e.g mid-term, end-term).

	Data sources: Rangelands

	Data collection methods[4]:
	Line intercept method: A tape is extended to create a transect across the site. Transect length depends on the vegetation and type of plants which are to be measured. In many instances, 15 m transects have been found suitable in dense vegetation, while 30-50 m is needed to obtain a representative sample in sparse vegetation. The observer proceeds along the line-transect, identifies ground cover intercepted by the tape, and records intercept distance. Each transect is regarded as one sample unit, so multiple transects must be measured to estimate sample variance and conduct statistical analyses of cover data.
	Digital vegetation charting method: A more reliable and cost-effective technique is the use of digital vegetation charting technique where the cover is computed by the computer based on the number of pixels each class represents within a fixed area.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term. It is recommended that data collection is conducted during peak standing crop (Spring season).
	Evidence required: Data collection forms (raw data), dataset
	Rationale: Plant cover is ecologically important because plant leaves and branches protect the soil from the damaging effects of heavy rainfall and reduce soil erosion. Furthermore, the greater the vegetation cover, the more vegetation is available for livestock and wildlife.Tracking ICARDA's work in restoration of rangelands is critical for determining the gains made in optimizing the productivity of grazing lands.
	Comments and limitations: The line intercept method requires the use of more transects as site heterogeneity increases, and this could significantly increase the cost and time required to gather data for reporting this indicator.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-9.1: Share of the improved breeds in total livestock population

Definition:	This indicator will measure the composition of improved livestock breeds in total livestock reared. Improved breeds include livestock that is a genetically superior as a result of selective breeding.
Unit of Measure:	Percentage
Disaggregated by:	Livestock type (Goats, Sheep, Cattle), breed, Improved trait, Geographic location (national, sub-national)
	Improved trait: Resistance to parasites and diseases, milk production, meat production, resistance to adverse climatic conditions
Method of Calculation:	

$$Share\ of\ improved\ breeds = \frac{Total\ count\ of\ improved\ breeds}{Total\ count\ of\ livestock} \times 100$$

Data sources:	Farm households
Data collection method:	Farm household surveys
Data collection and reporting responsibility:	Program leader, project leader, project M&E focal point person
Data Collection and Reporting Frequency:	Annual, bi-annual, baseline, mid-term, end-term.
Evidence required:	

	For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: Livestock provide a wide variety of goods and services that generate income and support the livelihoods of millions of poor people. Improved breeds enhance the benefits that accrue to farm households, as such, livestock is entrenched in the ICARDA strategic research priorities (SRPs) two and three. This indicator will therefore contribute towards the measurement of results related to SRP 2 and SRP 3.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-9.2: Share of livestock under improved livestock management

	Definition: This indicator will determine the share of livestock that are under improved livestock management practices. The practices considered for this indicator include: livestock health services and products such as vaccines; improved livestock handling practices and housing; improved feeding and grazing practices (e.g rotational grazing, improved fodder crop including the use of dual-purpose crops,…), improved waste management practices.
	Unit of Measure: Percentage
	Disaggregated by: Livestock type (Goats, Sheep, Cattle), Geographic location (national, sub-national)
	Method of Calculation: $$Share\ of\ livestock\ under\ improved\ management = \frac{Count\ of\ livestock\ under\ improved\ management}{Total\ number\ of\ livestock} \times 100$$
	Data sources: Farm households
	Data collection method: Farm household surveys
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: Livestock provide a wide variety of goods and services that generate income and support the livelihoods of millions of poor people. Besides improved breeds, it is important that farm households practice improved livestock management practices so as to accelerate the gains from livestock rearing. This indicator will contribute towards the measurement of results related to SRP 2 and SRP 3.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC10.1: Consumption frequency of ICARDA-mandated crops and livestock 🖱	
	Definition: This is indicators is a count of the number of days in a week that a household consumes an ICARDA-mandated crop or livestock food product. It is a sub-set of the Food Consumption Score (FCS) indicator, widely used in food security projects/studies.
	Unit of Measure: Count
	Disaggregated by: Crop/livestock, sex of household head (Male, Female), Geographic location (national, sub-national) Crop: Chickpea, Lentil, Faba beans, grass pea, Spring barley, Winter barley, Durum wheat, Spring Bread wheat _If crop:_ Timing of data collection (Within 3 months from harvest, >3-6 months from harvest, >6-12 months from harvest. Livestock: Goats, Sheep, Cattle
	Method of Calculation: Step 1: For each of the past 7 days, elicit the number of times an ICARDA-mandated crop or livestock food product was consumed, and record 1 if any was consumed at all on a particular day Step 2: Elicit the number of days an ICARDA-mandated crop or livestock food product was consumed using a standard 7-day recall period. Step 3: Compute the average number of days the ICARDA-mandated crop or livestock food product was consumed by households
	Data sources: Farm households
	Data collection method: Farm household surveys
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: For food-based nutrients to be efficacious, they have to be consumed in sufficient quantities and intensities. This indicator provides a snapshot of the usefulness of the ICARDA-promoted food crop and animal foods in household diets.
	Comments and limitations: • This indicator generates discrete indicator values with a narrow range, and so the underlying distribution does not conform to normal distribution. Whereas means are more accurate for normally distributed values, the computed means for this indicator are deemed to provide useful guidance, and the limitations thereof are acknowledged. • The indicator is meant to measure the contribution of ICARDA-promoted crops to the dietary diversity of the household. It however does not encompass the whole dietary diversity concept as this is the subject of indicator OC-10.3.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

	OC-10.2: Quantity of ICARDA-mandated crops and livestock food products consumed
	Definition: This indicator measures the average daily intake of food products derived from ICARDA-mandated crops and livestock by each adult equivalent in the household.
	Unit of Measure: Grams per adult equivalent per day
	Disaggregated by: Crop/livestock, sex of household head (Male, Female), Geographic location (national, sub-national) Crop: Chickpea, Lentil, Faba beans, grass pea, Spring barley, Winter barley, Durum wheat, Spring Bread wheat _If crop:_ Timing of data collection (Within 3 months from harvest, >3-6 months from harvest, >6-12 months from harvest. Livestock: Goats, Sheep, Cattle
	Method of Calculation: 1. Determine the all the household members by age and gender; 2. Determine the quantity of food by category & type consumed in the household for a given period of time and determine those/share derived from ICARDA-mandated crops or livestock; 3. Adjust the quantity of food for post-harvest & preparation losses. 4. Compute the adult equivalent number of household members using the FAO age-gender specific energy requirements (http://www.fao.org/3/a-y5686e.pdf) and using the reference of 1 adult equivalent equal to 3,050 Kcal/day (i.e the Daily Energy Requirement of an adult male of 18-30 year). 5. Divide the quantity of food consumed daily from ICARDA-mandated crops or livestock and divide by the total adult equivalents in the household.
	Data sources: Farm households, FAO/WHO energy requirement documents, food conversion tables, literature on post-harvest and preparation food losses.
	Data collection method: Farm household surveys, document review
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: For food-based nutrients to be efficacious, they have to be consumed in sufficient quantities and intensities. This indicator provides a snapshot of the usefulness of the ICARDA-promoted food crops and animal foods and hence signals potential nutritional benefit (or the lack thereof) accruing to the producer and consumer households.
	Comments and limitations: The indicator does not capture potential intra-household variations in food consumption, but rather assumes consumption proportional to individual energy requirements.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

	OC-10.3: Share of people consuming a diet of minimum diversity
	Definition: This indicator captures the percent of people in the population who are consuming a diet of minimum diversity. A person is considered to consume a diet of minimum diversity if she consumed at least five of 10 specific food groups during the previous 24 hours (day and night). The 10 food groups included in the indicator are: 1. Grains, white roots and tubers, and plantains; 2. Pulses (beans, peas and lentils); 3. Nuts and seeds (including groundnut); 4. Dairy; 5. Meat, poultry and fish; 6. Eggs; 7. Dark green leafy vegetables; 8. Other vitamin A-rich fruits and vegetables; 9. Other vegetables; 10. Other fruits.
	Unit of Measure: Percentage
	Disaggregated by: Gender group, geographic location (national, sub-national) Gender group: Women of reproductive age/ women 15-49 years, children 6-24 months, children 6-59 months, men 15-49 years (as comparison group)
	Method of Calculation: Step 1: Elicit the foods (and by extension food groups) consumed by individual members of the household during the previous 24 hours (day and night). Step 2: Determine the number of people (by gender group) that have consumed at least five of 10 specific food groups during the previous 24 hours (day and night). Step 3: Compute the indicator value using the formula below: $Share\ of\ people\ consuming\ a\ diet\ of\ minimum\ diversity$ $= \dfrac{Number\ of\ people\ who\ consume\ atleast\ 5\ food\ groups}{Number\ of\ people\ in\ the\ sample\ for\ which\ data\ on\ consumption\ was\ collected}$ $\times\ 100$
	Data sources: Farm and consumer households
	Data collection method: Farm and consumer household surveys
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: • Dietary diversity is a key characteristic of a high quality diet with adequate micronutrient content and is thus important to ensuring the health and nutrition of the population, especially vulnerable groups such women and their children. Monitoring consumption of diets of minimum diversity among people across different gender groups, locations, and across time helps with understanding why positive changes in nutrition indicators are or are not occurring. • Research has validated that women of reproductive age consuming foods from five or more of the 10 food groups are more likely to consume a diet higher in micronutrient adequacy than women consuming foods from fewer than five of these food groups. So this indicator is a proxy for the somewhat complex-to-measure indicator
	Comments and limitations: The aggregated crops and/or animal products with the food groups in this indicator makes it difficult to make inference on crop-specific interventions. So interventions that are crp-specific rather than a food basket approach are urged to exercise caution before adopting this indicator.

	You may provide feedback by leaving a comment [here](#). When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-11.1: Rain Use Efficiency

	Definition: Rain use efficiency (RUE) is the ratio of aboveground net primary production (ANPP) to mean annual precipitation (MAP).
	Unit of Measure: kg ha^{-1} mm^{-1}
	Disaggregated by: Vegetation type, soil type, geographic location (national, sub-national)
	Method of Calculation: Rain use efficiency (RUE) is the ratio of above-ground net primary production (ANPP) to mean annual precipitation (MAP), or simply the ratio of standing biomass to rainfall: $$RUE = \frac{\text{Aboveground net primary production } (ANPP)}{\text{Mean annual precipitation } (MAP)}$$
	Data sources: Rangeland and meteorological station.
	Data collection method: Field-data collection of ANPP from rangeland and routine recording of MAP from the nearest weather station.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term. Please note that above-ground net primary production (ANPP) can be estimated during the peak growing season of primary production which cincides with development of the annual vegetation and carried out in ungrazed sites.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: Rain use efficiency (RUE) is an important indicator for arid and semi-arid rangeland health, where rainfall is a major limiting factor for plant growth. RUE is a critical indicator for evaluating the response of primary productivity to variability of rainfall in arid and semi-arid ecosystems. Therefore, changes in RUE is an integral measure for evaluating ecosystem health, land degradation and desertification.
	Comments and limitations:
	You may provide feedback by leaving a comment [here](#). When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-11.2: Biophysical water use productivity (Basic)

	Definition: This indicator will measure crop and/or livestock output per unit of water supplied. The indicator shall consider the volumes of water used and the source, i.e rainfall and/or irrigation (whether from surface water or groundwater). Crop: Crop output may either be the dry weight of grains/seeds or the above-ground dry biomass for crops such as maize, soybean and sunflower. For cotton, the crop output referes to the weight of lint, whereas for fruits such as bell peppers and eggplant, it refers to the weight of the fruits which may either be the fresh or dry weight. Livestock: Livestock output to be measured for this indicator will be both milk and meat, where applicable, because often farms maintain dual-purpose herds. Water-use: The indicator will encompass water use for growing fodder, to its conversion into feed biomass, and the effectiveness of diets ingested by cattle (e.g. nutrient contents and impacts on both milk production and live weight gain).

	Unit of Measure: kilograms per cubic meter

	Disaggregated by: Production system, Main crop/livestock, geographic location (national, sub-national)
	
	Production system: Crop, livestock, integrated crop-livestock
	    If crop or integrated crop-livestock system:
	      o Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat
	      o Soil type: Heavy, light
	      o Crop management: Good management, poor management
	          ▪ Good management practice: Break crops, summer weed control, early sowing, wider rows, irrigation timing/deficit irrigation regime, disease control, sub-soil manuring
	      o Production/input system: Rain-fed only, mainly irrigated, mainly rain-fed with limited irrigation
	      o Output estimation method: Whole plot harvest, crop cut method, farmer recall, farmer prediction, sampling of harvest units, expert assessment, crop diary and crop diary with telephone calls, crop cards, crop modelling
	Main livestock: Goats, sheep, cattle

	Method of Calculation: Field level measurement of soil water, rainfall and irrigation amount, crop productivity; secondary data or literature review $$WUP_{Crop} = \frac{Crop\ output\ (kg)}{Rainfall\ (m^3) + Irrigation\ (m^3)}$$ $$WUP_{Livestock} = \frac{Livestock\ output\ as\ either\ milk\ or\ meat\ (kg)}{Rainfall\ (m^3) + Irrigation\ (m^3)}$$ $$WUP_{Integrated} = Average\ (WUP_{crop};\ WUP_{Livestock})$$
	Data sources: Farm households, weather stations
	Data collection method: Farm household surveys, routine recording of weather (rainfall) information at meteorological stations, document review Crop-specific data collection notes: See guidance here on the use of different methods for estimating crop output. Livestock-specific data collection notes: Measure water volumes used to produce forage; forage biomass from irrigated plots; and the annual output of milk and live weight gain obtained per farm. • To determine forage biomass weighing plant samples harvested from each plot within a 1 m² quadrat at each harvest. Compute the nutrients (net energy and digestible protein) supplied by the biomass by using appropriate conversion factors from reputable publications that closely match the area of study as much as possible. • Milk volumes and live weight gains should be recorded for each farm. • Milk used by suckler calves should not be taken into account since it is considered an intermediary input for live weight gain. • The growth performance of livestock should be estimated heart girth measurements. Water measurement notes: • Measure total irrigation and rainfall amount for each site/ area during the crop/livestock growing season/cycle. It is recommended that water volumes be estimated through frequent measurement of water supply from points of supply (e.g wells) and at the entry

	point of irrigated plots, and combined with regular enquiries about the durations of irrigation applications.
	• Rainfall data ought to be obtained from the nearest meteorological station.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: Information generated by tracking this indicator will be useful in understanding the benefits that accrue from ICARDA'S work of identify and promotion of genotypes with better water-use efficiency and the associated agronomic and/or livestock management practices. In addition, the measurement of this indicator for integrated crop-livestock systems will provide insight on the complementarity between the two systems promoted for ensuring farming sytems resilience.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-11.3: Biophysical water productivity (Advanced)

	Definition: This indicator will measure crop and/or livestock output per unit of water consumed. The indicator shall consider consider the volumes of water used and its sources, i.e rainfall, irrigation (whether from surface water or groundwater) and water balance or virtual water for crop and livestock respectively.
	Unit of Measure: kilograms per cubic meter (kg/m^3)

	Disaggregated by: Production system, Main crop/livestock, geographic location (national, sub-national)
	 Production system: Crop, livestock, integrated crop-livestock
	     If crop or integrated crop-livestock system:
	       o Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat
	       o Soil type: Heavy, light
	       o Crop management: Good management, poor management
	         ▪ Good management practice: Break crops, summer weed control, early sowing, wider rows, irrigation timing/deficit irrigation regime, disease control, sub-soil manuring
	       o Production/input system: Rain-fed only, mainly irrigated, mainly rain-fed with limited irrigation
	       o Output estimation method: Whole plot harvest, crop cut method, farmer recall, farmer prediction, sampling of harvest units, expert assessment, crop diary and crop diary with telephone calls, crop cards, crop modelling
	 Main livestock: Goats, sheep, cattle

	Method of Calculation: $$WUP = \frac{Crop\ output\ (kg)}{Evapotranspiration\ (m^3)}$$

$$Evapotranspiration$$
$$= [Rainfall\ (m^3) + Irrigation(m^3)]$$
$$- [Evaporation\ (m^3) + Drainage\ (m^3)]$$
$$+ [Soil\ water\ content\ at\ sowing\ (m^3)$$
$$- Soil\ water\ content\ at\ harvest\ (m^3)]$$

$$WUP_{Livestock}$$
$$= \frac{Livestock\ output\ as\ either\ milk\ or\ meat\ (kg)}{Rainfall\ (m^3) + Surface\ water\ (m^3) + Ground\ water\ (m^3) + Virtual\ water}$$

$$WUP_{Integrated} = Average\ (WUP_{crop};\ WUP_{Livestock})$$

The basic considerations for computing the advanced form of water productivity are as stated in indicator OC-11.2. In addition, this indicator measures the net water used for crop growth through evapotranspiration and for livestock (or integrated systems) including virtual water, i.e water ingested by livestock from off-farm feed supply.

Data sources: Farm households, weather stations

Data collection method: Farm household surveys, routine recording of weather information at metreological stations, document review

Additional data collection notes:

In addition to the data stated in OC-11.2, collect data on: Soil water content, water use/loss, soil evaporation losses, and evapotranspiration.

Crop-specific data collection notes:

In addition to the measures stated in OC-11.2, measure soil moisture before seeding and at harvest at 3 different soil depths 0-30 cm, 30-60 cm and 60-90 cm; Calculate soil evaporation loss during the cropping season.

Livestock-specific data collection notes: In addition to the variables measured in OC-11.2, obtain data on:

- Off-farm feed resources such as dietary rations (forage and concentrate) consumed by lactating cows and growing calves.
- The equivalent virtual water corresponding to off-farm feed resources (mainly cereal grains and bran)- calculated based on conversion factors from reputable publications.

Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person

Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.

Evidence required:

For internal evaluation or research studies: Study protocol, data collection tools, dataset, report;

For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset

Rationale: Information generated by tracking this indicator will be useful in understanding the benefits that accrue from ICARDA'S work of identify and promotion of genotypes with better water-use efficiency and the associated agronomic and/or livestock management practices. In addition, the measurement of this indicator for integrated crop-livestock systems will provide insight on the complementarity between the two systems promoted for ensuring farming sytems resilience.

FEEDBACK | You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-11.4: Absolute amount of water saved per hectare	
	Definition: Absolute amount of water saved is the 'surplus' water unused by the farmer who adopts water saving technologies and management practices, compared to the business-as-usual scenario. This indicator will be measured in the context of the inputs and outputs stated in indicator OC-11.2.
	Unit of Measure: Cubic metres per hectare (m³/ha)

	Disaggregated by: Production system, Main crop/livestock, geographic location (national, sub-national)
	Production system: Crop, livestock, integrated crop-livestock
	    If crop or integrated crop-livestock system:
	      ○ Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat
	      ○ Soil type: Heavy, light
	      ○ Crop management: Good management, poor management
	          ▪ Good management practice: Break crops, summer weed control, early sowing, wider rows, irrigation timing/deficit irrigation regime, disease control, sub-soil manuring
	      ○ Production/input system: Rain-fed only, mainly irrigated, mainly rain-fed with limited irrigation
	Main livestock: Goats, sheep, cattle

	Method of Calculation: Water saved $(W_s) = W_t - W_O$ W_0 denotes water used per hectare in the first reporting period (e.g baseline) and W_t denotes water usage per heactare in subsequent reporting periods (e.g mid-term, end-term).
	Data sources: Farm households, farm records
	Data collection method: Farm household surveys, document review
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: In addition to the rationale for OC-11.2, this indicator will provide information on the amount of water made available for other uses as a result of promoting genotypes and technologies that promote water efficiency within the ICARDA-mandated crops and livestock.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.
OC-11.5: Economic Water productivity (Basic)	
	Definition: This indicator is designed to measure the economic value of production, measured against the total volume of of water supplied for production purposes.
	Unit of Measure: USD per cubic metre (USD/ m³)
	Disaggregated by: Production system, Main crop/livestock, geographic location (national, sub-national)

	Production system: Crop, livestock, integrated crop-livestock 　　If crop or integrated crop-livestock system: 　　　○ Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat 　　　○ Soil type: Heavy, light 　　　○ Crop management: Good management, poor management 　　　　▪ Good management practice: Break crops, summer weed control, early sowing, wider rows, irrigation timing/deficit irrigation regime, disease control, sub-soil manuring 　　　○ Production/input system: Rain-fed only, mainly irrigated, mainly rain-fed with limited irrigation Main livestock: Goats, sheep, cattle
	Method of Calculation: The inputs and output of production considered for this indicator are as described in OC-11.2. $$Economic\ Water\ Productivity\ (EWP)$$ $$= \frac{Economic\ value\ (Gross\ margin)\ of\ crop\ and/or\ livestock\ output\ (USD)}{Total\ amount\ of\ water\ supplied\ (m^3)}$$
	Data sources: Farm households, farm records
	Data collection method: Farm household surveys, document review Additional data collection notes on determining economic value: In addition to the data described in OC-11.2, collect data on: • Monetary value of water: • Family labor: Use of family labor labour and impute its value. • Crops: Input costs may include the cost of fertilizers, persticides, herbicides e.t.c • Livestock: Input costs may include costs on feed and veterinary treatments, as well as of farm workers' wages. Where markets do not exist, contingent valuation approaches such as willingness to pay elicitation should be used to derive the monetary value.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Information generated by tracking this indicator will be useful in understanding the economic (monetary) benefits that accrue to the farmers as a result of ICARDA'S work of identifying and promoting genotypes with better water-use efficiency and the associated agronomic and/or livestock management practices. In addition, the measurement of this indicator for integrated crop-livestock systems will provide insight on the complementarity and synergy between the two systems promoted for ensuring farming sytems resilience.
	Comments and limitations: The lack of markets for certain products or inputs may pose a challenge as the inputed market values through valuation approaches such as willingness to pay or willingness to accept payment may not be accurate estimates for the real market value. However, with advances in the methodological approaches, it is anticipated that even with imputation of market values, this indicator will provide useful information to inform decision-making and determination of progress on this metric.

	You may provide feedback by leaving a comment [here](). When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-11.6: Economic water productivity (Advanced)

	Definition: This indicator measures the economic value of production measured against the depleted water.
	Unit of Measure: USD per cubic metre (USD/ m³)

	Disaggregated by: Production system, Main crop/livestock, geographic location (national, sub-national)
	
	Production system: Crop, livestock, integrated crop-livestock
	    If crop or integrated crop-livestock system:
	       o Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat
	       o Soil type: Heavy, light
	       o Crop management: Good management, poor management
	           ▪ Good management practice: Break crops, summer weed control, early sowing, wider rows, irrigation timing/deficit irrigation regime, disease control, sub-soil manuring
	       o Production/input system: Rain-fed only, mainly irrigated, mainly rain-fed with limited irrigation
	Main livestock: Goats, sheep, cattle

	Method of Calculation: The inputs and output of production considered for this indicator are as described in Indicator OC-11.3. $$Economic\ Water\ Productivity\ (EWP)$$ $$= \frac{Economic\ value\ (Gross\ margin)\ of\ crop\ and\ or\ livestock\ output(USD)}{Net\ amount\ of\ water\ utilised\ by\ the\ crop\ (m^3)}$$
	Data sources: Farm households, Farmers' fields/plots
	Data collection method: Farm household surveys, soil sampling Additional data collection notes on determining economic value: In addition to the data described in OC-11.3, collect data on: • Monetary value of water: • Family labor: Use of family labor labour and impute its value. • Crops: Input costs may include the cost of fertilizers, persticides, herbicides e.t.c • Livestock: Input costs may include costs on feed and veterinary treatments, as well as of farm workers' wages. Where markets do not exist, contingent valuation approaches such as willingness to pay elicitation should be used to derive the monetary value.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, final report, dataset
	Rationale: Information generated by tracking this indicator will be useful in understanding the economic (monetary) benefits that accrue to the farmers as a result of ICARDA'S work of identifying and promoting genotypes with better water-use efficiency and the associated agronomic and/or livestock management practices. In addition, the measurement of this

	indicator for integrated crop-livestock systems will provide insight on the complementarity and synergy between the two systems promoted for ensuring farming sytems resilience.
	Comments and limitations: The lack of markets for certain products or inputs may pose a challenge as the inputed market values through valuation approaches such as willingness to pay or willingness to accept payment may not be accurate estimates for the real market value. However, with advances in the methodological approaches for valuation approaches, it is anticipated that even with imputation of market values, this indicator will provide useful information to inform decisionmaking and determination of progress on this metric.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-12.1: Nutrient use efficiency (Basic)

	Definition: This indicator will measure nutrient use efficiency in terms of output per unit OF fertilizer applied.
	Unit of Measure: Ratio
	Disaggregated by: Nutrient, crop, geographic location (national, sub-national) Nutrient: Nitrogen, phosphorus, potassium Crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat
	Method of Calculation: Measure the total amount of particular fertilizer applied (for example nitrogen, phosphorus, potassium, etc.) and quantity of crop produced. $$Nutrient\ Use\ Efficiency\ (NUE) = \frac{Crop\ output(kg\ or\ MT)}{Quantity\ of\ fertiliser\ supplied\ (kg\ or\ MT)}$$
	Data sources: Farm households, Farmers' fields/plots
	Data collection method: Farm household surveys, farm records, soil sampling
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, fertilizer application records, laboratory analysis records For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Nutrient use efficiency (NUE) is a critically important concept in the evaluation of crop production systems. Tracking this indicator will help examine the process ICARDA is making in the areas of fertilizer management, soil management, and water management.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-12.2: Nutrient use efficiency (Advanced)

	Definition: This indicator measures nutrient removal per unit of nutrient supplied through pre-existing nutrient in the soil and addition of organic and inorganic fertilisers.
	Unit of Measure: Ratio
	Disaggregated by: Nutrient, crop, geographic location (national, sub-national) Nutrient: Nitrogen, phosphorus, potassium Crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat

	Method of Calculation:
	$Nutrient\ Use\ Efficiency\ (NUE)$ $$= \frac{Crop\ nutrient\ content}{Quantity\ of\ nutrient\ removed\ from\ the\ soil\ by\ the\ crop}$$ $Quantity\ of\ nutrient\ removed\ from\ the\ soil\ by\ the\ crop$ $$= (nutrient\ content\ of\ organic\ fertilizer\ applied)$$ $$+ (nutrient\ content\ of\ inorganic\ fertilizer\ applied)$$ $$+ (soil\ nutrient\ content\ at\ sowing - soil\ nutrient\ content\ at\ harvest)$$
	Data sources: Farm households, Farmers' fields/plots
	Data collection method: Farm household surveys, farm records, soil sampling
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, fertilizer application records, laboratory analysis records For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Nutrient use efficiency (NUE) is a critically important concept in the evaluation of crop production systems. Tracking this indicator will help examine the process ICARDA is making in the areas of fertilizer management, soil management, and water management.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-13.1: Change in soil macro-nutrient content

	Definition: This indicator will focus on soil nutrients that are in most demand by crops and supplied by fertilizers: nitrogen (N), phosphorus (P), and potassium (K).
	Unit of Measure: Percentage
	Disaggregated by: Agro-ecological zone, geographical area (national, sub-national)
	Method of Calculation: Step 1: Follow the instructions in this manual to measure soil macronutrient content Step 2: Compute the change in soil macronutrient content as per the equation below $$Change\ in\ soil\ Macronutrient_i = \frac{Macro_{it_n} - Macro_{it_o}}{Macro_{it_o}} \times 100$$ $Macro_{it_o}$ denotes content of soil macronutrient i in the first reporting period (e.g baseline) and $Macro_{it_n}$ denotes content of soil macronutrient i in subsequent reporting periods (e.g mid-term, end-term).
	Data sources: Farmers' fields/plots
	Data collection method: Soil sampling. Additional remark on soil sampling: A soil sample should be composed of several sub-samples representing a seemingly uniform area or field with similar cropping and management history. It is recommended that eight sub-samples are taken per hectare (ha) in a diagonal pattern for obtaining one composite sample. Soil sampling Should be done at depths of about 20-cm and 60-100 cm. See detailed information in the Manual.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person

	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Additional remarks on soil sampling:
	• Soil samples can be taken any time that soil conditions permit, but sampling directly after fertilization or amendment application should be avoided.
	• Samples taken during the crop growth period will help in knowing the nutrient status of the soil in which plants are actively taking up nutrients.
	• It is important to sample at similar times year after year for comparing analysis at regular time intervals.
	Evidence required:
	For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, laboratory analysis records
	For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Soil is a non-renewable resource upon which mankind depends for survival, since the productivity of the soil determines what can be grown on and harvested from the soil. Soils vary greatly across the region ICARDA operates and the worldover. Soils have inherent weakness, primarily deficiencies in nutrients that are essential to crop cultivation across space and time, and hence the need to measure results related to this indicator. The insights generated from reported indicator values will help contextualize the observed crop productivities, inform the requisite interventions and help measure changes achieved through ICARDA's work on improving soil conditions.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-13.2: Change in soil micro-nutrient content

	Definition: This indicator will focus on secondary nutrients: Calcium (Ca), Magnesium (Mg), Sulfur (S), Iron (Fe), Zinc (Zn), Manganese (Mn), Copper (Cu), and Boron (B).
	Unit of Measure: Percentage
	Disaggregated by: Agro-ecological zone, geographical area (national, sub-national)
	Method of Calculation:
	Step 1: Follow the instructions in this manual to measure soil micronutrient content
	Step 2: Compute the change in soil micronutrient as per the equation below
	$$Change\ in\ soil\ Micronutrient_i = \frac{Micro_{it_n} - Micro_{it_o}}{Micro_{it_o}} \times 100$$
	$Micro_{it_o}$ denotes content of soil micronutrient i in the first reporting period (e.g baseline) and $Micro_{it_n}$ denotes content of soil micronutrient i in subsequent reporting periods (e.g mid-term, end-term).
	Data sources: Farmers' fields/plots
	Data collection method: Soil sampling.
	Additional remark on soil sampling: A soil sample should be composed of several sub-samples representing a seemingly uniform area or field with similar cropping and management history. It is recommended that eight sub-samples are taken per hectare (ha) in a diagonal pattern for obtaining one composite sample. Soil sampling Should be done at depths of about 20-cm and 60-100 cm. See detailed information in the Manual.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person

	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term. Additional remarks on soil sampling: • Soil samples can be taken any time that soil conditions permit, but sampling directly after fertilization or amendment application should be avoided. • Samples taken during the crop growth period will help in knowing the nutrient status of the soil in which plants are actively taking up nutrients. It is important to sample at similar times year after year for comparing analysis at regular time intervals.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, laboratory analysis records For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Soils vary greatly across the region ICARDA operates and the worldover. Soils have inherent weakness, primarily deficiencies in nutrients that are essential to crop cultivation across space and time, and hence the need to measure results related to this indicator. The insights generated from reported indicator values will help contextualize the observed crop productivities, inform the requisite interventions and help measure changes achieved through ICARDA's work on improving soil conditions.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-13.3: Change in soil moisture content

	Definition: This indicator will focus on the amount of water present in the soil.
	Unit of Measure: Percentage
	Disaggregated by: Agro-ecological zone, geographical area (national, sub-national)
	Method of Calculation: Step 1: Follow the instructions in this manual to measure soil moisture content Step 2: Compute the change in soil moisture as per the equation below $$Change\ in\ soil\ Moisture = \frac{Moisture_{t_n} - Moisture_{t_o}}{Moisture_{t_o}} \times 100$$ $Moisture_{t_o}$ denotes soil moisture level in the first reporting period (e.g baseline) and $Moisture_{t_n}$ denotes soil macronutrient level in subsequent reporting periods (e.g mid-term, end-term).
	Data sources: Farmers' fields/plots
	Data collection method: Soil sampling. Additional remark on soil sampling: A soil sample should be composed of several sub-samples representing a seemingly uniform area or field with similar cropping and management history. It is recommended that eight sub-samples are taken per hectare (ha) in a diagonal pattern for obtaining one composite sample. Soil sampling Should be done at depths of about 20-cm and 60-100 cm. See detailed information in the Manual.
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term. Additional remarks on soil sampling: • Soil samples can be taken any time that soil conditions permit, but sampling directly after fertilization or amendment application should be avoided.

	• Samples taken during the crop growth period will help in knowing the nutrient status of the soil in which plants are actively taking up nutrients. It is important to sample at similar times year after year for comparing analysis at regular time intervals.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, laboratory analysis records For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Water is the most limiting factor in the arid to semi-arid areas. Soil moisture influences crop growth not only by affecting nutrient availability, but also nutrient transformations and soil biological behavior. Tracking changes in soil moisture levels through this indicator is of major significance.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-13.4: Share of farmers that perceive a change in soil attributes due to adoption of the improved technologies

	Definition: This indicator measures the percentage of farmers whose likert-scale score on soil attributes is atleast 3 out of 5. The attributes covered by this indicator include: soil salinity, soil fertility, and soil depth
	Unit of Measure: Percentage
	Disaggregated by: Soil attribute (soil salinity, soil fertility, and soil depth), geographic location (national, sub-national)
	Method of Calculation: Step 1: Elicit farmers' perceptions of the soil attributes (soil salinity, soil fertility, and soil depth) on a 5-level likert scale, where 1 is the lowest score and 5 is the highest score; Step 2: Compute the percentage of farmers whose likert score is atleast 3. Step 3: Compute the change in soil quality perception as per the equation below $$Change\ in\ soil\ quality\ perception_i = \frac{Perception_{it_n} - Perception_{it_o}}{Perception_{it_o}} \times 100$$ $Perception_{t_o}$ denotes percent of farmer that perceived the quality of the soil to be above average (likert score of 3 and above) in the first reporting period (e.g baseline) and $Perception_{t_n}$ denotes percent of farmers that perceive the quality of the soil to be above average (likert score of 3 or above) in subsequent reporting periods (e.g mid-term, end-term).
	Data sources: Farm households
	Data collection method: Farm household surveys
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: Soil fertility and health are key to the sustainability of crop and animal production systems. This indicator will measure heuristic impressions of soil fertility and health and will directly contribute to agenda 5.5 of the ICARDA Strategic Plan 2017-2026.

	Comments and limitations: The use of a cut-off point on the likert-scale to categorize farmers' perceptions creates a distortion, in that if a farmers' score changes from 4 to 5 between 2 reporting periods, this may not have an effect on the assessed 'perception'.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

OC-14: Change in net income due to adoption of the improved technologies

	Definition: Net income refers to the difference between total revenue from the sale of the agricultural commodities (crops or livestocks), their share of the total cost of production, processing costs (if any) and transport costs.
	Unit of Measure: United states dollars
	Disaggregated by: Crop/livestock, geographic location (national, sub-national), gender of the household head of farm/plot/livestock owner (male, female) Main crop: Chickpea, lentil, faba beans, grass pea, spring barley, winter barley, durum wheat, spring bread wheat Main livestock: Goats, sheep, cattle
	Method of Calculation: $$Net\_income = (total\ sales\ revenue) - Q_s * (total\ production\ costs) \\ - (transport\ costs - processing\ costs)$$ Where Q_s share of crop produce or animal products sold in total crop produce or total crop production respectively.
	Data sources: Farm households
	Data collection method: Farm household surveys
	Data collection and reporting responsibility: Program leader, project leader, project M&E focal point person
	Data Collection and Reporting Frequency: Annual, bi-annual, baseline, mid-term, end-term.
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset
	Rationale: ICARDA provides leadership in strategic research to develop integrated dry areas farming systems, using the diversity of crops and livestock to build profitable and sustainable farming enterprises. Knowledge generated through this indicator will thus shed light in this respect.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

IP-1: Quantity of greenhouse gas emissions

	Definition: This indicator measures the emissions of carbon dioxide, methane, and nitrous oxide linked to the management of agricultural soils, livestock, crop production and vegetation cover. The indicator will factor in sequestration (enhanced) through ICARDA's work of promoting technologies that minimize emission intensities. Examples include low- or no-till practices; restoration of organic soils and degraded lands; efficient nitrogen fertilizer use; agroforestry; introduction/expansion of perennials; practices that promote greater resource use efficiency (e.g. drip irrigation, upgrades of agriculture infrastructure and supply chains). The indicator does not attempt to capture carbon dioxide emissions from fossil fuel consumption by farm machinery.
	Unit of Measure: Carbon dioxide equivalents (CO2e)

	Disaggregated by: Production system, geographic location (national, sub-national) Production system: Crop cultivation, animal rearing, integrated crop-livestock system
	Method of Calculation: FAO's EX-Ante Carbon balance Tool (EXACT) explained here; and ex-post methods for process-based modelling developed/validate by the M&E Unit and SEP team
	Data sources: Farm households, project documents, project staff
	Data collection method: Farm household surveys, key informant interviews/ Rapid assessment technique explained here.
	Data collection and reporting responsibility: M&E Unit, SEP team
	Data Collection and Reporting Frequency: Annual, bi-annual
	Evidence required: Model outputs
	Rationale: Collectively agriculture and food systems contribute a significant share of global greenhouse gas emissions. This indicator will track the contribution of ICARDA in making agriculture and food systems more climate smart.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.

IP-2: Number of households assisted to exit poverty by the interventions

	Definition: Number of households whose per capita income has been increased to surpass the poverty line.
	Unit of Measure: Count of households
	Disaggregated by: Poverty line, ggeographic location (national, sub-national), gender of the household head (male, female) Poverty lines: \$1.25 per capita per day, \$2 per capita per day, other nationally-defined poverty line
	Method of Calculation: *At baseline*: - Estimate the total household income - Divide total household income by number of household members to derive the baseline per capita income both for control and treatment households (i_b). If the figure computed is below the poverty line, count the households - Add all households for which the average per capita income is below the poverty line (n_o). *At subsequent/endline evaluation/study*: - Draw sample from both intervention (treatment) and non-intervention (control) households - Collect data not only on household income (non-farm, agricultural & income from promoted enterprise(s)), but also on factors that determine poverty status/income ($\acute{X}$). - Estimate a linear econometric model, where the dependent variable is the increase in per capita income $(i_e - i_b)$. Estimate the model using standard errors robust to heteroskedasticity and control for multicollinearity. $$(i_e - i_b) = \acute{\alpha}\acute{X} + \beta I + \varepsilon$$ I is the intervention dummy, and the value of β is the contribution of the intervention to the increase in per capita income. - Add β to the baseline income among intervention (treatment) households (i_b) and determine the number of households below the poverty line (n_e). - The number of households assisted to exit poverty can then be computed as $n_o - n_e$. - Extrapolate the results to the extent that the study design permits.
	Data sources: Intervention and non-intervention households
	Data collection method: Household survey with household income and expenditure module
	Data collection and reporting responsibility: M&E Unit, SEP team

Data Collection and Reporting Frequency: Baseline, endline	
Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, re-executable data management and analysis file; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset, re-executable data management and analysis file	
Rationale: Contribution towards poverty reduction is within the mission of ICARDA, and this aligns with the CGIAR Strategy and Results Framework and the United Nations' Sustainable Development Goal 1 (No Poverty). This indicator will therefore quantify ICARDA's contribution.	
Comments and limitations: Measuring data for this indicator requires early planning for the evaluation such that data from both intervention and non-intervention households is collected both at baseline and endline, at requires careful impementation of interventions to ensure that a control group of sufficient size is maintained to enable endline evaluation. In addition, the project staff need to work jointly with the M&E team to ensure that the control group is not contaminated in the course of project delivery. A major pitfall to evaluation approach is the ethics related to excluding a section of potentail beneficiaries from the intervention to allow for evaluation of the impact of the intervention on poverty. Project managers are advised to plan interventions for the control group, to be delivered after the endline/impact evaluation; and as such the evaluation ought to be carriedout within a few months to allow for intervetions to be delivered to the control group.	

IP-3: Number of people moved from inadequate to adequate intake of micronutrients

Definition: This indicator measures the number of people living in households whose suppy of micronutrients (and macronutrients) has surpassed the aggregate Recommended Dietary Allowance (RDA) and/or Estimated Average Requirement (EAR) through the consumption of ICARDA promoted/supplied crops and livestock cultivated/reared within the household or purchased from the market.	
Unit of Measure: Count of people/individuals	
Disaggregated by: Threshold (RDA, EAR), Gender, Geographic location Gender: Women of reproductive age/ 14-59 years, children 6-24 months, children 6-59 months, men 14-59 years(as comparison group)	
Method of Calculation: Step 1: Compute the average amount of food available for daily consumption in the household; Step 2: Discount for post-harvest and preparation/processing losses; Step 3: Divide the quantity of food per day by the total number of adult equivalents in the household; Step 4: Use appropriate food composition tables and efficacy factors to compute the amount of micro- and macro- nutrient intake per adult equivalent per day; Step 5: Make reference to the adult equivalents of age-gender group of interest and impute the micro- or macro- nutrient intake for these groups; Step 6: Compare the share of the sampled farmers that had below WHO threshold intake before and after intervention Step 7: Based on the total number of people (by age-gender category) in the intervention group, calculate the number of people lifted above the micro- or macro-nutrient intake threshold.	
Data sources: Intervention Households	
Data collection method: Survey with an elaborate food intake module	

	Data collection and reporting responsibility: M&E Unit, SEP team
	Data Collection and Reporting Frequency: Baseline, endline'impact evaluation
	Evidence required: For internal evaluation or research studies: Study protocol, data collection tools, dataset, report, re-executable data management and analysis file; For external evaluation or research studies: Request for proposals (RFP) document, inception report, final report, dataset, re-executable data management and analysis file
	Rationale: This indicator will track the work of ICARDA is combating hunger and malnutrition, as envisaged in SLO2 and SDG 2.
	Comments and limitations: The adult equivalent approach assumes intra-household distribution of food based on metabolic energy requirements of the household members. There maybe cases where this assumption does not hold, but the cost and rigor required to conduct a study on intra-household food allocation make this a prgmatic apprach and it has been used widely in Scientific literature. In addition, the inference methods used require that the study sample is representative of (drawn randomly from) the intervention group. Careful timing of the study is also key to the validity and representativeness of the results due to temporal fluctuations in households consumption patterns.
FEEDBACK	You may provide feedback by leaving a comment here. When you do so, kindly include your name and e-mail address to enable us provide you responses to your feedback.