Sustainable Rice Platform Performance Indicators for Sustainable Rice Cultivation

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This document has been prepared by the Sustainable Rice Platform (SRP) team led by UN Environment Programme (UNEP), International Rice Research Institute (IRRI) and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), and supported by the SRP Working Group on Farmer Support, Performance Measurement, and Assurance, following extensive consultation with SRP members, external stakeholders, and ad hoc working groups.

Disclaimer

The views expressed in this document are those of the Sustainable Rice Platform and may not in any circumstance be regarded as representing an official position of the organizations involved.

Validity

SRP Performance Indicators Versions 1.0 and Version 2.0 remain valid until the outcome of field testing of Version 2.1.

About the Sustainable Rice Platform (SRP)

The Sustainable Rice Platform e.V. (SRP) is a global multi-stakeholder alliance comprising over 100 institutional members from public, private, research, civil society and the financial sector. Originally co-convened by the International Rice Research Institute (IRRI), the United Nations Environment Programme (UNEP) and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), SRP is now an independent member association, working together with its partners to transform the global rice sector by improving smallholder livelihoods, reducing the social, environmental and climate footprint of rice production, and by offering the global rice market an assured supply of sustainably produced rice.

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Version 2.1 of the SRP Performance Indicators has been updated from Version 1.0 by a Sustainable Rice Platform (SRP) team led by the International Rice Research Institute (IRRI), UN Environment (UNEP) and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, following extensive consultation with SRP members and external stakeholders. The SRP Secretariat wishes to express its gratitude to the following individuals and organizations for their support during the revision process: IRRI technical experts: Cecilia Acuin, Olivyn Angeles, Peter Brothers, Pauline Chivenge, Matty Demont, Martin Gummert, Buyung Hadi, Joel Janiya, Hung Van Nguyen, Estela Pasuquin, Ranjitha Puskur, James Quilty, Bjoern Ole Sander, Grant Singleton, Alex Stuart, Reiner Wassmann, Sudhir Yadav and in particular Sarah Beebout, who led this revision process throughout.

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A. Changes from Version 1.0 to Version 2.0

The Sustainable Rice Platform (SRP) Performance Indicators Version 1.0 was originally published in October 2015. Version 2.0 is the result of a comprehensive review and revision, which began in August 2017 and was completed in January 2019. The revision was conducted in compliance with the ISEAL Code of Good Practice for Setting Social and Environmental Standards (P005, Version 5.01, June 2010).

Version 2.0 introduces significant changes including the replacement of some indicators and the option to measure most indicators at any of three levels: Basic, Intermediate, and Advanced. These three levels allow users to select the optimal measurement level according to resource availability, ease of collection of data or desired level of accuracy. Users are not required to collect data for all three levels. Version 2.0 allows collection of basic data (Level 1) as an entry point while leaving collection of higher-level data to external partners.

Version 2.0 of the SRP Performance Indicators was approved by the SRP membership at the SRP 8th General Assembly held in Siem Reap (Cambodia) on 24 January 2019. Version 2.1 published in January 2020, contains additional details and clarifications. An overview of key changes is provided in Table 1 below.

Table 1: Overview of changes between Performance Indicators v. 1.0 and v 2.1

PERFORMANCE INDICATORS V. 1.0	CHANGES DURING REVISION	PERFORMANCE INDICATORS V. 2.1
1. Profitability: net income from rice	• Added two levels (1 & 3)	1. Profitability
2. Labor productivity	• Added two levels (1 & 3)	2. Labor productivity
3. Productivity: grain yield	• Added two levels (1 & 3)	3. Productivity: grain yield
4. Food safety	• Moved Indicator No. 4 to 9 • Added two levels (1 & 3)	(See Indicator No. 9 below)
5. Water use efficiency	• Moved to Indicator No. 4 • Added water quality • Added two levels (1 & 3)	4. Water productivity & quality
6. Nutrient-use efficiency: N	• Moved to Indicator No. 5 • Added two levels (1 & 3)	5. N-use efficiency
7. Nutrient-use efficiency: P	• Moved to Indicator No. 6 • Added two levels (1 & 3)	6. P-use efficiency
8. Pesticide use efficiency	• Replaced Indicator No. 8 (Pesticide Use) with Indicator No. 7 (Biodiversity) • Moved entire scorecard to new locations, including: Standard, Indicator No. 7 Biodiversity, Indicator No. 10 Worker health & safety	7. Biodiversity
9. Greenhouse gas emissions	• Moved to Indicator No. 8 • Added two levels (1 & 3)	8. Greenhouse gas emissions
(See insertion Version 2.0)	• Moved Indicator No. 4 to 9 • Added two levels (1 & 3)	9. Food safety
10. Worker health & safety	• Added two levels (1 & 3)	10. Worker health & safety
11. Child labor	• Added youth engagement • Added two levels (1 & 3)	11. Child labor & youth engagement
12. Women's empowerment	• Developed new scorecard • Added levels 1 & 3	12. Women's empowerment

B. SRP Performance Indicators (PIs) Version 2.0

B.1 Introduction

The Sustainable Rice Platform (SRP) offers a range of tools to promote sustainable rice cultivation, including the Performance Indicators (PIs), the SRP Standard for Sustainable Rice Cultivation, an Assurance Scheme, official SRP training modules and decision-making tools. These tools are intended to be used either separately or together as needed.

Revision of the PIs was undertaken as a multi-stakeholder process in parallel to revision of the SRP Standard on Sustainable Rice Cultivation. The Standard provides a normative framework and defines a set of key sustainability requirements with different levels of compliance, allowing for a stepwise improvement and verification process.

This document contains the revised Performance Indicators Version 2.1, including a description of each PI and the methodologies required for sampling and data collection at each of the three possible measurement levels. The PIs are intended to be used in conjunction with the SRP Standard and the SRP Assurance Scheme. The revised Standard, PIs, Assurance Scheme, training tools and templates are all available for download at the Members' Area of the SRP website: www. sustainablerice.org.

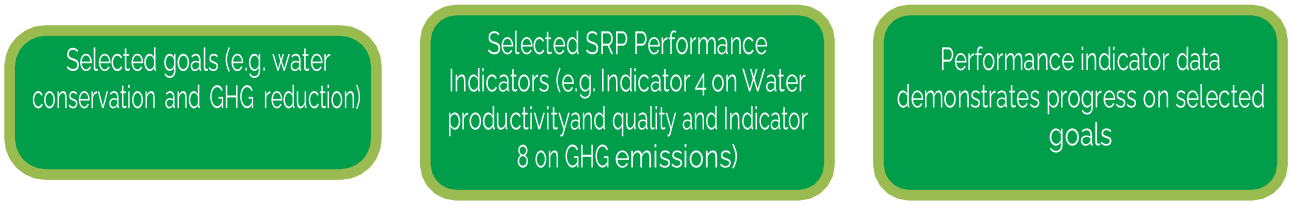
The Annex provides Scorecards to be used in evaluating specific PIs: e.g. Health & Safety (PI 10), Child Labor (PI 11) and Women's Empowerment (PI 12). These Scorecards should not be seen as a duplication of the SRP Standard but as a necessity whenever the PIs are used as a stand-alone document independent of the Standard.

The PIs are designed to assess sustainability improvements resulting from changes in farm practice. The revised PIs simplify measurement by offering a basic level of data collection. The PIs cover key sustainability topics, selected according to the following criteria:

- Relevance to key sustainability issues in the rice sector
- Applicability across diverse rice farming systems
- Ability of farmer to improve on indicator
- Ease of measurement (cost, effort, complexity)
- Ability to quantify performance
- Ability to measure indicators against agreed targets and thresholds

The PIs thus complement the normative guidance provided by the Standard by offering a framework for benchmarking and monitoring impacts on-farm adoption of sustainable best practices, e.g. through compliance with the SRP Standard, or other interventions. The PIs offer a versatile tool to deepen our understanding of the effectiveness of individual interventions and the tradeoffs between them. Data gathered by SRP partner using the PIs will thus provide an evidence base to assess and communicate progress towards sustainability for any rice production system. According to the impact visualization shown in Figure 1 below, implementation partners may select individual PIs to show progress in specific goals.

Figure 1. Impact Visualization



Feedback from field implementation of the Standard and Performance Indicators v. 2.0 across diverse production contexts will be important to ensure their relevance, robustness and user-friendliness, while demonstrating their utility as scalable tools for driving wide-scale adoption of sustainable, climate-smart best practices. The practical applicability and utility of the Standard at country level will be maximized by definition of National Interpretation Guidelines for the SRP Standard.

Table 2 below summarizes the PIs and basis for measurement at the three levels: Basic/Intermediate/Advanced.

Table 2: SRP Performance Indicators v. 2.1

INDICATOR	LEVEL	DATA
IMPROVED LIVELIHOODS		
1. Profitability: net income from rice	Basic	• Local currency/season
	Intermediate	• $/ ha/ crop cycle • $/ ha/ year
	Advanced	• Same as level 2, divided by opportunity cost of family labor
2. Labor productivity	Basic	• Local unit of grain production / man-day
	Intermediate	• Kg paddy rice/ man-day • Man-days/ ha/ crop cycle
	Advanced	• $ gross production / man-day
3. Productivity: grain yield	Basic	• Amount of grain produced (local unit)/field
	Intermediate	• Kg paddy/ha (adjusted to 14% moisture content), measured on whole field
	Advanced	• Kg paddy/ha (adjusted to 14% moisture content), using crop cuts from specific areas within field
RESOURCE USE EFFICIENCY		
4. Water productivity and quality	Basic	• No. of irrigations/season • Water quality risk assessment checklist
	Intermediate	• L water (rainfall + irrigation)/kg paddy •% water from irrigation • Water quality risk assessment checklist + water sampling when a risk is identified
	Advanced	• Same as level 2 with greater accuracy
5. Nitrogen-use efficiency	Basic	• Amount of grain harvested / amount of N fertilizer added through organic or inorganic sources (local units
	Intermediate	• Kg N uptake / kg N input (using table to estimate N content of organic materials) • Kg paddy / kg N input (organic + inorganic)
	Advanced	• Kg N removal/ kg N input (using laboratory analysis of %N in organic materials) • Kg paddy / ha / kg N input (organic + inorganic + soil-supplied N)

INDICATOR	LEVEL	DATA
6. Phosphorus-use efficiency	Basic	• Amount of grain harvested / amount of P fertilizer added through organic or inorganic sources (local units)
	Intermediate	• Kg P uptake / kg P input (using table to estimate P content of organic materials) • Kg paddy / kg P input (organic + mineral + synthetic)
	Advanced	• kg P removal/ kg P input (using laboratory analysis of %P in organic materials) •Kg grain / ha / kg P input (organic + mineral + synthetic + soil-supplied P)
LIFE ON LAND		
7. Biodiversity	Basic	• PI 7 checklist of sightings of key pests and indicator organisms • Number of pesticide sprays per season
	Intermediate	• Pest damage rating • Presence/absence of key pest and indicator species (from detailed country-specific checklist) • Number of cumulative pesticide applications per season
	Advanced	• Area of land conversion (% of landscape converted to rice since 2009) • Enhancement of edge habitat (% edge habitat/arable land) • Abundance of protected/conservation target species (no. of individuals/100 ha) • Abundance of key biodiversity indicator species (country-specific)
CLIMATE ACTION		
8. Greenhouse gas emissions	Basic	• (under development)
	Intermediate	• Mg CO_2 equivalents/ ha (methane only; using IPCC default values) • Mg CO_2 equivalents/ kg paddy
	Advanced	• Mg CO_2 equivalents/ ha (methane and nitrous oxide; using country-specific baseline values) • Mg CO_2 equivalents/ kg paddy
CONSUMER NEEDS		
9. Food safety	Basic	• Checklist for food safety risk assessment completed
	Intermediate	• Milled grain samples submitted to laboratory for analysis
	Advanced	• Evidence of corrective action based on laboratory analysis results
LABOR CONDITIONS		
10. Health & safety	Basic	• PI 10 scorecard self-evaluation
	Intermediate	• PI 10 scorecard external assessment
	Advanced	• Same as level 2, with reports of accidents
11. Child labor & youth engagement	Basic	• PI 11 scorecard self-evaluation
	Intermediate	• PI 11 scorecard external assessment
	Advanced	• PI 11 scorecard external assessment and records of youth-inclusive activities
SOCIAL DEVELOPMENT		
12. Women's empowerment	Basic	• PI 12 scorecard self-evaluation
	Intermediate	• PI 12 scorecard external assessment
	Advanced	• PI 12 scorecard external assessment and records of women-inclusive activities

In addition to basic data recorded by the farmers (for example in their Farmer Field Books), it will be an advantage for implementation partners such as farmer group leaders, service providers or extension workers to collect data on certain indicators at intermediate or advanced levels. Table 3 presents a matrix of data quality.

Table 3. Performance Indicator matrix (data quality)

PERFORMANCE INDICATOR MATRIX OF DATA QUALITY				
DATA LEVEL	DATA PURPOSE	DATA COLLECTION SCALE	DATA SOURCE	DATA VERIFICAITON
Basic	• Farmer learning and self-improvement • Minimum record keeping requirement on the standard	• One cropping season • One field • One household	• Farmer • Farmer Group • Service Provider	• Existence of record book
Intermediate	• Farmer group management • Internal verification • Minimum requirement for certification	• One cropping season • Group of fields • Group of farmers	• Farmer • Farmer Group • Service Provider • Scientist	• High-quality survey of farmers • Quantitative claims verified as specified per indicator
Advanced	• Improving the standard	• Two or more cropping seasons (including non-rice) • Contiguous group of fields (landscape) or larger • Farmer group or larger	• Farmer Group • Service Provider • Scientist	• Data maintained to publication standards, with evidence of quality control

The following sections outline the overall methodology for measuring the PIs, followed by a more detailed description including definitions, rationale, measurement units, methodologies and data collection. The Annex contains the following Scorecards and Checklists to be used for assessing impacts where the PIs are used as a stand-alone document:

- Incoming water quality assessment checklist (PI No. 4)
- Biodiversity checklist (PI No. 7)
- Food safety (PI No. 9)
- Health and safety (PI No. 10)
- Child labor and youth engagement (PI No. 11)
- Women's empowerment (PI No. 12)

B.2 Data collection methodology

Responsible data collector

The implementing partner is responsible for data collection. An implementing partner may be a research institute, company, extension worker, project owner, group manager or miller. Data collection can be organized in different ways. If relying on farmer records, it is important to ensure that farmers have the capacity, willingness and information to

measure and record accurately and regularly. Partner should also visit farmers regularly to discuss and corroborate their activities over the previous recording period.

Number of indicators to measure
SRP recommends measurement of the full set of PIs at any one of the three levels, in order to identify potential trade-offs among competing sustainability objectives. Such an analysis cannot be achieved by measuring a partial set. However, since the relative importance of indicators depends on production context, intervention strategy or available resources, implementing partners may elect to focus on a subset of PIs as relevant to specific objectives and priorities.

Frequency of data collection
It is important to establish a baseline dataset as a pre-intervention benchmark at the outset of the project in order to be able to monitor future improvement as a result of project interventions. The ability to set baselines will depend, to some extent, on availability of historical farm records (for example cooperative accounts, government data, or data from international research centers).

Collection of farm records, household surveys and laboratory tests should take place at the end of each crop cycle. Where applicable and possible, it is recommended to also collect data during the crop cycle as this can serve to validate the quality of record keeping. It is recommended to measure PIs for at least 2 consecutive crop cycles (see Figure 2 below).

Figure 2. Sampling process

Sampling approach
For large numbers of participating producers a sampling approach per project is recommended. The implementing partner selects a certain number of target farmers based on their representativeness, capacity and willingness to participate. If both women and men are part of the target population, stratification by gender is required in order to generate gender-disaggregated data.

Population size will determine the number of farmers to be sampled. The following guidelines should be used to calculate sample size:

- A minimum of 5 farmers if the population size is equal to 50 farmers or fewer.
- For target groups of 50-3,500 farmers, the sample size should equate to 10% of the total population of target farmers.
- If the target group is above 3,500 farmers, the implementing partner will select 350 farmers.

Implementing partners are encouraged to collect additional data from a control group of non-participating farmers. This will provide a baseline to define plausible contributions of

project interventions to observe improvements among target farmers and help ascertain attributability.

Control farmers may live in the same village as farmers in the project, in neighboring villages or in other locations, provided they are matched with project farmers in terms of similarities in their farming systems and socio-economic characteristics such as farm size, varieties grown, irrigation system, number and type of workers. It is however important to avoid selecting control farmers who may be influenced by project interventions (e.g. by peer-to-peer influences) or who may benefit from other ongoing interventions.

The following guidelines (Table 4) are proposed to calculate sample size for control groups:

- If the sample size is 5 farmers, a minimum of 5 farmers will also be selected for the control group.
- If the sample size is 10% of the target group, the control group shall be 5% of the sample size.
- If the sample size is 350 farmers, the control group shall comprise 35 farmers.

Table 4: Sample sizes

POPULATION (N)	SAMPLE SIZE TARGET GROUP	CONTROL GROUP
N =>50	5	5
N = 50-3500	10%	5% of sample size
N = > 3500	350	35

Data collection tool

To facilitate consistent date collection, data aggregation and analysis, an Excel-based data collection tool is available for Version 1.0 of the PIs and is being updated for Version 2.1 as an app for iOS and Android. The data collection tool will be supported with standardized formats for farm record keeping on the required records to measure the PIs. Data ownership, privacy, use and type of reporting will be defined during development of the SRP's central IT database.

C. Detailed description of the performance indicators

1. Performance Indicator on Profitability: net income from rice

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Net income from rice	Local currency/ season	• Amount of rice produced • Sale price of rice • Cash costs for inputs (land, seed, labor, agrochemicals) • agricultural fees and taxes (irrigation fee)	• Farmer-diary record • Recall survey	Farmer Farmer group
Intermediate	Net income from rice, considered within the context of total farm income	USD/ hectare/ season	Same as Basic, plus: • Estimated cost of family labor • Field size	• Farmer-diary record • Recall survey (may use estimates for typical local costs of labor and other inputs)	Farmer Farmer group Service provider
Advanced	Returns to family labor	Unitless ratio	• Gross production • Farm inputs and expenses • Cost of hired labor • Amount of family labor • Opportunity cost of family labor	Returns to family labor = [gross production – farm inputs and expenses - cost of hired labor]/ [amount of family labor * opportunity cost of family labor]	Service provider Research and development specialist

Indicator: Net income from rice
This indicator measures profitability, defined as the farmer's net income from rice cultivation per crop cycle and per year. An increase over time is considered desirable.

Rationale: The assumption is that increased net income leads to increased household capacity to pay for food, health services and education. Increased net income increases the attractiveness of rice cultivation and provides increased ability to invest in the farm.

Measurement details

Basic: Provides an estimate of the profit from rice production. The focus of farmer learning is keeping records of expenditures and sales to enable improvement of profitability through both increased production and decreased expenditure.

Intermediate: The indicator is calculated as the gross income received from the sale of the rice crop minus the total fixed and variable costs of growing the rice crop. It should be interpreted within the context of total farm income, because rice production may only be a part of farming operations. The calculation should include both rice marketed and rice used for subsistence as well as the opportunity cost of family labor:

Net income from rice = gross income - costs

where:

- gross income includes both market rice and rice used for subsistence (valued at market prices; the
- average price of 1 kg rice sold that season)
- costs include all fixed and variable costs, including opportunity cost of family labor (determined by the wage for one day of rural labor in the project area during the applicable period)

Advanced: The indicator "Returns to family labor" measures the ratio of returns to investment of family labor of a farm. Ideally, the ratio should be greater than one in order for the farm to be sustainable because that means that family labor is rewarded at its opportunity cost and generates a surplus that can be reinvested in the farm for further growth.

Returns to family labor = [gross production -costs - family labor cost] / [amount of family labor * opportunity cost]

where:

- gross production is measured as the paddy output times the price
- costs are defined as in Intermediate level above
- amount of family labor includes time in record-keeping
- opportunity cost is the wage for one day of rural labor in the project area during the applicable time period

2. Performance Indicator on Labor productivity

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Field labor productivity	Local unit of rice produced/ days labor	• Number of people contributing field labor • Amount of time each person contributes • Amount of rice produced	• Farm-diary record • Recall survey	Farmer Farmer group
Intermediate	Labor productivity	kg rice produced/ days labor days labor/ hectare/ season	• Field labor (by activity, gender, age) • Farmer and family labor (by activity, gender, age)	• Farm-diary record • Recall survey	Farmer Farmer group Service provider
Advanced	Gross production per worker	USD/ day	• Amount of rice produced • Sale price of paddy • Field labor • Farmer and family labor	• Farm-diary record	Farmer group Service provider Research and development specialist

Indicator: Labor productivity
The indicator measures labor productivity, defined as the total amount of days worked, per kg of rice produced or per hectare cultivated. A decrease over time is considered desirable. Maintenance of labor productivity might be sufficient in cases of already high labor productivity.

Rationale: The assumption is that increased labor productivity leads to increased profitability, more time to spend on other activities, increased attractiveness of rice cultivation and increased willingness to invest in the farm.

Measurement details

Basic: Provides an estimate of field labor productivity based on a farmer's recall of how many people and how much time was spent working in the field during the cropping season. The focus for farmer learning is awareness that different management practices affect the amount of grain that can be produced with one person's labor.

Intermediate: Provides an assessment of total labor productivity based on farm-diary records. Labor productivity includes field labor for all rice-related farm activities such as field clearing, plowing, planting, irrigation and fertilizer application, pest management, and harvesting. Labor includes temporary, permanent, and seasonal workers paid in cash as well as non-paid labor carried out by household members, other relatives and acquaintances. Labor includes farmer time spent in planning and record-keeping, as well as in the field.

Advanced: Gross production per worker measures the contribution of each worker to gross output of rice valued at current prices. Gross production is measured as the paddy output times the price. Labor is calculated as described for the intermediate level.

3. Performance Indicator on Productivity: grain yield

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Grain yield	Local unit/ season	• Amount of rice produced	Farm-diary record	Farmer
Intermediate	Grain yield (at 14% moisture content)	kg/ hectare/ season (measured on whole field)	• Field size • Amount of rice produced • Moisture content of paddy at time of weighing	• Measuring tape or map calculation • Weighing scale • Moisture meter (or oven-drying and re-weighing a subsample) • When moisture meter is not available assume 24% as default moisture percent	Farmer Farmer group Service provider

Advanced	Grain yield (at 14% moisture content)	kg/ hectare (measured by crop cut)	• Field size • Amount of rice produced from a patch of known area (e.g. 5 m2) • Moisture content of paddy at time of weighing	• Measuring tape or map calculation • Weighing scale • Moisture meter (or oven-drying and re-weighing a subsample)	Service provider Research and development expert

Indicator: Grain yield
The indicator measures productivity, defined as the recovered grain yield per hectare. An increase over time is considered desirable.

Rationale: It is assumed that increased productivity leads to increased household food security, an increase in marketable surplus and increased national and international food security.

Measurement details

Basic: Provides an approximate estimate of productivity, based on farmer recall of amount of grain harvested in local units (without adjusting for moisture content). The focus for farmer learning is awareness of how this season's harvest compares with other seasons and other fields.

Intermediate: Provides an accurate measurement of grain yield for the whole field. Field size must be verified through direct measurement with a measuring tape or calculation of area on a map, not just from farmer record. Legal records of landholding size may be used, but are less desirable than direct measurement because planted field area is not usually the same as property borders. Yield is measured in kilograms of wet grain harvested from the whole field. Before weighing, the grain should be threshed and dried to an appropriate moisture content for selling, milling or storage, depending on the intended immediate use. A moisture meter should be used to document the actual moisture content at the time of weighing. This value can be used to calculate the final grain yield, which must be reported at 14% moisture content. The entire harvest should be weighed and divided by the total land area. If the farmer records separate yield measurements for different fields within a farm, these should be averaged across the whole farm (total amount of grain harvested/total land area of the farm) and reported as one value per household.

Example moisture content adjustment calculation for 4350 kg grain at 23% moisture content (MC) at the time of weighing:

weight14% = weight23% x (100-23)/(100-14)
weight14% = 4350 x (77/86) = 3895 kg at 14% MC

For interpretation and appropriate comparisons, rice yields should be disaggregated by:

- type of rice, to provide information on the farmer's choice (e.g. high yielding varieties, or low-yielding, high-value specialty products such as red glutinous rice)
- cropping season

Advanced: Provides an accurate measurement of the most and least productive parts of the farm by taking crop cuts from small sections with known area. The assessment is done by an average of various crop cuts. As with the intermediate level, grain weight is measured after threshing and initial drying, and moisture content is recorded at the time of weighing so that yields can be expressed at 14% moisture content

4. Performance Indicator on Water productivity and quality

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Irrigation water use Irrigation water quality risk assessment	Number of irrigations/ season Number of 'yes' responses in Checklist A PI No.4	• No. of irrigations during land preparation and during the crop cycle • Data elements of Checklist A. PI No.4	• Actual observations (e.g. farm diary) or recall survey • Checklist A. PI No. 4 in Annex 1 • Actual observations or recall survey	Farmer Farmer group Water association
Intermediate	Water productivity (irrigation + rainfall) Percent of total water from irrigation [L irrigation water/ L (irrigation + rainfall) * 100] Irrigation water quality sample analyzed if necessary	Litres water/ kg paddy rice % Checklist	• Estimated irrigation water volume during land preparation (L) • Estimated irrigation water volume during the growing season (L) • Total rainfall during land preparation and the crop growing cycle (L) • Irrigation water samples analyzed for salinity if risks were identified through use of the checklist • Field size • Grain yield at 14% moisture content (PI3 Intermediate) • Number of irrigations during land preparation and during the crop cycle • Data elements in Checklist A. PI No. 4	• Computation from actual observations (No. of irrigations x depth of irrigation x land area) • Computation from actual observations (same as above) • On-site measurement (rain gauge) or nearby weather station • Completed checklist + evidence of sample collection and submission for any risks identified	Farmer Farmer group Water association

Advanced	Same as intermediate plus: Water quality testing of outflowing (runoff) water	Same as intermediate plus: Water quality analysis results	• Duration of land preparation (days) • Measurement of irrigation water volume during land preparation and crop cycle • Rainfall data may be obtained from remote sensing data or may be simulated instead of being measured with a rain gauge • Water input and output samples should be tested for net change in concentrations of the following: • pH • Salinity • Turbidity • Dissolved oxygen • Total dissolved solids • Nitrate • Phosphate • Pesticide residues (focus analysis on pesticides known to be present in the system)	• Farm records of start date of land preparation and date of crop establishment • Record of volume used for each irrigation (e.g. with a flow meter) or a proxy such as amount of fuel used for a specific pump	Water association Service provider Research & development expert

Indicator: Total water productivity & quality
This indicator measures water productivity, defined as the total amount of water used to produce 1 kg paddy rice. A decrease over time is considered desirable. It also provides a risk assessment for identification of incoming (irrigation) or outgoing (runoff) water quality concerns.

Rationale: It is assumed that savings in irrigation or rain water can be used for other important purposes (i.e. water availability increases). The assumptions are that irrigation water must be high-quality to achieve water-use efficiency and that farm management should prevent contamination of downstream water sources.

Measurement details

Basic: The focus for farmer learning and self-improvement is awareness of the quality and quantity of irrigation water used during land preparation and during the cropping season. It is important to include land preparation, because up to of the total season's water may be used before the crop is planted. It is important to consider the context of the season (wet vs. dry) when interpreting the results. The checklist for incoming (irrigation) water quality (see annex) is intended to make the farmer aware of potential water quality concerns that could affect productivity.

Intermediate: Provides a good estimate of how much irrigation water is used before and during a season and an assessment of salinity risks in irrigation water. An accurate estimate of field dimensions and grain yield are required for this indicator (see Level 2 for Indicator #3). The farmer records details in the Farm

Diary on the water input for each irrigation event (no. of irrigations and depth of water during irrigation). An estimate of rainfall is provided by the farmer group or water association using a rain gauge. Water inputs are disaggregated by source: rainwater or irrigation. The water quality checklist is completed and a water sample is tested for salinity if any risks have been identified. Data are collected per farmer, at least once at the end of every rice season. However, this indicator, especially, would benefit from more frequent data collection to ensure completeness and quality of data. An extension worker or research partner can also collect and check the data via a household survey. Alternative data collection methods such as the use of mobile devices by extension workers are also encouraged.

Advanced: Provides an accurate measurement of how much water is used before and during a season and an assessment of incoming and outflowing water quality. Accurate field dimensions and grain yield measurements are required for this parameter (see Level 3 for Indicator #3). The farmer records details in the Farm Diary on the water input or energy consumption for each irrigation event. Water inputs are disaggregated by source: rainwater or irrigation. For irrigation water, inputs are disaggregated by irrigation source: groundwater or surface water.

- Rainfall (mm), either within individual farmer fields or at a village level, is recorded using a rain gauge after each rainfall event. Alternatively, rainfall data can be sourced from local meteorological organizations or using global rainfall prediction models that are available through agencies such as NASA. The use of rain gauge data can be used to ground truth rainfall model data.

- Groundwater Irrigation. The farmer records the total number of irrigation events and the depth of water in the field at the start and end of each irrigation event. The initial water depth at the start of each irrigation should be negative where AWD irrigation scheduling is used, reflecting the water level below the soil surface. Where possible the farmer records the amount of pumped groundwater, by installing a flow meter or calibrated pump and then records the time it is open or the amount of energy used to pump the water. Alternatively, the discharge capacity (in terms of liters per second or equivalent units) and size of the pump, depth of groundwater (m) and the amount of energy consumed, either volume (diesel, gasoline) or kWh (electricity), during each irrigation event or total irrigation energy consumption per season should be recorded.

- Surface water irrigation. The farmer records the number of irrigation events and the depth of water in the field at the start and end of each irrigation event. The initial water depth at the start of each irrigation should be negative where AWD irrigation scheduling is used, reflecting the water level below the soil surface. Where possible the farmer should install an appropriate flow measuring device for open or closed channels, such as a weir, flume, submerged orifice or current meter.

For water quality analysis, service laboratories will provide information about their standard method(s); this information should be included with any report for SRP. Acceptable laboratory analysis methods are those that follow an adequate laboratory quality assurance system.

The relevant water quality parameters are:

- pH
- Salinity
- Turbidity
- Dissolved oxygen concentration
- Total dissolved solids
- Nitrate concentration
- Phosphate concentration
- Pesticide concentration

5. Performance Indicator: Nutrient use efficiency: N

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	N fertilizer productivity: amount of grain produced/ unit fertilizer added	Local units for grain yield and fertilizer amount	• Number of times fertilizer was applied • Amount of fertilizer applied • Type of fertilizer applied (synthetic or organic) • Amount of rice produced	• Farmer records • Farmer recall survey	Farmer Farmer group
Intermediate	Partial factor productivity of N input N output/input ratio	kg grain yield / kg N input kg N output/ kg N input (unitless ratio)	• Dates of fertilizer application • Amount of fertilizer applied (kg) • Type of fertilizer applied (with labeled N analysis or estimated N content according to table) • Grain yield at 14% moisture content (PI13 Intermediate) • Estimated straw yield (approximately equivalent to grain yield) • Estimated straw and grain N content (according to table)	• Farmer records • Farmer recall survey	Farmer Farmer group Fertilizer retailer Service provider

	Partial factor productivity of N: kg grain yield/ kg N input (from fertilizers & soil) N output/ input ratio: kg N removed from field/ kg N added to field (organic + inorganic +soil supplied N)	kg grain/ kg N Unitless ratio	Same as Intermediate except: • Analysis of N content for any organic material applied at >1 t/ha • Grain yield measured at level 3 • Estimate or measurement of straw removed from field • Estimate of soil-supplied N	• Standard laboratory method (refer to a list of methods for different types of samples) (see Indicator #3) • Weight of straw removed (preferred) or estimate from height of harvest • Nutrient omission plot trials (preferred) OR soil analysis: total organic carbon & % clay content	Service Provider Research and Development Expert (Scientist)

Indicator: Nitrogen-use efficiency
Nutrient use efficiency is defined as the recovered gain yield per unit of nitrogen input: an increase over time is considered desirable. The partial nutrient balance measures the output/input ratio of nitrogen. A value >1 means that the soil is being mined of its N content. A value <1 indicates inefficient use of N and possible release of excess N into the environment.

Rationale: The assumption is that improved N management leads to improved yields or reduced input costs, higher farm profitability, increased food security, less N lost to the environment, reduced eutrophication of waterways, reduced emissions of greenhouse gases (GHG) from paddy fields, and reduced energy consumption and GHG emissions from production, transportation and use of N-containing fertilizers. Organic and synthetic sources of N are both included.

Measurement details

Basic: Provides an approximate estimate in local units for the N fertilizer use efficiency as the amount of grain produced divided by the amount of N-containing fertilizer used. The focus for farmer learning and self- improvement in nitrogen management is awareness of the amount and timing of fertilizer application and how this affects grain yield. It is important for the farmer to keep a record of what types of nutrients were added to the field and when they were added, and to be aware of the presence of N in organic inputs, such as manure or straw, even though it may not be labeled. Farmer-reported dates of application are used to check the appropriateness of the timing of application relative to the stage of the rice crop. If delayed, addition of some N until one to two months after crop establishment is practicable, fertilizer-use efficiency be improved.

Intermediate: Provides two robust assessments of N-use efficiency, one as a unitless ratio of N uptake/ N input, and one as partial factor productivity of N as the amount of grain produced (in kg) per unit of N applied (in kg). Requires an accurate record of the total amount of elemental N that is applied to a field, and requires an accurate yield estimation (see level 2 of Indicator #3). Records are kept of the total amount in kilograms of each type of fertilizer or soil conditioner applied to each rice field either prior to planting or during the season and the date of application. Record keeping should commence after harvest

of the previous crop on the same field (whether rice or other crop). Records should be kept of all types of fertilizers applied (mineral, organic or synthetic). Sources of N that are not readily controlled by the farmer are excluded (e.g. biological nitrogen fixation from algae, indigenous soil N supply and N contributed through decomposition of roots from previous seasons). The amount of elemental N applied to the field is calculated from the amount of fertilizer multiplied by the N content (% elemental N) of the fertilizer. For packaged fertilizers, the amount of N is usually included on the label. For various types of organic materials no computation is needed, the amount of N can be estimated according to Table 5 below.

Table 4: Sources of N

From Dobermann and Fairhurst, 2000

SOURCE OF N	PERCENTAGE OF ELEMENTAL N%
Rice straw	0.65
Cattle manure	0.5
Poultry manure	1.5
Pig manure	0.85
Compost (mostly cattle manure)	1.5
Compost (mostly poultry manure)	0.3
Compost (mostly kitchen scraps)	0.6

For the output/input ratio, the output is considered the amount of N taken up by the rice plant (both straw and grain, but not roots), and is calculated by multiplying the grain yield by 1.1% (the average N content of rice grain), estimating the straw production by assuming it to be approximately equivalent by weight to the harvested grain and then multiplying the amount of straw by 0.65% (the average N content of rice straw) and adding it to the N in the grain. The input is considered the amount of N added to the field by the farmer as described above.

N output = (grain yield * 0.011) + (straw * 0.0065)
N input = (fertilizer-1 * N content) + (fertilizer-2 * N content) + (fertilizer-3 * N content) + etc.

The reported dates of N application are used to check the appropriateness of the timing of application relative to the stage of the rice crop.

Advanced: Provides an accurate measurement of the total amount of N being added to a field, an estimate of the N supplied by the soil, and an accurate measurment of the amount of N removed from the field in grain and straw. This indicator requires accurate grain yield measurement (see level 3 for Indicator #3) and an estimate of straw biomass removed from the field, either through the weighing of a sub-sample of post-threshing straw harvest from a known field area or through estimation of straw removal based on height of stubble remaining in field. Actual N content of any organic input > 1 t/ha must be measured in a laboratory and labeled N content of fertilizers must be verified.

The preferred method for estimating soil-supplied N is through the use of a N-omission plot in the field, in which the grain yield is measured in a small area of the field which has not received any N fertilizer, and this is compared with the grain yield of a fully-fertilized area of the field. The difference in the amount of N between these two plots is considered to be equivalent to the N supplied by the soil. If N-omission plot data is not

available, soil tests for organic carbon content and clay content may be used to estimate the soil-N supplying capacity.

6. Performance Indicator: Nutrient use efficiency: P

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	P fertilizer productivity amount of grain produced/ unit fertilizer added	Local units for grain yield and fertilizer amount	• Number of times fertilizer was applied • Amount of fertilizer applied • Type of fertilizer applied (synthetic or organic) • Amount of rice produced	• Farmer-diary record • Farmer recall survey	Farmer Farmer group
Intermediate	Partial factor productivity of P input P output/ input ratio	kg grain yield/ kg P input and kg P output/ kg P input (unitless ratio)	• Dates of fertilizer application Amount of fertilizer applied (kg) • Type of fertilizer applied (with labeled P analysis or estimated P content according to table) • Grain yield at 14% moisture content (PI3 • Estimated straw yield (approximately equivalent to grain yield) • Estimated straw and grain P content (according to table)	• Farmer-diary record • Farmer recall survey	Farmer Farmer group Fertilizer retailer Service provider
Advance	Partial factor productivity of P: kg grain yield/ kg P input (from fertilizers & soil) P output/ input ratio: kg P removed from field/ kg P added to field	kg grain/ kg P Unitless ratio	Same as Intermediate except: • Analysis of P content for any organic material at > 1 t/ha • Grain yield measured at level 3 • Estimate or measurement of straw removed from field • Estimate of soil-supplied P	• Standard laboratory method (refer to a list of methods for different types of samples) (see Indicator #3) • Weight of straw removed (preferred) or estimate from height of harvest • Nutrient omission plot trials (preferred) OR soil analysis: P availability extraction (Olsen, Bray, or Mehlich)	

Indicator: Phosphorus use efficiency
Phosphorus use efficiency is defined as the recovered grain yield per unit of phosphorus input. An increase over time is considered desirable. The partial nutrient balance measures the output/input ratio of phosphorus. A value >1 means that the soil is being mined of its P content. A value <1 indicates inefficient use of P.

Rationale: The assumption is that improved P management leads to improved yields or decreasing input costs, higher profitability for the farmer; less P lost to the environment, reduced eutrophication of waterways, and reduced energy consumption and GHG emissions from production, transportation, and use of P-containing fertilizers. Organic, mineral, and synthetic sources of P are all included.

Measurement details

Basic: Provides an approximate estimate in local units for the P fertilizer use efficiency as the amount of grain produced divided by the amount of P-containing fertilizer used. The focus for farmer learning and self-improvement in phosphorus management is awareness of the amount and timing of fertilizer application and how this affects grain yield. It is important for the farmer to keep a record of what types of nutrients were added to the field and when they were added, and to be aware of the presence of P in organic inputs, such as manure or straw, even though it may not be labeled. The farmer-reported dates of application are used to check the appropriateness of the timing of application relative to the stage of the rice crop. P-containing fertilizers may be applied at any time during the season and are usually applied just before or after crop establishment.

Intermediate: Provides two robust assessments of P-use efficiency, one as a unitless ratio of P uptake/ P input, and one as partial factor productivity of P as the amount of grain produced (in kg) per unit of P applied (in kg). Requires an accurate record of the total amount of elemental P that is applied to a field, and requires an accurate yield estimation (see level 2 of Indicator #3). Records are kept of the total amount in kilograms of each type of fertilizer or soil conditioner applied to each rice field either prior to planting or during the season and the date of application. Record keeping should commence after harvest of the previous crop on the same field (whether rice or other crop). Records should be kept of all types of fertilizers applied (mineral, organic or synthetic). Sources of P that are not readily controlled by the farmer are excluded (e.g. indigenous soil P supply and P contributed through decomposition of roots from previous seasons).

The amount of elemental P applied to the field is calculated from the amount of fertilizer multiplied by the P content (% elemental P) of the fertilizer. For packaged fertilizers, the amount of P is usually included on the label as % P_2O_5, which can be converted to elemental P (see example below). For various types of organic materials, the amount of P can be estimated according to the table below.

Example of elemental P calculation from a P_2O_5-labeled fertilizer:

Fertilizer label: 14 % P_2O_5 (which is 44% elemental P)
Amount fertilizer used: 60 kg
Amount of elemental P in fertilizer = 60 * 0.14 * 0.44 = 3.7 kg elemental P

Table 5: Sources of P
From Dobermann and Fairhurst, 2000

SOURCE OF P	PERCENTAGE OF ELEMENTAL P%
Rice straw	0.1
Cattle manure	0.15
Poultry manure	0.65
Pig manure	0.25
Compost (mostly cattle manure)	1.2
Compost (mostly kitchen scraps)	0.2
Compost (mostly rice straw)	0.1

For the output/input ratio, the output is considered the amount of P taken up by the rice plant (both straw and grain, but not roots), and is calculated by multiplying the grain yield by 0.2% (the average P content of rice grain), estimating the straw production by assuming it to be approximately equivalent by weight to the harvested grain and then multiplying the amount of straw by 0.1% (the average P content of rice straw) and adding it to the P in the grain. The input is considered the amount of P added to the field by the farmer as described above.

P output = (grain yield * 0.002) + (straw yield * 0.001)
P input = (fertilizer-1 * P content) + (fertilizer-2 * P content) + (fertilizer-3 * P content) + etc.

Advanced: Provides an accurate measurement of the total amount of P being added to a field, an estimate of the P supplied by the soil, and an accurate measurement of the amount of P removed from the field in grain and straw. This indicator requires accurate grain yield measurement (see level 3 for Indicator #3) and an estimate of straw biomass removed from the field, either through the weighing of a sub-sample of post- threshing straw harvested from a known field area or through estimation of straw removal based on height of stubble remaining in field. Actual P content of any organic input > 1 t/ha must be measured in a laboratory and labeled P content of fertilizers must be verified by laboratory analysis.

The preferred method for estimating soil-supplied P is through the use of a P-omission plot in the field, in which the grain yield is measured in a small area of the field which has not received any P fertilizer, and this is compared with the grain yield of a fully-fertilized area of the field. The difference in the amount of P uptake between these two plots is considered to be equivalent to the P supplied by the soil. If P-omission plot data is not available, soil extractions for plant-available P may be used (e.g. Olsen, Bray, or Mehlich).

7. Performance Indicator: Biodiversity

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECT	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Pest and beneficial organism sighting Pesticide use Land conversion since 2009	Number of 'yes' and number of 'no' responses in Checklist B. PI No. 7 Basic Number of sprays/ season Local units or hectares	• Data elements of Checklist B. PI No. 7 Basic • Number of times pesticide was used • Area of land converted due to rice farming since 2009	• Farmer recall survey • Checklist B. PI No. 7 Basic in Annex 1	Farmers Farmer groups
Intermediate	Pest damage rating Pesticide use	Pest damage assessment in Checklist C. PI No.7 Intermediate Number of individual product applications/ season	• Data elements of Checklist C. PI No.7 Intermediate • Record of trade name, active ingredients, and amounts of all pesticides applied during season (multiple applications of same pesticide should be recorded separately)	• Checklist C. PI No. 7 Intermediate in Annex 1 • Savary and Castilla (2010) • Transect field walk	Farmer groups Extension workers Service providers
Advance	Area of natural habitat conversion since 2009 Enhancement of edge habitat Abundance of protected or conservation target species Abundance of biodiversity	% of landscape % of arable land Number of individuals per 100 ha of landscape	• Total area of landscape (ha) • Area converted to rice farming since 2009 (ha) • Abundance of species on the country-specific checklist for PI 7	• Mapping from satellite images • Farmer or farmer group survey • Transect field survey • Spot counts	Service Providers Research and Development Experts (Scientist)

Indicator: Biodiversity

This indicator measures changes in biodiversity value of areas under rice cultivation and tracks the usage of pesticides and biocontrol agents. The indicator acknowledges that rice cultivation can, if managed appropriately, actually enhance the value of farmland for biodiversity. It focuses on understanding the impacts of rice cultivation techniques on the abundance of pests and beneficial organisms, and also threatened species that use rice-fields. For number of synthetic pesticides used per season, a value of <4 is considered desirable. For the checklist and scorecard, specific score interpretation is provided in the tools.

Rationale: The main assumption of this indicator is that improved crop management practices lead to improvements in biodiversity, which in turn lead to a favorable tilting of the ecological balance between pests and beneficial organisms. Improved crop management practices should not lead to increased loss of natural habitats, especially in protected areas or proposed protected areas, or areas that have been identified through objective processes to be of high importance for biodiversity (such as Key Biodiversity Areas). Such habitats are frequently protected under law, and their degradation or destruction is illegal. Greenhouse gasses are released if these habitats are destroyed, whilst this is especially true of forests, below-ground carbon in wetland habitats can also be substantial, and this carbon is released when they are ploughed. Natural habitats can also support populations of species that are beneficial to the farmer and reduce the need for farmers to use chemical or lethal control of pests, and they also possess other ecological, aesthetic or intrinsic values.

The Indicator monitors both the impacts of rice cultivation on wildlife, and the impacts of wildlife on rice cultivation. Populations of pests are monitored to test the assumption that pest management practices under the SRP Standards are effective. The populations of beneficial species are monitored to test the assumption that through improved crop management practices, the populations of beneficial species increase and can lead to incremental improvements in pest control.

The Indicator assumes that growing rice sustainably does not lead to declines in species of conservation concern, or degradation of the environment. In doing so it places rice cultivation within the context of a thriving and productive ecosystem that is beneficial to people and biodiversity alike. It articulates a broad vision for sustainable rice cultivation and the benefits that it can deliver.

Measurement details

Basic: Provides a self-assessment checklist for presence of pests and management of pesticides. The focus for farmer learning is an awareness of pest presence, of the role of beneficial organisms, and of the link with pesticide use. The checklist for PI 7, Section A, provides example photos to help farmers identify the presence of key organisms. The farmer estimates pesticide usage by recording the number of times pesticides were applied, without needing to record amounts and active ingredients. Area of land converted due to rice farming is identified through recall by farmers.

Intermediate: Provides a pest damage assessment and a more precise record of pest control products applied during the season (including details about method of application, active ingredient, amount).

Farm records should be kept in a Farm Diary on the following topics:

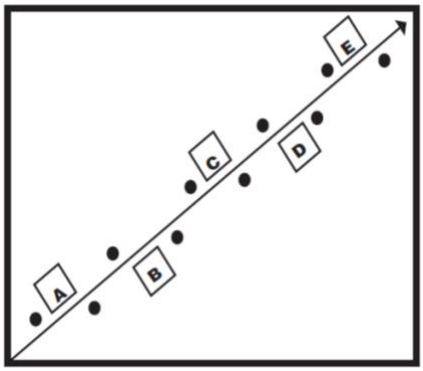
- The trade name and active ingredient of the pesticide
- Total amount of pesticides applied to each rice crop cycle season in kilogram or liter of pesticide applied.
- For multiple applications of the same pesticide, the farmer should record each separate application.
- All active ingredient applications are added throughout the season, so that if two active ingredients are applied in one product, it is counted as 2.

The crop status is determined by examining the entire field and scoring it according to the following table:

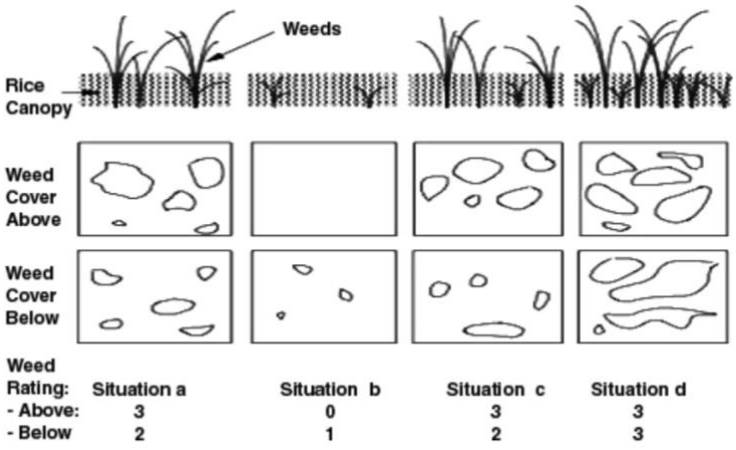
Overall crop canopy structure (A)		Folinge color (B)		Crop Density (C)		Overall crop assessment and rating (A+B+C)	
Description	Point Mark	Description	Point Mark	Description	Point Mark	Category	Total
Regular height, very homogeneous	5	Homogeneous dark green	5	Full crop closure	5	Very good	15
A few irregularities in height and/or off-types	4					Good	12-14
Fairly regular, some irregularities in height and/or off-types	3	Green homogeneous	3	Some gaps (less than 1% of ground cover)	3	Average	8-11
Not regular, irregular crop height and/or many off-types	2	Irregular color, or overall pale/ yellowing color	2	Gaps (more than 1% but less than 5% of ground cover)	2	Poor	6-7
Very irregular crop height and/or many off-types, or overall stunted growth	1	Pale or yellowish, or large fraction of plants discolored	1	Many gaps (over 5% of ground cover)	1	Very poor	3-5

Four broad categories of injury caused by animal pests are covered: these are injuries affecting tillers, panicles, leaves, and systemic injuries. Injury to tillers reduces the number of potentially or actually fertile tillers, and include deadhearts (caused by stemborers), silvershoot (caused by gall midge), and panicle mite injury on the leaf sheath. For each hill or quadrat, the number of injured tillers is entered in the recording form. Injury to panicles is caused by sucking or grain-damaging insects, and is represented by rice bug or stink bug injury, panicle mite injury on the panicles and whitehead (caused by stemborers). For each injury, the number of injured panicles is entered in the recording form. Although panicle mites feed on both leaf sheaths and panicles, the number of tillers with injured sheath or grains is counted per hill or quadrat. Leaf injury is caused by insects such as leaf folder, leaf miner, rice hispa and whorl maggot. For this category, the number of injured leaves in each sample hill or quadrat is recorded. Injuries caused by other defoliators, such cutworm, green hairy caterpillar, caseworm, and rice semilooper are entered in the "other" category. The fourth category is systemic injury, such as hopperburn (caused by brown planthopper and white-backed planthopper) and bugburn (caused by rice black bug). In contrast to injuries belonging to the other categories, systemic injuries affect the entire plant and cannot therefore be assessed accurately by counting affected leaves, tillers or panicles. To assess systemic injury caused by insect pests, five areas (A, B, C, D, E), each measuring 1m x 1m, should be sampled as shown in the figure below. The percentage of each area affected by an injury, disease, or weed coverage is rated based on the following five-point rating scale (0 to 4):

0 : No injury or no weed
1 : Severity or weed cover below 10 % (low)
2 : Severity or weed cover from 10 % to 30 % (moderate)
3 : Severity or weed cover from 30 % to 60 % (high)
4 : Severity or weed cover above 60 % (very high)



Crop growth and crop health assessments in the a farmer's field are done by passing through the field. The diagonal line represents the recommended path across the field. Circles represent the 10 hills (or 10 cm x 10 cm quadrats for direct-seeded rice). Assessments of weeds and systemic diseases and injuries caused by animal pests are done by selecting five areas, each measuring 1m x 1m. The squares marked A, B, C, D and E represent the five areas and the circles represent the 10 hills or quadrats



An illustration of the procedure for rating weed cover. For each situation, the topmost figure represents the side view of a sampling area with weeds above and below the rice canopy (represented by shaded area). Frames below each figure represent the corresponding top view of the sampling area and irregular shapes within each frame represent weed cover above and below the rice canopy. Values for each situation refer to the scale that corresponds to the percent weed cover.

Advanced: Provides a landscape-level assessment conducted by service providers, researchers and/or development experts (scientists). One of the indicators is valuable ecosystem land area (such as natural habitat) converted to rice since 2009. The corresponding data to be collected is the previously natural habitat area (ha) converted to rice farming since 2009 as well as the total area of landscape (ha). The applied unit is % (converted area out of total landscape). The suggested measurement method is mapping from satellite images.

Another indicator is the % of arable land area reserved for enhancing habitats (i.e. not cropped or built on). Farmer or farmer group surveys can be used as measurement methods.

Changes over time in the abundance of biodiversity, including key indicator species, protected or conservation target species are a further indicator. The data unit is number

of individuals per 100ha of landscape. Transect field surveys and spot counts are suggested measurement methods.

There is no example yet of an advanced level country-specific Biodiversity Checklist. Country or regional biodiversity checklists should be identified or developed, due to the unique diversity and ecosystems in different regions.

Field testing in 2019 of this advanced level of data collection is expected to provide further details. An example of an advanced level country-specific Biodiversity Checklist is expected to become available in the course of 2019.

8. Performance Indicator: Greenhouse gas emissions

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Greenhouse gas awareness	Number of dry down events	• Growth duration • Dry down events • Field size	• Farm diary record	Farmer
Intermediate	Methane emission Nitrous oxide emission	Mg CO_2 equivalents/ hectare Mg CO_2 equivalents/ kg rice	• Number of days of flooding prior to crop establishment • Number of days of crop growth • Total amount and type of organic material incorporated into the soil • Number of drying events • Total N input • Grain yield at 14% moisture content (PI3 Intermediate)	• Farm diary record • IPCC equations using global default emission values	Farmer Farmer group Service provider
Advance	Methane emission Nitrous oxide emission	Mg CO_2 equivalents/ ha Mg CO_2 equivalents/ kg rice	• Water level monitoring on farmer fields • Emission measurements on reference fields	• Farm diary record • Emission measurements • IPCC equation using emission values that are more specific than the global default	Service Provider Research and Development Expert (Scientist)

Indicator: Greenhouse gas emissions
This indicator assesses the amount of methane and nitrous oxide (level 3 only) emitted per unit of land area, expressed in units of CO_2 equivalence, using the 100-year global warming potential weighting for the different gases. A decrease is considered to be desirable.

Rationale: The assumption is that reduced methane emissions from rice fields during crop growth decrease the contribution of rice cultivation to climate change.

Measurement details

Basic: The focus for farmer learning is awareness that flooded rice fields are sources of greenhouse gas emission, and that one way to decrease emission is to decrease the amount of time a field is flooded. This could be accomplished by growing a shorter-duration rice variety or by using some dry periods during the season. The farmer keeps record of how many days the rice is in the field and the number of dry down events (removal of standing water from the rice field).

Intermediate: Provides an estimate of methane and nitrous oxide emitted from the field before and during the growing season. The focus for farmer learning is awareness that decomposition of organic materials in flooded conditions makes methane emission much worse. Calculation is from an IPCC-approved methodology [IPCC, 2016] based upon the following farm-diary data:

1. Field size
2. Number of days of flooding prior to crop establishment
3. Number of days of crop growth (starting at transplanting for a transplanted crop).
4. Total amount, in kilograms, and type of organic material incorporated into the soil (i.e. straw, manure or compost)
5. Number and duration of drying events (the number of times when the water depth falls at least 10 cm below the soil surface; or the number of times in which the soil dries to the point of light cracking)
6. Total N input (see PI 5 Intermediate for explanation of how to measure it)

Advanced: Provides a more accurate estimate of greenhouse gases (methane and nitrous oxide) emitted from the field before and during the growing season. As at the intermediate level, calculation is from the IPCC-approved methodology above, but with use of country- or system-specific emission values rather than the global default. These comparisons (before and after crop cycle) can therefore be made with either IPCC default standards or country-specific baselines or factors if stated in the country's National Communication. These calculations are based on the same farm-diary data as the intermediate level, plus:

7. Water depth before and during the growing season (see PI 4 Intermediate for explanation of how to measure it)
8. Methane and nitrous oxide emission measurements on reference fields (not every farmer's field).

9. Performance Indicator: Food Safety

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Food safety risk assessment	Score (out of 30) in Scorecard D. PI No. 9 Food Safety	• Data elements of Scorecard D. PI No. 9 Food Safety (questions a to c only)	• Self-assessment with Scorecard D PI No. 9 Food Safety (questions a to c only) in Annex 1	Farmer Farmer group
Intermediate	Food safety risk assessment with samples submitted for any identified risks	Score (out of 40) in Scorecard D. PI No. 9 Food Safety	• Data elements of Scorecard D. PI No. 9 Food Safety • Submission of a grain sample if risks are identified	• Group assessment with Scorecard D. PI No. 9 Food Safety (questions a to d only) in Annex 1 • Submission of grain sample to a laboratory for analysis (arsenic, cadmium, mercury, mycotoxin, pesticide residues)	Farmer group Service provider
Advance	Same as Intermediate level	Score (out of 50) in Scorecard D. PI No. 9 Food Safety	• Data elements of Scorecard D. PI No. 9 Food Safety (all questions) in data column Laboratory results of grain sample analysis • Evidence of corrective action if necessary based on laboratory results	• Group assessment with Scorecard D. PI No. 9 Food Safety (all) in Annex 1 • Service laboratory uses a certified method of analysis • Consultation with a remediation expert	Service Laboratory Service provider Research and development expert

Indicator: Food safety
The indicator assesses food safety risks for rice production (heavy metals, pesticide residues and mycotoxins).

Unit: The measurement unit is a 0-50 score based upon answers to multiple choice questions which describe practices related to food safety. An increase over time is considered positive.

Rationale: The assumption is that safe rice products lead to consumer assurance. Safer food reduces rice- related human exposure to specific contaminants and leads to a healthier population.

Measurement details

Basic: Provides food safety risk assessment (Scorecard section 9.1). The focus for farmer learning is awareness of food safety risks. The farmer is asked to complete the first five questions in the Scorecard for PI no. 9 in Annex 1.

Intermediate: Provides food safety risk assessment and dietary diversity assessment. The focus for farmer and farmer group learning is awareness of food safety risks, as well as action on any risks that have been identified. The farmer is asked to complete all questions and calculate a score for Scorecard for PI no. 9 in Annex 1.

- If any items in the checklist for 9.1a have been answered "yes", it is necessary to test at least once for heavy metals (arsenic, cadmium, mercury, chromium and lead). If no risks have been identified then there is no need for further tests. If moderate levels of heavy metals have been detected then subsequent tests need to be conducted.
- If any items in the checklist for 9.1b have been answered "yes", it is necessary to test for mycotoxins. Mycotoxin tests need to be repeated every season in which a risk factor is present. As mycotoxin infections are triggered by diseases at the panicle stage, tests for mycotoxins should be conducted in the event of detection of a risk of panicle diseases.
- A preliminary test must be conducted for pesticide residues whenever pesticide residues exceeding MRLs have been reported by a national government within the last 5 years, or if any items in the checklist for 9.1c have been answered "yes".

Grain sample collection: If a mill has traceability to the farm level, the miller or extension worker can collect the samples at the mill after milling. Since most mills do not have traceability to the farm level, samples of paddy may be collected at the farm and sent to the laboratory for milling immediately prior to analysis. In both cases, sub-samples should be taken from three or more parts of the batch and mixed together to form a composite sample of at least 100 g, with records kept of the size of the batch from which the sample was taken (in kg). SRP will consider selecting one or two labs to standardize the analytical procedure for use by all SRP participants. These should have automated LCMS-MS capability enabling analysis for many pesticides at one time.

Advanced: Provides evidence of action taken on any food safety risks identified using the checklist, and assess household food insecurity experience in addition to providing a quantitative measurement of dietary diversity. Grain samples should be analyzed if risks are identified, as described for the Intermediate level. Laboratory analysis results should be provided as evidence for corrective action to address a food safety concern (grain samples should be analyzed before and after the corrective action is implemented).

10. Performance Indicator: Health & Safety

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Health & safety awareness	Score in Scorecard E. PI No. 10 Food Safety	Data elements of Scorecard E. PI No. 10 Food Safety	Self-assessment with Scorecard E. PI No. 10 Food Safety in Annex 1	Farmer Farmer group
Intermediate	Health & safety assessment	Score in Scorecard E. PI No. 10 Food Safety	Data elements of Scorecard E. PI No. 10 Food Safety	Group assessment with Scorecard E. PI No. 10 Food Safety in Annex 1	Farmer group Service provider
Advanced	Health & safety assessment Accident rate	Score in Scorecard E. PI No. 10 Food Safety No. of serious accidents per day of labor	• Data elements of Scorecard E. PI No. 10 Food Safety • Record of serious accidents • Total labor for season (person x days)	• Group assessment with Scorecard E for PI No. 10 Food Safety in Annex 1 • Farm diary records	Service provider Research and development specialist

Indicator: Workers' health & safety

Unit: The measurement unit is a 0-100 score based upon answers to multiple choice questions which describe a combination of practices and outcomes related to health and safety. An increase over time is considered positive.

Rationale: The indicator is based on the assumption that increased health and safety measures lead to reduced health and safety risks. Improved worker health lead to reduced health-related costs, improved continuity of work and improved livelihoods.

Measurement details

Measurement is based upon a scorecard covering the following topics:

1. Incidence of work-related accidents and illnesses
2. Safety instructions and first aid
3. Re-entry periods after pesticide application
4. Availability and use of PPE
5. Suitable maintenance of equipment for safe operation
6. Pesticide applicator training
7. Age and gender of pesticide applicator
8. Washing and changing facility for pesticide applicator
9. Storage of pesticides
10. Disposal of pesticide container

The scorecard E for PI No. 10 is provided in Annex 1.

Basic: Farmer learning focuses on self-awareness of safety topics. The scorecard is used as a self-assessment tool.

Intermediate: The scorecard is used as a group assessment tool. Scores are reported and examined over time. Training is provided on safety topics that have low scores.

Advanced: Same as Intermediate level, with the additional record-keeping of number of serious accidents per unit labor (person-day). A serious accident is defined as one which requires treatment by a medical professional.

11. Performance Indicator: Child labor and youth inclusion

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Youth engagement awareness	Score in Scorecard F. PI No. 11 Child Labor and Youth Inclusion	Data elements of Scorecard F. PI No. 11 Child Labor and Youth Inclusion	Self-assessment with Scorecard F PI No. 11 Child Labor and Youth Inclusion in Annex 1	Farmer Farmer group
Intermediate	Youth engagement assessment	Score in Scorecard F. PI No. 11 Child Labor and Youth Inclusion	Data elements of Scorecard F. PI No. 11 Child Labor and Youth Inclusion	Group assessment with Scorecard F PI No. 11 Child Labor and Youth Inclusion in Annex 1	Farmer group Service provider
Advanced	Youth engagement assessment	Score in Scorecard F. PI No. 11 Child Labor and Youth Inclusion	Data elements of Scorecard F. PI No. 11 Child Labor and Youth Inclusion	• Group assessment with Scorecard F PI No. 11 Child Labor and Youth Inclusion in Annex 1 • Farm diary records	Research and development specialist

Indicator: Child Labor & Youth Inclusion
This indicator measures the incidence of child labor, respect for children's right to education, and efforts to make farming activities attractive to people aged 15 to 30. Further definition of youth might be needed according to national context.
Unit: The measurement unit is a 0-100 score based upon answers to multiple choice questions describing a combination of practices and outcomes related to child labor. An increase over time is considered positive.

Rationale: The assumption is that the absence of child labor leads to reduced health risks and greater opportunity to attend school.

Measurement details

Measurement is based upon a scorecard covering the following topics:

1. Employment of children below the age of 15 years old as permanent or seasonal workers
2. Children below the age of 18 years old doing hazardous work
3. Children of school attending school throughout the school year
4. Youth access to agricultural knowledge
5. Youth access to modern agricultural technologies

6. Youth access to capital
7. Youth access to agribusiness training

The scorecard can be found in Annex 1.

Basic: The focus for farmer learning is to build awareness of youth engagement topics. The scorecard F for PI No. 11 in Annex 1 is used as a self-assessment tool. For details on conducting self-assessments, please refer to the SRP Assurance Scheme.

Intermediate: The scorecard F for PI No. 11 in Annex 1 is used as a group assessment tool. Scores are reported and examined over time. Training is provided on youth engagement topics that have low scores. The scores can be triangulated by observations and records, e.g. school enrolment.

Advanced: Same as Intermediate level following scorecard F for PI No. 11 in Annex 1 with the potential of evaluation at the value chain level. Details on the evaluation at the value chain level were still under development at the time of launching PI v. 2.0 and are expected for future revisions of the SRP PI document.

12. Performance Indicator: Women's empowerment

DATA LEVEL	INDICATOR DESCRIPTION	UNIT	DATA TO BE COLLECTED	MEASUREMENT METHOD	RESPONSIBLE STAKEHOLDER
Basic	Women empowerment awareness	Score in Scorecard G. PI No12 Women's Empowerment	Data elements of Scorecard G. PI No. 12 Women's Empowerment	Self-assessment based on Scorecard G. PI No. 12 Women's Empowerment in Annex 1	Farmer Farmers Group
Intermediate	Women empowerment assessment	Score in Scorecard G. PI No12 Women's Empowerment	Data elements of Scorecard G. PI No. 12 Women's Empowerment	Self-assessment based on Scorecard G. PI No. 12 Women's Empowerment in Annex 1	Farmer group Service Provider
Advanced	Women empowerment assessment	Score in Scorecard G. PI No12 Women's Empowerment	Data elements of Scorecard G. PI No. 12 Women's Empowerment	Self-assessment based on Scorecard G. PI No. 12 Women's Empowerment in Annex 1	Service Provider Research and development specialist

Indicator: Women's empowerment
The indicator measures women's power to make decisions relevant to their well-being.

Unit: The measurement unit is a 0-210 score based upon answers to multiple choice questions which describe a combination of practices and outcomes related to women's empowerment. An increase over time is considered desirable.

Rationale: The indicator is based on the SRP guiding principle: Social Development. The assumption is that empowerment of women leads to improved maternal health, improved

family health and well-being. In situations where women are directly involved in rice production, women's empowerment (e.g. by increasing women's access to knowledge) is also expected to lead to higher levels of productivity and profitability.

Measurement details

Measurement is based upon a scorecard covering the following topics:

1. Women's control over decisions regarding household agricultural production
2. Women's control over decisions regarding their own labor input
3. Women's satisfaction regarding their labor input
4. Women's access to information and capacity building
5. Women's access to seasonal resources for farm activities
6. Women's control over long-term resources for farm activities

7. Women's control over decisions regarding household income
8. Women's control over their personal income
9. Women's participation in collective-decision making
10. Violence against women

In this indicator we refer to the main decision making female(s) in the household (generally spouses).

The scorecard G for PI No. 12 can be found in Annex 1.

For this indicator an attempt should be made to ask an equal number of both men and women (although not both from the same household).

Basic: The focus for farmer learning is on self-awareness of women empowerment topics. The scorecard is used as a self-assessment tool.

Intermediate: The scorecard is used as a group assessment tool. Scores are reported and examined over time. Training is provided on women empowerment topics that have low scores. The scores can be triangulated by observations and records, e.g. participation in trainings.

Advanced: Same as Intermediate level, with evaluation at the value chain level [needs more explanation]

D. References

Aplin KP, Brown PR, Jacob J, Krebs CJ, Singleton GR. 2003. Field methods for rodent studies in Asia and the Indo-Pacific. Canberra (Australia): Australian Centre for International Agricultural Research. ACIAR Monograph Series No. 100. 223 p.

Chiarappa L. 1971. Crop loss assessment methods: FAO manual on evaluation and prevention of losses by pests, diseases, and weeds. Farnham (England): Commonwealth Agricultural Bureaux.

De Wit CT, Penning de Vries FWT. 1982. L'analyse des systèmes de production primaires. In:Penning de Vries FWT, Djiteye MA, editors. La productivité des pâturagesSahéliens. Agricultural Research Report 918. Wageningen (The Netherlands): Pudoc. p. 275-283.

Dobermann, A. and T. H. Fairhurst (2000). Rice: Nutrient disorders & nutrient management. Los Banos: Int. Rice Res. Inst.

FAO, 2016. The Food Insecurity Experience Scale: Measuring food insecurity through people's experiences. Rome: Food and Agriculture Organization of the United Nations. Available at: http://www.fao.org/in-action/voices-of-the-hungry/using-fies/en/

IPCC, 2006.IPCC (Intergovernmental Panel on Climate Change) guidelines for national greenhouse gas inventories. In: Prepared by the National Greenhouse Gas Inventories Programme. Eggleston HS, Buendia L, Miwa K, Ngara T, Tanabe K (Eds). IGES, Japan (2006).

Lele, U., Masters, W.A., Kinabo, J., Meenakshi, J., Ramaswami, B., Tagwireyi, J., Bell, W. &
Goswami, S. 2016. Measuring Food and Nutrition Security: An Independent Technical Assessment and User's Guide for Existing Indicators. Measuring Food and Nutrition Security Technical Working Group. Rome: Food Security Information Network. Available at http://www.fsincop.net/topics/fns-measurement

Zadoks, JC. 1985. On the conceptual basis of crop loss assessment: the threshold theory. Annu. Rev. Phytopathol. 23: 455-473.

Zadoks JC, Schein RD. 1979. Epidemiology and plant disease management. New York, New York (USA): Oxford University Press.

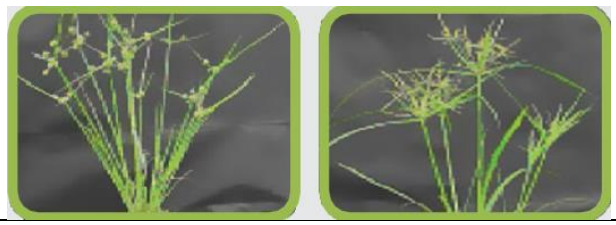
Annex 1: Scorecards and checklists

Checklist A. PI No. 4: Incoming water quality assessment

NO	ITEM	Yes	No	Unknown
1	Has your irrigation source ever had high salinity levels?			
2	Is your land located within 3 km of a body of salt water?			
3	Has your land received direct saltwater intrusion within the past 5 years (e.g. flood, typhoon waves, tsunami, etc.)?			
4	Does your land experience tide-related changes in water table?			
5	Does your water table depth change by more than 10 cm between seasons?			
6	Have there been any government or community warnings in your area about soil or water salinization?			
7	Does your irrigation source get depleted towards the end of the dry season?			
	Column totals			
Scoring & follow up actions	If you checked "yes" to any item in this checklist, it is recommended that you have your irrigation water tested for salinity. If there is a salinity problem (if the water test shows electrical conductivity (EC) > 4 mmhos/cm), please consult an expert to discuss options for improving the situation.			

Checklist B. PI No. 7 Basic: Biodiversity

NO	ITEM	Yes	No	Unknown
1	Golden apple snails or their eggs (pest, invasive species)  			
2	Plant hoppers (pest) 			
3	Stem borers (pest) 			
4	Army worms (pest) 			
5	Rodent pests (rats and mice) 			
6	Water hyacinth (weed, invasive species)			

				
7	Sedges (weeds) 			
8	Broadleaf plants (weeds) 			
9	Dragonflies (beneficial) 			
10	Lady beetles (beneficial) 			
11	Spiders or spider webs (beneficial) 			
12	Frogs or tadpoles (beneficial)			

				
13	Water birds and small bird species (beneficial) 			
14	Bats (beneficial 			
15	Fish (beneficial) 			
Scoring & follow up actions	Column totals for pests (items 1-8)			
	Column totals for beneficial organisms (items 9-15)			
	If you checked "yes" for any pests, talk with an extensionist to determine severity and discuss environmentally friendly options for controlling the pest. If you checked "no" to any of the beneficial organisms, talk with an extensionist about options for improving habitat. If you checked "no" for most pests and "yes" for most beneficials, then your farm shows healthy biodiversity – congratulations!			

Checklist C. PI No. 7 Intermediate: Pest damage assessment

Crop Growth Stage:			Crop Status:								
Section A Total Number											
Hill No.	1	2	3	4	5	6	7	8	9	10	Average
No. of tillers per hill (or per 10 x 10 cm2 area if direct seeded)											
No. of panicles per hill											
No. of leaves per hill											
Section B. Damage by animal pests											
No. of tillers with rat damage											
No. of panicles with bird injury											
No. of panicles with deadheart											
No. of panicles with panicle mite injury											
No. of panicles with rice bug injury											
No. of panicles with silvershoot											
No. of panicles with whitehead											
No. of leaves with leaffolder injury											
No. of leaves with leaf miner injury											
No. of leaves with rice hispa injury											
No. of leaves with whorl maggot injury											
Section C. Damage from disease											
No. of leaves infected with bacterial leaf blight											
No. of leaves infected with bacterial leaf streak											
No. of leaves infected with bakanae											
No. of leaves infected with brown spot											
No. of leaves infected with leaf blast											
No. of leaves infected with leaf scald											
No. of leaves infected with narrow brown spot											
No. of leaves infected with red stripe											
No. of panicles infected with dirty panicle											
No. of panicles infected with false smut											
No. of panicles infected with neck blast											
No. of panicles infected with sheath blight											
No. of panicles infected with sheath rot											
No. of panicles infected with other disease (specify)											

Crop Growth Stage:	Crop Status:					
Area (1m x 1m) designation	A	B	C	D	E	Average
Severity of injury from bugburn (0 to 4)						
Severity of injury from hopperburn (0 to 4)						
Severity of injury from grassy stunt (0 to 4)						
Severity of injury from orange leaf syndrome (0 to 4)						
Severity of injury from ragged stunt (0 to 4)						
Severity of injury from tungro (0 to 4)						
Severity of injury from SRBSDV (0 to 4)						
Severity of injury from yellowing syndrome (0 to 4)						
Weed rating above canopy (0 to 4)						
Weed rating below rice canopy (0 to 4)						
Main weed type (B = broadleaf, G = grass, S = sedge)						

Scorecard D. PI No. 9: Food Safety

No	Indicator	Corresponding requirement	Checklist (Y=yes; N=no; U=unknown)	Level(s) of performance	Score
1	Food safety risk assessment	1a. If farmland is near a known potential source of contamination, these risks are identified using the checklist.	Has the rice-growing land ever been used for: 1. Sewage sludge application? Y N U 2. Industrial, electronic, battery, or hospital waste disposal? Y N U 3. Mining (large or small-scale)? Y N U 4. Is it downstream from an active or former mine, water treatment facility, livestock production facility (including poultry), or fisheries operation? Y N U 5. Is it adjacent to a busy road (like a highway or expressway)? Y N U 6. Has any cadmium-containing fungicide ever been used on it? Y N U 7. Has any arsenic-containing pesticide ever been used on it? Y N U 8. Has any mercury-containing fungicide ever been used on it? Y N U 9. Have there been any reports of groundwater or surface water contamination or has your irrigation source ever had test results outside the normal range for any contaminant? Y N U	All 9 check items have "no" answers At least 5 items have "no" answers and up to 4 items have "unknown" answers More than 5 items have "unknown" answers	10 5 0
		1b. If there are any potential mycotoxin contamination sources, these risks are identified using the checklist.	1. Was there any visible mold or dirt on the harvest equipment or storage containers? Y N U 2. At 24 hours after harvest, was the moisture content of the grain higher than 15% Y N U 3. Was there any visible mold or mildew on the stored grain (either paddy or milled)? Y N U 4. Has any pesticide been used on the stored grain	All 4 checklist items have "no" answers At least 2 items have "no" answers and up to 2 items have "unknown" answers. More than 2 items have "unknown" answers	10 5 0
		1c. If there are potential	1. Was any pesticide applied less than 3 weeks prior to harvest? Y N U	Both checklist items have "no" answers.	10

		pesticide residue risks, they are identified using the checklist.	2. Has any pesticide been used on the stored grain? Y N U	One checklist item has a "no" answer. Both checklist items have "unknown" answers	5 0
		1d. Appropriate investigative action is taken on any food safety		There are no known potential contamination sources at this rice- questions in Checklist 9 Section A). There is a known soil risk (a "yes" answer) and soil and grain samples have been sent for analysis to determine risk level. There is the potential for an unknown risk, and a grain sample has been submitted for analysis. There has been no sample submitted for analysis after identification of a "yes" or "unknown" risk in Checklist 9 Section A.	10 10 10 0
		1e. Appropriate action taken on any food safety risks that have been confirmed through laboratory		There are no known potential food safety risks for this site ("no" answers to all of the conditions in Checklist 9 Section A). Soil and/or grain samples were submitted in response to known or unknown risks, and laboratory analyses have confirmed that soil and/or grain samples are safe. Soil and/or grain samples were submitted in response to known or unknown risks, and the laboratory analysis results have not yet been received. Laboratory analysis has confirmed a risk of contamination from soil, and	10 10 5 5

				appropriate remediation measures have been taken Laboratory analysis has confirmed a risk of contamination from soil, and no remediation measures have been taken.	0
				Total Score (0 to 50)	

Scorecard E. PI No. 10: Health and Safety

No	Indicator	Corresponding requirement	Level(s) of performance	Score
	Incidence of work-related accidents	The frequency of work-related accidents resulting in minor and major injuries or ill health for workers or any person in or outside the farm. Examples of accidents that could result in injuries or ill health include but are not limited to: • Fires, explosions, emissions, spills, accidents with vehicles or machinery, collapses, cuts, accidents during pesticide use Examples of injuries or ill health include but are not limited to: • Fractures, cuts, infections, burns, respiratory and other diseases related to pesticide use, snake bites, leptospirosis We distinguish a minor and major degree of severity of injuries or ill health: • Minor: injuries or diseases with a short-term impact and that require medical assistance or cause to miss at least one day of work • Major: semi-permanent, permanent injury or ill health diseases or death	a) No minor and major work related injuries or ill health b) No major work related injuries or ill health, but minor cases in a lower frequency compared to the last crop cycle c) Any major work related injuries or minor cases in an equal or higher frequency compared to the last crop cycle	10 5 0
R26	Safety instruction and first aid	Workers, including working household members, receive regular safety instruction to prevent work related accidents or diseases, where to access first aid kits, and how to contact health workers. The first aid kit should be well-labeled and available on- farm or placed at a designated medical center known by and accessible to farmers in a group.	a) Workers, including working householder members, receive safety instruction annually, and first aid kit is available on-farm or at a designated medical center known by and accessible to farmers in a group. b) Workers, including working household members, have received safety instruction, and are aware of how to contact the nearest health worker or clinic. c) There is no safety instruction	10 5 0

R27	Tools and Equipment	Tools and equipment for farm operations and postharvest processes are working and efficient in use by regular and proper maintenance and calibration. Tools are adequately stored. Pesticide application equipment (if pesticide(s) is (are) applied) is maintained and calibrated to prevent leakage or contamination.	a) Calibration and maintenance within current crop cycle. b) Calibration and maintenance within the past 2 years. c) No calibration and maintenance within the past 2 years.	10 5 0
R28	Training of pesticide application	Pesticide applicators receive training and apply good practices on the safe handling and use of pesticides, including: • An explanation of the names, toxicity, health risks, and other relevant information related to all substances to be applied. • Techniques for correct handling of substances. • Preventive measures for reducing possible damage to health and the environment caused by substances. • Emergency procedures for cases involving poisoning or undue contact with substances.	In the last 5 years: a) There is no use of pesticides. b) Pesticide applicators participated in training and demonstrate that relevant content is applied. c) Pesticide applicators participated in training. d) Pesticide applicators did not participate in training.	 10 10 5 0
R29	Personal Protective Equipment (PPE)	Pesticide applicators use functional and good-quality PPE as recommended on the product label, including: • Chemical-resistant gloves • Masks • Dermal protection (e.g., long-sleeved shirt, long trouser) • Boots • Eye protection during mixing and application	a) There is no use of pesticides. b) In the case of spraying: Pesticide applicators use all five of the listed PPE items of good quality (or what is recommended on the product label). c) In the case of plane, drone, or tractor application: Pesticide applicators use chemical-resistant gloves and masks of good quality during mixing (or what is recommended on the product label). d) In the case of spraying: Pesticide applicators use at least chemical-resistant gloves and masks of good quality. e) None of the above.	10 10 10 5 0
R30	Washing and changing	Designated areas for washing of PPE, bathing, and changing are available for pesticide applicators after finishing the application. All PPE worn during pesticide application is washed after use and does	a) There is no use of pesticides. b) Designated areas for washing and changing (separated) are available,	10 10

		not enter housing. These designated areas are separated from areas used for household laundry.	and they are not used for household laundry. c) Designated area for washing and changing (combined) is available, and it is not used for household laundry. d) Area(s) for washing and changing for pesticide applicators is (are) used for household laundry	 5 0
R31	Applicator restrictions	Pesticides are not applied by pregnant or lactating women, by children below 18 years, or by persons who suffer from respiratory diseases.	a) There is no use of pesticides. b) Pesticides are not applied by pregnant or lactating women or by persons below 18 years, or by persons who suffer from chronic or respiratory diseases. c) Pesticides are applied by pregnant or lactating women or by children below 18 years, or by persons who suffer from chronic or respiratory diseases.	10 10 0
R32	Re-entry time	Re-entry time after the use of pesticides: 1. Follows the recommendation on the product label, or after 48 hours if the label does not give a recommendation. 2. Is clearly communicated.	a) There is no use of pesticides. b) Farmer meets criteria 1 and meets criteria 2 by placing warning signs or symbols in the fields. c) Farmer meets criteria 1 and meets criteria 2 by verbally communicating re-entry time. d) Farmer does not meet criteria 1 and/or 2.	10 10 5 0
R33	Pesticide and chemical storage	Pesticides and inorganic fertilizers (including partyly- empty containers) are: 1. Labeled. 2. Stored in a locked place that is separate from fuel, food, and rice, and which is out of reach of children	a) There is no storage of pesticides and/or inorganic fertilizers b) Farmer meets criteria 1 and 2. c) Farmer meets criteria 2. d) None of the above.	10 10 5 0
R34	Pesticide disposal	Empty pesticide containers, surplus pesticides, and obsolete pesticides (e.g., past shelf life or banned) are disposed of properly, through a collection, return, or disposal service, or through	a) There is no use of pesticides.	10 10

		good practices in pesticide disposal. Good practices in pesticide disposal include: 1. Empty containers are rinsed 3 times with water. Surplus spray and wash water is applied over an unmanaged part of the farm, away from water bodies. 2. Containers are made unusable by crushing or puncturing before burning them on-farm. 3. Containers are buried in a designated area (at least 20 meters away from a water body) and are not accessible to children or unauthorized persons. 4. Obsolete pesticides are returned to the dealers or, if not possible, disposed of in a manner that minimizes exposure to humans and the environment	b) Farmer participates in a collection, return or disposal service, especially if there is a large volume of waste c) In absence of such a service, farmer meets all four criteria for good practices in pesticide disposal d) In the absence of such a service, farmer does not meet all four criteria for good practices in pesticide disposal e) There is a collection, return, or disposal service, but it is not used.	5 0 0
				Total Score (0 to 100)

Scorecard F. PI No. 11: Child Labor and Youth Inclusion

No	Indicator	Corresponding requirement	Level(s) of performance	Score
R35	Child Labor	Children below 15 years are not engaged as permanent or seasonal workers. Family members below 15 years of age living on family farms may participate in farming activities that consist of light, age-appropriate duties that give them an opportunity to develop skills, only if activities are: 1. Not harmful to their health and development. 2. Do not interfere with schooling and leisure time. 3. Carry heavy loads. 4. Work with dangerous substances. 5. Work at night. Age of workers is always verified and documented	a) Farmer does not engage children below 15 years of age as workers. b) Family members below 15 years of age are living and working on the farm, and farmer complies with all four criteria. c) Family members below 15 years of age are living and working on the farm, and farmer does not comply with one or more criteria. d) Farmer engages children below 15 years of age (who are not family members living on the farm) as workers	15 15 0 0
R36	Hazardous work	Children below 18 years are not assigned to work, which is likely to harm their safety and health. Children below 18 years of age do not conduct hazardous work or work that may harm their physical, mental, or moral wellbeing. They do not: 1. Work in dangerous locations. 2. Work with dangerous machinery, equipment, and tools (as defined by national laws and regulations). 3. Carry heavy loads. 4. Work with dangerous substances. 5. Work at night. Age of workers is always verified and documented.	a) There are no children below 18 years working on the farm. b) There are children below 18 years of age working on the farm, and farmer complies with all five criteria. c) There are children below 18 years of age working on the farm, and farmer does not comply with one or more criteria.	15 15 0
R37	Education	Children living on the farm in the age of compulsory schooling go to school all year long.	a) There are no children living on the farm within the age of compulsory schooling. b) Children living on the farm within the age of compulsory schooling go to school all year long.	30 30 20

			c) Children living on the farm within the age of compulsory schooling go to school, but not all year long. d) Children living on the farm within the age of compulsory schooling do not go to school, but efforts are made to provide education. e) Children living on the farm within the age of compulsory schooling do not go to school, and no efforts are made to provide education.	5 0
The following Indicators are part of the Youth Inclusion Scorecard. Note that there is no clear definition of youth and therefore a risk of error is self-reporting. Youth to be defined in national context				
No	Indicator	Corresponding requirement	Level(s) of performance	Score
4	Access to agricultural knowledge	Youth should have access to formal and informal opportunities to gain agricultural knowledge	a) Youth get knowledge and information from agricultural extension workers and researchers through training, meetings, field days, etc. b) Youth get information from family members, relatives, neighbours and friends. c) Youth do not have access to agricultural information.	10 4 0
5	Access to modern agricultural technologies	Youth should have access to modern agricultural technologies and information.	a) Youth have access to modern technologies from public and/or private sector. b) Youth do not have access to modern technologies.	10 0
6	Access to capital	Youth should have access to capital for engaging in entrepreneurial activity in rice value chains.	a) Youth have access to formal sources of credit. b) Youth have access to informal sources of credit. c) Youth do not have access to credit.	10 4 0
7	Agribusiness training	Youth should be trained to engage in rice value chains as a commercial activity.	a) Youth are trained by public sector and/or private sector actors. b) Youth have no agribusiness training opportunities.	10 4
			Total Score (0 to 100)	

Scorecard G. PI No. 12: Women's Empowerment

No	Indicator	Corresponding requirement	Level(s) of performance	Score
1	Women's control over household agricultural production and marketing decisions	1a. Women should have decision-making control over the choice of crops/varieties to be planted in own or leased-in farms	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		1b. Women should have decision-making control over the choice of technology/management practices (through rice production to post-harvest processing)	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		1c. Women should have decision-making control over the use of inputs (including fertilizers, pesticides, irrigation, etc.) in rice cultivation	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		1d. Women should have decision-making control over the use of rice produced (e.g. home consumption and sale)	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
2	Women's control over use of household income	2a. Women should have decision-making control over the use of income from rice	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		2b. Women should have decision-making control over the use of off-farm income	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision	10 6

			Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	3 0
3	Women's control over decisions regarding use of her time and labor	3a. Women should have full control over the use/ allocation of her own time for income-generating activities, unpaid tasks (including household chores, child care), and leisure	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		3b. Women should have decision-making control over their contribution of labour in rice value chain related activities--both amount and activities	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		3c. Women should have decision-making control over use of drudgery- or labor-reducing technologies	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		3d. Nursing mothers have access to appropriate facilities and time to feed their infants and children while working on rice farms, processing and trading units	Women have access to facilities and are able to nurse their children Women do not have access and are constrained from nursing their children	10 0
4	Women's access to and control of productive resources and markets	4a. Women have control over the decisions on use of farm land (owned or leased), including decisions around purchase, sale or leasing in and out	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		4b. Women have control over the decisions on use of farm machinery and tools (owned or hired), including decisions around purchase, sale, or hiring in and out	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3

		4c. Women should have access to agricultural knowledge, information and capacity building	Women get knowledge and information from agricultural extension workers and researchers through training, meetings, field days, etc. Women get agricultural information from family members, relatives, neighbours, and friends. Women do not have access to agricultural information.	0 10 4 0
		4d. Women should have access to formal and informal sources of credit/microfinance.	Women can borrow from formal sources. Women can borrow from informal sources Women have no access to loans	10 3 0
		4e. Women should have decision-making power over the use of loans	Women have at least equivalent decision-making power. Someone else makes the decision, but women have a significant say in the decision Somebody else makes the decision, but the women are consulted Women are not involved in decision-making	10 6 3 0
		4f. Women should have access to markets	Women can freely engage in markets for purchase and sale of agricultural produce or products. Women need permission from a household member or need to be accompanied in order to engage in market transactions. Women are not free to engage in markets.	10 3 0
5	Women's mobility, social capital, leadership and domestic violence	5a. Women can make decisions about their movements in public places such as hospitals, markets, etc.	Women can move around freely without asking for permission. Women need to get permission from other household members to go to public places. Women need to be accompanied by family members to go to public places. Women are not allowed to go to public places.	10 4 2 0
		5b. Women participate in formal and informal village and community organizations	Women are active members of community organizations and influence group decisions Women are passive members of organizations Women are not members of community organizations	10 4 0

		5c. Women are leaders of village/community organizations 5d. Women should be free from domestic violence	Women are elected as leaders of community/village organizations. Women are nominated to be leaders of community/village organizations. Women are not leaders of community/village organizations. There are no cases of violence in the community There is at least one case of violence in the community	 10 4 0 10 0
6	Women's wage gap	Women do not experience wage gap in the rice value chain	Women and men are paid equal wages for the same type of work. Women are paid lower wages than men for the same type of work.	10 0
				Total score (210)