Scaling Readiness Innovation Profile

of

Multi-functional Lentil Varieties Package

in

Bangladesh, India, and Nepal

for

Increasing micro-nutrient availability for smallholder farmers and improving soil health

in

2020-12-20

Draft 1

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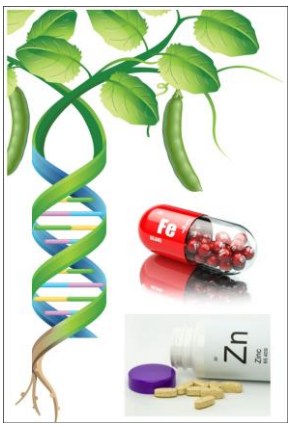
Innovation Profile Sheet



Multi-functional Lentil Varieties Package

Multi-functional Lentil Varieties Package is a set of multi-functional varieties and features for producing lentils in rice-based and other intercropping systems. They improve both production and consumption aspects of lentils. From the production side, they decrease the time necessary to harvest lentils, making it possible to be grown in between two rice seasons in South Asia. They also increase the nitrogen content in the soil, decreasing the costs for rice production. From the consumption side, since they have higher iron and zinc content, they simultaneously improve micro-nutrient availability for small-scale farmers. Some of them also need less energy and time to cook.

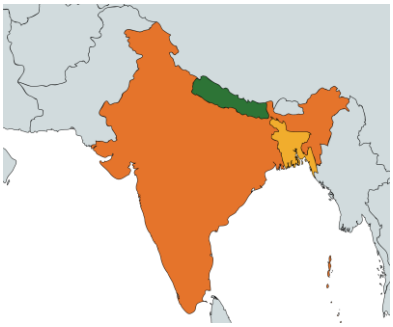
Used by
Farmers

Delivered by
National research centers

Benefits
Farmers

Pros
Can be produced between 2 rice seasons
Improves soil health
Not water-hungry
Iron and Zinc-rich
Easier to cook
Water-efficient

Cons
Produces less biomass than traditional varieties



Used in
Bangladesh
Nepal
India

Works best
Rice-based intercropping systems
Relay cropping technique
Smallholder production

Used by

Indian Ministry of Agriculture

Bangladesh Ministry of Agriculture

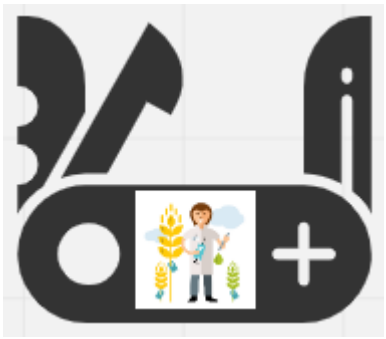
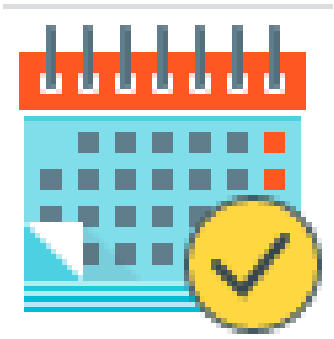
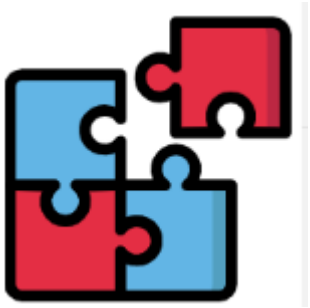
OCP Group

IFAD
INTERNATIONAL FUND FOR AGRICULTURAL DEVELOPMENT

THE UNIVERSITY OF WESTERN AUSTRALIA

UNIVERSITY OF SASKATCHEWAN

WASHINGTON STATE UNIVERSITY

Novel Components		
		
Multi-purpose breeding	Early maturity	High iron and zinc producing genes
		
Best bet variety selection	Prioritization of smallholder preference traits	Import substitutability

Innovation Readiness Scores

Space: Bangladesh, India, and Nepal
Time: December 2020
Goal: Increasing micro-nutrient availability for smallholder farmers and improving soil health

Components of the System	Type	Readiness Level	Evidence Sources[1]
Multi-purpose breeding	Principle	4	1, 7, 8, 9, 10
Early maturity	Feature	6	11,12
High iron-producing genes	Product	Eight [2]	6, 2, 11, 13, 14, 15
High zinc producing genes	Product	8[2]	6, 2, 11, 13, 14, 15
Best bet variety selection	Principle	4	11, 16, 17
Prioritization of smallholder preference traits	Principle	4	16, 18
Import substitutability	Feature	7	9, 19, 20

Highlights

- The Multi-functional Lentil Varieties Package consists of 7 key components.
- These seven components are different types. Two of them are products, three of them are principles, and two of them are features.
- The components' Readiness varies between 4, i.e., application model and 8, being tested to work in Bangladesh, India, and Nepal to increase micro-nutrient availability for smallholder farmers and improve soil health.
- The evidence base on the contribution of the principles of the package is narrower than the product and the feature components of the varieties package.

[1] The references numbered 1, … did not provide any specific evidence on the Readiness of the components below
[2] Evidence from Readiness level 8 is coming from a single not peer reviewed resource (13). However, evidence for level 6 is well established (6,2,11,14)

Recommendations for Research for Development Organizations Aiming to Improve Innovation Readiness

Improving innovation readiness of the Multi-functional Lentil Varieties Package requires

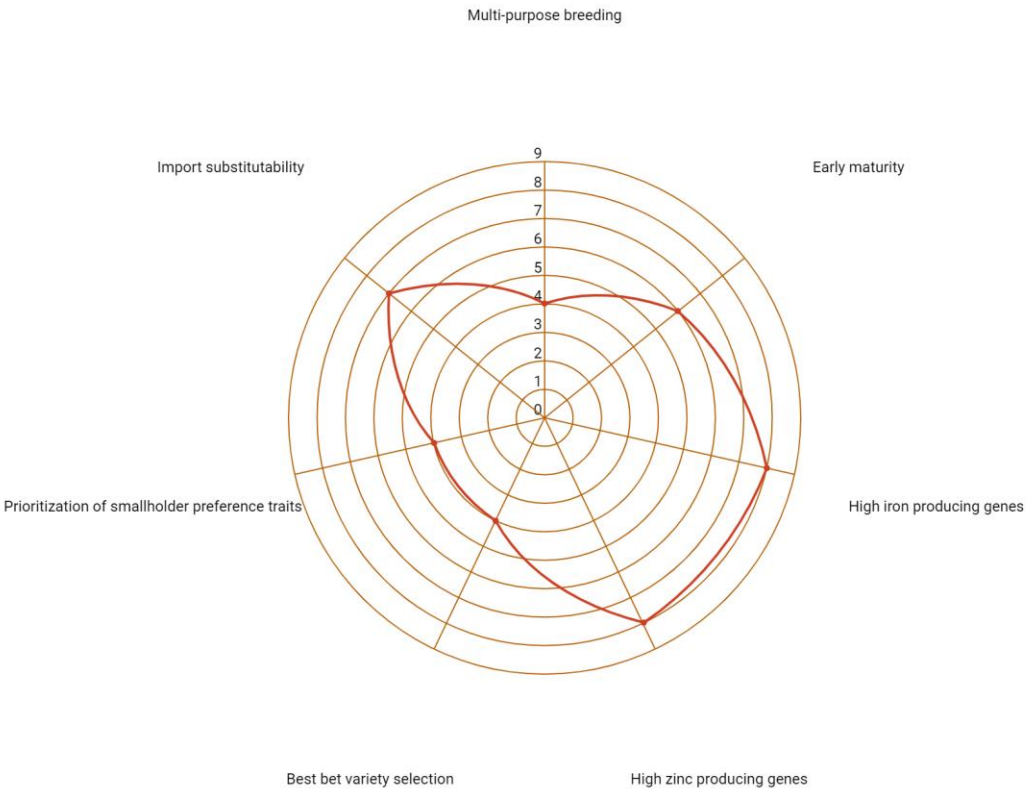
- Validation of how the principles of the package, i.e., *having a multi-purpose breeding approach, selecting the best bet varieties that fit the local realities rather than most performing ones in the experiments, and prioritization of the smallholder preference traits*, contributes to the increasing micro-nutrient availability for smallholder farmers and improving soil health using existing applied science evidence
- Testing the changes in the small scale farmer's micro-nutrient access and health of small scale farms by designing and conducting controlled studies in Bangladesh, India, Nepal and incorporating the learning in the selection of the traits
- Documenting the evidence on how having early maturity influences the performance of lentil value chain and rise value chains in terms of providing nutritious food, higher soil health, and other desired goals

Other recommendations that can contribute to advancing Multi-functional Lentil Varieties Package in Bangladesh, India, and Nepal

- There are significant differences in evidence claims between the impact assessment paper (3) and communications products referring to it (1, 2). Yigezu et al. (2019) wrote that "Improved variety adoption does not affect farmer yield; taste, nutrition and cooking q*uality are main breeder objectives.*" I suggest caution in using the communication products on incomes and other impact claims until further evidence is presented the positive impact undisputedly. The only non-conflicting evidence is the adoption of relatively older varieties 2006 or earlier.
- Multi-functional Lentil Varieties Package offers a comprehensive improvement solution as a whole for micro-nutrient availability and soil health. However, the performance of the varieties in the package in terms of yield, disease resistance, diversity of the gene pool, reducing current account deficit differ among the countries vary significantly. Profiling the specific contributions of the package to different countries specifically and compiling them in various documents might increase the use of the varieties as a whole significantly.

Readiness Levels of the Components of Multi-functional Lentil Varieties Package

in December 2020 for Increasing micro-nutrient availability for smallholder farmers and improving soil health in Bangladesh, India and Nepal



Further Steps for Assessing Scaling Readiness of the Multi-functional Lentil Varieties Package

The innovation profile focuses on the description and the Readiness of the innovation, i.e., maturity or effectiveness of innovation is to achieve its use objectives. Although Innovation Readiness is necessary to assess the impact at scale potential of innovations via Scaling Readiness scores, it is not sufficient alone. To complete the Scaling Readiness of the Multi-functional Lentil Varieties Package, we recommend complementing this study with Innovation Use Assessment, designing the innovation package for scaling the lentil varieties, and full Scaling Readiness assessment of the Innovation Package. We provide further information about innovation use, innovation package, and other relevant Scaling Readiness Concepts in the Annexes.

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ANNEX -1: SCALING READINESS CONCEPTS

Evidence-based measurement: Innovation Readiness scores (Annex - 2) are calculated using evidence. Specific claims of Readiness are assessed through a hierarchy of sources of verification. High-quality science articles and other peer-reviewed documents are the first sources. In their absence, technical reports or other publicly scrutinized documents are used to back up specific evidence claims. In the lack of any documents, different opinions of experts proven to have sufficient competencies are triangulated to identify the measures.

Innovation Component: A tool, technique, concept, principle, feature that constitutes a part of innovations. Although components can be novel, they can not be considered innovations as they can not address social and economic problems alone. In Scaling Readiness, novel components of innovations are characterized and diagnosed. Research for development interventions can control the design, development, and delivery of innovation components.

Innovation: A novel product, service, approach, an organizational and institutional arrangement with an economic, environmental, health, industrial, etc. use in the society. Innovations can be technical or social. They can be tangible and intangible. In Scaling Readiness, innovations are characterized, diagnosed, and strategized. Research for development interventions can control or strongly influence the design, development, and delivery of innovations.

Innovation Package: The combination of the innovations a project aims to scale and other innovations necessary to scale them. Innovation packages usually consist of technologies and other products, services, approaches, organizational and institutional arrangements required to improve awareness of, accessibility, affordability, and usability of the technologies at scale. Innovation package is the fundamental unit of analysis for scaling innovations in Scaling Readiness. Research for development interventions can influence the design and delivery of innovation packages, but they can not control it. Many innovations in the innovation packages are beyond the control and influence zone of interventions; therefore, partnerships are vital in improving the overall Readiness of innovation packages.

Innovation Readiness Level: It is a number indicating how mature or effective an innovation is to achieve its use objectives. It can be considered as a systematic answer to the question "*how good an innovation works at scale*." It can be between 0, which indicates that the innovation is just an idea in the mind of its potential developers, and 9, which suggests that the innovation has been proven to achieve its use objectives in uncontrolled conditions similar to the context, the innovation is used without a research and development project support. Research and development projects increase innovation readiness levels by improving the design of the innovations, developing and validating the improved designs in uncontrolled and controlled conditions.

Innovation Use Level: It is a number indicating the level of the use of innovations at scale. It can be considered as systematic answers to the combined questions of "*who uses an innovation and in which order of magnitude*." It can be between 0, which indicates that the innovation is not being used in the context a project aims to increase to the use of the innovation, and 9, which suggests that the innovation is being commonly used among the users who are not involved in any innovation design, development or dissemination processes. Research and development projects increase existing innovation use levels by disseminating the innovations and expanding the use of innovations by other innovation professionals who are not involved in the same projects as well as users who are not involved in any innovation processes.

Scaling Readiness Level: It is a single number combining the readiness and use level of all the innovations in the innovation package. It can be considered as a single answer to the question of "*what is the likelihood that an innovation package will achieve impact at scale*." There are different ways of calculating Scaling Readiness Levels based on the preferences of the management system it is used. It can be an average level, a minimal level, or a weighted average level.

ANNEX -2: INNOVATION READINESS LEVELS

Innovation readiness score	Innovation readiness level	Description	Type of science	Type of evidence
0	Idea	The genesis of the innovation. Formulating an idea that innovation can meet a specific goal.	None	None
1	Hypothesis	Conceptual validation of the idea that innovation can meet specific goals and development of a hypothesis about the initial idea.	Conceptual	Generic
2	Basic Model (unproven)	Researching the hypothesis that the innovation can meet specific goals using existing basic science evidence.	Conceptual	Generic
3	Basic Model (proven)	Validation of principles that the innovation can meet specific goals using existing basic science evidence.	Basic science	Generic
4	Application Model (unproven)	Researching the capacity of the innovation to meet specific goals using existing applied-science-evidence.	Basic science	Generic
5	Application Model (proven)	Validation of the capacity of the innovation to meet specific goals using existing applied science evidence.	Applied science	Generic
6	Application (unproven)	Testing the innovation's capacity to meet specific goals within a controlled environment that reflects the specific spatial-temporal context in which the innovation is to contribute to achieving impact.	Applied science	Generic
7	Application (proven)	Validation of the innovation's capacity to meet specific goals within a controlled environment that reflects the specific spatial-temporal context in which the innovation is to contribute to achieving impact.	Applied science (controlled)	Specific to intervention context
8	Incubation	Testing the innovation's capacity to meet specific goals or impact in natural/real/uncontrolled conditions in the specific spatial-temporal context in which the innovation is to contribute to achieving impact with support from an R4D.	Applied science	Specific to intervention context
9	Ready	Validation of the innovation's capacity to meet specific goals or impact in natural/real/uncontrolled conditions in the specific spatial-temporal context in which the innovation is to contribute to achieving impact without support from an R4D.	Applied science (uncontrolled)	Specific to intervention context

ANNEX -3: INNOVATION USE LEVELS

Innovation use score	Innovation use level	Description
0	None	Innovation is not used for achieving the objective of the intervention in the specific spatial-temporal context where the innovation is to contribute to achieving impact
1	Intervention team	Innovation is only used by the intervention team who are developing the R4D intervention
2	Effective partners (rare)	Innovation has some use by effective partners who are involved in the R4D intervention
3	Effective partners (common)	Innovation is commonly used by effective partners who are involved in the R4D intervention
4	Innovation network (rare)	Innovation has some use by stakeholders who are not directly involved in the R4D intervention but are connected to the effective partners
5	Innovation network (common)	Innovation is commonly used by stakeholders who are not directly involved in the R4D intervention but are connected to the effective partners
6	Innovation system (rare)	Innovation has some use by stakeholders who work on developing similar, complementary, or competing innovations but who are not directly connected to the effective partners
7	Innovation system (common)	Innovation is commonly used by stakeholders who are developing similar, complementary, or competing innovations but who are not directly connected to the effective partners
8	Livelihood system (rare)	Innovation has some use by stakeholders who are not in any way involved in or linked to the development of the R4D innovation
9	Livelihood system (common)	Innovation is commonly used by stakeholders who are not in any way involved in or linked to the development of the R4D innovation