Scaling Readiness Innovation Profile

of

Cactus Based Complementary Feed

in

India, Jordan, and Tunisia

for

Improving Feed Availability for Small Scale Livestock Producers

in

2020-12-15

Draft 1

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Innovation Profile Sheet

Cactus Based Complementary Feed

Cactus Based Complementary Feed is a feed solution produced by small-scale farmers without significant labor and time commitment. It enables small-scale sheep and cattle producers to diversify the feed sources. Since cactus does not require a substantial amount of water, cactus-based complementary feed reduces small-scale livestock producers' vulnerability to water accessibility risk, i.e., drought, shifting rain patterns, in feed production.

Used by
Small scale livestock producers

Delivered by
Cactus.net
International organizations

Benefits
Farmers

SDGs

Pros
Grow in areas where no other crops can grow

Require little labor and production inputs

Cons
No direct grazing

Requires mixing with other feed

Partial incompatibility with international legislation of plant movement

Used in
Tunisia
Jordan
India

Works best
In low agricultural productivity areas

In extremely arid areas

Used by

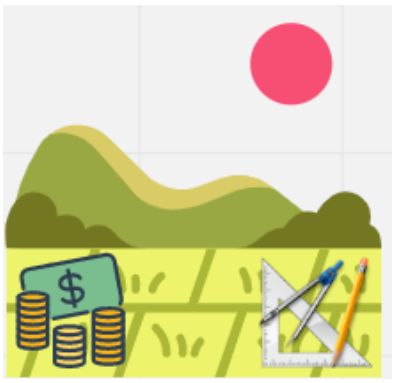
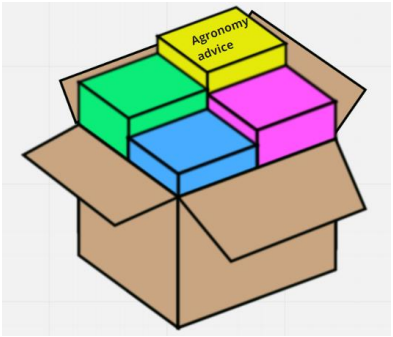
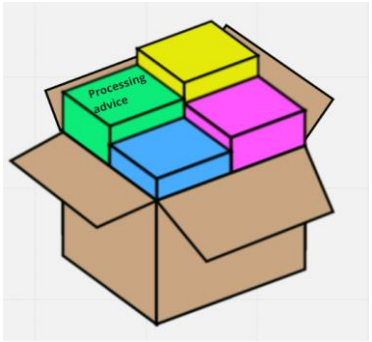
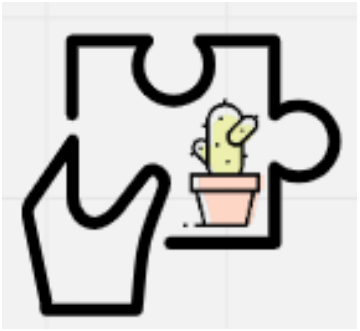
MINISTÈRE DE L'AGRICULTURE, DES RESSOURCES HYDRAULIQUES ET DE LA PÊCHE

Tunisian Ministry of Agriculture, Water Resources and Fisheries

सत्यमेव जयते

Indian Ministry of Agriculture and Farmers Welfare

Palermo University

Novel Components		
		
Commercial approach	Non-competition principle	Bundling with processing advice
		
Bundling with agronomy advice	Customized plant material provision	Internet portal (cactus.net)

Innovation Readiness Scores

Space: India, Jordan, and Tunisia
Time: December 2020
Goal: Improving Feed Availability for Small Scale Livestock Producers

Components of the System	Type	Readiness Level	Evidence Sources
Commercial approach	Principle	9	1,2,3,4
Non-competition principle	Principle	9	5,6,3
Bundling with processing advice	Technique	7	8,10,11
Bundling with agronomy advice	Technique	8	7,3
Customized plant material	Product	8	13
Cactusnet	Tool	4	1,12

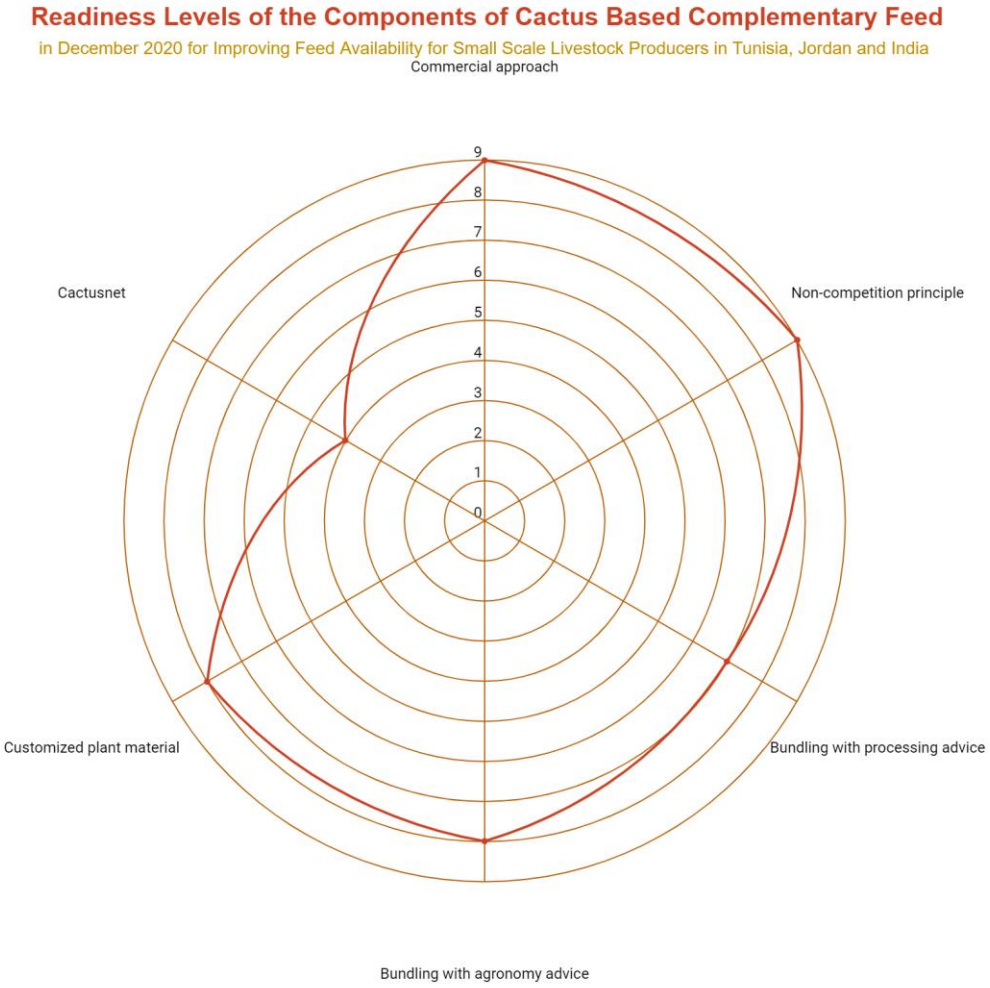
Highlights

- Cactus Based Complementary Feed has six essential components.
- These six components are different types. One of them is a tool, one of them is a product, two of them are techniques, and two are principles.
- The Readiness of the components varies between 4, i.e., application model, and 9, ready.
- The amount of available evidence for each of the three countries is similar across the components.
- Except for Cactusnet, all the other components are shown to contribute to Cactus Based Complementary Feed's performance in control or uncontrolled environments.

Recommendations for Research for Development Organizations Aiming to Improve Innovation Readiness

Improving innovation readiness of the Cactus Based Complementary Feed requires

- Generating evidence about how the Cactusnet technical platform and the professional network it facilitates contribute to the overall use and dissemination of cactus
- Testing the contribution of the bundling cactus with processing advice to the functioning and effectiveness of the complementary feed
- As the Innovation Readiness of the Cactus Based Complementary Feed is high, it is recommended to focus the R4D efforts and investment in the use of the Cactus Based Complementary Feed in Tunisia, Jordan, and India.



Further Steps for Assessing Scaling Readiness of the Cactus Based Complementary Feed

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 Cactus-based Complementary Feed, we recommend complementing this study with Innovation Use Assessment, designing of customized innovation packages to scale Cactus-based complementary feed effectively in different locations, and full Scaling Readiness assessment of the Innovation Package in the selected locations. Since the Innovation Readiness of the Cactus Based Complementary Feed is high, these complementary studies can have a more considerable impact in designing the Cactus-based complementary feed's scaling in the near future. We provide further information about innovation use, innovation package, and other relevant Scaling Readiness Concepts in the Annexes.

Bibliography

1. De Waal, H. O., Louhaichi, M., & Taguchi, M. (2015). Development of a cactus pear agro-industry for the sub-Sahara Africa region. Proceedings of International Workshop. https://hdl.handle.net/20.500.11766/7109
2. Salem, H. B., & Nefzaoui, A. (2010). Cactus holds promises as a tool to improve the productivity & sustainability of livestock-based production systems under the climate change context. https://hdl.handle.net/20.500.11766/12301
3. Nefzaoui, A., & Salem, H. B. (2002). Forage, fodder, and animal nutrition. Cacti: Biology and Uses. https://hdl.handle.net/20.500.11766/12307
4. Peyre, A., Guidal, A., Wiersum, K. F., & Bongers, F. (2006). Dynamics of Homegarden Structure and Function in Kerala, India. Agroforestry Systems, 66(2), 101–115. https://doi.org/10.1007/s10457-005-2919-x
5. Shetty, A. A., Rana, M. K., & Preetham, S. P. (2012). Cactus: a medicinal food. Journal of Food Science and Technology, 49(5), 530–536. https://doi.org/10.1007/s13197-011-0462-5
6. Alary, V., Nefzaoui, A., & Jemaa, M. B. (2007). Promoting the adoption of natural resource management technology in arid and semi-arid areas: Modelling the impact of spineless cactus in alley cropping in Central Tunisia. Agricultural Systems, 94(2), 573–585. https://hdl.handle.net/20.500.11766/12288
7. Louhaichi, M. (2019, January 2). Cactus: provision of ecosystem goods, services, and function. MENA 2018 ESP Regional Conference, Dead Sea, Jordan. The Ecosystem Services Partnership (ESP). https://hdl.handle.net/20.500.11766/9040
8. Du Toit, A. (2013). Antioxidant content and potential of fresh and processed cladodes and fruit from different colored cactus pear (Opuntia ficus-indica and Opuntia robusta) cultivars [Free State University]. https://scholar.ufs.ac.za/handle/11660/8083
9. Inglese, P. (2010). Cactus pear, Opuntia ficus-Indica L.(Mill.) for fruit production: an overview. Improved Utilization of Cactus Pear for Food, Feed, Soil. http://www.cactusnetwork.org/wp-content/uploads/2016/12/Issue12May2010.pdf#page=84
10. Mashope, B. K. (2007). Characterization of cactus pear germplasm in South Africa [University of the Free State]. https://scholar.ufs.ac.za/handle/11660/1415
11. Nefzaoui, A., & El Mourid, M. (2010). Cactus pear for soil and water conservation in arid and semi-arid lands. Improved Utilization of Cactus Pear for Food, Feed, Soil and Water Conservation and Other Products in Africa, 117. https://hdl.handle.net/20.500.11766/12300
12. Rekik, M. (2018). Promoting the social and ecological benefits of cactus production: Enhancing sheep reproduction through cactus-based feed diets. Cactusnet. https://hdl.handle.net/20.500.11766/8523
13. Singh, A. K. (2017). Revisiting the status of cultivated plant species agrobiodiversity in India: an overview. Proc Indian National Science Academy. https://www.researchgate.net/profile/Bijan_Paul3/publication/302916891_Photophysics_and_Rotational_Dynamics_of_a_Fluoroquinolone_Drug_Norfloxacin_in_Biomimetic_Reverse_Micellar_Nanocavities/links/5934cb9745851553b6ee669b/Photophysics-and-Rotational-Dynamics-of-a-Fluoroquinolone-Drug-Norfloxacin-in-Biomimetic-Reverse-Micellar-Nanocavities.pdf

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 economic, environmental, health, industrial, etc., used 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 in the innovation is used without a research and development project support. Research and development projects increase existing 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 and 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 an innovation can meet a specific goal.	None	None
1	Hypothesis	Conceptual validation of the idea that innovation can meet specific goals and develop 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 of the capacity of the innovation 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 capacity of the innovation 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 capacity of the innovation 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 capacity of the innovation 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.