SCALING READINESS OF THE CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA

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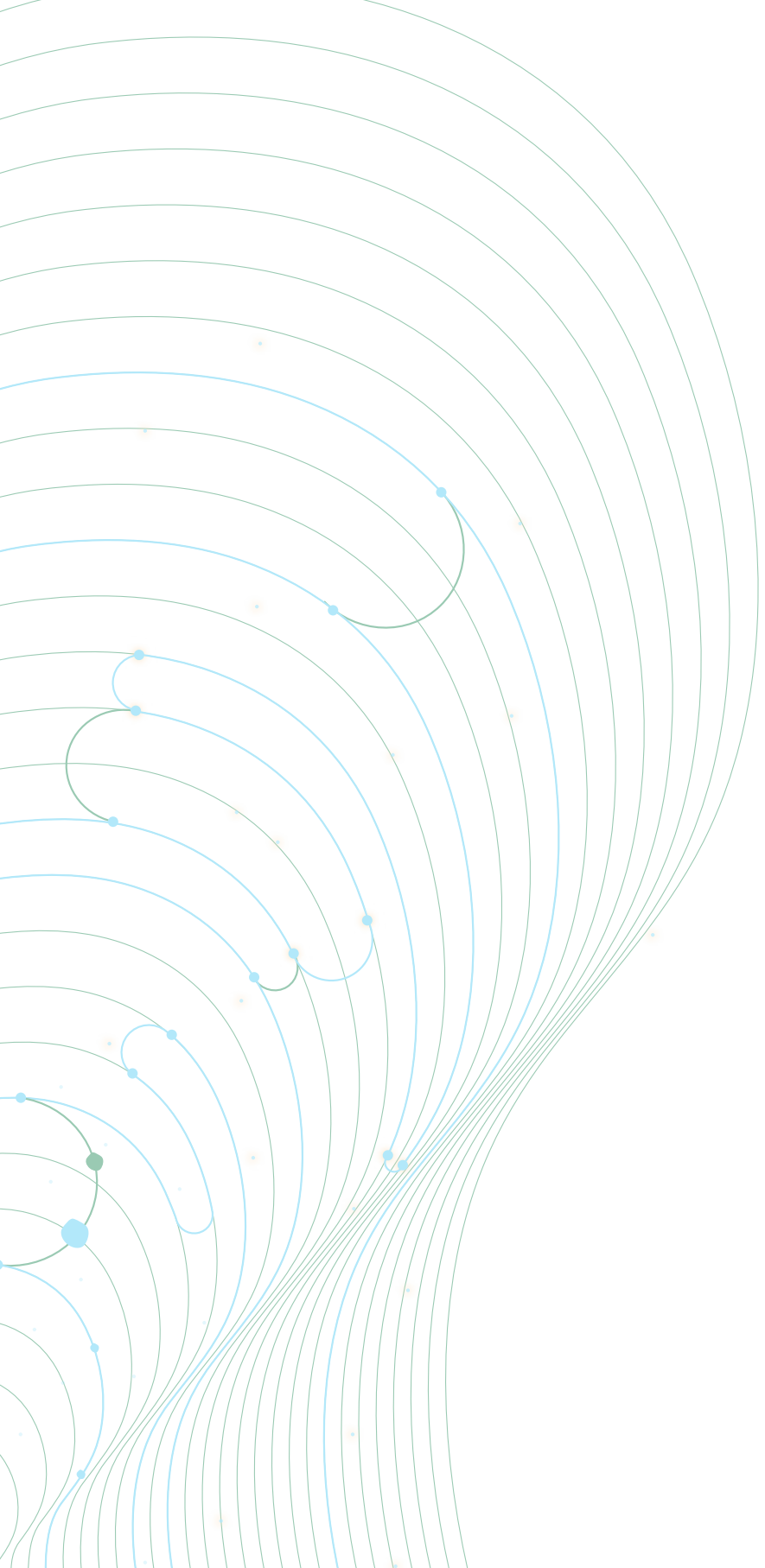
This study is a collaborative effort between Strengthening Knowledge Management For Greater Development Effectiveness In the Near East, North Africa, Central Asia, And Europe (SKiM) project, International Fund for Agricultural Development (IFAD) Near East and North Africa (NENA), and Central and Eastern Europe and the Newly Independent States (CEN) teams and critical stakeholders of conservation agriculture in Moldova. It has been commissioned by IFAD as a part of the SKiM project in 2021 and was prepared between February and April 2021.

The SKiM project has been developed by International Center for Agricultural Research in the Dry Areas (ICARDA) in collaboration with consortium partners CIHEAM Bari (Italy), Virginia Tech (USA), and Procasur. In consultation with IFAD, the proposals submitted by ICARDA, CIHEAM-Bari, Virginia Tech University, and Procasur were integrated to have a comprehensive project that can improve the knowledge management (KM) systems of three target countries. This aimed to create global learning on design and implementation principles for knowledge management projects by IFAD and other investors in the worldwide donor community in Agriculture. The project built upon IFAD's commitment to expanding its capacity development support to monitoring, evaluation, and learning systems, in conformity with thematic Cluster III (Better results management through improved M&E system) of the IFAD Medium-Term Plan 2016-2018.

SKiM aims at efficient, effective, and sustainable KM processes that include co-learning partnership activities involving diverse organizations and end-users. To ensure the application of agricultural and rural solutions, end-users are engaged in the process early on in project implementation. Such inclusion fosters interactive feedback from participating stakeholders and enhances the capacity of organizations and agents to develop and utilize rural development knowledge. Building on IFAD experience of the interventions implemented with similar stakeholders is a significant source of information for designing specific activities.

SKiM prioritizes supporting the sharing/dissemination of knowledge, focusing on strengthening capacity and the transfer of agricultural and rural solutions already considered "best practices" by farmers. It also produces strategic knowledge products that can contribute to the innovation and impact objectives of the countries it operates. This study

is one of such strategic knowledge products and uses a state of the art innovation and scaling methodologies in agricultural research for development, Scaling Readiness.

Scaling Readiness is a decision support system designed to support international research for development projects and programs implemented by CGIAR in designing, developing, disseminating, and improving the use of innovations at scale [3]. Scaling Readiness concepts and indicators used in this study are explained in the Scaling Readiness Lexicon. More general information about Scaling Readiness can be accessed via www.scalingreadiness.org. For the science dimensions of Scaling Readiness, a recent research paper [1] and implementation of the Scaling Readiness Guide [2] can be useful.

A recent case study [3] can give more information about the scope of Scaling Readiness Assessments. To have more information about Scaling Readiness and the cases it has been implemented, please contact **murat.sartas@cgmel.org**

SCALING READINESS LEXICON

Evidence-based measurement: Measures in scaling readiness are calculated using evidence. Specific claims of readiness and use measures 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, experts' opinions 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, an organizational or institutional arrangement with economic, environmental, health, industrial, etc. benefits or their purposeful combinations, i.e., systems. Innovations are different from inventions since they have explicit implementations. To be considered innovation, a product, service, an arrangement, or a system need to have a clear use objective. 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 and catalyze or support their use at scale.

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, organizational and institutional arrangements, and systems required to improve awareness of accessibility, affordability, and other characteristics of an innovation that influence the maturity and usability 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." It can be between 0, which indicates that the innovation is just an idea in the mind of its potential developers, and 9, suggesting that the innovation has been proven to achieve its use objectives in uncontrolled conditions similar to the context in which the innovation is aimed to be used without 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 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 management system's preferences. It can be an average level, a minimal level, or a weighted average level. In this study, two Scaling Readiness Levels are documented; the average Scaling Readiness Level and Scaling Readiness Score. Scaling Readiness Level is the multiplication of the averages of the individual Innovation Readiness and Use levels of components or innovations. Scaling Readiness Score is the multiplication of the readiness and use scores of the minimum level component or the innovation in the package. Scaling Readiness Score is a more strict version focusing on the minimum. It aims to help the designers of the interventions prioritize the bottleneck components or innovations that hinder the high impact at scale.

Characterization: Characterization is the first step of the Scaling Readiness cycle. It includes the activities aiming to document and classify three critical units, i.e., interventions, innovations, and stakeholders. Two of these three critical units, intervention or the component and innovation, the program, are characterized in this study by using a customized version of Scaling Readiness step 1.

Diagnosis: Diagnosis is the second step of the Scaling Readiness cycle. It includes assessments of the characteristics of the interventions, innovations, and stakeholders generated in the first step and the implications of these characteristics in achieving impact at scale. Diagnosis of the intervention and innovation is made in this study using a customized version of Scaling Readiness step 2.

Strategizing: Strategizing is the third step of the Scaling Readiness cycle. It includes strategies for addressing the diagnosis and improving the impact performance. Strategizing is done **partially** in this study by using a customized version of Scaling Readiness step 3.

EXECUTIVE SUMMARY

The world is experiencing an exceptional transition period in multiple dimensions. Health, climate, economic and political shocks are getting more common and more interwoven. Current approaches and systems based on single sectors and regular global supply chains are being disrupted more frequently. To keep agriculture viable for most farmers and enterprises, significant changes in how agricultural systems operate are necessary. The changes should include technological advances and new governance mechanisms, and a change in the overall approach to agriculture. The shocks and the changes to address forces farmers and enterprises to become more resilient.

Conservation agriculture is one of the promising approaches that can improve the resilience of the farming sectors, farmers, and enterprises involved in farming. To capitalize on the gains from the conservation agriculture, national and international governance actors in Moldova have been establishing and supporting systems. The International Fund for Agricultural Development (IFAD) has been one of the critical pillars of the support provided to conservation agriculture efforts. Conservation agriculture has been championed in IFAD Near East, North Africa, Europe, and Central Asia regional strategies and plans for more than a decade. IFAD funded multiple initiatives to enhance the Conservation Agriculture System.

This study is prepared to complement IFAD Near East, North Africa, Europe, and Central Asia directorate efforts in Moldova. It utilizes state of the art Scaling Readiness Approach[1] to assess the current Conservation Agriculture System scientifically and provide recommendations for further improvements in the Conservation Agriculture System and its contribution to resilient farming at scale. The information presented in the study is synthesized from a set of global cases. The evidence collection is partially guided by selected few experts among the pool of key experts who have significant knowledge and experience in designing and implementing the Conservation Agriculture Systems components.

The study consists of three parts that address the needs of different

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1 www.scalingreadiness.org

users. The first part, **Scaling guidelines**, presents the synthesis of the findings and provides actionable recommendations to managers of Conservation Agriculture System projects, programs, and policies and professionals of specific innovations and elements in the Conservation Agriculture System in Moldova. The second part, **Scaling Readiness Assessment**, provides a detailed description and the diagnosis of the Conservation Agriculture System using an innovation and science perspective. It also presents the Scaling Readiness graph of the Conservation Agriculture System and the innovation package that aims to improve the use of the Conservation Agriculture System at scale in Moldova. The third part, **Scaling Readiness Evidence Review**, articulates the findings of this study by discussing the evidence sources and gives an extensive list of the resources analyzed and used in writing this study. It also provides further insights in using the Scaling Readiness Approach in assessing the impact potential of innovations at scale.

The study shows that the Conservation Agriculture System is a system type of innovation consisting of 8 novel elements critical for its successful implementation. Improving the maturity of the Conservation Agriculture System requires nine other innovations to impact the resilience of farming systems in Moldova at scale. Maturity and use levels of the novel components and the complementary innovations differ significantly. It presents that agricultural practice components of the

Conservation Agriculture System and the policy frameworks supporting the system are relatively more advanced. At the same time, some of the integral and complementary products are relatively less advanced. Based on the findings, the Scaling Readiness Assessment team recommends that interventions aiming to improve the Conservation Agriculture System need to prioritize

conducting applied research on implementing farming systems principles in the Conservation Agriculture System

co-designing an application framework for integration of the high yielding varieties or new high-value-added crop alternatives into the Conservation Agriculture System

producing a youtube champion farmer story about the benefits of the Conservation Agriculture System

producing and distributing a brief fact sheet about the economic benefits of Conservation Agriculture System

integrating several tools into a digital farmer/ enterprise suitability assessment tool

The study also recommends mobilizing a diverse set of competencies cutting across multiple disciplines such as innovation behaviors, participatory research, seed and plant material regulation systems, agricultural finance, story design, and data management in addition to Conservation Agriculture System subjects.

CONTENTS

PART

A

SCALING GUIDELINES FOR IMPROVING THE CONSERVATION AGRICULTURE SYSTEM AT SCALE IN MOLDOVA

WHAT ARE THE SCALING GUIDELINES?

The scaling guidelines bridge the results of the Scaling Readiness diagnosis and assessments with the four major management questions vital for an intervention aiming to enhance the impact of the Conservation Agriculture System at scale.

Specifically, they provide answers to

what is meant by the Conservation Agriculture System in Moldova, or what do the interventions aim to scale,

what should the Conservation Agriculture System interventions need to prioritize to improve the performance of the system

which complementary innovations do the interventions need to prioritize for improving farming resilience at scale in Moldova and

which competencies and capabilities should the intervention managers look for in identifying and collaborating within their organizations and from other stakeholders operating in the agriculture for development landscape in Moldova.

The scaling guidelines are at the strategic level. They aim to be a first reference document for designing or adapting strategies and can be followed by a detailed strategic plan that can be integrated into the design and planning of the interventions to contribute to the Conservation Agriculture System in Moldova.

The guidelines are designed to be a stand-alone document for

managers of Conservation Agriculture System projects, programs, and policies,

designers, developers, and managers of specific innovations and elements in the Conservation Agriculture Systems

The Scaling Readiness measures and the evidence sources are not articulated in this part. More information about the measures can be accessed from the Scaling Readiness. Assessment (Part B) and Evidence Review (Part C). Detailed explanations about the measures and the evidence sources used to do the assessment can be accessed from the Scaling Readiness Evidence Reviews.

WHAT IS MEANT BY THE CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA?

The Conservation Agriculture System is a combination of many different products, services, organizational and institutional arrangements. Among these many components, some of them are novel in Moldova. These novel components differentiate the Conservation Agriculture System from other conventional or traditional agricultural systems in Moldova and make the Conservation Agriculture System an innovation. In other words, the Conservation Agriculture System is a system type of innovation since it introduces novel components in an integrated way in Moldova. The Conservation Agriculture System components novel for Moldova might not be novel for other countries, and the system might not be considered an innovation in other countries.

Specifically, the Conservation Agriculture System in Moldova has the following eight novel components:

Minimum or no-tillage farming	Long term vision
Mulching	Farming systems principles
Crop rotation	High-value-added crops or varieties
Use of perennial legumes	Labor-saving technologies

In brief, when an intervention mentions improving the use of the Conservation Agriculture System at scale, it refers to increasing the use of some of no-tillage farming or mulching and the use of all the components listed above coordinated way.

WHAT SHOULD THE INTERVENTIONS NEED TO PRIORITIZE TO IMPROVE THE PERFORMANCE OF THE CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA?

The components of the Conservation Agriculture System have different readiness and use scores to achieve farmer resilience. The Scaling Readiness Assessment of the Conservation Agriculture System showed that while some novel elements are at the design stage, others are already tested and validated in Moldova. While some of the elements are not known by the farmers/enterprises, others are implemented by farmers/enterprises without support from the government, civil society organizations, and international organizations.

The Scaling Readiness Assessment showed that the implementation of the farming system principles and high-value-added crops or varieties are the components that have the lowest maturity and use among all the novel components. In other words, they are the bottlenecks for achieving impact from using the system in Moldova to increase the resilience of farming.

Conducting Applied Research On Implementing Farming Systems Principles In The Conservation Agriculture System

Specifically, farming systems principles have a readiness score of 4, which corresponds to an unproven application model. Implementing the farming system principles as a part of the Conservation Agriculture System was designed as a general concept. It was validated against the basic agro-biological and social principles, and an application model for operationalizing it in other countries was proposed. However, the application model was not validated systematically, neither in Moldova nor in other countries. In other words, there is no evidence about how the implementation of the farming system principles can contribute to the high performance of the Conservation Agriculture System for achieving a more resilient farming system. To address this bottleneck or gap, the Scaling Readiness team recommends conducting applied research with an experimental design in which the conservation agriculture is implemented the system with and without implementing farming system principles. Such research will lead to findings and

insights for tools, practices, and mechanisms for better integrating the farming system principles into the Conservation Agriculture System and improving the system's maturity as a whole. Since such research is not done systematically outside of Moldova, there can be interest from the international conservation agriculture research community. Therefore, designing/participating in an international research project with a work package on implementing farming system principles in the Conservation Agriculture System in Moldova can be a good option for Moldovan researchers and knowledge organizations.

Co-designing An Application Framework For Integration Of The High Yielding Varieties Or New High-Value Added Crop Alternatives

The second bottleneck component for increasing the impact of the Conservation Agriculture System for improving farmer resilience in Moldova is the identification of high-value-added crops or varieties and their use in the Conservation Agriculture System. High-value-added crops or varieties have a readiness score of 5, which corresponds to the proven application model. Similar to the farming system principles, the use of high-value-added crops and varieties was conceptualized as one of the potential improvement sources in the Conservation Agriculture Systems. The concept was validated using agronomical research, and later multiple application models with different crop/variety choices have been designed. Some of them were validated outside of Moldova. However, how the high-yielding varieties or new high-value-added crop alternatives be integrated into the Conservation Agriculture System in Moldova was not addressed systematically. The Scaling Readiness team recommends co-designing an application framework to integrate the high-yielding varieties or new high-value-added crop alternatives to target this bottleneck. Designing the framework together with the critical farmer/enterprise representatives and the governance actors and going beyond the researchers is a critical success factor that needs to be considered. It is also essential to document the design process since the same process can be used by the local stakeholders of the Conservation Agriculture System for different crops and varieties, enabling more performance gains for the Conservation Agriculture System. The involvement of the other stakeholders will contribute to better design and awareness, and buy-in of the farmers/enterprises helping to increase the use of them at scale.

WHICH COMPLEMENTARY INNOVATIONS DO THE INTERVENTIONS NEED TO PRIORITIZE FOR IMPROVING FARMING RESILIENCE AT SCALE IN MOLDOVA?

Achieving a high maturity Conservation Agriculture System alone will not be sufficient to impact farming resilience in Moldova positively. To ensure good use of the system at scale, it is crucial to improve the other innovations that complement the Conservation Agriculture System, i.e., complementary innovations.

The Scaling Readiness Assessment identified the following nine complementary innovations and assessed the readiness and use scores for each of them.

The innovations had different readiness and use levels. The first four had relatively low readiness and use scores and are the bottlenecks in the Conservation Agriculture System package.

Producing A Youtube Champion Story About The Benefits Of The Conservation Agriculture System

Short benefit stories from conservation agriculture champions are youtube videos showcasing the experience of the farmer/enterprise champions who implemented Conservation Agriculture Systems. In the stories, multiple champions talk about their journeys using the principles of narrative design. Short benefit stories are commonly used in marketing to introduce a new system to customers and make them interested in the innovations. Although they are not very common in agriculture, there are multiple examples for a range of subjects. Some short benefits stories related to the Conservation Agriculture System have been conceptualized in other countries. Several have been tested for the Conservation Agriculture System-related subjects outside of Moldova. However, the Scaling Readiness Assessment could not identify any evidence on proposals or final versions of a champion story that presents the benefits of the Conservation Agriculture System in Moldova, which implies a readiness level of 4. To increase the awareness of the farmers/enterprises on the benefits of the Conservation Agriculture System, the Scaling Readiness team recommends making a short benefit stories video. In Moldova, existing work on farmer champions is in the form of interviews. A few projects published interviews presenting some farmers/enterprises implementing the Conservation Agriculture System. This translated into use level 2. Showcasing the youtube video in other social media outlets and advertisements on Youtube can significantly increase awareness about the Conservation Agriculture System.

Photo: IFAD Consolidated Programme Implementation Unit // www.ucipifad.md

Producing And Distributing A Brief Fact Sheet About The Economic Benefits Of Conservation Agriculture System

Factsheet about the economic benefits of the Conservation Agriculture System is a single pager or maximum two-page document presenting the economic case of implementing a Conservation Agriculture System visually. It has the readiness score of 4. In other words, the concept of using short descriptive documents for increasing the awareness of farmers/enterprises has been developed and validated outside of Moldova, and there were several short descriptive documents about the Conservation Agriculture System in Moldova as well. However, no draft or finalized fact sheet compellingly presented the economic benefit. To convince the farmers/enterprises about the benefits of implementing the Conservation Agriculture System, the Scaling Readiness Assessment team proposes to prepare the factsheet. The use level of the factsheet is 1, indicating that there is no clear evidence of the use of a similar factsheet. To increase the use of the factsheet, it is necessary to distribute them on a large scale. It could be ideal for distributing the factsheet to farmers/enterprises in their farms or in small gatherings by people informed by the factsheet content and who can communicate with the farming community at ease.

Integrating Several Tools into A Digital Farmer/ Enterprise Suitability Assessment Tool

Digital farmer/enterprise suitability assessment tool is a classification engine that uses agro-ecological conditions of the farm, socioeconomic characteristics, and farming history of the farmer/enterprise to assess if and how much a farmer/enterprise can economically benefit from using the Conservation Agriculture System. It also shows when is the break-even point for implementing the Conservation Agriculture System. Components of such a tool have been designed and tested by different interventions working in Moldova. However, a single tool with specific interfaces such as web portals or smartphone apps has not been experimentally validated yet, which corresponds to a readiness score of 6. The tool can be integrated from existing other tools in the Moldovan agricultural sector and has a considerable potential to increase the efficiency of the investments in the Conservation Agriculture System. The use level of the tool is 1. Although there is long-term use of some of the

components of the tools, such as in organic agriculture databases, the use has been restricted to a few experts working for an intervention. To increase the use of the tool, after completing its design, it is necessary to strategize the handover of the tools initially by local experts in the agricultural governance system in Moldova. Later they should be simple enough for the farmers/enterprises to assess the benefits of the Conservation Agriculture System for themselves.

Generating Evidence And Insights About The Contribution Of The Farmer Field Schools To The Conservation agriculture system By Supporting Studies Commissioned By The Local Capacity Building Governance Actors And Farmers/ Enterprises

Farmer field schools are critical capacity development assets for farmers/ enterprises interested in implementing the Conservation Agriculture System in Moldova. They have been conceptually designed and validated to contribute to implementing the Conservation Agriculture Systems outside Moldova. However, there has been no systematic applied evidence showing the contributions of using farmer field schools as an instrument to improve the Conservation Agriculture Systems in Moldova or countries in a similar context. This corresponds to a readiness score of 3. Generating such evidence and using the insights from studies has a significant potential to improve the capacity development activities about the Conservation Agriculture System in Moldova and beyond. The farmer field schools have been used by many farmers/enterprises participating in the interventions implemented by local and international investors. However, the Scaling Readiness Assessment team could not find any specific evidence for farmers/ enterprises, designers, developers of agricultural curriculums, and training practices that are not supported by the interventions. This corresponds to a use level of 3. Incentivizing the local capacity building governance actors, farmers/enterprises to recruit experts and specialists who design and develop farmer field school relevant tools and practices can increase the use of the farmer field schools. It can also lead to multiple learnings and insights that benefit the agricultural sector in Moldova as a whole.

WHICH STAKEHOLDERS TO WORK WITH NOW?

Advancing the priority work on the components of the Conservation Agriculture System and complementary innovations requires a specific set of competencies. Interventions targeting the priority work need to access these competencies by including the people who have them in the intervention teams or establishing collaboration mechanisms. These competencies are from different disciplines such as science, research, and development, agronomy, communication, and ICT. Specifically, the Scaling Readiness team recommends having the following competences

PRIORITY	COMPETENCES ON
Conducting Applied Research on Implementing Farming Systems Principles in the Conservation Agriculture System	Integrated farm management, conservation agriculture practices, conservation agriculture equipment, innovation adoption behavior, analytical writing, participatory research
Co-designing an Application Framework for Integration of the High Yielding Varieties or New High-Value Added Crop Alternatives	Seed systems, seed and plant material certification, seed and plant material regulations, EU agricultural acquis, applied international Conservation Agriculture Systems literature, agricultural finance
Producing a Youtube Champion Story about the Benefits of the Conservation Agriculture System	Story design, video production, social media management, Conservation Agriculture System
Producing and Distributing a Brief Fact Sheet about the Economic Benefits of Conservation Agriculture System	Farm accounting, enterprise accounting, agricultural finance, effective writing in Rumanian / Russian, visual design
Integrating Several Tools into A Digital Farmer/Enterprise Suitability Assessment Tool	Data management, back-end design, front-end design, user experience, public administration, farm management

PART

B

**SCALING READINESS
ASSESSMENT OF
THE CONSERVATION
AGRICULTURE SYSTEM IN
MOLDOVA**

The Scaling Readiness Assessment provides detailed information about the conservation agriculture system in Moldova and complementary innovations critical for the impact at scale potential of it for achieving more resilient farming.

Specifically, it presents:

the essential characteristics of the Conservation Agriculture System in terms of its performance at scale

the diagnosis of these essential characteristics from an innovation and scaling perspective

readiness and use scores of the novel components of the Conservation Agriculture System

innovations that are necessary to achieve a positive impact from using the Conservation Agriculture System at scale

the diagnosis of the innovations from an innovation and scaling perspective
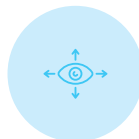
readiness and use scores of the innovations in the Conservation Agriculture System Innovation Package
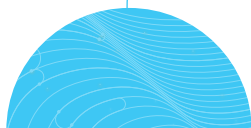
The Scaling Readiness Assessment is at the action level. It aims to provide a deeper understanding of innovation-related information relevant to achieving impact at scale by implementing the Conservation Agriculture System.

The Assessment is designed to be a stand-alone document for

managers of Conservation Agriculture System projects, programs, and policies which are interested in developing a deeper understanding

designers, developers, and managers of specific innovations and elements in the Conservation Agriculture Systems

The procedures for identifying the Scaling Readiness measures and the evidence sources are not articulated in this part. More information about the measures can be accessed from the Scaling Readiness Evidence Review (Part C). The assessment also does not articulate the implications of the findings for designing and implementing Scaling projects, programs, and policies. A synthesis of the findings and recommendations are provided in the Scaling Readiness Guidelines (Part A)

INNOVATION PROFILE OF THE CONSERVATION AGRICULTURE SYSTEM

Scaling Readiness Innovation Profile is a tool to describe the characteristics of an innovation aimed to be designed, developed, disseminated, or be used at scale [3]. It aims to create and contribute to improving the impact of the Conservation Agriculture System at scale through i) presenting gaps in the design of the Conservation Agriculture System, ii) developing a shared understanding between national actors, donors, developers, disseminators, and users about what conservation agriculture is and what it entails and iii) creating a brief communication product for presenting the innovation to various stakeholders. In this study, a customized version of the Innovation Profile is used to characterize "the Conservation Agriculture System." In this section, the Innovation Profile Sheet, an overall diagnosis of the results in the Innovation Profile Sheet, and innovation readiness and use assessment of the Conservation Agriculture System are provided.

INNOVATION PROFILE SHEET

THE CONSERVATION AGRICULTURE SYSTEM

The Conservation Agriculture System is an integrated agricultural system for producing crops in a way that has the most negligible negative impact on the environment. It improves the fertility of the soil in multiple ways and increases the resilience of farmers to soil-related shocks such as erosion and flooding. There are several fundamental tenets of the system consisting of minimum or no-tillage of soil, covering the soil surface with crop residues, and crop rotation.

APPLIED BY

Progressive smallholder farmers

SUPPORTED BY

International organizations

Foreign investors

Civil society organizations

BENEFITS

Rural residents

Urban residents

AIMS AT

Erosion control

Prevention of flooding

Climate change adaptation

PROS

Decrease input costs

Improves soil health

Improve food quality for consumers

CONS

Knowledge-intensive

Advisory support intensive

Requires no-till seeders

CONTRIBUTES TO

SUSTAINABLE DEVELOPMENT GOALS

TARGET 2·4

TARGET 3·9

TARGET 12·4

TARGET 15·1

NOVEL ELEMENTS OF THE CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA

Minimum or no-tillage farming

Mulching

Crop Rotation

Use of perennial legumes

Long term vision

Farming systems approach

High value added crops or varieties

Labor saving technologies

Innovation Profile Diagnosis

This part provides information about the diagnosis of the assessment team on the components of the innovations presented in the Innovation Profile Sheet.

Users

The Conservation Agriculture System targets most farmers in Moldova but has been used chiefly by progressive farmers, who are open to using new tools and practices. Although early-adopting progressive farmers are a minority in Moldova, they can be an excellent initial showcase for presenting the benefits of the Conservation Agriculture System. If the initial case of the progressive farmers is attractive for the remaining large group of farmers, it can be a pull factor for adopting the system. Support of international organizations, foreign investors such as Japan, and civil society organizations for increasing the use of innovative approaches in agriculture in Moldova is valuable for increasing the use of conservation agriculture. However, for large-scale adoption, it is vital to have a strategy for gradually increasing the role of local governance structures and the private sector while decreasing the role of international organizations. **Overall, the current user pattern of the Conservation Agriculture System in Moldova is compatible with the localization of international approaches and does not necessitate a significant change.**

ALTHOUGH EARLY-ADOPTING PROGRESSIVE FARMERS ARE A MINORITY IN MOLDOVA, THEY CAN BE AN EXCELLENT INITIAL SHOWCASE FOR PRESENTING THE BENEFITS OF THE CONSERVATION AGRICULTURE SYSTEM

Photo: IFAD Consolidated Programme Implementation Unit // www.ucipifad.md

Major Contributions Of The Conservation Agriculture System In Moldova

Available information about the status of the Conservation Agriculture System showed that it had and can enhance erosion control, prevent flooding and contribute to the resilience of the Moldovan agricultural sector to climate change. Although these contributions are critically significant for the sustainability of Moldovan agriculture, it is shown in other countries with a long experience with conservation agriculture that they did not necessarily raise the interest of farmers and convinced them to adopt the Conservation Agriculture System. **To increase the use of the Conservation Agriculture System at scale, it is necessary to build on the early studies done in Moldova and explore which potential activities can convince the Moldovan farmers to adopt the system.**

Advantages And Disadvantages Of Conservation agriculture system In Moldova

Compared to its conventional alternatives in Moldova, the Conservation Agriculture System requires fewer inputs (fertilizers, herbicide in the long run, etc.). It requires less cash in the long run. Also, a reduction in the use of chemical inputs leads to higher quality agricultural produce. However, the Conservation Agriculture System can be labor-intensive. Labor-intensive activities are an opportunity for an economy with a growing population. However, this advantage does not translate into a real one in Moldova due to the shortage of labor and low level of unemployment in Moldova.

On the contrary, coupled with the decline of the labor force in absolute numbers in Moldova and migration to cities, the labor will become less scarce, which will make the labor intensity a more considerable disadvantage. The Conservation Agriculture System is also intense in terms of the farmer knowledge it requires and research and extension support. **To increase the use of the Conservation Agriculture System at scale in Moldova, it is necessary to orient the Conservation Agriculture System away from low value-added high volume cereals to high-value-added niche sectors. Another option is to increase accessibility and use of labor-saving technologies.**

Novel Elements Of The Conservation Agriculture System In Moldova

To achieve a positive impact at scale, new interventions like conservation agriculture need to do business differently and introduce novel elements to the agricultural sector in Moldova. Therefore, it is crucial to identify the novel elements necessary to use the Conservation Agriculture Systems at scale and understand their current status to develop appropriate strategies.

The research done by the assessment team identified **eight** novel components for the Conservation Agriculture System. Four of the eight components are well-established agricultural practices in the Conservation Agriculture System in several high-income countries. However, they are new for most of the farmers in Moldova. These four are minimum or no-tillage farming, mulching, crop rotation, and the use of perennial legumes with the main crops. These four practices address the needs of soil fertility management and play critical roles in the performance of the Conservation Agriculture System as an innovation in Moldova.

The assessment team identified the remaining four from the interviews with the key experts working on the Conservation Agriculture System in Moldova and studying the experience of other countries around the globe which have similar conditions with Moldova. The components are long-term vision, utilization of farming systems approach, a set of high-value-added crops or crop varieties, and labor-saving technologies.

The interviews done for the assessment showed that the Conservation Agriculture System in Moldova needs to have a **long-term vision for change**. In the current demographic, advisory service, and technological endowment conditions of the Moldovan Agricultural sector, in the short term, it is hardly possible to achieve adoption of the Conservation Agriculture System at scale. Reaching favorable labor conditions, building necessary research and extension capabilities, and building machine parks sufficient for the use of the system at scale can be achieved only in the long term. Therefore, the Conservation Agriculture System in Moldova needs to include a long-term vision as an integral part.

The current state of the art of science and knowledge about the Conservation Agriculture System indicates that successful implementation of the Conservation Agriculture System   requires understanding the interactions between crops, soil biology, soil physics and chemistry, climate, and market conditions in specific contexts. In other words, it requires using a **farming systems approach** in organizing the agricultural activities rather than a standardized intensified farming value chain approach. To be able to achieve a high impact on the Conservation Agriculture System at scale in Moldova, suitable farming systems in Moldova need to be identified, nurtured, and institutionalized.

Mini-Till
Disc

Photo: IFAD Consolidated Programme Implementation Unit // www.ucipifad.md

Diagnosis of the advantages and disadvantages of the Conservation Agriculture System in Moldovan conditions showed that a mainstream system that focuses on cereals and other low margin crops might not be viable in Moldova. Although the experience of using a conservation agriculture approach in high-value-added crops is scarce, there are examples of successes [4–6]. A similar effort for identifying **high-value-added options** such as very high-performing cereal varieties or new crops that would fit best to the local context in Moldova might catalyze the use of the Conservation Agriculture System at scale.

Diagnosis also indicated that labor is a critical ingredient for the Conservation Agriculture System, and it is scarce in Moldova. Therefore, achieving the use of the system in Moldova requires a variety of **labor-saving technologies** that will increase the efficiency of the work in different activities of agricultural production. These technologies include machinery with minimal soil disturbance and digital elements that will capitalize the information for reducing the need for interaction.

Readiness And Use Of The Conservation Agriculture System

The Scaling Readiness of an innovation is the **first** metric used to assess the impact potential of the Conservation Agriculture System in Moldova. It focuses on the components of the system and provides a holistic picture of readiness and use. Readiness is a measure of how good the components of an innovation perform to achieve its desired objective, while use is a measure that presents the type of people using the system and their numbers. More information about the readiness and use measures can be found in Annex 1 and 2.

The Scaling Readiness Assessment team has prepared a Scaling Readiness Assessment for the Conservation Agriculture System by using the published evidence provided in the evidence review in Part C. The assessment results are specific for Moldova in February and March 2021 for the contribution of the Conservation Agriculture System to the resilience of the farmers in Moldova. It can differ for other countries, for other periods, and in achieving other goals.

Figure B1:
Scaling Readiness Assessment of the
Conservation Agriculture System
For Moldova - 2021 March - More Resilient Farming

CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA FOR MORE RESILIENT FARMING, MARCH 2021

- Practice
- Product
- Principle
- Innovation

The Conservation Agriculture System in Moldova has an average readiness level of **6.4** and a use level of **2.9**, corresponding to an average Scaling Readiness Level of **18.3** and a Scaling Readiness Score of **4**.

Mulching

Minimum or no-tilage farming

Crop Rotation

Use of perenial legumes

High value added crops or varieties

Long term vision

Conservation Agriculture System

Labor saving technologies

Farming systems principles

Readiness level ▲

Use level ▶
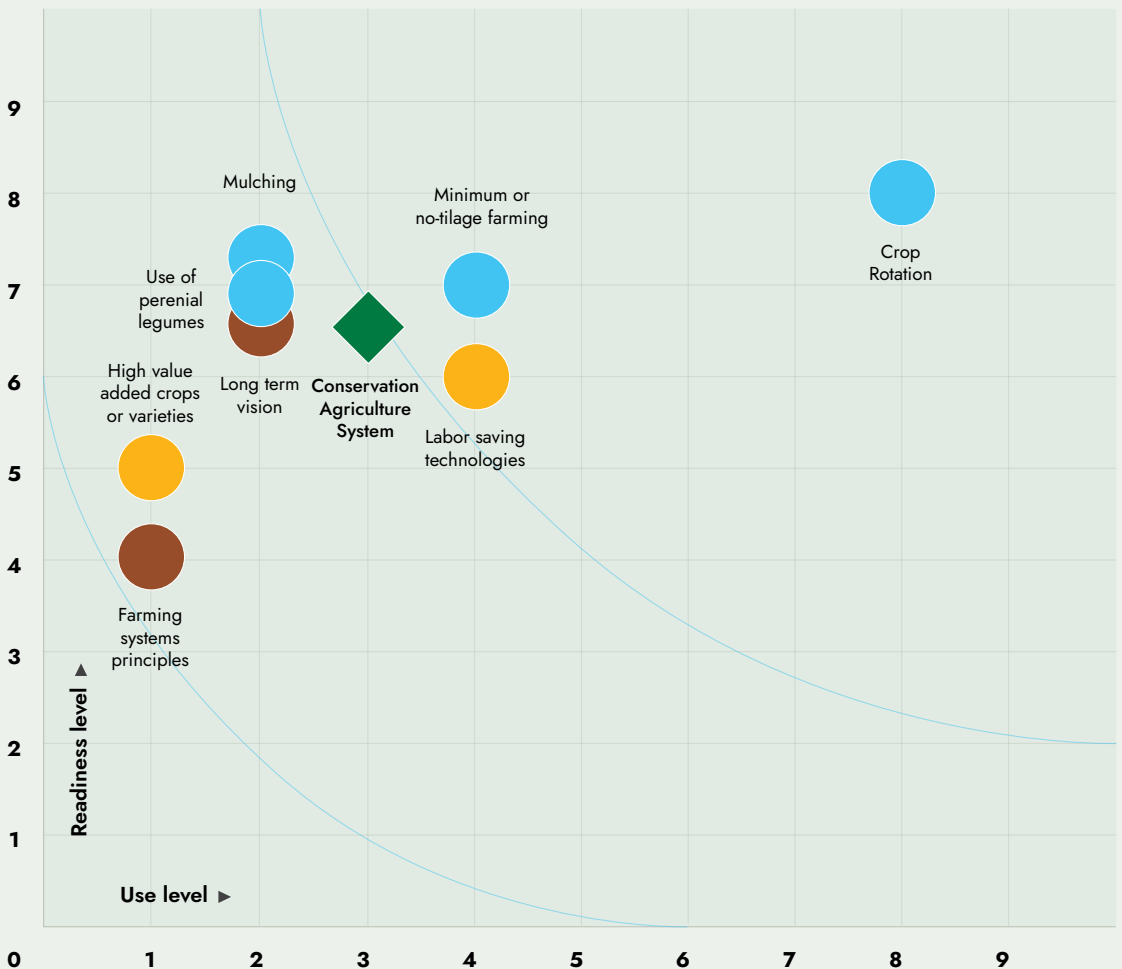
Scaling Readiness Of Conservation Agriculture System

Scaling Readiness Assessment of the elements of the Conservation Agriculture System in March 2021 in Moldova for achieving more resilient farming indicates that the elements vary in terms of their readiness (their functional performance) and use (their actual use in Moldova). Overall, the evidence base about the four practices is broader, and practices have higher documented readiness levels (Figure 1 - above). Crop rotation has a level of readiness 8, meaning that it has been validated to work in Moldova to improve the resilience of farmers in a controlled environment. Minimal or no-tillage, mulching, and use of perennial legumes have readiness scores of 7, meaning that the work on their contributions to the resilience of farmers has been continuing in Moldova.

The Conservation Agriculture System's principle and product components have lower scores than the practices except for the long-term vision principle. Like most practices, the long-term vision principle have been argued to contribute to more resilient farming in Moldova, but how it contributes is not shown yet scientifically. The other principle, the farming systems principle for designing and implementing the Conservation Agriculture System, has a readiness score of 4 for improving farming resilience in Moldova. Although there are some application models for operationalizing farming systems principles in conservation agriculture, there is no precise application of the principle that can be used in Moldova yet.

Two products in the Conservation Agriculture System in Moldova have readiness levels 6 (labor-saving technologies for implementing Conservation Agriculture System) and 5 (high-value-added crops or varieties that can be used in the Conservation Agriculture System). Application models for some mechanical equipment technologies, same high-value crops, and high yield cereal varieties have been designed in other countries, and some of these are provided in Moldova. However, there is no clear evidence on how they contribute to implementing the Conservation Agriculture System in Moldova yet.

In terms of the use, the components of the Conservation Agriculture System in Moldova have higher variability. Crop rotation is implemented by a small ratio of farmers in Moldova that the government or another development intervention has not supported. The assessment could not identify any clear evidence of the use of the other components beyond the secondary partner farmers, who were linked to the people who are supported by the interventions implemented by international organizations and civil society. There is documented evidence that minimum or no-tillage farming and labor-saving technologies are used in Moldova by the farmers who are not directly linked to the interventions.

The partner farmers of the interventions used mulching and perennial legumes. However, long-term vision, farming system principles, and the high-value crops and varieties for the Conservation Agriculture System were not shown to be adopted by stakeholders beyond the intervention teams.

INNOVATION PACKAGE PROFILE FOR THE CONSERVATION AGRICULTURE SYSTEM

Scaling Readiness Innovation Package Profile is a tool to describe other innovations necessary to use an innovation at scale. Innovations can not be used at scale without other innovations complimenting their use [1]. For instance, a machine can not achieve use at scale without complementary energy infrastructure, the best practices about using it, etc. Scaling Readiness Innovation Package Profile aims to improve the performance of an intervention through i) helping to identify other innovations systematically and ii) developing a shared understanding between the project managers, designers, developers, disseminators, and use partners about their complementary roles. In this study, an Innovation Package Profile is used to identify other innovations necessary to use "Conservation Agriculture" at scale. In this section, i) the Innovation Package Sheet, ii) an overall diagnosis of the configuration of the Innovation Package Sheet, and iii) innovation readiness and use assessments of the innovation package are provided.

INNOVATION PACKAGE FOR THE CONSERVATION AGRICULTURE SYSTEM

SHORT BENEFITS STORIES FROM CONSERVATION AGRICULTURE CHAMPIONS

Short (youtube) videos showing the support farmers can receive if they use conservation agriculture practices

⊘ To increase awareness about direct short term benefits of using Conservation Agriculture System

FACTSHEET OF ECONOMIC BENEFITS

A digital/paper one-pager that is showing the conditions the conservation agriculture can be profitable and economic opportunities it offers

⊘ To convince farmers to adopt the Conservation Agriculture System

FINANCIAL INCENTIVES FOR AGRICULTURAL TOOLS AND EQUIPMENT

Subsidy and tax break legislation and mechanism for purchasing and maintenance of agricultural tools and equipment

⊘ To increase the affordability of equipment necessary to apply Conservation Agriculture System

APPLIED AGRICULTURAL TOOL AND EQUIPMENT USE AND MAINTENANCE COURSE

Practical training course on use, maintenance, and repairing of agricultural machinery and other tools

⊘ To increase the capacity of farmers to use tools used in the Conservation Agriculture System

TRANSLATION INCENTIVES FOR APPLIED CONSERVATION AGRICULTURE PUBLICATIONS

Financial and nonfinancial incentives for translating the applied knowledge of Conservation Agriculture System best practices around the world

⊘ To increase the capacity of farmer trainers and service providers to farmers

FARMER FIELD SCHOOLS

Whole year long available farmer support and demonstration facility

⊘ To increase the capacity of farmers to use Conservation Agriculture System

LOCAL INTEGRATED RESEARCH AND KNOWLEDGE MANAGEMENT SYSTEM

A green paper (background study) for identifying research and science capabilities that can be mobilized in implementing the Conservation Agriculture System and recommendations for consolidating them

⊘ To increase the effectiveness of generating, disseminating, and using local know-how on Conservation Agriculture System

DIGITAL FARMER/ENTERPRISE SUITABILITY ASSESSMENT TOOL

A digital tool for identifying which farmers can and cannot commercially benefit from the Conservation Agriculture System

⊘ To increase the efficiency of the Conservation Agriculture System

AGRICULTURAL TOOL AND EQUIPMENT REPAIR SUPPORT PROGRAM

A set of training and investment support program for agricultural tool and equipment repairing workshops

⊘ To increase the efficiency of the Conservation Agriculture System

Diagnosis Of The Innovation Package

This part provides information about the diagnosis of the innovations presented in the innovation package sheet.

Awareness About The Conservation Agriculture System At Scale

The Conservation Agriculture System is known by progressive farmers and enterprises eligible for interventions implemented by governments and international donors. Information portals such as Agrobiznez.md provide up-to-date support on the Conservation Agriculture System. However, there is no sufficient awareness among the majority of farmers and small enterprises about the economic benefits and direct support they can get if they use the Conservation Agriculture System. One innovation that can address the gap in awareness is "**Short benefits stories from conservation agriculture champions**," in which farmers who got support for using the Conservation Agriculture System share their own experience and explain the support and economic benefit they received. Since youtube is one of the top websites visited by Moldovans, using youtube for hosting videos has an immense potential to increase the outreach of the benefit stories and their contribution to awareness.

Being Convinced About The Benefits Of The Conservation Agriculture System At Scale

The research done for this study showed that most of the stakeholders of the Conservation Agriculture System were convinced that the system contributes to the resilience of farming through multiple channels. However, being convinced about more resilient farming is not sufficient to use the Conservation Agriculture System alone. To achieve large-scale use, the economic benefits of the system need to be presented clearly in a concise manner. A potential innovation that can convince most of the farmers in Moldova is a **short fact sheet** presenting the economic benefits and the requirements for benefiting economically.

Affordability Of The Conservation Agriculture System

A suit of labor-saving technologies, i.e., **agricultural tools and equipment**, is one of the components of the Conservation Agriculture System. Equipping farmers and enterprises with such technologies require significant investments. The number of farmers and enterprises who have the financial capability to afford such tools and equipment is limited in Moldova. In addition, agricultural equipment and tools usually have high rates of depreciation and require continuous maintenance. In other words, purchasing and maintaining agricultural tools and equipment are not affordable for most Conservation Agriculture System users. Therefore, financial incentives for agricultural tools and equipment can increase the affordability of the Conservation Agriculture System at scale. Previous studies in Moldova showed that cash transfer incentives did not necessarily contribute to the use of Conservation Agriculture Systems[7]. Considering that most of these tools and equipment are imported, legislation that provides tax breaks and subsidies for imports can increase the use of the Conservation Agriculture System.

Capacity Of The Users To Benefit From The Conservation Agriculture System At Scale

The Conservation Agriculture System has four farming practices (minimum or no-tillage, mulching, crop rotation, and use of perennial legumes) and two principles (long-term vision and farming systems approach). Previous studies showed that implementing these practices in the light of principles requires a significant departure from conventional agricultural methods. To enable the transition from conventional practices and principles to the Conservation Agriculture System, it is necessary to provide capacity building. **Farmer field schools** are an innovation that can be used to achieve the required capacity building. Among others, they have i) the advantage of providing a range of different subjects in a single curriculum, ii) providing continuous demonstration opportunity, and iii) training the farmers and enterprises on the use of the practices and principles of the Conservation Agriculture System in an integrated manner in practice rather than individual practices and abstract principles. In other words, farmer field schools can make significant contributions to the capacity development needs of farmers and enterprises to apply the Conservation Agriculture System.

A suit of labor-saving technologies, agricultural tools, and equipment is another component of the Conservation Agriculture System that requires capacity building. Some of these technologies are new to Moldova, and users need to have the capacity to use them. In addition, the literature on conservation agriculture outside of Moldova showed that the training is not effective unless it has significant applied components. Therefore, an **applied agricultural tool and equipment use course** has a significant potential to address the capacity development needs of the Conservation Agriculture System. The course could be a part of the curriculum of the farmer field schools. They should also be provided stand-alone since some of the graduates of farmer field school programs will need training about new tools and technologies that will come to Moldova, and some enterprises can be interested only in the technological part.

Photo: IFAD
Consolidated
Programme
Implementation Unit //
www.ucipifad.md

Effectiveness Of The Conservation Agriculture System At Scale

The Conservation Agriculture System is a knowledge-intensive system. It requires high-resolution customized data on biophysical and socio-economic systems. Moreover, due to climate change, and recent developments in international politics, the variability and intensity of shocks are increasing. These combined make **local integrated research and knowledge management system** including tools and practices for generating, disseminating, and using local applied knowledge, an essential complementary aspect for the successful implementation of the Conservation Agriculture System. A pillar of the local management system is to understand the current capabilities of the public, private sector, and international organizations to serve the needs of the Conservation Agriculture System. In addition, available information on the organizational system indicates a decentralized and loosely integrated knowledge generation and dissemination. A first step to map existing capabilities and consolidate such capabilities for the needs of the Conservation Agriculture System is a green paper[1] on consolidating research and knowledge capabilities related to the Conservation Agriculture System. The green paper with systematic assessment of knowledge management capabilities and recommendations for consolidating them can improve the effectiveness of the Conservation Agriculture System.

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1   A green paper is a tentative government report and consultation document of policy proposals for debate and discussion. A green paper represents the best that the government can propose on the given issue, but, remaining uncommitted, it is able without loss of face to leave its final decision open until it has been able to consider the public reaction to it.

Efficiency Of The Conservation Agriculture System At Scale

Currently, the Conservation Agriculture System is a niche in Moldovan agriculture. Although every farmer and enterprise can implement a Conservation Agriculture System, most of them will not be capable of implementing it profitably. Considering the resource limitations, it is necessary to identify the profile of the farmers and enterprises that are most suitable for successfully implementing the Conservation Agriculture System. In addition, the variability of the farm and farmer/enterprise characteristics in Moldova is high. Therefore, it is necessary to consider a diverse set of variables to identify the best-fit farmers/enterprises that can benefit from the Conservation Agriculture System. A **digital farmer/enterprise suitability assessment tool** can overcome the diversity of variables. By identifying which farmers can and cannot commercially benefit from the Conservation Agriculture System, it is possible to design and develop more targeted instruments and support projects, increasing the efficiency of the investments done on the Conservation Agriculture System.

Agricultural equipment and tools are significant parts of the cost of the farmers/enterprises implementing the Conservation Agriculture System. Also, they usually have high rates of depreciation and require continuous maintenance due to the nature of their work. To use them efficiently, it is necessary to keep the time they are under maintenance and repair at a minimum. In most circumstances, it is not easy to build the human and hardware capacity of the farmers and enterprises to deal with the maintenance and repair of their tools and equipment themselves. An excellent way to create sufficient maintenance and repair capacity to serve all the farmers/ enterprises is to support existing workshops that can serve as hubs for different parts of Moldova. Since existing workshops do not have sufficient human and equipment capacity, an **agricultural tool and equipment repair support program** has immense potential to increase the efficiency of the Conservation Agriculture System.

23

COUNTRIES HAVE ASSESSED THEIR INNOVATIONS USING SCALING READINESS. MOLDOVA IS THE FIRST IN EUROPE

Scaling Readiness Of The Innovation Package

The Scaling Readiness of an innovation package is the **final metric** used to assess the impact at scale potential of the Conservation Agriculture System. The scope of the Scaling Readiness of the innovation package goes beyond the components of the Conservation Agriculture System, which were analyzed previously and include all the innovations in the Innovation Package Sheet and following diagnosis section.

The Scaling Readiness Assessment team has prepared a Scaling Readiness Assessment for the Conservation Agriculture System Innovation Package using the published evidence in Part C, the Evidence Review. The assessment results are specific for Moldova in February and March 2021 for the contribution of the Conservation Agriculture System to the resilience of the farmers in Moldova. It can differ for other countries, for other periods, and in achieving other goals.

The innovations in the Conservation Agriculture System Innovation Package had a minimum readiness score of 3 and a maximum readiness score of 8 (Figure 2). Their use score ranged from 0 to 6. The average innovation readiness score was 5.67, and the average innovation use score was 3.44. These corresponds to an average Scaling Readiness Score of 17.82 and a Scaling Readiness Level of 4[2].

The Scaling Readiness Assessment of the Conservation Agriculture System Innovation Package indicated that policies (brown-colored innovations in Figure 2) relevant for achieving significant improvements in the more resilient farming sector in Moldova are relatively more mature and have been used more. After policies, services have on average higher readiness, and the products in the package have the least readiness and use scores. Considering that policies necessitate a longer duration to improve, this picture presents a potential for quick improvements in the impact at scale potential of the Conservation Agriculture System Innovation Package. The lowest readiness and use components are the factsheet about the economic benefits of the Conservation Agriculture System, short champion benefit stories, and farmer field schools. Accessible resources on these three innovations indicated no applied evidence on how farmer field schools contributed to implementing the Conservation Agriculture System. Although there was some scattered information about the economic benefits, there were no integrated, easily accessible video stories presenting the business case to implement the Conservation Agriculture System.

2   Please see glossary for the interpretation of the measures.

Figure B2:

Scaling Readiness Assessment of
the Conservation Agriculture System Innovation Package
For Moldova - 2021 March - More Resilient Farming

CONSERVATION AGRICULTURE SYSTEM INNOVATION PACKAGE IN MOLDOVA FOR MORE RESILIENT FARMING, MARCH 2021

The Conservation Agriculture System Innovation Package has an average readiness score of **5.67** and a use score of **3.44**, corresponding to an average Scaling Readiness Level of **17.82** and a Scaling Readiness Score of **4**.

- Product
- Service
- Policy
- All Package

Tool and equipment repair support program

Translation incentives

Applied tool and equipment course

Digital farmer/ enterprise suitability assessment tool

Agricultural tools and equipment incentives

Conservation Agriculture System Innovation Package

Loca Integrated Research and Knowledge Management System

Factsheet of economic benefits

Short champion benefits stories

Farmer field school

Readiness level ▲

Use level ▶
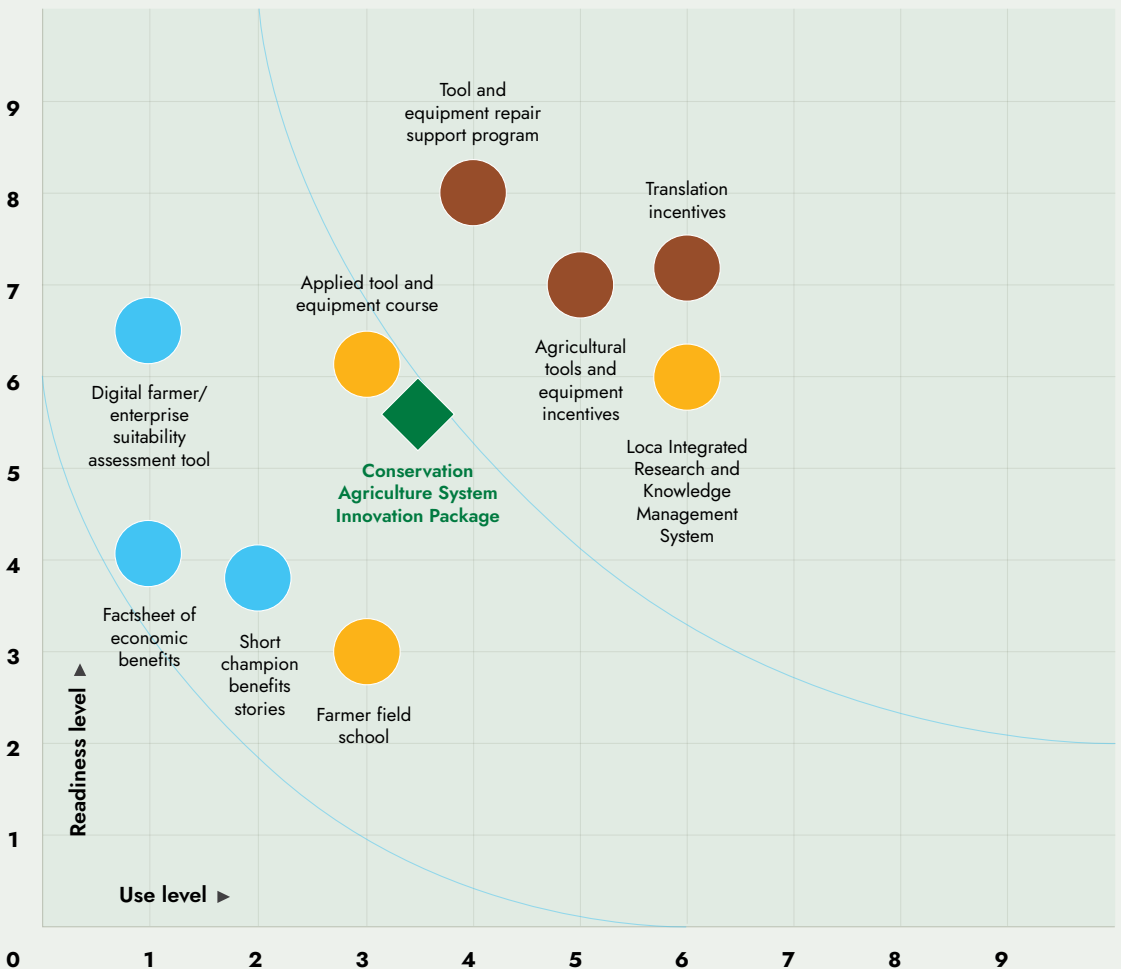
PART

C

**SCALING READINESS
EVIDENCE REVIEW
FOR CONSERVATION
AGRICULTURE SYSTEM
IN MOLDOVA**

The Scaling Assessment Study for the Conservation Agriculture System in Moldova for More Resilient Farming in March 2021 includes two Scaling Readiness Assessments. Based on the fact that the impact at scale potential of an innovation depends on the novel aspects it has concerning the existing innovation landscape, Scaling Readiness Assessment of the Conservation Agriculture System identifies the novel elements of the system and measures the readiness and use scores of each of them. Afterward, Scaling Readiness does the same for the innovation package, i.e., the combination of innovations necessary to improve the impact at scale potential of the Conservation Agriculture System in Moldova for achieving more resilient farming.

This Evidence Review provides a detailed explanation of the readiness and use levels of each of the components of the Conservation Agriculture System and the innovations included in the Conservation Agriculture System Innovation Package. It also links the study to the broader science and technical documentation of Scaling Readiness and the conservation agriculture literature in Moldova and globally. To support further inquiries about the quality of the Scaling Readiness Assessment and contribute to the design of other research and management interventions, it provides a complete list of the resources used to carry out the assessment.

The Scaling Readiness Evidence Review is at the research and science level. It aims to provide a systematic assessment of the evidence sources and technical information about using Scaling Readiness Metrics.

The Evidence Review is designed to be a stand-alone document for

designers, developers, and managers of specific innovations and elements in Conservation Agriculture Systems

researchers who conduct applied research on Conservation Agriculture Systems

practitioners who are interested to learn more about doing Scaling Readiness Assessment

The basic information about the novel components of the Conservation Agriculture System and the descriptions of the innovations in the Conservation Agriculture System Innovation Package are not presented in detail in the Evidence Review. This information is available in the Scaling Readiness Assessment (Part B). The Evidence Review also does not articulate the implications of the findings for designing and implementing Scaling projects, programs, and policies. A synthesis of the findings and recommendations are provided in the Scaling Readiness Guidelines (Part A)

SCALING READINESS ASSESSMENT OF THE CONSERVATION AGRICULTURE SYSTEM TO IMPROVE FARMING RESILIENCE IN MOLDOVA MARCH 2021 ONWARDS

The core innovation of this study is the **Conservation Agriculture System in Moldova**. It consists of the following eight novel components.

AGRICULTURAL PRACTICES

Minimum or no-tillage farming

Mulching

Crop rotation

Use of perennial legumes

FARM MANAGEMENT PRINCIPLES

Long-term vision

Farming systems principles

PRODUCT TYPE FARM INPUTS

High-value-added crops or varieties

Labor-saving technologies

These novel components were identified by assessing the available evidence base about the agriculture and rural sector in Moldova and the key informant interviews with the experts working in various research and development organizations in Moldova. The components might change across time depending on the changes in Moldova or reorientation of the objective from a more resilient farming system to another objective.

Each of the eight components has different readiness and use scores (Figure 1). Available evidence showed that on average agricultural practices (Blue colored components in Figure 1) have higher readiness scores. In other words, they are more mature and have higher development status in Moldova for achieving more resilient agriculture. Among the components, crop rotation had the highest documented use. It was shown that there are some farmers/enterprises in Moldova that use crop rotation without receiving direct support from existing research for development projects. This was not the case for the other components of the Conservation Agriculture System. In the rest of the section, specific scores and the evidence sources that support these scores are presented in detail.

Photo: Selectia Research Institute of Field Crops, Dorin Ceban

Figure C1:

Scaling Readiness Assessment of
the Conservation Agriculture System
For Moldova - 2021 March - More Resilient Farming

CONSERVATION AGRICULTURE SYSTEM IN MOLDOVA FOR MORE RESILIENT FARMING, MARCH 2021

The Conservation Agriculture System in Moldova has an average readiness level of **6.4** and a use level of **2.9**, corresponding to an average Scaling Readiness Level of **18.3** and a Scaling Readiness Score of **4**.

- Practice
- Product
- Principle
- INNOVATION

Mulching

Use of perennial legumes

Minimum or no-tiliage farming

Crop rotation

Long term vision

Conservation Agriculture System Innovation Package

High value added crops or varieties

Labor saving technologies

Farming system principles

Readiness level ▲

Use level ▶

Minimum Or No-tillage Farming

Minimum or no-tillage farming had a relatively broader evidence base. Multiple resources [8–12] included clear evidence of the improvement in the long-term benefits of minimum and no-tillage in the farms, supported by the research and development projects in Moldova. Since the Scaling Readiness team could not identify evidence of the benefit for farms that did not receive direct support, the readiness of the minimum or no-tillage farming was at the level of proven application in the controlled environment - level 7. In terms of the use, there was evidence that minimum or no-tillage practices were implemented by the farmers/enterprises who were supported by research for development projects [13,14]. It was shown that some farmers/enterprises are not directly receiving support but still benefiting from such support [7]. This translated into a use level of 4.

Mulching

Several resources also validated the contribution of mulching. It was shown that mulching increased the resilience of the farming in Moldova by increasing the productivity of the soil in the long term and reducing the external input requirement [8,15,16]. Since the evidence was taken from farms supported by the research and development interventions, not in uncontrolled conditions without support, the readiness level was 7. Pilarova et al. 2018 have shown that mulching was used by the farmers/enterprises involved in the projects implemented by international and national research organizations [7]. Since the study could not identify any evidence of the use of mulching outside of the projects supported by research and development organizations, the use score was 2.

Crop Rotation

The Scaling Readiness Assessment team has identified many resources on the benefit of crop rotation in Moldova and other East European and Blacksea countries. Andrieş et al. and Baltag showed that crop rotation contributed to the resilience of farming in Moldova in the controlled conditions [17,18]. Many others discussed the use of crop rotation by farmers/enterprises in Moldova without support from research and development organizations [10,19–24]. Since there was early evidence

of the contribution of the crop rotation without support, the readiness level was 8. There was also more evidence about the use of crop rotation. Multiple resources have shown that crop rotation was practiced by the farmers/enterprises that were not involved in any research for development projects [8,25–27]. This corresponded to a higher use level than the other components, with a use level of 6.

Use Of Perennial Legumes

Some studies argued for the benefit of perennial legumes on the resilience of farming in Moldova [9]. Olesa and Cerbari, Olfirovich presented some results on the benefits in Moldova in a controlled environment [28,29], and Andrieş et al. [17] showed the evidence on the benefit in Moldova. Therefore the readiness level of perennial legumes was 7. In terms of the use of perennial legumes, a paper written by Pilarova was the only resource explicitly referring to the user dynamics [7]. It showed the use of perennial legumes by the partner farmers/enterprises of the research for development projects, which implies a use level of 2.

Long-term Vision

Two resources showed that having a long-term vision improved the benefit of conservation agriculture outside of Moldova[10,30]. Several others showed that the benefits are observed in Moldova as well [14,22,31]. This corresponded to a readiness level of 7. There were resources explicitly mentioning the use of the long-term approach in the context of conservation agriculture in Moldova. Leah et al. mentioned that some of the research for development initiatives have a long-term vision [10], and the long-term vision was implemented by enterprises supported by international investors [14]. Since the use of the long-term vision was restricted to the projects and their few partners, the use level was 2.

Farming Systems Principles

The use of farming system principles in the context of the Conservation Agriculture System in Moldova was proposed by Boincean [8] and was supported by conceptual studies of multiple other researchers in [8,32] and outside of Moldova [33–36]. However, no applied study showed the contribution of the farming system approach in practice in Moldova. Therefore, the readiness level of farming system principles was 4. The Scaling Readiness Assessment team could not identify any resource that explicitly refers to the use of farming system principles in conservation agriculture in Moldova. Thus, the use level of the farming system approach in practice was 0.

High-value-added Crops Or Varieties

Several studies showed that conservation agriculture is more viable when done for the high-value-added crops instead of staples or food security crops outside Moldova [33,37,38]. However, the Scaling Readiness Assessment team could not find a resource to study the benefits of using high-value-added crops and comparing them with dominant cereals. These implied that the readiness score of including high-value-added crops in the Conservation Agriculture System was 5. The Scaling Readiness Assessment team found projects that promote high-value-added with a conservation agriculture approach [39,40]. Still, there was no evidence of implementation outside the project team and farmers/enterprises working with the projects. Therefore, the use level was 1.

Labor-saving Technologies

The benefits of using labor-saving technologies were presented in multiple resources outside of Moldova [41,42], and it was tested empirically in multiple countries [7,43]. However, the Scaling Readiness Assessment team could not identify any evidence that showed how using labor-saving technologies in a Conservation Agriculture System benefited farming resilience in Moldova. Therefore, the readiness level was 6. In terms of use, it was shown that some tools and agricultural equipment were used by farmers/enterprises, which are not directly supported by research for development projects but indirectly benefited from them [10,44,45]. This translated into a use level of 4.

SCALING READINESS ASSESSMENT OF THE CONSERVATION AGRICULTURE SYSTEM INNOVATION PACKAGE TO IMPROVE FARMING RESILIENCE IN MOLDOVA MARCH 2021 ONWARDS

The Conservation Agriculture System alone is not enough to achieve impact at scale. To be able to show its full potential in improving the resilience of the farming in Moldova and achieve use at scale, it needs to be complemented by other compatible innovations that fit the conditions of Moldova. An innovation package is a set of innovations, including the Conservation Agriculture System and other complementary innovations. These innovations are necessary to increase awareness of farmers/enterprises, convince them of the benefits of implementing the system, and ensure that the Conservation Agriculture System is available, accessible, affordable, and user-friendly, effective, and efficient.

The Conservation Agriculture System Innovation Package has nine more innovations. In addition to the system described in the previous section has the following innovations belonging to three main categories, i.e., products, services, and policies.

PRODUCTS

- Short benefits stories from conservation agriculture champions

- Factsheet of economic benefits

- Digital farmer/ enterprise suitability assessment tool

SERVICES

- Applied agricultural tool and equipment use and maintenance course

- Farmer field schools

- Local integrated research and knowledge management system

POLICIES

- Financial incentives for agricultural tools and equipment

- Translation incentives for applied conservation agriculture publications

- Investment support program for agricultural tool and equipment repair

CONSERVATION AGRICULTURE SYSTEM CONSISTS OF NOT ONLY AGRICULTURAL PRACTICES, BUT ALSO FARM MANAGEMENT PRINCIPLES, PRODUCTS, AND SERVICES

The readiness and use scores of these nine innovations differ. Among them, the policy innovations have larger readiness scores indicating that the policy domain in conservation agriculture is more advanced than the products and services domain (Figure 2). None of the innovations have a higher use level than six, indicating that the existing knowledge of the implementers about the Conservation Agriculture System is minimal beyond the farmers/enterprises involved in the projects. Among the components, farmer field schools, short champion benefit stories, factsheet of economic benefits, and applied tools and equipment courses have the lowest readiness and use scores. In the Scaling Readiness approach, they are the bottlenecks that hinder the impact of the Conservation Agriculture System at scale and need to be prioritized by the upcoming interventions on conservation agriculture. In the rest of the section, specific scores of the innovations in the Conservation Agriculture System Innovation Package and the evidence sources that support these scores are presented in detail.

Figure C2:
Scaling Readiness Assessment of
the Conservation Agriculture System Innovation Package
For Moldova - 2021 March - More Resilient Farming

CONSERVATION AGRICULTURE SYSTEM
INNOVATION PACKAGE IN MOLDOVA FOR
MORE RESILIENT FARMING, MARCH 2021

The Conservation Agriculture System Innovation Package has an average readiness score of **5.67** and a use score of **3.44**, corresponding to an average Scaling Readiness Level of **17.82** and a Scaling Readiness Score of **4**.
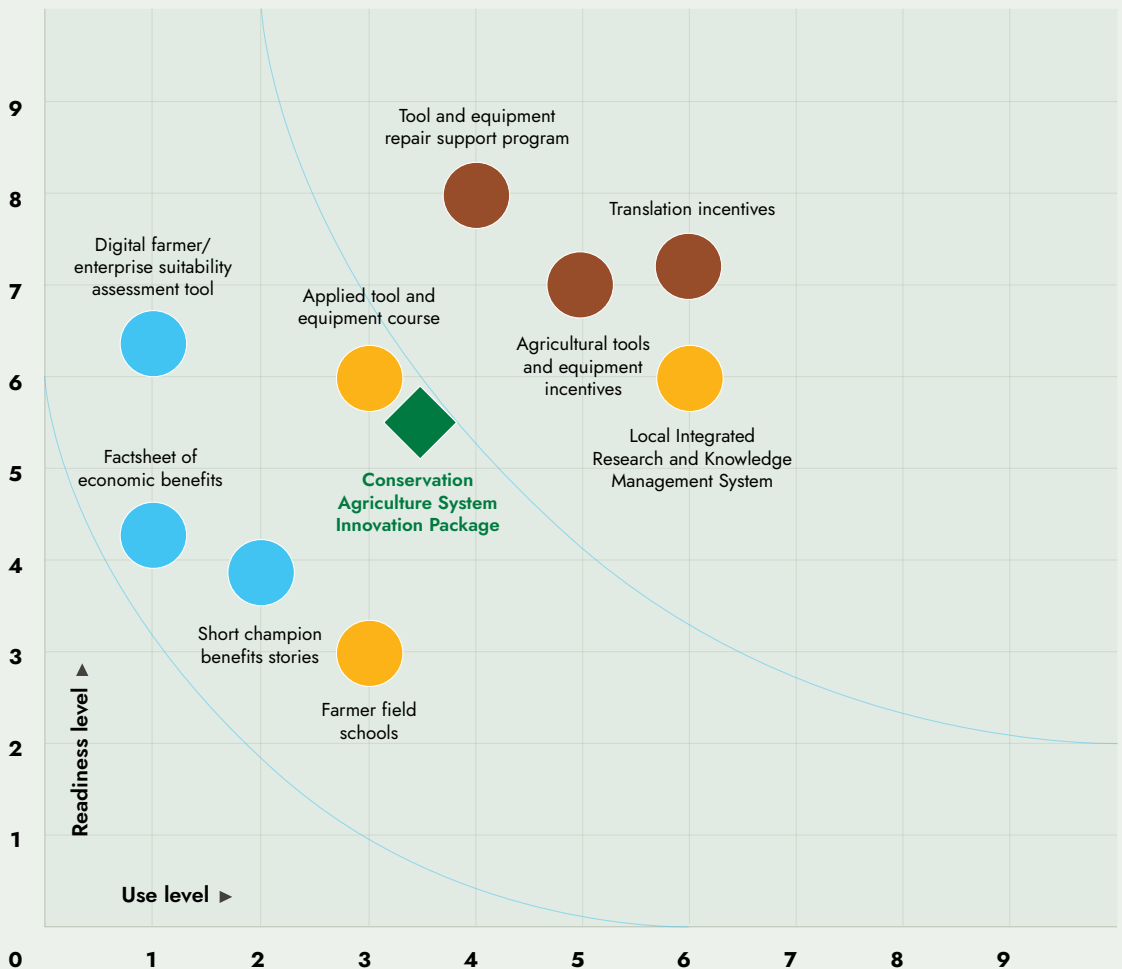
Short Benefits Stories From Conservation Agriculture Champions To Improve Awareness

Although benefit stories are a common way of marketing in many other sectors and youtube is one of the most visited internet sites in Moldova, there was only one resource that provided evidence on the contribution of the short benefit stories to the awareness about the Conservation Agriculture System. It proposed that short benefit stories can improve communication about sustainable agriculture [46]. This corresponded to a readiness level of 4. In Moldova, such benefit stories are done as interviews. A few projects made interviews published in Agrobizniz. md[47,48] They show that some of the farmers/enterprises implementing the Conservation Agriculture System and supported by the Conservation Agriculture System projects have seen the records of the interviews in Agrobizniz.md. This translated into use level 2.

Factsheet Of Economic Benefits To Convince The Farmers/Enterprises

Factsheets are one-pagers that summarize the key numbers that compellingly show the economic benefits. Factsheets were proposed as an alternative for convincing farmers/enterprises to implement a Conservation Agriculture System and tested in other countries [49]. However, a clear example of a factsheet used for convincing farmers/enterprises could not be found by the Scaling Readiness Assessment team. Therefore, the readiness score of the factsheet is 4. There were multiple factsheets produced by a recent project, **InfOrganic**[50], indicating their use in a project setup. However, since there was no explicit information about the nature and number of users, the use level of the factsheet of economic benefit is 1.

Digital Farmer/Enterprise Suitability Assessment Tool To Increase The Efficiency

Several tools that assess different aspects of the farmers and their potential in implementing different components of the Conservation Agriculture System have been published for other countries [51,52] and Moldova [7,40,53]. Although these tools can partially address the suitability assessment needs, the Scaling Readiness Assessment team could not identify any single tool that directly assesses the farmer/enterprise

suitability in Moldova. Therefore, the readiness score is 6. Cimpoieș 2012 showed that some of the similar tools were used for many farmers/enterprises that were not directly involved in the research and development projects but linked to the projects indirectly, corresponding to a use level of 5.

Applied Agricultural Tool And Equipment Use And Maintenance Course To Increase The Capacity Of Farmers/Enterprises

Applied courses on agricultural tool and equipment use have been included in the design of projects aiming to improve Conservation Agriculture Systems in other countries through improving the capacity of farmers/enterprises [54,55]. Since the Scaling Assessment team could not identify any resources studying the contribution of such training to the Conservation Agriculture System, the readiness level of the applied courses was 6. The applied course has been provided to farmers/enterprises in Moldova through several projects implemented by The integrated Unit for the Implementation of IFAD Programs and the Ministry of Agriculture and Food Industry, in partnership with the National Agency for Rural Development (ACSA) and the company Elit-tehnica [44]. This corresponded to a use level of 3.

Farmer Field Schools To Increase The Capacity Of Farmers/Enterprises

Farmer field schools were argued to be one of the innovations that can increase the capacity of the farmers/enterprises in Moldova [31]. The Scaling Readiness team could not identify any empirical study showing how farming field schools contributed to the capacity of the farmers/enterprises implementing the Conservation Agriculture System in general and specifically for Moldova. Therefore, the readiness level of farmer field schools is 3. The farmer field school with a Conservation Agriculture System was kicked off in 2018 [56,57] and operationalized in 11 districts by a part of the Rural Program for Inclusive Economic and Climate Resilience of IFAD [58]. Farmers/enterprises are supported there with IFAD funding. This corresponds to a use level of 3.

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EVIDENCE SOURCES HAVE BEEN STUDIED IN DETAIL TO COMPLETE THIS SCALING READINESS ASSESSMENT

Local Integrated Research And Knowledge Management System To Increase The Effectiveness

Local integrated research and knowledge management systems were considered to improve the effectiveness of the Conservation Agriculture System outside of Moldova [59,60], and a local system that captures some parts of the Conservation Agriculture System was tested in Moldova [40]. Since the test results are not published yet, the local integrated research and knowledge management system has a readiness of 6. The integrated system was used within the projects supported by the European Union [38]. It was also used later outside of the direct support of the EU [40]. Therefore, the use level of the local integrated system is 6.

Financial Incentives For Agricultural Tools And Equipment To Increase The Affordability

Agricultural tools and equipment can be used to increase the affordability of the Conservation Agriculture System. The contribution of financial incentives for purchasing such tools and equipment was tested and shown to be effective outside of Moldova [51,52,61] and in Moldova [7,40,53] for selected farmers/enterprises. This corresponds to a readiness level of 7. Also, the use of the financial incentives was shown for the farmers/enterprises directly working with some support projects [7]. Research showed that some farmers who were not involved with the projects but linked to the farmers/enterprises involved [53] also used the financial incentives. This corresponds to a use level of 5.

Translation Incentives For Applied Conservation Agriculture Publications To Increase The Capacity Of Farmers/Enterprises

Translation incentives were considered an essential tool for improving the knowledge base that can be used for increasing the capacity of farmers [62] and were shown to contribute to capacity building in the context of a project in Moldova [40]. This corresponds to a readiness level of 7. Also, it was shown that in Moldova, translation support was used by not only the partners of projects [63] but also by stakeholders who are not partners of the projects [32]. Therefore, the use level of the translation incentives for applied conservation agriculture publications is 6.

Agricultural Tool And Equipment Repair Investment Support Program To Increase The Efficiency

Some studies discussed the models for supporting the investments in repairing agricultural tools and practices [7]. They showed how supporting the investments on the capacity to repair agricultural tools and equipment contributes to the Conservation Agriculture System outside of Moldova [64]. There were also studies showing that it contributed to the efficiency of conservation agriculture in projects supported by international investors [65] and outside of the projects [66]. These correspond to a readiness level of 8. It was shown that agricultural tool and equipment repair investments support instruments were used by some farmers/enterprises which are not directly involved in the research for development projects [58,66,67], corresponding to a use level of 4.

ANNEX-1: INNOVATION READINESS LEVELS [1]

Innovation readiness level	Innovation readiness category	Description
0	Idea	Thinking about a novelty's ability to solve a problem
1	Hypothesis (proven)	Cognitively validated idea: Hypothesis
2	Basic Model (unproven)	Desktop research on the hypotheses' ability to solve a problem using existing conceptual/theoretical evidence
3	Basic Model (proven)	Conceptual/theoretical validated set of interrelated hypotheses: basic model
4	Application Model (unproven)	Desktop research on the basic model's ability to solve a problem using existing applied evidence
5	Application Model (proven)	Validated basic model using applied evidence: applied model
6	Application (unproven)	Experimental research on application model's ability to solve a problem in the controlled conditions
7	Application (proven)	Validated applied model using experimental evidence: application
8	Innovation (unproven)	Testing the capacity of the application to generate value by solving a problem in a specific uncontrolled context
9	Innovation (proven)	Validated application using evidence on the value: innovation

ANNEX-2:
INNOVATION USE LEVELS [1]

Innovation use level	Innovation use category	Description
0	None	The novelty 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	Team	The novelty is only used by the intervention team
2	Partners (rare)	The novelty has some use by the intervention partners
3	Partners (common)	The novelty is commonly used by the intervention partners
4	Unconnected designers and developers (rare)	The novelty has some use by designers and developers who are not directly involved in the intervention
5	Unconnected designers and developers (common)	The novelty is commonly used by designers and developers who are not directly involved in the intervention
6	Unconnected delivery and use support stakeholders (rare)	The novelty has some use by delivery and use support stakeholders who are not directly involved in the intervention
7	Unconnected delivery and use support stakeholders (common)	The novelty is commonly used by delivery and use support stakeholders who are not directly involved in the intervention
8	Unconnected end-users (rare)	The novelty has some use by the end or final users who are not involved in the intervention
9	Unconnected end-users (common)	The novelty is commonly used by the end or final users who are not involved in the intervention

ANNEX-3: EVIDENCE SOURCES REFERRED IN THE EVIDENCE REVIEW

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ANNEX-4: OTHER SOURCES INFORMING THE EVIDENCE REVIEW

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ANNEX-5: ADDITIONAL WEB RESOURCES INFORMING THE ASSESSMENT

IFAD and other Support for Conservation Agriculture System in Moldova: https://agrobiznes.md/?s=agricultura+conservativa

https://finantare.gov.md/?s=agricultura

Regulations and instruments supporting the Conservation Agriculture System on nature and conservation:

https://madrm.gov.md/ro/content/fondul-ecologic-na%C8%9Bional)

http://www.mediu.gov.md/ro

Statistics on the Conservation Agriculture System

https://statistica.gov.md/pageview.php?l=ro&idc=601&id=6322

Maps informing the governance and implementation of the Conservation Agriculture Systems:

https://madrm.gov.md/ro/content/har%C8%9Bi-digitale

https://www.arcgis.com/apps/MapSeries/index.html?appid=87c14bb5c945473a831ab7de6fb54f60

http://www.ucipifad.md/harta-interactiva/

Scaling Readiness of the Conservation Agriculture System in Moldova