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Investing in rural people

President's report

Proposed global/regional grant to the International Center for Agricultural Research in the Dry Areas for conservation agriculture in crop and livestock systems in drylands to enhance water use and soil fertility

Note to Executive Board representatives

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For: Approval

Recommendation for approval

The Executive Board is invited to approve the recommendation for the proposed grant as contained in paragraph 19.

Proposed global/regional grant to the International Center for Agricultural Research in the Dry Areas for conservation agriculture in crop and livestock systems in drylands to enhance water use and soil fertility

I. Background and compliance with IFAD Policy for Grant Financing

1. Low-and-middle-income countries in North Africa (NA) and Latin America and the Caribbean (LAC) are confronted with growing populations, increased urbanization and changing food demands and preferences. The food and livelihood security of rural populations in these countries depend largely on crop-livestock (CL) production systems. Many poorer smallholder farmers in these regions live in drylands where their CL systems are rainfed, making them vulnerable to limited and increasingly unpredictable and variable rainfall. Crop and biomass productivity are low because of abiotic stresses and reduced levels of input use. Increased frequency of droughts further exacerbates abiotic stresses.
2. Conservation agriculture (CA) principles (including minimum tillage, crop residue retention and soil cover, and crop rotation/intercropping) have proven to be effective interventions for enhancing crop productivity and improving resource-use efficiency and soil health. For small farms, the lack of technical options such as suitable farm implements and the need to use crop residues as animal feed are major constraints to the adoption of CA in drylands. In addition to meat, milk and hides, livestock has important functions regarding farm power, nutrient cycling and soil improvement, and plays a critical role as a capital-saving mechanism and risk-mitigation strategy in case of crop failure.
3. Addressing the competition for the use of crop residues is key for developing integrated, sustainable crop-livestock systems under CA (CLCA) for smallholders in dryland rainfed areas where biomass production is a limiting factor. This constraint has been identified as a major challenge for the large-scale adoption of CA by small farmers in NA¹ and some LAC countries.²
4. In NA, the recently completed Integrated Crop-Livestock Conservation Agriculture for Sustainable Intensification of Cereal-based Systems in North Africa and Central Asia³ project made significant progress towards the development of productive, functional and integrated CLCA systems for smallholder farmers. The project was implemented in an integrated manner in order to develop strategic practical options for these systems. It reconciled the demand for feed from livestock with residue retention under CA, incorporating fodder crop production into crop rotation.
5. A main finding of the project was that the full implementation of a CLCA system is feasible and can contribute to addressing existing water-related yield gaps for both cereals and legumes, by: increasing crop water use efficiency/yield potential by as much as 50 per cent (rainfed) and small ruminant offtake rates by 30 per cent

¹ El-Gharras, O., El-Mourid, M. and Boulal, H. "Conservation Agriculture in North Africa: Experiences, Achievements and Challenges," in *Conservation Agriculture for Africa: Building Resilient Farming Systems in a Changing Climate*, ed. A. Kassam et al. (CAB International 2017): 127-138.

² Alary, V. et al. "Economic assessment of conservation agriculture options in mixed crop-livestock systems in Brazil using farm modelling." *Agricultural Systems*, 144 (2016): 33-45.

³ Integrated Crop-Livestock Conservation Agriculture: Project Completion Report. See <https://goo.gl/9IHfaM>.

(rainfed and irrigated). In the participating NA countries, farmers have already accepted zero tillage as an alternative technology for rainfed CL systems. Areas under CA in Tunisia have reached 14,000 ha in 2015 while in Algeria – where the technology is more recent – there are approximately 6,000 ha.

6. In LAC, long-term on-farm adaptive trials have shown that CA has the potential to enable farmers to mitigate and adapt to climate change.⁴ Long-term rainfed trials show that CA results in high physical, chemical and biological soil quality that favours larger yields and reduces net global warming potential compared to traditional agriculture. High physical soil quality properties ensure that the cropping system is optimized to cope with both heavy rainfall events and prolonged droughts, which are likely to increase in frequency in the future.
7. Nevertheless, research and development gaps still need to be addressed, including: (i) site-specific adaptation of CA and livestock-feeding practices to local physical, social, gender and economic conditions, allowing for wider adoption in traditional CL systems; (ii) integrated pest, weed and disease management (across crop rotations and extended for a number of years); and (iii) risk management and decision-support frameworks for farmers (including simple but realistic economic analysis) that minimize production risks and provide clear market linkages.
8. To address these research and development topics at scale, the International Center for Agricultural Research in the Dry Areas (ICARDA) and the International Maize and Wheat Improvement Center (CIMMYT) will build on their CLCA initiative in NA and research efforts in LAC, combining an adaptive research programme including integrated capacity development with the active development of a delivery mechanism for CLCA systems to serve as accelerators for scaling up.
9. This project is in line with the IFAD Policy for Grant Financing (2015). Within the 2017 priorities for grant financing, the grant will contribute to all three focus areas of the agricultural research for development priority area “to sustainably increase production and productivity for food security, nutrition and income generation”. In particular, it will contribute to focus area (b): “Increasing water management efficiency, mainly in arid and semi-arid regions”.⁵
10. The grant recipient, ICARDA, was selected through a competitive process through an open call based on a concept note approved by IFAD’s Operational Strategy and Policy Guidance Committee.

II. The proposed project

11. The goal of the project is to sustainably increase production and enhance resilience of smallholder crop-livestock production systems to climate variability in countries in Near East, North Africa and Europe (NEN), and LAC. The objective is to develop, in participation with smallholder crop-livestock producers, gender-sensitive processes for facilitating the broad uptake of CA within integrated CL systems in drylands within LAC and NEN. This will be achieved through: (i) the development of contextually-relevant soil conservation and water use-efficiency practices; (ii) the introduction of more productive forage crops and enhanced practices for biomass management; and (iii) linking with and leveraging existing or upcoming IFAD projects within the countries of engagement, and developmental programmes to be undertaken by national governments and international organizations.
12. The main target groups directly reached by the project are 3,000 small crop-livestock producer households in NA (Tunisia and Algeria) and LAC (Nicaragua and Plurinational State of Bolivia) whose livelihoods are dependent upon the production of crops (barley- and wheat-based systems in NA and maize, wheat and Andean cereal-based systems in LAC) and livestock (sheep and goats in NA, and

⁴Verhulst, N., et al., "Conservation agriculture as a means to mitigate and adapt to climate change, a case study from Mexico" in *Climate Change Mitigation and Agriculture*, ed. , Wollenberg, E. et al . (Routledge 2012): 287-300.

⁵ Strategic Guidance for IFAD Grants 2017, p. 5.

small ruminants, llamas, and cattle in LAC). Since CL systems form the basis of livelihoods for two thirds of the population in developing countries,⁶ there is strong potential for scaling up the project's results. Through support to innovation systems supporting adoption, the involvement of national agricultural research and extension systems (NARES) and links with IFAD investment projects, 20,000 households are expected to indirectly benefit from the project.

13. The project will be implemented over four years with the following components:

Component 1: Participatory adaptive research with integrated capacity development of farmers and other key partners to fully implement and evaluate CLCA systems.

Component 2: Accelerated adoption through the development of a delivery system/participatory farmer-led extension systems, and informing the development of contextually relevant CLCA technologies and practices.

III. Expected outcomes/outputs

14. The project is expected to have the following outcomes/outputs:

Outcome 1: A total of 3,000 smallholder farmers reached (at least 40 per cent women and 20 per cent youth below 35 years), 2,100 of whom have directly adopted CLCA farming systems (in four target countries) with increased production and cost-benefit optimized by filling research and development gaps.

Output 1.1: An extended technical CLCA framework to include crop production, stubble management, forage production, livestock and manure management is developed and applied, taking into consideration farming systems and agro-ecological specificities as well as farmers' needs for sustainable livelihood development that is resilient to shocks.

Output 1.2: Increased water-use efficiency in rainfed and irrigated systems, and reduction of erosion in soils with steep slopes.

Outcome 2: At least six NARES in addition to decision makers, NGOs and IFAD loan project partners in the four target countries have adopted tools and methodologies for reliable decision-making and guide investments in contextually appropriate CLCA systems.

Output 2.1: Comprehensive trade-off models between competing uses for crop residue biomass are developed and simplified for wider use.

Output 2.2: Appropriate monitoring and evaluation frameworks are established.

Outcome 3: At least four effective agricultural innovation systems – one in each implementation area of the four target countries – are realized in order to foster broad uptake of CA practices within integrated dryland CL production systems.

Output 3.1: Contextually relevant processes for enhancing the broad uptake of CA – different from traditional (linear) processes of technology transfer – are refined in Tunisia (from a previous initiative), and adapted and fine-tuned in Algeria, Plurinational State of Bolivia and Nicaragua through participatory processes.

Output 3.2: Effective delivery systems are created for machinery, agronomic and livestock services through facilitating access to finance, private investment and public-private partnerships.

⁶ Herrero, M. et al., "Smart Investments in Sustainable Food Production: Revisiting Mixed Crop-Livestock Systems." *Science*, 327 (2010): 822-825.

IV. Implementation arrangements

15. The implementation of project activities will be ensured by ICARDA in NA and through a subcontract with CIMMYT in LAC. NARES will also be subcontracted for activities in each country. Both centres of the Consultative Group on International Agricultural Research (CGIAR) have long and productive histories in the development and promotion of CA in NA and LAC.
16. Within ICARDA, the project will be managed by the Sustainable Intensification and Resilience of Production Systems Research Programme (previously the Global Conservation Agriculture Programme). Regional offices in Tunisia, Cairo, and Rabat will establish strong linkages between ICARDA science teams and NARES, and these regional offices will coordinate administrative and financial transactions with NARES in Algeria and Tunisia.
17. Within CIMMYT, the project will be managed by the Sustainable Intensification and Resilience of Production Systems Research Programme. CIMMYT's headquarters in Mexico will undertake administrative and financial transactions with collaborators in Nicaragua and Plurinational State of Bolivia. There are no deviations from the standard procedures for financial reporting and audits.

V. Indicative project costs and financing

18. The overall cost of the project is estimated at US\$3 million over four years (2018-2021), of which IFAD will finance US\$2.5 million. Disbursements from IFAD will be made to ICARDA through the World Bank, which will act as trustee. IFAD funding will be supplemented by in-kind contributions from NARES totalling US\$500,000.

Table 1
Costs by component and financier
 (Thousands of United States dollars)

Components	IFAD	NARES	Total
1. Participatory adaptive research with integrated capacity development of farmers and other key partners to fully implement and evaluate CLCA systems	1 267	333	1 600
2. Accelerated adoption through the development of a delivery system/participatory farmer-led extension systems, and informing the development of contextually relevant CLCA technologies and practices	501	79	579
3. Cross-cutting knowledge management component	501	88	589
4. Overheads	181	-	181
5. Cost-share percentage 2%	50	-	50
Total	2 500	500	3 000

Table 2
Costs by expenditure category and financier
 (Thousands of United States dollars)

Expenditure category	<i>IFAD</i>	<i>NARES</i>	<i>Total</i>
1. Salaries and allowances	619	293	912
2. Consultancies	50	-	50
3. Travel and allowances (including hotels)	199	43	242
4. Workshops	188	3	191
5. Training	132	-	132
6. Operating costs	227	48	275
7. Equipment and materials	235	61	296
8. Goods, services and inputs	618	52	670
9. Management fees/overheads	182	-	182
10. Cost-share percentage 2%	50	-	50
Total	2 500	500	3 000

VI. Recommendation

19. I recommend that the Executive Board approve the proposed grant in terms of the following resolution:

RESOLVED: that the Fund, in order to finance, in part, the use of conservation agriculture in crop and livestock systems in drylands to enhance water use and soil fertility, shall provide a grant of two million and five hundred thousand United States dollars (US\$2,500,000) to the International Center for Agricultural Research for a four-year period upon such terms and conditions as shall be substantially in accordance with the terms and conditions presented to the Executive Board herein.

Gilbert F. Hougbo
 President

Results-based logical framework

Objectives-hierarchy	Objectively verifiable indicators	Means of verification	Assumptions
<p>Goal: To sustainably increase production and enhance the resilience of smallholder crop-livestock production systems to climate variability in drylands in NEN and LAC countries.</p>	<p>Yield gaps of cereals, legumes and livestock are reduced by increased resources use efficiency (e.g. water and nutrients). Crop yield gaps reduced by as much as 40% and livestock offtake rate by 30% in both rain fed and irrigated systems.</p>	<ul style="list-style-type: none"> -Project generated data and reports; results of the IFAD loans and government programmes; national statistics. -Collaborative agreements signed between consortium and NARES for strengthening local technical capacities and scaling activities. 	<ul style="list-style-type: none"> -Normal weather patterns and absence of calamities along the duration of project. -Political stability of countries where the project is implemented. -Continued funding from other linked projects (matching funds).
<p>Objective: To develop in participation with smallholder crop-livestock producers contextually relevant a gender sensitive processes for enhancing the broad uptake of CA within integrated CL systems in drylands in LAC and NEN regions</p>	<ul style="list-style-type: none"> -Beneficiaries of existing and new IFAD as well as other government initiatives have been exposed and have applied technologies and practices promoted by the project through 4 country-based formative research and interactive KM models, tools and products. -Regulatory systems and policies in four countries have been informed on newly gained knowledge via evidence based policy briefs and bottom-up information flow. -Four national innovation systems (one in each target countries) have been engaged in developing avenues for enhancing an enabling institutional and economic environment to facilitate broad uptake of CLCA technologies. -Farmers, men and women, have adopted agronomic and biomass management practices resulting in a better management of natural resources for more productive and sustainable use (relative increase of 3-5% of soil organic matter depending on soil type and aridity conditions and 10-20% increase in water use efficiency). -Farmers, men and women, have adopted fodder, cover crops, and alternative feed resources leading to increased feed availability with ultimate increases in livestock productivity. -Farmers, men and women, in the intervention areas of NA and LAC are exposed to an efficient, integrated and economically viable CLCA system achieving increased productivity, and most importantly, stabilization in cereal yields, as well as reduction in production costs (20-40% reduction in energy cost, 15-20% reduction in other production costs). 	<ul style="list-style-type: none"> -Reports identifying the presence and participation of IFAD project representatives and key officials from local, regional and national government organs at key meetings, consultations, workshops and policy dialogue events. -Capacity development and training reports on partners' and beneficiaries' participation in formative research activities. -Project data from on-farm trials and long-term on-station trials; NARES project reports; technology adoption assessment and participatory video. -Records of effective innovation systems, with installed infrastructure and members who meet regularly and who jointly uncover opportunities for enhancing equitable access to machinery services and to technical knowledge (project reports and testimonials) through private investment potential and/or public-private partnerships in the provision of machinery services and technical support. 	<ul style="list-style-type: none"> -Normal weather patterns and absence of calamities along the duration of project. - Political stability of countries where the project is implemented. -Public support to the strategic plans promoting CA and red meat value chain are no longer maintained. - Economic environment and market situations allow profitable private investment in machinery acquisition and service provision; and public-private partnerships are strong and with public resources.
<p>Outcome 1: 3,000 smallholder farmers reached (at least 40% women and 20% youth below 35 years) and 2100 have directly adopted CLCA farming systems (in 4 target countries) with increased production and improved cost-benefits that are optimized by filling research and development gaps;</p>			
<p>Output 1.1: An extended technical CLCA framework (including crop production, stubble management, forage production, livestock and manure management resilient to shocks) is developed and applied, taking into consideration farming systems and agro-ecological specificities as well as farmers' needs for sustainable livelihood development.</p>	<ul style="list-style-type: none"> -In NA, 20% increase in barley and wheat yields across a total area of 60,000 ha (11,000 irrigated) through effective integrated CA packages; 30 % increase of forage biomass which will support small-scale farm feedlots. -In NA at least 25% increase in live weight growth and 20% increase in fertility of sheep directly and indirectly impacting 220,000 heads. -In LAC grain and straw yield of cropping systems increased by 15% through CA management, including agroforestry and soil and water conservation practices. Fodder and cover crops adopted by farmers leading to 25% increased fodder availability with ultimate increase of livestock productivity by 15%. -In both regions, 25% of total beneficiaries (900 farmers), 50 extension staff, and 30 scientists participate in knowledge sharing on CLCA practice management. 	<p>Project data from on-farm trials and on-station trials; NARES project reports; results of the IFAD loans and government programmes.</p>	<ul style="list-style-type: none"> -Targeted farmers open to innovate in land and their flocks management under -CLCA system and collaborate with the project team for on-farm trials and data collection. -Public institutions for the development of CA and livestock as well as farmers-led extension services welcome extension of integrated CLCA system into the cereal-livestock systems of NA and LAC. -At least 2 average rainfall years during the project period to achieve meaningful measures.
<p>Output 1.2: Increased water use efficiency and reduction of erosion in soils</p>	<ul style="list-style-type: none"> -A suite of pertinent soil and water conservation practices (SWC) (including no-till and residue management) identified and promoted for different agro-ecologies in 		

with steep slopes.	LAC countries and appropriate for different types of farming systems.		
Outcome 2: At least 6 NARES, in addition to decision makers, NGO's and IFAD loan project partners in the 4 target countries have adopted tools and methodologies for reliable decision making and guide investments on contextually appropriate CLCA systems.			
Output 1.3: Comprehensive trade-off models between competing uses for crop residue biomass developed and simplified for wider use	<ul style="list-style-type: none"> -Detailed analysis of costs, benefits, and market viability of CLCA options. - Farm level models for multi-criteria assessment and trade off analysis for different farm types and agro-ecologies, one in each target countries of NA and LAC developed, calibrated and available for use by NARES. -Simplified simulation tools of optimised CLCA systems for wider use by IFAD loan projects and local development partners. 	<ul style="list-style-type: none"> -Project generated data, national statistics, CLCA farms typology and manuals for model calibration and use. 	<ul style="list-style-type: none"> -NARES capabilities and support are available for integrated assessment of CLCA systems -Institutional will within NARES and collaborators to embark in integrated assessment of CLCA and robust M&E&L strategies
Output 1.4: Appropriate monitoring and evaluation frameworks are established	<ul style="list-style-type: none"> -ITC-based M&E tools developed and used by NARES and collaborators. Algorithms for data storage, classification and analysis developed. -4 qualitative studies on farmers' (men and women) existing knowledge, attitudes and practices are carried out with 150 participants in each country. -4 participatory evaluations are conducted with 150 farmers (men and women) in each country. -Feedback indicators from decision makers and private market actors are collected via survey monkey on a national level and shared between the countries. 	<ul style="list-style-type: none"> -Collaborators and NARES appropriation of M&E and qualitative research tools. -Project generated data. -FGD protocols and transcripts. -FGD content analysis report. -Use/stakeholder survey report. 	
Outcome 3: At least 4 effective agricultural innovation systems - 1 in each implementation area of the 4 target countries - are coalesced in order to foster broad uptake of conservation agriculture practices within integrated dryland crop-livestock production systems			
Output 2.1: Contextually relevant processes for enhancing broad uptake of CA are refined in Tunisia (from a previous engagement), adapted and fine-tuned in both Algeria and Latin America (Bolivia and Nicaragua), through participatory processes	<ul style="list-style-type: none"> -Context relevant knowledge and learning centred structures are facilitated (innovation systems, learning centres, multi-stakeholder workshops) – at least two in each country of engagement – within which IFAD's toolkits on household methodologies (HHMs) are tested for proof of concept and adaptation in context. 	<ul style="list-style-type: none"> - CLCA technologies guidance/manual (for management and implementation of CLCA practices in different agro-ecologies). -One cross country/ cross region synthesis paper on approaches and process uncovered in coalescing innovation systems for CLCA within marginal production environments. 	<ul style="list-style-type: none"> -Local manufacturers willing to collaborate in the design of alternative -mechanization and business models for broad uptake of CLCA practices and technologies. -Political will to allow local manufacturers and service providers to perform their business. -Local institutional infrastructure and will to host knowledge repositories on CLCA.
Output 2.2: Effective delivery systems for machinery, agronomic and livestock services through facilitation of access to finance, private investment and public-private partnerships.	<ul style="list-style-type: none"> -Extension/advisory services providing efficient and effective support to the beneficiaries allowing for a successful implementation of the framework. -CLCA guidelines for extension and advisory services are developed with partner organizations. -Private machinery service providers are supported through facilitation in access conventional finance sources, and where required through public-private partnerships in order to foster investment in machinery required to facilitate broad uptake of CA. -500 farmers, 50 extension staff, 20 scientists, 2 NGOs, and 2 traders per country participating in courses, workshops and field days in relation to CLCA -At least 1 training platform and 10 validation sites and 10 scaling partners using methodologies and knowledge generated in the project per country. -At least 2 research questions per country formulated that feed back to Component 1. 	<ul style="list-style-type: none"> - Project documents, survey tools and data generated including field books per site and lists of participants -Number of farmers and stakeholders receiving training and services -CLCA adoption rates indicator 	